

**Clemson University
Clemson, South Carolina**

**Reports Required by *Government Auditing Standards*
and the *Uniform Guidance***

For the year ended June 30, 2019

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Clemson University, Clemson, South Carolina

Schedule of Expenditures of Federal Awards

For the year ended June 30, 2019

Federal Grantor/Pass-Through Grantor/Program Title	Federal CFDA Number	Pass-through Entity Identifying Number	Passed Through to Subrecipient	Total Federal Expenditures
RESEARCH AND DEVELOPMENT CLUSTER				
Department of Agriculture				
Acquisition of Goods and Services	10.RD	58-6082-7-016	\$ -	\$ 20,936
Acquisition of Goods and Services	10.RD	58-6080-8-001	-	4,196
Acquisition of Goods and Services	10.RD	58-6080-8-003	-	6,797
Acquisition of Goods and Services	10.RD	58-6082-8-009	-	46,682
Acquisition of Goods and Services	10.RD	58-6082-8-012	-	17,639
Acquisition of Goods and Services	10.RD	58-6080-8-008	-	50,275
Acquisition of Goods and Services	10.RD	58-6082-8-013	-	37,363
Acquisition of Goods and Services	10.RD	58-6082-8-014	-	27,765
Acquisition of Goods and Services	10.RD	58-6082-9-001	-	28,457
Acquisition of Goods and Services	10.RD	58-6080-9-002	-	30,136
Adaptation of Intelligent Spray Application Technologies in Peach Orchards	10.RD	59-5082-6-002	-	36,259
Animal Health	10.RD	unknown	-	15,908
Are Herbivore Induced Volatiles Relevant to Biocontrol of Crop Pests?	10.RD	2017-67012-28615	-	61,819
Area wide Pest Management of the Invasive Sugarcane Aphid in Grain Sorghum- Clemson	10.RD	58-6048-6-015	-	34,021
Bat Monitoring on the Andrew Pickens Ranger District	10.RD	15-PA-11081209-020	-	3,394
Biology of the Redbay Ambrosia Beetle in Sassafras at the Leading Edge of Laurel Wilt	10.RD	19-CS-11330129-030	-	5,215
Biosensor-Based Assay for the Detection and Quantification of Quorum Sensing Autoinducers (Acyl Homoserine Lactones and Autoinducer-2) Produced in Package Foods	10.RD	2018-67031-27359	-	33,304
Breeding Biofortified Pulse and Cereal Crops for US Organic Cropping Systems	10.RD	2018-51300-28431	-	88,286
Building Entrepreneurial Farm Management and Land Stewardship Capacity for Capacity Building for USDA- Rural Development Programs in South Carolina	10.RD	2016-70017-25351	26,615	198,725
Clean Water3 - Reduce, Remediate, Recycle: Informed Decision Making to Facilitate Use of Clemson-South Carolina State CYFAR	10.RD	RD-RB-16-26	-	11
Clean Water3 - Reduce, Remediate, Recycle: Informed Decision Making to Facilitate Use of Clemson-South Carolina State CYFAR	10.RD	2014-51181-22372	1,397,057	1,661,621
Collaborative Research to Improve Evaluation of Advanced and Diverse Wheat Germplasm for FHB Resistance in the Atlantic Coastal Plain	10.RD	2018-41520-28750	-	47,967
Comparative Stoichiometry of Chinese Tallow (Triadica Sebifera) in the Native and Invasive Ranges	10.RD	58-6070-8-014	-	13,982
Crop Protection and Pest Management Extension Implementation Program for South Carolina	10.RD	18-JV-11242311-107	-	6,000
Crop Protection and Pest Management Extension Implementation Program for South Carolina to Advance Stakeholder Adoption in Key Commodities	10.RD	2017-70006-27156	-	124,815
Demonstrating the Influence of Cover Crop Termination Time on Nutrient Provision to Yield of Cash Crop	10.RD	2014-70006-22568	-	17,951
Demonstration of Innovative Nutrient Management Strategies Combined with Soil Amendments to Enhance Fertilizer Use Efficiency, Farm Profits and Environmental Quality	10.RD	NR184639XXXXG006	-	23,055
Design a Framework for Payments for Ecosystem Service and Analysis of Adoption Behavior in the Santee Basin	10.RD	69-3A75-14-268	-	76,434
Developing a Sensor-Based, Variable-Rate Nutrient Management Technique for Center Pivot Irrigation Systems	10.RD	NR184639XXXXG002	-	15,179
Developing Host Plant Resistance for Thrips in Cotton to Address Emerging Insecticide Resistance	10.RD	2017-67011-26071	-	10,526
Developing Resources to Manage the Exotic Root-Knot Nematode Meloidogyne Enterolobii	10.RD	2017-70006-27264	30,431	79,512
Development and Comparison of Pathogen Viability Tests for Seed Certification and Improved Management of Bacterial Spot of Tomato	10.RD	58-6080-8-010	-	1,708
Development and Implementation of Biological Control Tactics for Key Vegetable Insect Pests in the Southeastern US	10.RD	2017-70006-27206	6,870	207,415
Development of Technical Tools and Publications to Implement Energy Conservation in Animal Production Facilities (under the Piedmont South Atlantic CESU Umbrella Agreement Number 68-3A75-13-107)	10.RD	2018-51300-28425	51,853	65,206
Edge of Field Water Quality Monitoring	10.RD	68-3A75-18-063	14,810	16,290
Effects of Prescribed Fire Intensity and Frequency on Bat Foraging Habitat Use and Roosting	10.RD	68-4639-15-527	-	17,620
Enhancing FANH Education Through Sensor-Linked Mobile Applications to Improve Technical Literacy	10.RD	17-JV-11330134-108	-	29,990
Enhancing the Nutrient Use Efficiency in Crop Plants by Tailoring the Nitrogen and Evaluating the Net Climate Benefits of Switchgrass Versus Pine Plantations in the Southeast: A Seed Grant to Support Data Collection and Model Development	10.RD	2017-70003-26390	-	11,500
Evaluation of Paper Bags for Pest and Disease Management in Organic Peach Production	10.RD	2016-67020-25264	-	115,249
Evaluation of Peach NCGR Germplasm for Fruitlet Freeze Tolerance	10.RD	2017-68002-26612	44,299	101,828
Expanding the Use of Wood Building Products in SC	10.RD	2016-51300-25726	61,869	201,384
Forest Road Soil Stabilization Demonstration Utilizing Native and Non-Native Cover Crops	10.RD	58-2032-7-057	-	2,687
FY2017 NCPN Clemson/Scott Southeastern Budwood	10.RD	15-CA-11083150-053	-	18,599
FY2018 NCPN- Clemson University- Southeast	10.RD	NR184639XXXXG004	-	42,421
Genetic Structure in Native Plants: Foundational Information for Developing Plant Materials	10.RD	AP17PPQS&T00C138	-	36,376
Genomics, Transcriptomics and Microbiome Analysis of Dipteran Pests Affecting Livestock and Humans	10.RD	AP18PPQS&T00C046	-	58,475
	10.RD	16-CS-11330123-060	-	2,393
	10.RD	58-3020-6-015	-	10,442

Clemson University, Clemson, South Carolina

Schedule of Expenditures of Federal Awards

For the year ended June 30, 2019

Federal Grantor/Pass-Through Grantor/Program Title	Federal CFDA Number	Pass-through Entity Identifying Number	Passed Through to Subrecipient	Total Federal Expenditures
RESEARCH AND DEVELOPMENT CLUSTER, Continued				
Department of Agriculture, continued				
Genotypic Specificity in Plant-Herbivore Interactions and its Application to Management of an Invasive Weed Hatch	10.RD	2015-67014-22956	-	34,105
Impact of Fescue Toxicosis on Fetal Development and Postnatal Growth	10.RD	unknown	-	4,077,504
Impact of Prescribed Fire on Polycyclic Aromatic Hydrocarbon Production and Contaminant	10.RD	2015-67015-23218	-	26,130
Improving the Nutritional Value of Chickpeas	10.RD	2014-67019-21615	-	92,822
Interactive Effects of Temperature and Photoperiod on Flower Initiation and Development	10.RD	58-2090-8-084	-	1,525
Intraspecific Functional Trait Variation Among Populations of Common Species of the Longleaf Pine Ecosystem	10.RD	58-5082-8-013	-	14,558
Investigating the Plant-Soil Feedback That Maintains the Legacy Effect in Invaded Ecosystems	10.RD	16-JV-11330123-022	-	47,286
Investigation of the Diversity of Phytoseiid Predatory Mites in Watermelons and Tomato and Their Use of Non-Prey Resources	10.RD	2017-67014-26698	-	162,859
Isolation, Identification, and Management of Phytophthora Species in Nurseries and Keeping the Green Heart Healthy: An Ecologically Sound and Economically Viable Conservation Plan for the Cowasee Basin	10.RD	2018-67012-27994	-	73,984
McIntire Stennis	10.RD	58-8062-8-015	-	36,102
Modeling Fire-Induced Tree Mortality for Eastern Hardwood Forests	10.RD	2018-67020-27854	-	61,027
Monitoring Success of Farm Bill Programs in Conserving Avian Wildlife	10.RD	unknown	-	837,837
National Needs Training in Computationally Intensive Genomic Analysis and Application	10.RD	16-JV-11242311-079	-	63,140
On-Farm Demonstrations to Assist Producers with How Soil Sampling Influences Nutrient	10.RD	69-4639-16-261	-	7,736
Optimizing No-Till Cover Crop Management for Weed Control in Vegetable Production:	10.RD	2016-38420-25299	-	99,828
Outreach Activities for the Consortium of Appalachian Fire Managers and Scientists	10.RD	69-4639-17-140	-	17,003
Outreach Activities for the Consortium of Appalachian Fire Managers and Scientists	10.RD	2015-70006-24163	-	3,228
Pine Seedling and Thinning Demonstration Site Development in the Piedmont of South Carolina	10.RD	16-JV-11330136-001	-	41,025
Potential of Woody Substrate- Based Bioreactors to Remediate Plant Pathogens in Agricultural Runoff for Onsite Water Reuse	10.RD	18-JV-11330136-079	-	50,291
Promote the Sustainable Carbon Market to South Carolina Forest Landowners	10.RD	69-4639-17-145	-	13,808
Promoting Water, Soil and Nutrient Conservation in Peach Orchards with Trees Planted in Quantifying the Cover Crops Nitrogen and Potassium Credit to 3-yr Cotton-Peanut Rotation	10.RD	2018-67011-28074	-	40,434
Seed Grant on Genomics of Prebiotic Carbohydrates Affecting Lentil Nutritional Quality	10.RD	69-4639-17-147	-	25,631
Selection, Molecular and Genetic Analysis of HLB Tolerant/Resistant Variant Citrus Plants	10.RD	NR184639XXXXG005	-	3,832
Soil Health Demonstration at Pee Dee REC	10.RD	NR184639XXXXG009	-	18,273
Solutions to the Armillaria Root Rot Threat Affecting the U.S. Stone Fruit Industry	10.RD	2018-67014-27621	-	82,011
Storage, Reactivity, and Bioavailability of Mercury in Manage Forests - Balancing Mercury Toxicity and Wildfire Risks Through Effective Fuel Reduction	10.RD	2017-70016-26051	236,770	426,474
Stress Induced Modification of the Quantity and Composition of Phytochemicals in Fruits:	10.RD	NR184639XXXXG012	-	1,307
The Impact of Leptin Concentrations on the Development of Appetite Regulation in Beef Calves	10.RD	2018-51181-28378	-	42,155
To Evaluate the Potential of Organic Farming Practices in South Carolina	10.RD	2018-67019-27795	48,163	86,423
Tracking and Managing Diseases of Floriculture Crops Caused by Oomycetes and Fungi	10.RD	2016-67014-24578	-	12,658
Transforming Nanocellulose Into an Advanced Biorenewable Reinforcement With Hyperbranched Polymers	10.RD	2018-67016-27472	-	35,963
Understanding the Vulnerability of Tri-colored Bats to White-nose Syndrome in South Carolina: Torpor Patterns and Hibernacula Conditions	10.RD	69-4639-17-142	-	45,446
Utilization of Cross Laminated Timber	10.RD	58-8062-5-037	-	4,341
Utilizing Deep-Rooted Cover Crops to Enhance Water Quality, Soil Health, and Farm Profits While Reducing Soil Compaction in Coastal Plain Region	10.RD	2016-67021-25016	8,524	86,243
Water Use in the Propagation of Vegetative Animals	10.RD	16-JV-11330134-010	-	10,064
Will Use of Alternate Winter Roosts by Tri-Colored Bats Protect Them From White-Nose Syndrome?	10.RD	16-DG-11083150-054	-	75,018
Pass-through programs from:				
California Strawberry Plant Growers Association				
Identification of Inoculum Sources and the Development of Methods to Reduce Dispersal of Xanthomas fragariae to minimize its impact on international trade of strawberry nursery stock	10.RD	TASC-2015-31-Clem	-	(45)
CHK Group, Inc.				
Development and Use of Biosilica as a High Reactivity Pozzolan in Ultra-High Performance Concrete (UHPC) Mixtures	10.RD	CU-01	-	5,971
Cornell University				
Developing an Eastern Broccoli Industry Through Cultivar Development Economically and Environmentally Sustainable Production and Delivery	10.RD	79598-10781	-	55,561
Expanding the Impact of the Cornell Center for Behavioral Economics in Child Nutrition Programs	10.RD	77867-10816	-	5,175

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
Department of Agriculture, continued				
Pass-through programs from, continued:				
Dillon County				
Demonstration of Crop, Soil Health and Economic Impact of Tillage and Cover Crop Systems	10.RD	69-4639-16-267	-	11,502
Kansas State University				
Navy/4-H Military Partnership and Outreach and Support	10.RD	S17178	-	(730)
Michigan State University				
RosBREED: Combining Disease Resistance with Horticultural Quality in New Rosaceous Cultivars	10.RD	RC104285B	-	279,753
North Carolina Central University				
New Strategy and Method for Isolating and Concentrating Foodborne Pathogens	10.RD	PO# USDA-NIFA-AFRI-003958	-	45,021
North Carolina State University				
An Investigation into Antixenosis, Antibiosis and Tolerance Mechanisms to Kudzu Bug in Soybean	10.RD	2015-2467-01	-	8,412
North Carolina State University				
Cross-Commodity Bt Resistance in Dynamic Row Crop Agroecosystems: Linking the Development of GE Technology at the Landscape-Scale to Resistance in Cotton Bollworm	10.RD	2017-2861.01	-	17,780
Impact of Refuge Management Tactics On Helicoverpa Zea Population Dynamics And Moving Regional Food Systems Toward Sustainability: An Adaptive and Interactive Online Course in Local Food System Development for NC, SC, and VA Extension Agents and Other Service Providers.	10.RD	2017-1456-03	-	3,960
Southeast Cattle Handling for Women Producers: Advanced BQA Training and Farm Safety	10.RD	2017-1419-02	-	3,758
Determining Effects of Cover Crop Use on Pest Attraction to Tomato	10.RD	2015-0085-31	-	4,799
Growing New Roots: Grafting to Enhance Resiliency in U.S. Vegetable Industries	10.RD	2016-1498-01	-	132,552
Strawberry Disease Cycle Illustrations, Animations, and Time-Lapse Videos for IPM Education	10.RD	2015-0085-30	-	24,047
Pennsylvania Department of Agriculture				
Short and long-term solution for Armillaria Root Rot in Prunus; FY2016 Specialty Crop Block Grant Program and 2015 Specialty Crop Multi-State Program	10.RD	ME#44165761 // 16SCCMA004	52,762	193,162
Pheasants Forever				
A multi-species approach to managing the effects of weather and land cover on upland game birds	10.RD	LPCI-16-08	-	30,178
Rutgers, The State University of New Jersey				
Protecting Pollinators with Economically Feasible and Environmentally Sound Ornamental Horticulture	10.RD	6065-PP2016-Chong PO#479850	-	60,124
Protecting Pollinators with Economically Feasible and Environmentally Sound Ornamental Horticulture	10.RD	6142-PP2016-Thayaril PO#607871	-	225,275
Protecting Pollinators with Economically Feasible and Environmentally Sound Ornamental Horticulture	10.RD	0876-PP2018-Tharayil / PO# 1046399	-	21,475
South Carolina Department of Agriculture				
Capture and Reuse of Phosphorus in Specialty Crop Production	10.RD	AM180100XXXXG026	-	5,124
Choosing the Right Fungicides to Prevent Spread of Gummy Stem Blight in Watermelon Fields	10.RD	D033/AM170100XXXXG034	-	20,832
Detecting and Managing the Hypervirulent Nematode Meloidogyne enterlobii on Sweet Developing Strategies to Manage Premature Peach Tree Decline from Cytospora Canker in Peach Orchards	10.RD	AM180100XXXXG026	-	6,449
Development of a Website for Weed Control Recommendations in Specialty Crops in	10.RD	AM180100XXXXG026	-	8,826
Enabling Breeding of Peach Cultivars for Spring Climate Resilience Traits	10.RD	AM180100XXXXG026	-	12,887
Enabling Breeding of Peach Cultivars for Spring Climate Resilience Traits	10.RD	D039/AM170100XXXXG034	-	11,517
Evaluation of Novel POST-Emergent Herbicide Concepts in Sweet Potato	10.RD	D040/AM170100XXXXG034	-	16,239
Good Agricultural Practices for Field Pea and Kale Nutritional Breeding in South Carolina	10.RD	AM180100XXXXG026	-	722
Improving Irrigation Scheduling for Maximum Fruit Size in Peach Orchards in South	10.RD	AM180100XXXXG026	-	16,595
Nutritional and Biological Yield Improvement of SC Grown Kale (Brassica oleracea var. acephala L.) for Improved Human Health	10.RD	15-SCBGP-SC-0013	-	442
Promoting Spinach Consumption and Sustainable Agricultural Practices in Schools Using Aquaponics	10.RD	15-SCBGP-SC-0013	-	1,538
Reducing the Impacts of Chemical Insect Pest Management in Cucurbit Crops	10.RD	AM180100XXXXG026	-	3,787
Restoring the Sweet Potato Industry in South Carolina through Research and Extension	10.RD	16-SCBGP-SC-0026	-	3,699
Selecting Organic Kale Varieties with Increased Production and Nutritional Quality	10.RD	16-SCBGP-SC-0026	-	3,222
South Carolina Cantaloupe Disease Survey	10.RD	AM180100XXXXG026	-	17,557
Training Growers in Use of Cover Crops and Reduced Tillage for Organic Vegetable	10.RD	AM170100XXXXG034	-	17,644
South Carolina Forestry Commission				
Ice Storm Impact on Forest Health: Monitoring & Predicting the Growth & Mortality of Ice-damaged Trees in Southern Forests	10.RD	NONE	-	31,294
Texas A&M University				
Research and Extension to Address Herbicide Resistance Epidemic in Annual Bluegrass in Managed Turf Systems	10.RD	06-505773-01005-M1900021	-	36,773

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For the year ended June 30, 2019

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
Department of Agriculture, continued				
Pass-through programs from, continued:				
The Center for Produce Safety				
Identifying Competitive Exclusion Microorganisms against Listeria monocytogenes from Biological Soil Amendments by Metagenomic, Metatranscriptomic, and Culturing Approaches	10.RD	2019CPS07	-	10,745
Preservation of Stone Fruits by Spray Application of Edible Coatings with Antimicrobial Properties	10.RD	2018CPS01; Grant # SCB17053	-	52,878
Preventive Sanitation Measures for the Elimination of Listeria monocytogenes Biofilms in Critical Postharvest Harboring Sites	10.RD	2019CPS02	-	49,029
The Longleaf Alliance				
Education and Outreach to Increase Longleaf Pine Ecosystem Restoration in SC	10.RD	33.2019.02.00	-	1,426
University of Arkansas				
Environmental Assessments to Customize Food Safety Training for Very Small to Small Berry	10.RD	91163-01	-	36,846
Risk Management for Current and Potential Users of Unmanned Aircraft Systems (UAS) an Emerging Technology	10.RD	21752-01	-	4,821
University of Florida				
Evaluate the Efficacy of Selected Insecticides Against Redheaded Flea Beetle in Field	10.RD	PO 1800574483	-	3,880
Evaluate the Efficacy of Selected Insecticides Against Western Flower Thrips in Outdoor	10.RD	1600472074	-	801
Evaluate the Efficacy of Various Products Against Ambrosia Beetles on Ornamental Plants	10.RD	PO: 1800632814	-	6,691
Strategic Management of Multiple Diseases in Strawberry Nurseries and Production Fields in the Eastern United States	10.RD	UFDSP00010493	-	127,304
University of Georgia				
A System Approach to Improve Disease Management and Production of Watermelon In the Southeastern United States	10.RD	SUB00000575	-	13,011
Cover Cropping to Improve Soil Moisture Content for the Following Cash Crop	10.RD	SUB00001798	-	366
Cover Cropping to Increase the Sustainability of Cropping Systems by Developing Soil Organic Matter, Improving Soil Health, and Suppressing Weed Growth.	10.RD	SUB00001662	-	5,496
Optimizing Nutritional Management in Fruit Tree Production in Southern U.S.	10.RD	RD309-137/S001520	-	1,234
Sustainable Agriculture and Education (SARE) Program	10.RD	SUB00001696	-	1,561
University of Minnesota				
Expanding the Diversity of Farm Financial Benchmarking	10.RD	H006425302	-	3,789
Innovating to Expand Farm Financial Management and Benchmarking	10.RD	H005728802	-	2,287
University of Tennessee				
Omega-3 and Fatty Acid Production from Sweet Sorghum	10.RD	8500054640	-	77,393
University of Texas at San Antonio				
Cloud-Based Decision Support System Integrating Biomass Quality, Uncertainty and Risk to Optimize the Production of Second-Generation Biofuels	10.RD	1000002562	-	10,316
US Endowment for Forestry & Communities				
A Systems Approach to Design and Manufacture CNC-Enabled Lightweight Automotive Components	10.RD	E17-18	-	6,658
Washington State University				
Genome Database for Rosaceae: Empowering Specialty Crop Research Through Big-Data Driven Discovery and Application In Breeding	10.RD	123519-G003399	-	144,046
Yaupon Wellness Company, Inc.				
Evaluating the Feasibility of Cultivating Yaupon Holly for its Food Value	10.RD	Prime # 2018-33610-28278	-	31,069
Total Department of Agriculture			1,980,304	12,607,544
Department of Commerce				
Highly Charged Tests of Quantum Electrodynamics and the Breit Interaction	11.RD	70NANB19H024	-	70,719
Improving Disaster Resilience by Quantifying WUI community ember exposure	11.RD	70NANB17H213	-	63,893
LINE EMISSION FROM MULTIPLY CHARGED METAL IONS	11.RD	70NANB18H284	-	76,851
Summer Undergraduate Research Fellowship MML SURF	11.RD	70NANB18H141	-	2,750
Summer Undergraduate Research Fellowship SURF	11.RD	70NANB18H141	-	2,750
Pass-through programs from:				
South Carolina Sea Grant Consortium				
Economic contribution of coastal nature-based tourism for the state of South Carolina Phase	11.RD	A/E-SG7 Phase II	-	3,990
A Socioeconomic Evaluation of Stormwater Control Measures to Guide Decision-Making in Coastal South Carolina - Year 1	11.RD	R/CG-2 Year 1	-	29,922
Economic Impact of Coastal Nature-based Tourism for the State of South Carolina	11.RD	A/E-SG7	-	6,837
Economic Impact of South Carolina's Coastal Marshes and Wetlands - Phase I	11.RD	A/E-SG10 Phase I	-	9,206
Economic Impact of South Carolina's Coastal Marshes and Wetlands - Phase II	11.RD	A/E-SG10 Phase II	-	3,814
Examining the Social Carrying Capacity for Mariculture Development on the South Carolina Coast	11.RD	R/A-36 Year 1	-	53,331

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For the year ended June 30, 2019

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
Department of Commerce, continued				
Pass-through programs from, continued:				
South Carolina Sea Grant Consortium, continued				
Microplastic Contamination in Coastal South Carolina: Sources, Trophic Transfer, and Performance Based Design of Low Impact Development Technologies in Response to Climate Induced Changes in Rainfall Patterns - Year 2	11.RD	N468 (R/ER-46)	1,983	5,016
Quantifying Responses of Salt Marsh Productivity to Environmental Variability over Multiple Time Scales using Novel Field Management - Year 1	11.RD	N467 (R/CH-6)	-	7,909
Sponsorship Support for the 2019 Pollutant Responses in Marine Organisms (PRIMO 20) Conference on May 19th through May 22nd	11.RD	R/ER-50 Year 1	7,685	40,032
University of Delaware				
At-Bioreactor trace metal quantification and statistical process control in CHO cell-culture production (C/I NIIMBL)	11.RD	M/PM-2H Year 1	-	999
		70NANB17H002	-	56,884
Total Department of Commerce			9,668	434,903
Department of Defense				
(YIP) Engineering Robust Enzyme Activity Through Fundamental Studies of Extremophile	12.RD	FA9550-15-1-0163	-	225
2018 and 2019 Clemson Mini-Conference on Discrete Mathematics and Algorithms	12.RD	H98230-18-1-0286	-	5,821
2018 Mixed Integer Programming Workshop	12.RD	N00014-18-1-2161	-	5,000
A Practical Approach for Modeling Matrix Diffusion Effects in REMChlor	12.RD	W912HQ-14-C-0009	4,582	53,201
A Unified Materials Approach to Mitigating Nonlinearities in HEL Optical Fibers	12.RD	N00014-17-1-2546	146,908	468,437
Abiotic Transformation of Chloroethenes in Low-Permeability Formations	12.RD	W912HQ-16-C-0022	71,107	255,438
Arbitrary Waveform Generator for Orbital Angular Momentum Multiplexing in Maritime Sensing	12.RD	N00014-18-1-2225	-	147,707
Assessing the Impact of Asymmetric Information in Interdiction and Bilevel Games	12.RD	N00014-17-1-2421	-	99,755
Atomistic Molecular Simulation Methods to Predict CBW A-Surface Interactions	12.RD	HDTRA1-10-1-0028	-	(3,879)
Complete and Resilient Documentation (CARD) for Operational Medical Environments	12.RD	W81XWH-17-C-0238	126,473	717,896
Complex Models on Graph Based Topological Spaces	12.RD	W911NF-17-1-0455	-	121,383
Deeply Subwavelength All-Dielectric Nanophotonics in Silicon	12.RD	FA9550-19-1-0057	-	67,273
Develop Integrated Management Practices for the Control of Chinese Tallow (Triadica sebifera) in Coastal Forests	12.RD	TO#M0026318F0018/ DO#M0026317D0006	-	50,392
Discriminatory Transcriptional Response of Environmental Microorganisms and Microbial	12.RD	HDTRA1-17-1-0002	-	244,093
Efficient Delivery of Information in Tactical Packet Radio Networks	12.RD	W911NF-15-1-0545	-	78,992
Enhancing mHealth Technology in the PCMH to Activate Chronic Patients	12.RD	W81XWH-15-C-0070	-	137,983
Exploration of Carbon-Based Hybrid Nanoarchitectures as a Unique Platform for Managing Excited State Energies and Processes	12.RD	FA9550-16-1-0166	-	67,171
GPU-accelerated mathematical optimization with applications to big data, computer modeling, and simulation	12.RD	N00014-19-1-2295	-	316,000
High Order Bessel Beams Integrated with Time (HOBBITs)	12.RD	N00014-18-1-2377	-	360,448
High Power, Single Frequency Broad-area Diode Laser Emitters/Arrays and Their Applications in Microresonator Based Frequency Combs Optoelectronics Program	12.RD	W911NF-14-1-0640	-	1,705
HOBBIT Control System Development for Higher Order Bessel Beams Integrated in Time (HOBBIT)	12.RD	N00014-17-1-2779	-	173,518
Hybrid Integration for Beam Combining on Silicon Photonics Platform-Optoelectronics Program	12.RD	W911NF-18-1-0176	-	112,960
Identifying and Evaluating Impacts to Wetlands from the Savannah River Estuary	12.RD	W912HZ-14-2-0002	-	127,345
Identifying and Evaluating Impacts to Wetlands from the Savannah River Estuary	12.RD	W912HZ-19-2-0007	-	81,351
INCORPORATING MATRIX DIFFUSION IN THE NEW MODFLOW FLOW AND TRANSPORT MODEL FOR UNSTRUCTURED GRIDS	12.RD	W912HQ19C0018	-	782
Integrated Modal Control and Beam Combining of High Power Diode Arrays for the Next Generation HEL System	12.RD	N00014-17-1-2556	105,087	279,563
Liquid Sampling-Atmospheric Pressure Glow Discharge (LS-APGD) Microplasmas for Elemental, Isotopic, and Molecular Determinations	12.RD	HDTRA1-14-1-0010	-	56,193
New RLT Theory for Solving Continuous Nonlinear and Mixed-Discrete Optimization Problems	12.RD	N00014-16-1-2168	-	44,595
New Techniques for Network-Coded Multicast Distribution in Wireless Communications	12.RD	N00014-17-1-2418	-	54,911
Non-Destructive Evaluation Precursor Mechanics of Embedded Magnetostrictive Composite	12.RD	W911NF-17-2-0184	-	104,868
Optical Fibers with Elevated Threshold for Higher-Order Mode Instability	12.RD	FA9451-15-D-0009/0002	5,060	35,036
Optimization Under Uncertainty and Conflict: Algorithms for Heterogeneous Quadratic Programs	12.RD	N00014-16-1-2725	-	86,031
Pilot Scale Assessment of a Deployable Photocatalytic Treatment System Modified with BiPO4 Catalyst Particles for PFAS Destruction in Investigation-Derived Wastewaters	12.RD	W912HQ-18-C-0085	-	152,870
Power Scaling of Combinable Fiber Lasers to Beyond 5KW	12.RD	W911NF-17-1-0454	-	263,951

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
Department of Defense, continued				
Predictive Structure-Function Relationships for Enzymes Immobilized on Complex Surfaces	12.RD	HDTRA1-16-1-0023	-	222,124
Preventing Infection by Surface Modification of Orthopaedic Fracture Fixation Implants for Privacy Support for TLA	12.RD	W81XWH-14-1-0438	-	70,552
Rapid and Accurate Uncertainty Propagation for Nonlinear Dynamic Systems by Exploiting Model Redundancy	12.RD	W911QY-16-C-0105	-	261,152
Reactive Membranes for Rapid Isotopic Analyses of Waterborne Special Nuclear Material	12.RD	FA9550-16-1-0158	-	105,261
Reactive-Moiety Functionalization of Polyurea for Increased Shock-Mitigation Performance	12.RD	HDTRA1-16-1-0016	-	273,096
Spatially and Temporally Agile Optical Communication Links for Maritime Applications	12.RD	N00014-14-1-0286	-	13,022
Stomach Content Analysis of Feral Hogs	12.RD	N00014-16-1-3090	-	321,587
The Laboratory for Advanced Photonic Composites	12.RD	W912HZ-17-C-0026	-	10,811
Time for Robotics - Technology in Manufacturing Education for Robotics	12.RD	N66001-04-1-8933	-	(6,603)
TrueView Enhancements	12.RD	N00014-18-1-2882	-	252,412
Trust-based Human-Robot Collaboration (HRC) for High-Level Distributed Multi-Robot Motion Planning with Temporal Logic Constraints	12.RD	N6600118P0319	-	79,443
Wafer Bonding for Hybrid Photonic Integration Research	12.RD	FA9550-17-1-0050	-	105,600
Pass-through programs from:				
Advanced Functional Fabrics of America				
Yarn Covering of Advanced Monofilament	12.RD	PO# 381	-	21,686
Advanced Robotics for Manufacturing Institution				
Revitalizing Apprenticeships for Small and Medium-Sized Industries	12.RD	ARM-EWD-17-02-02	-	46,096
Robotics Workforce Development	12.RD	NONE	-	186,734
Smart Companion Robots for Automotive Assembly (C/I ARMI)	12.RD	ARM-17-QS-F-02	147,327	471,903
Arizona State University				
Clemson University Research Foundation				
Advanced Optical Fibers for High Power Fiber Lasers	12.RD	W911NF-10-1-0423	-	12
Novel Fiber Concepts for High Power Single Mode Fiber Lasers	12.RD	W911NF-12-1-0332	-	121,701
Cornerstone Research Group, Inc.				
Health Monitoring Garment Development Consulting	12.RD	PO # 2017-00926	-	14
Phase II SBIR, DHA17-005: Compression Garment with Embedded Electronics for Ambulatory Health and Performance Monitoring	12.RD	2018-1051	-	36,641
Creare LLC				
LWIR Fiber Bundle for Thermal Imaging in Gas Turbine Systems	12.RD	89981	-	(23,060)
GSI Environmental Inc.				
Development of a Quantitative Framework for Evaluating Natural Attenuation of	12.RD	2017-111-CLEMS-01	-	120,896
Medical University of South Carolina				
Connectome Biomarkers for Predicting Alzheimer's Risk in Traumatic Brain Injury	12.RD	MUSC18-141-8D682	-	8,001
Microhortone, LLC				
Microwave Flow Cytometer: Count Microorganisms in Water	12.RD	CU-0001	-	1,449
Propel LLC				
The feasibility of melt spinning of nylon polymers with flame resistant (FR) additives	12.RD	MCP6541-1	-	4,556
Radiance Technologies Inc.				
High Energy Lase Advanced Concepts (HELAC)	12.RD	17S-3093; T/O No.: 0008	-	29,413
SA Photonics				
SAActive Imaging through Fog	12.RD	1051CLEM-1807 // N68335-18-C-0395	-	35,000
Scientific Research Corporation				
Joint Mission Environment Test Capability (JMETC) Support	12.RD	SR20181162 // SRC-BOA-0011-16-001	-	174,972
Joint Mission Environment Test Capability (JMETC) Support	12.RD	SR20190006/TG07 (2019)	-	182,832
Soar Technology, Inc.				
Mishap Awareness Scenarios and Training for Operational Readiness Responses	12.RD	SC-19-007	-	3,621
Solutions IES				
Estimating Mobile-Immobile Mass Transfer Parameters Using Direct Push Tools	12.RD	2015.0031.ARMY	-	48,539
Southwest Research Institute				
CWA THERMAL DEFEAT IN REACTIVE ATMOSPHERES	12.RD	J99059CP	-	29,464
Structured Materials Industries, Inc.				
Technical Data Analysis				
Innovative Multi-Scale/Multi-Physics Based Tool for Predicting Fatigue Crack Initiation and Propagation in Aircraft Structural Components using Phase Field Model Technique	12.RD	Topic No. N16A-T003 2076-001-02	-	35,604
Johns Hopkins University				
JHU/ONR MOBI	12.RD	147682	-	17,550
Understanding the Skin Microbiome through the Integration of Metagenomics, Bioinformatics, Spatial Ecology, and Synthetic Biology	12.RD	152174	-	37,598

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
Department of Defense, continued				
Pass-through programs from, continued:				
University of California Santa Barbara				
Highly-Perfect BaSnO3 Thin Films for Electronic Devices	12.RD	KK1905/N00014-18-1-2704	-	108,866
University of Delaware				
Tailored University Feedstock for Forming (TuFF)	12.RD	42525	-	349,669
University of Illinois				
Internal Cooling of Fiber and Disc Lasers by Radiation Balancing and Other Optical or Phonon Processes	12.RD	084272-16069	-	192,293
University of Michigan				
Heat Rejection Using Advanced Materials - Passive and Active Cooling Strategies	12.RD	3003058759	-	84,845
Heat Rejection Using Advanced Materials - Passive and Active Cooling Strategies	12.RD	3003058759	-	3,281
Improving Energy Efficiency and Mobility of Connected Fleets via Route Preview and Optical Control Pairing and Scheduling for Manned-Unmanned Vehicles Teaming Based on RoboTrust Algorithms	12.RD	3003058759	-	11,983
Systems Approach to Wheel and Pad Metamaterial Design Including Robustness Issues	12.RD	3003058759	-	92,491
Tools for Optimal Selection of Energy Storage Technology in Electrified Military Vehicles	12.RD	3003058759	-	128,863
Virginia Polytechnic Institute				
Chiral Spin Liquids and Other Topological Phases of Cold Atoms and Molecules in Optical Lattices	12.RD	450408-19244	-	65,799
Total Department of Defense			606,544	9,269,806
Department of the Interior				
Administrative Histories of Fort Sumter National Monument and Charles Pinckney National Historic Site	15.RD	P14AC01689	-	13,129
Analysis of Bird Population Count Data	15.RD	G16AC00400 RWO #101	-	826
Bog Turtle Nest Monitoring and Protection - 2018 Nesting Season	15.RD	F18AC00286	-	14,000
Community and Ecosystem-Level Effects of Growing v. Dormant Season Burning in the Southern Appalachians	15.RD	L16AC00192	-	23,175
Conservation and Natural History of Northern Pine Snake Across North Georgia	15.RD	F18AC00540	-	4,869
Conservation of Parrott Rifle Tubes, Carriages, and Chassis' at Fort Sumter	15.RD	P16AC00782	-	2,914
Eastern Brown Pelicans: Dispersal, Seasonal Movements and Monitoring of PAH's and Other	15.RD	G12AC20367 RWO #91	-	87,508
Evaluating the Effect of White-Nose Syndrome on Long-Term Bat Community Structure and Fuels Management and Cultural Landscape Restoration, Kings Mountain National Military Park and Other Southeast Region Parks	15.RD	G16AC00056 RWO #99	-	7,343
Human and Ecological Health Impacts Associated with Water Reuse: Engineered Systems for JFSP Project 14-1-06-19-- Forest Fire Alters Disinfection Byproduct Precursors from Forested	15.RD	P15AC01798	-	8,553
Liquefaction Probability Analysis of Pleistocene Deposits in the Greater Charleston, South	15.RD	G15AP00171	7,663	7,663
Needs Assessment for Facilities Maintenance Specialty Career Field	15.RD	L14AC00163	-	20,500
NPS Southeast Region Marine Science Support Center	15.RD	G16AP00118	-	(708)
Research to Evaluate Visitor Use Distributions, Impacts, Crowding, and Conflicting Use at Retreat of Tidally Influenced Freshwater Forested Wetlands in the Southeast: Biogeochemical Investigations and Field Support	15.RD	P12AC11224	-	10
Social Science Research to Support the Implementation of a Visitor Use Management (VUM) Strategy for Commercially-guided, Boat-based Polar Bear Viewing at the Arctic National Wildlife Refuge	15.RD	P15AC01833	-	11,476
Spatial Ecology, Movement Patterns, and At-Sea Habitat use of Brown Pelicans in the South	15.RD	P17AC01038	-	28,510
State Water Resources Research Institute Program	15.RD	G14AC00132	-	40,441
Vessel-based Surveys for Pelagic Seabirds in the Gulf of Mexico	15.RD	G17AC00101	15,536	39,083
Pass-through programs from:				
Auburn University				
Improving Southern Flounder Management in Alabama Coastal Waters by Quantifying Habitat Specific Rates of Growth, Sex Determination, and Recruitment to the Commercial and Recreational Fisheries	15.RD	18-FAA-223047-CU	-	77,920
Improving Southern Flounder Management in Alabama Coastal Waters by Quantifying Habitat Specific Rates of Growth, Sex Determination, and Recruitment to the Commercial and Recreational Fisheries	15.RD	19-FAA-223075-CU	-	80,154
			50,110	146,622

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
Department of the Interior, continued				
Pass-through programs from, continued:				
Georgia Department. of Natural Resources Occupancy and Movement of the Northern Pine Snake (<i>Pituophis melanoleucus</i>)	15.RD	none	-	18,087
Gulf States Marine Fisheries Commission Identifying Drivers of Hybridization Between Endemic and Invasive Black Basses in Georgia	15.RD	FWS-800-037-2018-CU	-	10,436
Kansas State University Evaluation of the Relationship Between Current Conditions, Travel Patterns, Visitor Research to Evaluate Visitor Characteristics Across and Within Seasons at Joshua Tree	15.RD	S18038	-	47,675
Montana Fish Wildlife & Parks Research to Evaluate Visitor Characteristics Across and Within Seasons at Joshua Tree	15.RD	S19037	-	47,638
National Fish & Wildlife Foundation Identifying Habitat Requirement of the Carolina Heelsplitter in Order to Inform Habitat	15.RD	1906.17.058597	10,642	74,086
Northern Great Plains Swift Fox Connectivity (MT)	15.RD	0103.16.051313	-	18,634
NC Wildlife Resources Commission Eastern Hellbender Reproductive and Larval Ecology	15.RD	WM-0326	8,686	68,408
Ecological Studies and Monitoring Strategies for Eastern Spotted Skunks in North Carolina	15.RD	WM-0322	-	86,264
Factors Influencing Bog Turtle Abundance and Nest Success in North Carolina	15.RD	WM-0306	-	3,114
Population Analysis of Self-Sustaining Trout in North Carolina Streams: Current Dynamics and Future Monitoring Strategies	15.RD	DIF-0026 // PO No. NC10362680 // NC-F-F17AF00221	-	1,183
South Carolina Department of Natural Resources Green Salamander Population Assessment and Connectivity Across a Gradient of Forest Disturbance	15.RD	SC-T-F18AF00973/SCDNR #P2404406119	-	12,048
Impacts of Special Hunting Clinics on the Recruitment and Retention of Young Adult College Student Hunters in South Carolina	15.RD	SCDNR FY2018- 001/P24016440118	-	150
Impacts of Special Hunting Clinics on the Recruitment and Retention of Young Adult College Student Hunters in South Carolina	15.RD	SCDNR FY2019-02 P2401LE00118/	-	18,022
NABat Acoustic Monitoring in South Carolina	15.RD	P2404LE00118 P24014404619	-	19,681
Roosting and Foraging Ecology of Rare and Sensitive Coastal Bats	15.RD	SCDNR FY2017019/ P24014304618	-	30,142
South Carolina Small River Conservation Planning Project	15.RD	SCDNR FY2018008/ P24019497415	-	20,123
Southeast Aquatic Resources Partnership Aquatic connectivity in the southeastern United States	15.RD	Connectivity_GCPO_2019_003	-	4,787
University of Central Florida Evaluating Mole Skink and Salt Marsh Snake Subspecific Taxonomy in Florida Using Genomics	15.RD	24036114	-	46,476
University of Utah Research to Inform Visitor Use Planning at Theodore Roosevelt National Park	15.RD	10044755-CLEMSON / PO# U000125188	-	31,720
Total Department of Interior			<u>92,637</u>	<u>1,262,634</u>
Department of Justice				
Pass-through programs from:				
Chesterfield County School District Testing Integrative Models to Improve School Safety; Positive Behavior Interventions	16.RD	2014CK-BX-0012-CU	-	115,392
Total Department of Justice			<u>-</u>	<u>115,392</u>
Department of Labor				
Pass-through programs from:				
South Carolina Department of Employment and Workforce SCDEW (SCJRU) Contract Extension	17.RD	13L2E003	-	49,909
SCDEW (SCJRU) Contract Extension	17.RD	13L2E003	-	29,158
Total Department of Labor			<u>-</u>	<u>79,067</u>

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
Department of State				
Pass-through programs from:				
Various Federal Sponsors				
Redacted	19.RD	SG-R-XZ1851-0	-	21,452
Internews				
Minecraft Pluggable Transport	19.RD	SG-R-GX1456-11	-	105,332
Total Department of State			-	<u>126,784</u>
Department of Transportation				
Dwight David Eisenhower Transportation Fellowship Program Graduate Fellowship	20.RD	693JJ31845078	-	1,750
University Transportation Center - Center for Connected Multimodal Mobility (C2M2)	20.RD	69A3551747117	209,003	517,091
University Transportation Center - Center for Connected Multimodal Mobility (C2M2)	20.RD	69A3551747117	-	31,284
University Transportation Center - Center for Connected Multimodal Mobility (C2M2)	20.RD	69A3551747117	-	16,962
University Transportation Center - Center for Connected Multimodal Mobility (C2M2)	20.RD	69A3551747117	-	20,776
University Transportation Center - Center for Connected Multimodal Mobility (C2M2) (Richard Brooks)	20.RD	69A3551747117	-	12,987
University Transportation Center - Center for Connected Multimodal Mobility (C2M2) (Amy Apon)	20.RD	69A3551747117	-	18,842
University Transportation Center - Center for Connected Multimodal Mobility (C2M2) (Eric Morris)	20.RD	69A3551747117	-	19,719
University Transportation Center - Center for Connected Multimodal Mobility (C2M2) (Jennifer Ogle)	20.RD	69A3551747117	-	30,565
University Transportation Center - Center for Connected Multimodal Mobility (C2M2) (Jim Martin)	20.RD	69A3551747117	-	62,689
University Transportation Center - Center for Connected Multimodal Mobility (C2M2) (Richard Brooks)	20.RD	69A3551747117	-	22,629
University Transportation Center - Center for Connected Multimodal Mobility (C2M2) (Sarasia)	20.RD	69A3551747117	-	6,568
University Transportation Center - Center for Connected Multimodal Mobility (C2M2) (Weichi Pang)	20.RD	69A3551747117	-	17,342
University Transportation Center - Center for Connected Multimodal Mobility (C2M2) (William Ferrell, Jr.)	20.RD	69A3551747117	-	52,491
Pass-through programs from:				
South Carolina Department of Transportation				
Adaptive Signal System Safety Impacts	20.RD	1936; SPR 737	41,316	163,879
Compliance with the United State Environmental Protection Agency (USEPA) Effluent	20.RD	1573; SPR No. 702	-	301
Cost Effective Strategies for Estimating Statewide AADT	20.RD	1691; SPR No. 717	16,028	57,725
Evaluation of Open Graded Friction Courses: Construction, Maintenance, and Performance, Phase II	20.RD	1781; SPR 725	-	73,764
Innovative Bridge Research and Deployment Project (IBRD-2012) NEXT-D Implementation and Field Monitoring of Hanging Rock Creek Bridge	20.RD	1596; Proj No. 29L1CEBR29018	-	42,809
Midblock Crash Analysis Using Precisely Geocoded Crashes	20.RD	1935; SPR 734	24,327	146,380
Operational and Economical Analysis of Access Management	20.RD	1665; SPR No. 715	-	(1,026)
SCDOT Asset Collection	20.RD	1692; SPR No. 716	108	5,771
Update to SCENARIO_PC	20.RD	2130; SPR 745	-	30,044
University of South Carolina				
Assessment of Structural Degradation for Bridges and Culverts	20.RD	18-3551 PO#2000037629/ USC No.15520-FB55	-	44,996
Calibration of the AASHTO Pavement Design Guide to South Carolina Conditions - Phase II	20.RD	173296/PO#2000031396/ USC#15520FB40	-	252,493
Wisconsin Department of Transportation				
Evaluation of H-pile Corrosion Rates for Wisconsin Bridges Located in Aggressive Subsurface Environments	20.RD	0092-16-03	-	8,779
Total Department of Transportation			<u>290,782</u>	<u>1,657,610</u>
National Aeronautics and Space Administration				
A Combined Density Functional Theory and Molecular Dynamics Approach for Quantifying Catalytic Energies in a Liquid Environment				
AZURE: Auroral Zone Upwelling Release Experiment	43.RD	NNX14AN43H	-	24,642
BL, LAC Objects at the Highest Redshifts	43.RD	NNX15AL71G	130,765	339,864
Characterizing a Shock-Cloud Interaction on the Western Edge of the Vela Supernova Remnant	43.RD	80NSSC18K1619	-	3,812
Chasing the Most Powerful Blazars (Cycle 3)	43.RD	80NSSC18K1716	-	29,029
Compton Thick AGN: The Physics Behind the Obscuration	43.RD	80NSSC18K0580	-	28,858
Compton-Thick AGN: The Final Quest	43.RD	80NSSC17K0635	-	19,836
Control and Modeling of Extensible Continuum Robots - NSTRF for Chase Frazelle	43.RD	80NSSC19K0531	-	1,862
Cosmic Chemical Memory and the Building Blocks of the Solar System	43.RD	80NSSC17K0173	-	68,994
Cosmology with Fermi-LAT	43.RD	NNX17AE32G	-	89,014
CUSP Upwelling and Heating Due to Small Scale Electric Field Fluctuations	43.RD	80NSSC18K1720	-	23,224
	43.RD	80NSSC18K0781	-	52,639

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National Aeronautics and Space Administration, continued				
Full 3D Mapping and Identification of the >10 GE Extragalactic Sky Research Opportunities in Space and Earth Sciences - 2016(ROSES - 2016)	43.RD	80NSSC17K0503	-	12,661
GRBS as Cosmic Probes of the UV and Optical Background	43.RD	80NSSC17K0506	-	15,042
Heavily Obscured AGN: The Physics Behind the Obscuration	43.RD	80NSSC18K1637	-	49,710
Hunting High-Redshift BL Lacertae Objects	43.RD	80NSSC17K0504	-	55,000
Hunting High-Redshift BL Lacertae Objects	43.RD	80NSSC18K1717	-	28,577
NANO-METALLURGY OF GRAIN BOUNDARIES: ATOMISTIC AND MESOSCALE SIMULATION STUDIES	43.RD	2003355	-	25,183
NRI-Small: Long, Thin Continuum Robots for Space Applications	43.RD	NNX12AM01G	-	34,794
Response of the Mesosphere/lower Thermosphere/ionosphere to Tidal Variability Caused by the Madden-Julian Oscillation	43.RD	80NSSC19K0258	-	125,253
ROSES 2015/Exoplanet Research Program - Direct Imaging and Interferometry of Proto-planets at the Epoch of Disk Clearing	43.RD	NNX16AJ81G	-	22,035
Signature of Energy Dissipation in the Magnetosphere-Ionosphere-Thermosphere Coupled System	43.RD	NNX17AG10G	-	24,137
Synthetic Biology for Recycling Human Waste into Nutraceuticals and Materials: Closing the Loop for Long-Term Space Travel	43.RD	NNX15AU46G	-	55,808
The Guaranteed Contribution of Star-Forming Galaxies to the Neutrino and Gamma-Ray Backgrounds	43.RD	80NSSC18K1718	-	13,700
The Photochemistry of Gas and Ice in UV and X-Ray Irradiated Disk Atmospheres	43.RD	80NSSC18K0904	-	18,600
The Unique Case of PKS1220+0203: a Jetted AGN with a Broad Iron Line	43.RD	80NSSC18K0612	-	48,151
Towards to Full 3D Mapping of the > 10 GEV Extragalactic Sky: A Spectroscopic Follow-up	43.RD	80NSSC18K1719	-	5,233
Utilizing Space-Based Technology to Determine Hydrological Properties of Soils for VortEx - Vorticity Experiment	43.RD	NNX15AD47G	2,755	4,372
Pass-through programs from:				
ASTRA				
Transport, Chemistry, and Energetics of Water in the Mesosphere and Lower Thermosphere and Implications for Polar Mesospheric Cloud Occurrence	43.RD	NNX16AF67G // Subcon #171-01	-	130,626
Center for the Advancement of Science				
Unlocking the Cotton Genome to Precision Genetics	43.RD	AG-2019-007	-	15,448
College of Charleston				
2018 SC Space Grant Consortium Graduate Research Assistantship	43.RD	521193-JW	-	11,881
2018 SC Space Grant Consortium Graduate Research Assistantship	43.RD	521193-JD	-	9,978
Evaluation of Polyphenol Antioxidants to Lower Redox & Active Irons Levels and Prevent Oxidative Damage	43.RD	521192-CMBrumaghim	-	139
Nanomaterials-Based Hybrid Energy Storage Devices and Systems for Space Applications	43.RD	521296-Clemson	2,507	226,676
Palmetto Academy 2018: Creating a Kilonova Spectrum in the Laboratory	43.RD	521179-PA-CMMarler	-	11,029
Palmetto Academy 2018: Microbial Peroxide-Producing Cells for Blackwater Treatment	43.RD	521179-PA-CMPopat	-	3,389
Palmetto Academy 2018: Student Participation in Developing Nanomaterials-Derived	43.RD	521179-PA-CMSun3	-	11,600
Palmetto Academy 2019: Anaerobic Membrane Bioreactors for Wastewater Treatment During Space Missions	43.RD	521179-PA-CM003	-	7,704
Palmetto Academy 2019: Student Participation in Developing Nanomaterials-Derived Technologies for Space Applications	43.RD	521179-PA-CM001	-	8,546
Palmetto Academy: Synthetic Biology in Space	43.RD	521179-PA-CM002	-	8,525
REAP 2018: Microbial Peroxide-producing Cells for Blackwater and Greywater Treatment During Space Missions	43.RD	521179-RP-CMPopat2	-	14,649
REAP 2019: Development of an In Vitro Organoid Culture Model to Study the Effects of Microgravity and Space Radiation on the Intervertebral Disc	43.RD	521179-RP-CM001	-	2,422
REAP 2019: Next Generation PUFFER for Lunar Pit Exploration	43.RD	521179-RP-CM002	-	1,759
Regional Biomass Burning Measurements for Air Quality Assessment and Satellite Validation	43.RD	521192-CMMetcalf	-	24,425
RockOn! 2018 Workshop Travel Funding	43.RD	521179-RO	-	1,377
RockSat-C: Soft Robotic Analysis	43.RD	521179-CM001	-	7,904
SC Space Grant Consortium Graduate Research Assistantship	43.RD	521193-PA	-	513
Cornell University				
Waves and Instabilities from a Neutral Dynamo (WINDY)	43.RD	73921-10522	-	158,783
Jet Propulsion Laboratory				
Chasing the Most Powerful Blazars	43.RD	RSA No. 1612924	-	3,607
Chasing the Most Powerful Blazars	43.RD	RSA No. 1611075	-	6,389
Initial Stress Analysis for JPL Lunar PUFFER	43.RD	1621866	-	14,766
Sandia National Laboratories				
ADD ON TO - GLOBAL OPTIMIZATION OF LARGE-SCALE AC POWER FLOW PROBLEMS - YEAR 3	43.RD	PO# 2000640	-	14,641

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Federal Grantor/Pass-Through Grantor/Program Title	Federal CFDA Number	Pass-through Entity Identifying Number	Passed Through to Subrecipient	Total Federal Expenditures
RESEARCH AND DEVELOPMENT CLUSTER, Continued				
National Aeronautics and Space Administration, continued				
Pass-through programs from, continued:				
Smithsonian Astrophysical Observatory				
An Experimental Program to Achieve High Accuracy Atomic Rates for the X-ray Astrophysics Recovery Mission (XARM) and Beyond	43.RD	SV8-88008	-	82,461
Compton Thick AGN: The Hunt Continues (Proposal No. 19700430)	43.RD	G08-19083X	-	61,078
The Aerospace Corp.				
TOMEX Plus: Turbulent oxygen Mixing Experiment Plus	43.RD	PO# 4600006190	-	5,875
University of Alaska - Fairbanks				
In-Situ Measurements of Neutral and Plasma Dynamics Associated with Earth's Cusp- Region Thermospheric Mass Density Anomaly	43.RD	UAF 18-0025 PO518692	-	100,350
KINET-X: Kinetic-Scale Energy and Momentum Transport Experiment	43.RD	UAF 19-0008	-	54,690
University of California				
The Role of Moist Convection in Titan's Hydrologic Cycle and General Circulation	43.RD	0995 G VB095	-	32,311
University of Georgia				
Project FUSION: Facilitating Unified Systems of Interdependent Organizational Networks	43.RD	SUB00001668	-	18,102
University of Louisville				
Short-term Tidal Variability from the Troposphere to the Dynamo Region	43.RD	ULRF14-1328-01	-	9,372
Total National Aeronautics and Space Administration			136,027	2,286,592
Institute of Museum & Library Services				
Pass-through programs from:				
Virginia Polytechnic Institute				
Identifying the Drivers of Success in Educational Programs at Nature Centers and National	45.RD	451438-19244	-	75,028
Total Institute of Museum & Library Services			-	75,028
National Science Foundation				
A Screened Lab Addition to Enhance New Ecological Research at Clemson's Baruch Institute	47.RD	1624705	-	42,188
A Sustainable ATE Coordination Network for Enhancing Personalized Learning Using Virtual and Augmented Reality- based Technology Innovations in Technical Education	47.RD	1700621	-	220,265
ABI Innovation: Fast Algorithms and Tools for Single-Molecule Sequencing Reads	47.RD	1759856	-	128,859
ABR: Collaborative Research: Computational Jewelry for Mobile Health	47.RD	1619950	15,204	116,563
ABR: Collaborative research: Smart earpiece for supporting healthy eating behaviors	47.RD	1835974	-	55,998
ADVANCE Institutional Transformation at Clemson University	47.RD	1629934	10,816	486,014
Advanced Cyberinfrastructure - Research and Educational Facilitation: Campus-Based Computational Research Support	47.RD	1341935	143,866	206,793
AF: Medium: Collaborative Research: Sparse Polynomials, Complexity and Algorithms	47.RD	1407623	-	10,848
AF: Small: Subdivision Methods: Correctness and Complexity	47.RD	1527193	-	82,577
AIR Option 2: Research Alliance Situational Intelligence for Smart Grid Optimization and Intelligent Control	47.RD	1312260	20,807	53,155
AIR-TT: Ultrapure Lignins Recovered from Paper-Mill Black Liquors as Renewable Biopolymers	47.RD	1701128	-	72,888
Algorithm Development and Analysis for Non-Newtonian Fluids Interacting with Elastic and Poroelastic Structures	47.RD	1818842	-	70,778
An Adaptive Partition- based Computational Framework for Stochastic Programs	47.RD	1854960	-	55,004
Broadband microwave flow cytometry: comprehensive nanoparticle sensing and	47.RD	1711463	-	34,160
Broadening Participation in engineering: Workshop on Reducing Attrition in Pre-calculus	47.RD	1737686	-	694
Building Research Capacity for STEM Faculty Development	47.RD	1638888	-	5,392
Capillary Channeled Polymer Structures and Chemistries for High Throughput Measurement of Large Molecules	47.RD	1608663	-	130,049
CAREER: Advancing the Mechanistic Understanding of Field-Scale Preferential Flow and Transport Processes in Soils Using Geophysics	47.RD	1151294	-	17,656
CAREER: Cross-Layer Power-Bounded High Performance Computing on Emerging and Future Heterogeneous Computer Clusters	47.RD	1551511	-	34,148
CAREER: Harnessing Hybrid Computing Resources in PetaScale Computing and Beyond	47.RD	1149644	-	18,375
CAREER: Hierarchical Mechanical Models of Cell Constructs	47.RD	1254609	-	27,397
CAREER: High Resolution Spectrochemical Imaging Through Tissue	47.RD	1255535	-	59,759
CAREER: Characterizing Nanoparticle Surface Interactions using Dissolution Dynamic Nuclear Polarization-Enhanced Nuclear Magnetic Resonance	47.RD	1751529	-	39,595
CAREER: Collaboratively Perceiving, Comprehending, and Projecting into the Future: Supporting Team Situational Awareness with Adaptive Multimodal Displays	47.RD	1750850	-	33,608
CAREER: Cooperative Control and Decision-Making for Human-Agent Collaborative Teams	47.RD	1454139	-	57,353
CAREER: Detecting Patterned Profiles for Functional and Dysfunctional Teamwork	47.RD	1654054	-	88,369
CAREER: Elastocapillary fluid mechanics: spreading, splashing, and instability	47.RD	1750208	-	158,886

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
National Science Foundation, continued				
CAREER: Elucidating Fundamental Structure-Property Relationships in Ionomer Nanocomposites for Redox Flow Batteries	47.RD	1848347	-	1,393
CAREER: Empowering Students to be Adaptive Decision-makers	47.RD	1745347	-	154,305
CAREER: Enabling Low-Cost, Maintenance-Free, Long-Term Embedded Sensing Without Batteries	47.RD	1453607	-	93,455
CAREER: Hierarchical Modeling for Rational Catalyst Design in Aqueous Conditions	47.RD	1554385	-	90,078
CAREER: Hybrid Experimental-Computational Modeling Framework for Transformative Research and Multidisciplinary Education in Cardiovascular Biomechanics	47.RD	1749017	-	2,213
CAREER: Innovative Methods for Designing Adaptive Clinical Trials	47.RD	1651912	-	96,011
CAREER: Integrated Studies of Polar Wave and Magnetosphere-Ionosphere-Thermosphere Couplings from New Observations and Whole Atmosphere Modeling	47.RD	1753214	-	16,444
CAREER: Large Scale Simulations Enabled Materials Engineering for Heterogeneous Ice Nucleation	47.RD	1653352	-	46,265
CAREER: Leveraging the Three- Dimensional Multi-Stability from Origami Folding to Synthesize Multi-Functional Material Systems	47.RD	1751449	-	55,154
CAREER: Multiscale Study of the Structure and Dynamics of Nanoparticle-Protein Coronae	47.RD	1553945	-	65,837
CAREER: Perceptually Guided Hand Motion Synthesis	47.RD	1652210	-	19,609
CAREER: Quantifying drought and vulnerability indicators for water security in a changing environment	47.RD	1653841	-	84,133
CAREER: Quantifying the Adaptability of Building Structures, Envelopes, and Foundations	47.RD	1553565	-	108,576
CAREER: Self-Protecting Artificial Implants and Invigorating the STEM Education Pipeline with Biomaterials	47.RD	1555224	-	142,269
CAREER: Structural dynamics of post-translationally modified Calmodulin and its role in target recognition	47.RD	1749778	-	91,065
Career: Towards Engineering Electronic Defects in Inorganic Luminescent Materials	47.RD	1653016	-	131,075
Carolina Dynamics Symposium 2016-2018	47.RD	1600746	-	5,405
CC* Cyber Team: Cyberinfrastructure Empowerment for Diverse Research, Scholarship, and CC*Data: National Cyberinfrastructure for Scientific Data Analysis at Scale (SciDAS)	47.RD	1659297	39,477	85,418
CEDAR: Exploration of Lower-atmosphere Wave Forcing, Vertical Wave Coupling and Their Center for Aviation and Automotive Technological Education Using Virtual E-School [CA2VES]: A Resource to Meet Technician Workforce Needs	47.RD	1659300	360,663	587,284
CGV: Large: Collaborative Research: Modeling, Display, and Understanding Uncertainty in	47.RD	1705448	-	50,388
CHS: Small: Looking Across the Uncanny Valley: Procedural and Data-Driven Methods for Gaze Modeling	47.RD	1501695	90,069	531,019
CHS: Small: Investigating the Behavioral Effects of Longitudinal Exposure to Immersive Consumer Virtual Reality	47.RD	1212501	-	4,691
CICI: Data Provenance: Collaborative Research: Provenance Assurance Using Currency Primitives	47.RD	1423189	-	19,864
CICI: RSARC: Secure Time for Cyberinfrastructure Security	47.RD	1717937	-	129,955
CI-New: Collaborative Research: HomeSHARE - Home-based Smart Health Applications across Research Environments	47.RD	1547164	-	111,696
CNH-L: Coupled Social and Ecological Consequences of Conservation Easements	47.RD	1738902	-	210,538
Collaborative Research: Computational Intelligence Methods for Dynamic Stochastic	47.RD	1629437	-	13,805
Collaborative Research: Data Selection for Unique Model Identification	47.RD	1518455	3,511	227,251
Collaborative Research: Effects of Hydrologic Processes on In Situ Stress Transients	47.RD	1232070	-	9,500
Collaborative Research: Halocarbon Biogeochemistry in Coastal Wetland Ecosystems	47.RD	1419038	-	2,072
Collaborative Research: II-NEW: Marcher - A Heterogeneous High Performance Computing	47.RD	0944315	-	(369)
Collaborative Research: Intracellular Localization of Biosynthetic Pathways for Conversion of Lipids to Dicarboxylic Acids in Oleaginous Yeast	47.RD	1529927	-	157,349
Collaborative Research: Jicamarca Radar Studies of Gravity Waves from D Region to Lower F	47.RD	1551262	-	30,266
Collaborative Research: US-Brazil IRES / Analytical Applications of Nanomaterials and	47.RD	1403099	-	(1)
Collaborative Research: 2018 Mixed Integer Programming Workshop Poster Session,	47.RD	1143514	-	2,024
Collaborative Research: A Regularized Poisson Boltzmann Model for Fast Computation of the Ensemble Average Polar Solvation Energy	47.RD	1565508	-	53,146
Collaborative Research: An Intelligent Restoration System for a Self-healing Smart Grid	47.RD	1841292	-	2,428
Collaborative Research: Bound-Bound and Bound-Free Opacities of Heavy Lowly-Charged r-Process Ions	47.RD	1812597	-	45,921
Collaborative Research: Branching in RNA Secondary Structures	47.RD	1408141	-	28,950
Collaborative Research: CEDAR - Along-Term Investigation of Auroral and Tidal Forcing of E-Region Thermospheric Winds at High Latitudes	47.RD	1815932	-	53,592
	47.RD	1815832	-	10,464
	47.RD	1853408	-	23,661

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
National Science Foundation, continued				
Collaborative Research: Characterizing Atmospheric Gravity Waves and their Effects on the Antarctic Ozone Layer	47.RD	1705450	-	16,613
Collaborative Research: CICI: Regional: SouthEast	47.RD	1642102	-	63,188
Collaborative Research: CICI: Secure and Resilient Architecture: SciGuard: Building a Security Architecture for Science DMZ Based on SDN and NFV Technologies	47.RD	1642143	-	106,789
Collaborative Research: Combining Operando Spectroscopy and Multi-Scale Modeling to Elucidate the Mechanism of Aqueous Phase Reforming of Oxygenates	47.RD	1764296	-	66,941
Collaborative Research: Comprehensive Investigation of Midlatitude Ionospheric Irregularities	47.RD	1360594	-	14,516
Collaborative Research: Controlling Cellular Physiology and Enzyme Localization for an Enhanced Oleochemical Biosynthesis in Yeast	47.RD	1706134	-	92,783
Collaborative Research: CRISP Type 2: Coordinated, Behaviorally-Aware Recovery for Transportation and Power Disruptions (CBAR-tpd)	47.RD	1822436	175,083	205,430
Collaborative Research: Dimensions US-BIOTAQ-Sao Paulo: Scales of Biodiversity-Integrated Studies of Snake Venom Evolution and Function Across Multiple Levels of Diversity	47.RD	1822417	-	169,744
Collaborative Research: Elucidating the chemical plasticity of fine roots in response to soil heterogeneities and developing a better parameter to forecast fine root decomposition	47.RD	1754679	-	141,193
Collaborative Research: Exploring the Evolution of Design Requirements Throughout the Design Process Using Network Models	47.RD	1463370	-	47,724
Collaborative Research: Feasibility and Fundamentals of Femtosecond-Laser Shock Peening Without Protective Coating in Air Environment	47.RD	1762581	-	67,467
Collaborative Research: Heterogeneous Ice Nucleation in Clouds: A Synergistic Experimental and Simulation Approach	47.RD	1541944	-	82,020
Collaborative Research: High Resolution Spectroscopy and Spectro-Astrometry of Warm Gas in Herbig Ae/Be Stars: A Search for Forming Gas Giant Planets	47.RD	1517014	-	77,242
Collaborative Research: Integrating Fossil and Modern Evidence to Determine the Role of Diet in Mammalian Diversification	47.RD	1841056	22,495	22,495
Collaborative Research: Intersectionality of Non-normative Identities in the Cultures of Engineering (InIce)	47.RD	1428523	16,203	62,177
Collaborative Research: IUSE: EHR: Engaged Student Learning Exploration and Design Tier: Engaging and Enabling Learners to Reason Logically about Code	47.RD	1611714	-	73,497
Collaborative Research: Microbicidal Carbon Dots for Combating Anti-Biotic Resistance and Beyond	47.RD	1701424	-	29,857
Collaborative Research: Novel Laser and Nonlinear Properties of Anderson Localization Optical Fibers	47.RD	1808232	-	45,519
Collaborative Research: RAPID: Capturing a critical transition in fungal wood endophyte communities by rapid response sampling post hurricane in Puerto Rico	47.RD	1822081	-	12,026
Collaborative Research: Selection Methods for Algebraic Design of Experiments	47.RD	1720341	-	8,407
Collaborative Research: Student Pathways in Engineering and Computing for Transfer Success	47.RD	1834081	-	21,571
Collaborative Research: Student Perspectives on Researcher Identity and Transformed Epistemologies (SPRITE)	47.RD	1531607	13,517	131,356
Collaborative Research: Tessellated Structural Architectural Systems for Rapid Construction, Repair, and Disassembly	47.RD	1762899	-	17,837
Collaborative Research: Uncovering the Dynamics and Functionality of Origami Structures and Materials	47.RD	1633952	-	69,668
Collaborative Research: Understanding the Multiscale Behavior of Triboelectric Devices	47.RD	1662587	-	70,879
Collaborative Research: Variational Structure Preserving Methods for Incompressible Flows: Discretization, Analysis, and Parallel Solvers	47.RD	1522191	-	29,706
Collaborative Research: What Do Leaders Want?: Collecting and Coding Issue Positions and Demands in the Militarized Interstate Dispute (MID) Data, 1816-2010	47.RD	1729138	-	36,272
Collaborative Research: Who's Not at the Table? Building Research Capacity for Underserved Communities in Engineering	47.RD	1551605	-	12,390
Collaborative Research: A Long-Term Investigation of Auroral and Tidal Forcing of E-Region Thermospheric Winds at High Latitudes	47.RD	1552214	-	22,505
Collaborative: WARP: Wide Area assisted Resilient Protection	47.RD	1855854	-	66,513
Computational-Experimental Insight across Time and Length Scales of Dynamics in Ionic Polymers	47.RD	1611136	-	90,984
Conductance Variability in Non-Conjugated Polymers: Memristors for Neuromorphic Applications	47.RD	1507266	-	85,576
CPS: Synergy: Collaborative Research: Semi-Automated Emergency Response System	47.RD	1812524	68,908	92,504
CPS: Synergy: Security of Distributed Cyber-Physical Systems with Connected Vehicle Applications	47.RD	1544910	-	197,525
CRII: CHS: Collaboratively Perceiving, Comprehending, and Projecting into the Future: Supporting Team Situational Awareness with Adaptive Collaborative Tactons	47.RD	1566346	-	70,401
CRII: CHS: Recommender Systems for Self-Actualization	47.RD	1565809	-	52,832
CRII: CHS: Redesigning Democratized Technology: The Broadening of Citizen Participation in Bottom-Up Technological Innovation	47.RD	1849718	-	22,513
CRII: CHS: Understanding and Supporting the Use of Self-Driving Vehicles by Persons with Visual Disabilities	47.RD	1849924	-	4,403

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
National Science Foundation, continued				
CRIL: CPS: Bilateral Adaptation Between Models for Human-Perceived Safety/ Comfort and Autonomous Driving Controllers	47.RD	1755771	-	46,711
CRISP Type 1: Data-driven Real-time Simulation for Adaptive Control of Interdependent Infrastructure Systems	47.RD	1638321	-	157,849
CS For All: RPP: A Scalable RPP for Preparing and Supporting Teachers to Teach Culturally Responsive and Rigorous CS Courses in SC High Schools	47.RD	1738760	-	473,276
CSBR: Natural History: Expanding the footprint and the reach of the Clemson University Arthropod Collection	47.RD	1457909	-	19,079
CSR: Large: Collaborative Research: Smart Earpiece for Supporting Healthy Eating Behaviors	47.RD	1565268	-	76,313
CyberSEES: Type 1: Enabling Sustainable Water Supplies Through Self-Powered Sensor-Based Monitoring	47.RD	1539536	-	73,593
De Branges Spaces as Models for a General Theory of Function Spaces	47.RD	1600874	-	36,932
Digitization TCN: Collaborative Research: The Key to the Cabinets: Building and Sustaining a Research Database for a Global Biodiversity Hotspot	47.RD	1410094	-	631
Dimensions: Collaborative Research: Functional Diversity of Chemosymbiosis in Lucinid Bivalves from Coastal Biomes	47.RD	1342763	-	112,333
Disentangling the Ecological Drivers of Teleost Body Form Diversity	47.RD	1830127	29,049	190,352
DMREF: Collaborative Research: An Integrated Multiscale Modeling And Experimental Approach To Design Fouling-Resistant Membranes	47.RD	1534304	-	174,768
EAGER CHS: Examining Self-Harm and Suicide Contagion Risks of Viral Social Media Challenges on Youth and Young Adults	47.RD	1832904	10,898	34,478
EAGER: Autonomous Self-Healing of Commodity Acrylic Copolymers	47.RD	1744306	-	119,400
EAGER: Building a Framework to Advance Research through Undergraduate Participation: Investigating pH in 3D Tissue Test Systems	47.RD	1451319	-	3,262
EAGER: Characterization, Prediction, and Management of Latency Variation in Virtualized HPC and Warehouse Scale Systems	47.RD	1642542	-	71,799
EAGER: Collaborative: PRICE: Using Process Tracing to Improve Household IoT Users' Privacy Decisions	47.RD	1640664	-	76,479
EAGER: Control Theory for Real-time Privacy-preserving Consensus Control of Engineering Networks	47.RD	1824014	-	82,228
EAGER: Corrosion Reduction in Reinforcing Steel of Concrete Structures Through Grain Size Alteration	47.RD	1552794	-	18,970
EAGER: Defending Against Visual Cyberbullying Attacks in Emerging Mobile Social Networks	47.RD	1537924	-	3,107
EAGER: Evaluating the Feasibility of Estimating Cognitive Load Using Microsaccadic Eye Motion and Oscillation in Pupil Diameter	47.RD	1748380	-	39,159
EAGER: Feedback-based Network Optimization for Smart Cities	47.RD	1647361	-	29,617
EAGER: SSDIM: Multiscale Methods for Generating Infrastructure Networks	47.RD	1745300	-	77,575
EAGER: Towards a Traffic Analysis Resistant Internet Architecture	47.RD	1643020	-	27,364
EAGER: Quantifying the Value of Information for Sensor Placements to Improve Soil Signals for Agricultural Water Management	47.RD	1841629	-	55,921
Explaining Choice, Persistence, and Attrition of Black Students in Electrical, Computer, and Mechanical Engineering	47.RD	1734347	61,236	110,348
Exploring Non-Normative Forms of Capital, Wealth and Knowledge Used by Engineering Students	47.RD	1463808	-	4,128
Fabrication of High Performance Metasurfaces by Nanoimprinting of Refractive Index	47.RD	1825787	-	52,702
Fast Algorithms for Large-Scale Nonlinear Algebraic Eigenproblems	47.RD	1719461	-	31,149
Fast and Scalable Multigrid Methods for Hypergraph Partitioning Problems	47.RD	1522751	-	11,611
Fault Detection and Diagnosis for Uncertain Nonlinear Systems Using Set-Based State Estimation.	47.RD	1826011	-	1,844
Fluorescent Polymer Nanoparticles for Nano-Imaging and Sensing	47.RD	1412694	-	83,943
Fundamental Study of Nonlinear Electrokinetic Phenomena in Insulator-based Dielectrophoretic Microdevices	47.RD	1704379	-	48,406
Geometry of Measures and Regularity of Associated Operators	47.RD	1830128	-	20,676
GP-EXTRA: Building An Affective Pathway To The Geosciences Through Experiential Learning Opportunities For Non-Geoscience Majors	47.RD	1540702	-	81,305
Graduate Research Fellowship	47.RD	1246875 & 1744593	-	17,503
Graduate Research Fellowship	47.RD	1246875 & 1744593	-	48,761
Graduate Research Fellowship Program	47.RD	1246875 & 1744593	-	(6,131)
Graduate Research Fellowship Program	47.RD	1246875 & 1744593	-	35,316
Graduate Research Fellowship Program	47.RD	1246875 & 1744593	-	35,316
Graduate Research Fellowship Program (GRFP)	47.RD	1246875 & 1744593	-	(7,190)
Guest-Induced Electrical Conductivity and Photovoltaic Activity of Metal-Organic Frameworks	47.RD	1809092	-	41,831
Highly Conductive Reduced Graphene Oxide Films for High Performance Electronic Devices	47.RD	1538215	20,611	20,611
High-Strength Carbon Fibers from Eco-Friendly Processing of Biomass	47.RD	1462804	-	110,096
Hydrothermal Brines: New Media for the Synthesis and Crystal Growth of Materials	47.RD	1808371	-	147,844
I/UCRC Phase II: Collaborative Research: Ceramic, Composite and Optical Materials Center	47.RD	1540025	-	38,233
I-Corps: Integrated Strain Sensor for Dynamic Hip Screws	47.RD	1933649	-	1,175
II NEW: Infrastructure to Support Research in Network-Aware Data-Intensive Computing	47.RD	1405767	-	97,978
III: CGV: Medium: Collaborative Research: Computational Design and 3D Printing of Textiles	47.RD	1722997	-	14,207

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
National Science Foundation, continued				
III: Small: Collaborative Research: Privacy-Aware Collaborative Data Sharing in Human-Centered Social Networks	47.RD	1527421	-	66,463
Interaction of Tool Wear and the Machining Affected Zone in Nickel-Based Superalloys	47.RD	1760809	-	38,456
Investigating Functional Peptides for Asymmetric Hypervalent Iodine Catalysis	47.RD	1664920	-	135,122
IRES: Call Me Globber-Under-represented Undergraduate Bioengineering Research in Singapore	47.RD	1460110	-	48,560
IUI Track-2 FEC: The Creation of Next-Generation Tools for Neuroscience-Noninvasive Radioluminescence Approaches to Optogenetics	47.RD	1632881	952,763	1,418,510
IUSE/ PFE: RED: Clemson University: Learning Teams and Innovation Ventures for Adaptable Training in Engineering (CULTIVATE)	47.RD	1730576	-	230,895
IUSE: EHR: Enabling Field Experiences in Introductory Geoscience Classes Through the Use of Virtual Reality	47.RD	1504619	-	3,077
IUSE: Understanding and Propagating the Essence of Successful Computing Education Projects	47.RD	1646691	-	5,370
Large Scale Networking (LSN) Workshop on Operationalizing SDN	47.RD	1747856	-	20,649
Material Removal and Ejection Dynamics in Femtosecond Laser Machining of Microchannels in Transparent Materials	47.RD	1563426	-	62,589
MCA-PGR: Spatial and Temporal Resolution of mRNA Profiles During Early Nodule Development	47.RD	1444461	-	421,054
Mechanics of Locomotion with Nonholonomic Constraints in a Fluid	47.RD	1563315	-	70,779
Mechanism for Heterogeneously Catalyzed Sugar Alcohol Reactions: Hierarchical Modeling and Experimental Studies	47.RD	1438325	-	1,035
Mechanisms of Fluid Feeding in Insects, from Nanoscale to Organism	47.RD	1354956	3,523	3,523
Metal Coordination and DNA Interactions Control Sulfur and Selenium Antioxidant	47.RD	1807709	-	160,406
Methods Development for Systematic Investigation of Factors Driving Outcomes in Informal STEM Environmental Education Programs	47.RD	1612416	55,162	71,823
Methods for improved size resolution for particle impactors	47.RD	1804304	-	7,872
MRI: Acquisition of a Soil Greenhouse Gas Flux Measurement System to Support Research in Coastal Ecology and Sustainable Agriculture	47.RD	1828167	-	230,464
MRI: Development of Enodia: A Highly Reconfigurable, HPC- Backed Instrument Enabling Multifaceted Interactive Visualization	47.RD	1828611	-	80,131
Multi-Point Monin-Obukhov Similarity and Spectral Dynamics in the Convective Atmospheric Surface Layer	47.RD	1561190	-	104,118
New Preconditioned Solvers for Large and Complex Eigenvalue Problems	47.RD	1819097	-	5,353
Novel Graphene-based Label-free Biosensor Array for Smart Health and Drug Discovery	47.RD	1606882	32,713	140,621
Novel microcantilever sensor using plasminically enhanced nonlinearity	47.RD	1809891	-	129,776
NRI:FND:COLLAB: Drones and the Design of Public Outdoor Spaces	47.RD	1734247	-	74,609
NRT: Technology-Human Integrated Knowledge Education and Research (THINKER)	47.RD	1829008	-	121,772
NRT-DESE: Preparing Resilient and Operationally Adaptive Communities through an Interdisciplinary, Venture-based Education (PROACTIVE)	47.RD	1633608	-	510,035
NSF Graduate Research Fellowship Program	47.RD	1246875 & 1744593	-	48,761
NSF Graduate Research Fellowship Program	47.RD	1744593	-	39,020
NSF Graduate Research Fellowship Program	47.RD	1744593	-	50,813
NSF Graduate Research Fellowship Program	47.RD	1744593	-	52,782
NSF Graduate Research Fellowship Program	47.RD	1744593	-	48,911
NSF INCLUDES DDLP Statewide Consortium: Supporting Underrepresented Populations in Precalculus by Organizational Redesign toward Engineering Diversity	47.RD	1744497	45,098	131,565
NSF Student Travel Grant for 2018 ACM International Workshop on Security in Software Defined Networks and Network Function Virtualization(SDN-NFV Security)	47.RD	1807103	-	1,500
NSF/DOE Partnership on Advanced Combustion Engines: Thermal Barrier Coatings for the LTC Engine - Heat Loss, Combustion, Thermal vs. Catalytic Effects, Emissions, Exhaust Heat	47.RD	1258714	-	(14,101)
Number Theory Meetings in the Southeast	47.RD	1701290	-	5,635
Numerical Methods for Non-Newtonian Fluid Structure Interaction Problems	47.RD	1418960	-	17,669
On a General Class of Count Time Series Models	47.RD	1407480	-	6,001
PFI: AIR-TT: Microwave Flow Cytometer: Monitor Yeast Cell Growth and Microbial Contamination in Fermentation	47.RD	1640578	-	198,021
PFI:AIR - TT: Novel Low-Power III-Nitride Heater Cantilever Based Selective VOC Sensor	47.RD	1602006	-	85,340
PFI:AIR-TT: Translation of Multimodal Membrane Adsorbers for Protein Purifications	47.RD	1640645	-	56,289
Phase I I/UCRC Clemson University Site: Advanced Mammalian Biomanufacturing Innovation Center (AMBIC)	47.RD	1624641	17,123	118,568
Production and Exploration of Rydberg Highly Charged Ions	47.RD	1806494	-	118,699
Quantifying dense gas dispersion in urban areas	47.RD	1703548	-	71,243
RAPID: Airborne Measurements of Black Carbon Aerosol and Its Mixing State Over the Eastern Pacific/Central Coast of California	47.RD	1833008	-	83,217

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Federal Grantor/Pass-Through Grantor/Program Title	Federal CFDA Number	Pass-through Entity Identifying Number	Passed Through to Subrecipient	Total Federal Expenditures
RESEARCH AND DEVELOPMENT CLUSTER, Continued				
National Science Foundation, continued				
RAPID: Critical Assessment of Drainage Infrastructure Performance in a Sustained Flooding Event: The Case of Hurricane Florence	47.RD	1855588	-	14,501
RAPID: Revisiting the compounding storm surge and extreme precipitation events on coastal flooding during hurricane Florence using field data	47.RD	1855374	-	10,778
RCN: Advancing Research and Education Through a National Network of Campus Research Computing Infrastructures - The CaRC Consortium	47.RD	1620695	36,649	214,874
Research: Developing Engineering Experiences and Pathways (D.E.E.P) in Engineering Technology Career Formation	47.RD	1825126	-	29,557
REU Site: Interfaces and Surfaces	47.RD	1460863	-	5,500
REU Site: Nature's machinery through the prism of Physics, Biology, Chemistry and Engineering	47.RD	1757658	-	65,750
REU Site: Solid-State Devices for Electronics, Photonics, and Magnetics Technology	47.RD	1560070	18,483	136,693
REU Site: Summer Undergraduate Research Program at Clemson University	47.RD	1560300	-	87,552
REU site: Undergraduate Research in Biological Sciences: From Genomes to Phenomes - Exploring Function Across Scales	47.RD	1460895	-	21,192
Reversible Anion and Ion-Pair Recognition under Electronic Control	47.RD	1660329	-	132,358
RI: Small Dynamic Payload Transport and Manipulation by Teams of Cooperating Mobile Robotic-Cranes	47.RD	1710898	-	(9,593)
RI: Small: Collaborative Research: A Modular Approach to Robot Systems Incorporating Compliant and Soft Elements	47.RD	1718075	-	5,555
RI: Small: Vine-Like Continuum Robots	47.RD	1527165	-	162,158
RII Track 1: Materials Assembly and Design Excellence in South Carolina: MADE in SC	47.RD	1655740	-	1,818
RII Track-2 FEC: Advanced Biomanufacturing: Catalyzing Improved Host Development and High Quality Medicines through Genome to Phenome Predictions	47.RD	1736123	-	87,789
RII Track-2 FEC: Advanced Biomanufacturing: Catalyzing Improved Host Development and High Quality Medicines through Genome to Phenome Predictions	47.RD	1736123	669,747	1,602,638
RII Track4: Event Based Approach to Model Indoor Airflow Patterns	47.RD	1832971	-	40,940
RTG: Coding Theory, Cryptography, and Number Theory	47.RD	1547399	-	420,844
SaTC: EDU: Collaborative: Enhancing Security Education through Transiting Research on Security in Emerging Network Technologies	47.RD	1723663	-	65,830
SDI-CSCS: Collaborative Research: S2OS: Enabling Infrastructure-Wide Programmable Security with SDI	47.RD	1700499	-	100,837
Self-Healing Photochromic Polymeric Coatings	47.RD	1332964	-	(3,331)
Simulation-Based Design of Polymer Nanocomposites for Structural Applications	47.RD	1563435	6,000	13,965
SusChEM: Sustainable Chemistry from Combined Inorganic and Organic Waste Precursors	47.RD	1708844	-	154,517
The Geometry of Measures and Analytic Properties of Associated Operators	47.RD	1800015	-	12,767
Tigers Teach Noyce Scholarship	47.RD	1136293	-	(8,609)
Topics in Algebraic Geometry Codes	47.RD	1403062	-	16,072
Toward Commercialization of the Carbon Dots Technology	47.RD	1749313	-	(2,323)
Transforming the Kirigami Art into a Design Framework for Multi-functional Adaptive Composites	47.RD	1760943	-	69,668
TWC: Medium: Collaborative: Studying Journalists to Identify Requirements for Usable, Secure, and Trustworthy Communication	47.RD	1513875	-	2,142
Understanding Particle Scale Motion Initiation Physics for Loose-laid Building Rooftop Aggregates in Severe Windstorms	47.RD	1760999	-	37,706
UNS: Formation and Toxicity of Disinfection Byproducts in Desalinated Waters	47.RD	1511051	23,073	124,321
UNS: High-performance Membranes for Engineered Osmosis	47.RD	1510790	-	66,660
Unveiling The Cosmic History of Light	47.RD	1715256	-	83,072
US Ignite: Track 1: Enabling Connected Vehicle Applications through Advanced Network Using Ultra Violet Light to Produce Layered Fiber Reinforced Materials Derived from Biological Sources	47.RD	1537756	-	77,055
Pass-through programs from:				
Carnegie Mellon University				
Learning to See Seeing to Learn: A Sociotechnical System Supporting Taxonomic Identification Activities in Volunteer-Based Water Quality Biomonitoring	47.RD	1122371-358369	-	1,413
Cornell University				
SCH: EXP: Home+, An Intelligent and Interoperable Suite of Robotic Furnishings, Learning and Evolving with Their Users	47.RD	81402.10758	5,539	43,554
East Carolina University				
IUSE: EHR: Assessing Virtual Reality Field Experiences for Enhanced Learning in the Geosciences	47.RD	A19-0220-S001	-	42,623
Engineered Marine Coatings, Inc.				
Marine Antifouling Deterrent Coatings - Subcontract for Quantum Paints	47.RD	NONE	-	(7,808)
GATS, Inc.				
Life-Cycle of the Quasi Two-Day Wave in the Southern Hemisphere	47.RD	GATS_SC_160003	-	7,797
HT CrystalSolutions LLC				
Hydrothermal Growth Strontium Beryllium Borate (SBBO) for Deep UV Nonlinear Optical Applications	47.RD	HTCS1819738	-	29,855
Johns Hopkins University				
AMBIC Reference Cell, Product, Media, Feeds (CLEMSON)	47.RD	PO# 2003603375	-	62,476
AMBIC Reference Cell, Product, Media, Feeds (CLEMSON)	47.RD	PO#2003603375	-	25,173
BOOM-OUR Feed Control for CHO Cell Culture (CLEMSON)	47.RD	PO# 2003603299	-	68

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
National Science Foundation, continued				
Pass-through programs from, continued:				
Johns Hopkins University, continued				
JHU /UCRC for advanced mammalian biomanufacturing	47.RD	2004168266	-	11,969
Understanding & Controlling ER Stress in Highly Secreting CHO Cells	47.RD	PO# 2003683366	-	11,832
Understanding & Controlling ER Stress in Highly Secreting CHO Cells	47.RD	PO# 2003683366	-	23,304
Louisiana Tech University				
Sophomore Fast-Forward: A Summer Bridge Program to Support Retention in Engineering	47.RD	32-0969-54130-CU	-	8,957
Medical University of South Carolina				
R1I Track-2 FEC: Bridging Cognitive Science and Neuroscience Using Innovative Imaging Technologies	47.RD	MUSC16-074-8B357	-	4,116
Michigan Technological University				
Driving Forces in Aqueous Two-Phase Systems for Vaccine Development	47.RD	1711076Z2 / PO102203	-	31,299
Northern Arizona University				
Digitization TCN: Lepidoptera of North America Network: Documenting Diversity in the Largest Clade of Herbivores	47.RD	1003017.02	-	3,247
Penn. State University				
Simulation-Based Design of Polymer Nanocomposites for Structural Applications	47.RD	6091-CU-NSF-4438	-	2,966
Purdue University				
Expanding Access to and Participation in the Multiple-Institution Database for Investigating Engineering Longitudinal Development	47.RD	4101-77545	-	32,465
Hazards Sees: Bridging Information, Uncertainty, and Decision-Making in Hurricanes using and Interdisciplinary Perspective	47.RD	4101-84811	-	62,300
South Carolina State University				
Louis Stokes South Carolina Alliance for Minority Participation (SCAMP): A Senior Alliance Enhancing Opportunities to Transition Students into Success STEM Pathways	47.RD	17-581054-SCAMP-Clemson-SC	-	62,705
Louis Stokes South Carolina Alliance for Minority Participation (SCAMP): A Senior Alliance Enhancing Opportunities to Transition Students into Success STEM Pathways	47.RD	18-581065-SCAMP-CU-SC	-	16,686
The Samuel Roberts Noble Foundation				
Research - PGR Function Genomics of Beneficial Legume Microbe Interactions	47.RD	2017-G04-003	-	34,399
University of Arizona				
PIRE: Dust Stimulated Draw-Down of Atmospheric CO2 as a Trigger for Northern Hemisphere Glaciation	47.RD	467895	-	2,785
University of California Davis				
Computational Infrastructure for Geodynamics	47.RD	201504240-01	-	9,477
University of Kentucky				
R1I Track-2 FEC: A Multiscale, Multiphysics Modeling Framework for Genome-to-Phenome Mapping via Intermediate Phenotypes	47.RD	3200002098-19-053 / PO 7800004458	-	224,012
University of Rochester				
RAISE - EQuIP: A high-speed, reconfigurable, fully integrated circuit platform for quantum photonic applications / URF (AWD00002483)	47.RD	417415G / UR FAO GR510842	-	41,303
University of San Diego				
Collaborative Research: Military Veteran Students' Pathways in Engineering Education	47.RD	140065-U2015-001 / PO# 26339	-	15,795
University of South Carolina				
R1I Track 1: Materials Assembly and Design Excellence in South Carolina: MADE in SC	47.RD	18-3494 22000FB02/ PO#2000036759	-	1,246,616
University of Texas Austin				
RESEARCH-PGR: Genomic and Epigenomic Analyses of Fiber Development in Allotetraploid Cottons	47.RD	UTA-18-001133	-	36,080
Sequencing a Reference-grade Genome of the Domesticated Allotetraploid Cotton	47.RD	UTA15-000467 (1444552)	-	46,210
University of Utah				
CloudLab Phase II: Community Infrastructure to Expand the Frontiers of Cloud Computing Research	47.RD	10045119-CLEM PO# U000099152	-	471,633
CloudLab: Flexible Scientific Infrastructure to Support Fundamental Advances in Cloud Architectures and Applications	47.RD	PO# 166490 10034358-CLEM 10040652-CU	-	6,151
CNH-L: Adaptation, Mitigation, and Biophysical Feedbacks in the Changing Bonneville Salt Flats	47.RD	PO # U000094568	-	28,817
Virginia Polytechnic Institute				
Collaborative Proposal: Multi-Perspective Evacuation Performance Measurement RAPID: Integrated Geotechnical and Geophysical Field Data Collection to Investigate Scour and Post-event Infilling at Subaqueous Foundations, Levees and River Banks impacted by Hurricane Harvey	47.RD	479463-19244	-	44,109
Washington State University	47.RD	479908-19244	-	8,175
CIF21 DIBBS Tripal Gateway: Platform for Next Generation Data Analysis and Sharing	47.RD	123507_G003405	-	625
Total National Science Foundation			<u>2,968,286</u>	<u>23,360,448</u>

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
Department of Veterans Affairs				
Grants for Adaptive Sports Programs for Disabled Veterans and Disabled Members of the Armed Forces	64.RD	2018-ASG-20	-	18,961
Targeted Delivery of Antioxidant Drugs Following Cerebral Ischemic Injury	64.RD	PO# 673-D85004	-	61,086
Total Department of Veterans Affairs			-	80,047
Environmental Protection Agency				
Forest Watershed Mgmt Practices & DW Quality	66.RD	CR-83586401	22,954	218,589
Pollution Prevention Incentives States	66.RD	00D41717	-	39,657
Schools: Lead in Drinking Water	66.RD	00D87419	-	316
Pass-through programs from:				
eXtension Foundation				
Pesticide Safety	66.RD	SA-2017-45	-	15,025
Friends of Lake Keowee Society, Inc.				
Cane Creek Watershed Based Plan Development	66.RD	EQ-7-791	-	3,410
South Carolina Department. of Health and Environmental Control				
South Carolina Volunteer Stream Monitoring Program (SC Adopt-a-Stream)	66.RD	None	-	35,116
Total Environmental Protection Agency			22,954	312,113
Nuclear Regulatory Commission				
Clemson University Nuclear Engineering and Radiological Science Scholarship Program	77.RD	31310018M0013	-	32,968
Clemson University Nuclear Engineering and Radiological Sciences Scholarship Program	77.RD	NRC-HQ-84-14-G-0021	-	3,040
Nuclear Faculty Development at Clemson University	77.RD	31310018M0037	-	12,911
US NRC Fellowship Education Grant at Clemson University	77.RD	31310018M0006	-	54,879
Total Nuclear Regulatory Commission			-	103,798
Department of Energy				
All-Digital Plug and Play Passive RFID Sensors for Energy Efficient Building Control	81.RD	DE-EE0007683	132,544	441,897
Boosting Energy Efficiency of Heterogeneous Connected Automated Vehicle (CAV)	81.RD	DE-EE0008232	30,000	575,438
Breeding High Yielding Bioenergy Sorghum for the New Bioenergy Belt	81.RD	DE-AR0000595	413,685	986,471
Characterizing and Interpreting the In Situ Strain Tensor During CO2 Injection	81.RD	DE-FE0023313	161	41,682
Dynamic Stochastic Optimal Power Flow (DSOPF)	81.RD	DE-AR0001079	-	39,289
Energize: An Interactive Evaluation Tool for Engaging the General Public with Energy Decision Making	81.RD	DE-NE0008568	-	232,012
Energy Efficiency for the Growing South Carolina Manufacturing Industries	81.RD	DE-EE0007727	-	331,058
Examination of Actinide Chemistry at Solid-Water Interfaces to Support Advanced Actinide Separations	81.RD	DE-SC0010355	-	28,146
First-Principles Calculation of Vibrational Mode in Complex Materials	81.RD	DE-SC0008487	-	37,744
Fully Integrated High Speed Megawatt Class Motor and High Frequency Variable Speed Drive System	81.RD	DE-EE0007254	1,197,770	1,621,947
Functionally Designed Ultra-Lightweight Carbon Fiber Reinforced Thermoplastic Composites Door Assembly	81.RD	DE-EE0007293	129,812	389,707
High Speed Medium Voltage CHP System with Advanced Grid Support	81.RD	DE-EE0008409	-	12,440
High-Temperature Atmosphere-Controlled Raman Microscope for Fuel Cycle Materials Research	81.RD	DE-NE0008675	-	121,100
Hydrogen Isotope Fractionation Using Graphene and Related 2-D Materials	81.RD	DE-SC0018151	-	161,060
Integrated Process Optimization for Biochemical Conversion	81.RD	DE-EE0008255	1,080	273,086
Integrated TBC/EBC for SiC Fiber Reinforced SiC Matrix Composites for Next Generation Gas Turbines	81.RD	DE-FE0031281	-	201,709
Ionic Polymers Under Dynamic Conditions	81.RD	DE-SC0019284	-	24,836
Laser 3D Printing of Highly Compacted Protonic Ceramic Electrolyzer Stack	81.RD	DE-EE0008428	-	318,430
Lignin Fractionation and Valorization: Focusing on both Value and Quality	81.RD	DE-EE0008502	27,769	177,670
Nano-structured Ceramic Membranes for Enhanced Tritium Management	81.RD	DE-NE0008703	-	190,359
Radionuclide Waste Disposal: Development of Multi-scale Experimental and Modeling Capabilities	81.RD	DE-SC0012530	86,116	838,485
Robust Extractive Scintillating Resin and Adsorptive Membranes for Plutonium Isotopic Analyses of Aqueous Media	81.RD	DE-NA0002920	-	201,553
Robust in Situ Strain Measurements to Monitor Carbon Dioxide (CO2) Storage	81.RD	DE-FE0028292	-	312,510
Sampling Rare Events In Aqueous Systems Using Molecular Simulations	81.RD	DE-SC0015448	-	91,733
Synthesis and Single Crystals of Refractory Oxides of Lanthanides and Thorium	81.RD	DE-SC0014271	-	54,341
Pass-through programs from:				
Battelle Memorial Institute				
Analysis of Chemical Parameters in Microcosms	81.RD	PO# US001-0000718036	-	26,883
Battelle Memorial Institute-PNNL				
Improved TRL of the LS-APGD Microplasma Ionization Source	81.RD	394845; Clemson, SC USA	-	25,466

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Department of Energy, continued				
Pass-through programs from, continued:				
Detroit Diesel Corporation				
Thermal Barrier Coatings for Improving Thermal Efficiency of a Heavy-Duty Engine	81.RD	PO#1590029839	153,736	313,379
Donald Danforth Plant Science Center				
A Reference Phenotyping System for Energy Sorghum	81.RD	22815-C	-	29,965
General Electric Company				
Joining of SiCf/SiC composites using polymer derived ceramics	81.RD	740134640	-	6,557
Handix Scientific LLC				
A Microfluidic Ice Nucleating Particle Counter for Continuous Measurements	81.RD	1801// Prime # DESC0018474	-	67,612
Lawrence Livermore National Laboratory				
Characterization of Actinide Migration in Field Lysimeter Experiment	81.RD	8626646	-	26,826
Characterization of Plutonium Migration under Field Conditions	81.RD	8633477	-	51,909
Stabilization of Pu Complexes on Mineral Colloids by Natural Organic Matter	81.RD	8621273	-	(1,890)
Lexington Technology Center				
Lexington Technology Center 2018-19 Faculty Professional Development	81.RD	None	-	1,201
Los Alamos National Laboratory				
Autonomous Monitoring of Wellbore Integrity Applying Time Reverse Nonlinear Elastic	81.RD	476893	-	83,950
National Technology and Engineering Solutions of Sandia				
Experimental Investigation of Additive Manufactured Materials in Various Loading				
Conditions	81.RD	PO# 1908748	-	46,642
Global Optimization of Large-Scale AC Power Flow Problems	81.RD	PO# 1787843	-	94,646
NaSOW p.r. 1886058	81.RD	1678873	-	19,025
PROTECTION OF INVERTER-DOMINATED ISLANDS WITH PV AND STORAGE IN MICROGRID	81.RD	PO# 2004274	-	10,236
Sintering Kinetics within Direct Ink Write Processes: The Born Qualified Grand Challenge				
Project	81.RD	1940247	-	24,999
New Mexico State University				
Protection Design and Coordination of Microgrids as Applied to Regional Distribution Grid				
in the City of Cordova AK	81.RD	Q01960	-	17,503
Penn. State University				
Maximizing Vehicle Fuel Economy Through The Real-Time, Collaborative, And Predictive				
Co-Optimization Of Routing, Speed, And Powertrain Control	81.RD	5989-CU-EARPA-0801	-	20,354
Savannah River Nuclear Solutions				
AMDT Testing (NSFB00014)	81.RD	PO 0000343108//TOA # NSCB00014//BOA 521	-	39,525
AMRL Microscopy Center Instrumentation and Data Preparation (NSCB000012)	81.RD	PO 347433; TOA NSCB000012; BOA 521 NSCB00003//BOA#0521//	-	22,130
CAPER GMLC Southeast Regional Partnership Support Activities (NSCB00003)	81.RD	PO#277771	20,243	22,986
H-CANYON PROCESS MODEL DEVELOPMENT	81.RD	PO#0000402031	81,262	91,746
Joint Appointment (JA) - Support of Laboratory Research and Development	81.RD	TOA/PO # 0000359811 // NSCB00013 // BOA 521 PO# 318416 // TOA # NSCB00009	-	39,677
Li-ion Electrolyte Development	81.RD	// BOA # 521	-	142,856
Spark Plasma Sintering for Transformation and Deposition of Special Nuclear Materials	81.RD	000384848 TOA#CEB00021 NSCB00015; PO 0000353501;	-	23,319
Support of Organosodalite Sorbents for Tc-99 and I-129 Remediation-NSCB00015	81.RD	BOA 521	-	10,938
Support of Solid State Transformer (SST) Testing - NSCB00018	81.RD	PO 0000365986; BOA 521	-	70,637
Synthesis & Characterization of Solid Proton Conductors and Conductivity Measurements - NSCB00020	81.RD	TOA/PO# 366765 // NSCB00020 // BOA 521	-	18,335
Task Order Proposal Request (TOPR) No. 429856 - Controller Hardware in the Loop Support for Transformer Protection	81.RD	E-SOW-A00097// BOA0521//PO#0000409270 PO# 308825 // TOA # NSCB00007	-	56,598
Thermal Diffusivity Measurements (NSCB00007)	81.RD	// BOA # 521 PO 317010 // TOA# NSCB00011 // BOA 521	-	7,011
Tritium Supply Chain Modeling NSCB00011	81.RD		-	131,222
SCUREF				
Advanced Microanalytical Measurements	81.RD	B139023	-	3,600
SRR Technical Support Provided by Clemson University	81.RD	SRRA001/SRRA021685	-	70,298
Symplectic Research, Inc.				
Direct Tomography Simulation for Combustion Flows	81.RD	Prime: DE-SC0019532	-	24,223
Tetramer Technologies				
Reduced Graphene Oxide for Scalable Flexible Transparent Electrodes	81.RD	TET 18002	-	33,389
University of Connecticut				
In-situ Measurement and Validation of Uranium Molten Salt Properties at Operationally Relevant Temperatures	81.RD	317174 / 5649590	-	55,848
University of Minnesota				
Energy Frontier Research Center for Inorganometallic Catalyst Design	81.RD	A004527501	-	12,309
Energy Frontier Research Center: Inorganometallic Catalyst Design Center	81.RD	A004527501	-	90,549

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
Department of Energy, continued				
Pass-through programs from, continued:				
University of Nebraska - Lincoln				
Systems Analysis of the Physiological and Molecular Mechanisms of Sorghum Nutrient Use Efficiency, Water Use Efficiency and Interactions with the Soil Microbiome				
	81.RD	25-1215-0123-006	-	282,929
University of South Carolina				
Center for Hierarchical Waste Form Materials (CHWM)				
	81.RD	17-3256/USC#13020FC78/ PO#2000030148	-	196,126
Total Department of Energy			2,274,178	10,016,217
Department of Education				
GAANN-Leadership development for Ph.D. students in Electrical and Computer Engineering				
	84.RD	P200A180009	-	15,005
GAANN: Model Validation Analytics in Support of High Consequence Decision Making				
	84.RD	P200A150310	-	443,401
GAANN: Molecular Engineering in Sustainability and Health				
	84.RD	P200A180076	-	69,602
Graduate Fellowship in Electrical & Computer Engineering				
	84.RD	P200A150107	-	218,401
Pass-through programs from:				
Littlejohn Community Center				
Building capacity at the TRIO Educational Opportunity Center and Club Edge After school Program				
	84.RD	none	-	7,435
South Carolina Commission on Higher Education				
ITQ - Exploring the Mathematics of Genetics				
	84.RD	None	24,543	41,916
Total Department of Education			24,543	795,760
Department of Health and Human Services				
Building the Evidence Base for Vomit Clean-Up Procedures in Long-term Care Facilities.				
	93.RD	5R01HS025987-02	33,978	109,070
CanSim: A Novel Simulator for Training Cannulation Skills in Dialysis Care				
	93.RD	5K01DK111767-04	-	158,121
Cell and matrix interactions in diabetic vascular tissue engineering models				
	93.RD	1R01HL133303-01A1	-	77,196
Center of Biomaterials for Tissue Regeneration (CBTR)				
	93.RD	5P20GM103444-08	-	57,088
Center of Biomaterials for Tissue Regeneration (CBTR)				
	93.RD	5P20GM103444-09	164,810	550,109
Center of Biomaterials for Tissue Regeneration (CBTR) - A Simionescu				
	93.RD	5P20GM103444-08	-	58,928
Center of Biomaterials for Tissue Regeneration (CBTR) - Y. Mei				
	93.RD	5P20GM103444-08	-	61,081
Center of Biomaterials for Tissue Regeneration (CBTR) (D Simionescu, Z Gao, & T Bruce)				
	93.RD	5P20GM103444-08	-	180,347
Center of Biomaterials for Tissue Regeneration (CBTR) (J Anker & J Desjardins)				
	93.RD	5P20GM103444-08	-	(3,373)
Center of Biomaterials for Tissue Regeneration (CBTR) (J Mercuri)				
	93.RD	5P20GM103444-08	-	92,017
Center of Biomaterials for Tissue Regeneration (CBTR) (J Nagatomi & C Webb)				
	93.RD	5P20GM103444-08	-	148,136
Center of Biomaterials for Tissue Regeneration (CBTR) (J Lee)				
	93.RD	5P20GM103444-08	-	80,310
Center of Biomaterials for Tissue Regeneration (CBTR) (Richardson)				
	93.RD	5P20GM103444-08	-	49,981
Center of Biomaterials for Tissue Regeneration (CBTR)(A. Foley)				
	93.RD	5P20GM103444-08	-	197,065
COBRE: EPIC - YR4 Ingram-Smith				
	93.RD	5P20GM109094-04	-	64,796
COBRE: EPIC - YR4 Whitehead				
	93.RD	5P20GM109094-04	-	1,033
COBRE: EPIC Year 2 Carryover				
main project 209-2022528/2021812				
	93.RD	5P20GM109094-03 rev	-	146,301
COBRE: Eukaryotic Pathogens Innovation Center (EPIC) Ingram-Smith				
	93.RD	5P20GM109094-03	-	172,255
COBRE: Eukaryotic Pathogens Innovation Center (EPIC) J Alper				
	93.RD	5P20GM109094-03	-	48,834
COBRE: Eukaryotic Pathogens Innovation Center (EPIC) J Morris				
	93.RD	5P20GM109094-03	-	182,192
COBRE: Eukaryotic Pathogens Innovation Center (EPIC) K Paul				
	93.RD	5P20GM109094-03	-	139,663
COBRE: Eukaryotic Pathogens Innovation Center (EPIC) M Morris				
	93.RD	5P20GM109094-03	-	167,256
COBRE:EPIC - Core 1 (C Parkinson)				
	93.RD	5P20GM109094-03	-	178,957
COBRE:EPIC - YR4 Admin Core				
	93.RD	5P20GM109094-04	-	112,273
COBRE:EPIC - YR4 Core 1				
	93.RD	5P20GM109094-04	-	27,338
COBRE:EPIC - YR4 Core 2				
	93.RD	5P20GM109094-04	-	42,391
COBRE:EPIC - YR4 J. Morris				
	93.RD	5P20GM109094-04	-	59,518
COBRE:EPIC - YR4 K. Paul				
	93.RD	5P20GM109094-04	-	60,416
COBRE:EPIC - YR4 L. Kozubowski				
	93.RD	5P20GM109094-04	-	39,922
COBRE:EPIC - YR4 M. Morris				
	93.RD	5P20GM109094-04	-	61,447
COBRE:EPIC (L Kozubowski)				
	93.RD	5P20GM109094-03	-	156,628
COBRE:EPIC (T Bruce)				
	93.RD	5P20GM109094-03	-	109,806
COBRE:EPIC Admin Core - Temesvari & Smith				
	93.RD	5P20GM109094-03	-	229,657
COBRE:EPIC-Dou's Pilot Year 2 Carryover				
	93.RD	5P20GM109094-03 revised	-	71,712
Craniofacial Dysmorphology Associated with Phelan-McDermid Syndrome using Three-Dimensional Morphometrics				
	93.RD	5R03DE027497-02	-	58,916
Creatine: A Novel Modulator of GABA Inhibitory Synapses				
	93.RD	1R03HD088942-01	-	11,634
Critical functions of the gut microbiota that mediate recovery from recurrent Clostridium difficile infection				
	93.RD	7K01DK111794-02	-	713

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
Department of Health and Human Services, continued				
Defining and harnessing macrophage pathways for Aspergillus clearance in vivo	93.RD	1K22A1134677-01A1	-	71,709
Detecting and Monitoring Implant Infection Using X-ray Excited Luminescence Chemical Imaging (XELCI)	93.RD	5R01AR070305-04	16,203	400,705
Entamoeba Metabolism: The Role of Acetate Kinase and ADP-Forming Acetyl-CoA Synthetase	93.RD	1R15GM114759-01A1	-	52,915
Functional Tissue Engineering and Regeneration of the Aortic Root	93.RD	1R56HL130950-01	-	72,446
Genetics of Cocaine and Methamphetamine Sensitivity in Drosophila	93.RD	7U01DA041613-03	-	277,957
Human Factors Considerations in the Design and Implementation of Telemedicine-Integrated Ambulance-based Environments for Stroke care	93.RD	1R03HS026809-01	-	19,105
Identification of kinetoplastid parasite glucose uptake and subcellular localization inhibitors as therapeutic leads	93.RD	1R21A1127575-01	107,543	129,995
Improving hiPSC Cardiomyocyte Engraftment and Integration with Nanowired Human Cardiac Organoids-Fellowship for Robert Coyle	93.RD	1F31HL145979-01	-	14,701
Inhibition of Human Islet Amyloid Polypeptide Aggregation	93.RD	5R35GM119691-04	-	360,042
Integrating Biomechanics & Cell Biology to Understand TMJ Pathology	93.RD	4R01DE021134-05 revised	141,215	278,523
Intensive Models of HCV Care for Injection Drug Users	93.RD	7R01DA034086-07	67,945	199,343
Label Free RF Imaging of Cell Membrane Heterogeneity in Liquid	93.RD	4K25GM100480-05	-	9,794
Mechanisms of Fluconazole-Induced Aneuploidy in Cryptococcus Neoformans	93.RD	1R15 AI119801-01 Revised	-	94,859
Mechanisms of Long-term Arsenic Exposure on Stem Cells	93.RD	1R15ES027651-01	-	142,124
Medial Arterial Calcification: Mechanisms and Therapy	93.RD	R01HL145064	34,447	145,820
MENTOR: Medical Enrichment Through Opportunities in Research	93.RD	5T35A134643-02	-	15,851
Microfabricated Coculture Model: Myocyte Rescue by TNT-Transfer Mitochondria	93.RD	5R01HL124782-03	-	81,474
Multiplexed, Quantitative Fluorescence Imaging in Tumor Sections	93.RD	7R21CA196418-04 Revised	-	255,396
Nanowired Human Cardiac Spheroids for Heart Repair	93.RD	5R01HL133308-03	193,586	384,847
Neuron-Specific Nanotherapeutics for Spinal Cord Injury Repair	93.RD	1R01NS111037-01	-	38,172
New Enzymes for DNA Demethylation	93.RD	1R15GM121997-01	-	162,545
New Generation DelPhi: large systems and beyond electrostatics	93.RD	5R01GM093937-09	18,245	254,450
Oral Microbiomes and Dental Caries in a Human Immunodeficiency Virus Infected Population	93.RD	5R01DE028154-02	207,570	247,581
Predicting the Heterogeneity of Cell-Fate Decisions	93.RD	7R01GM104184-05	44,386	268,385
Project EMPOWER - Engaging Medicine Providers On Ways to Enhance Recovery	93.RD	5H79TI081664-02	24,535	39,155
Realizing Improved Patient Care Through Human-Centered Design in the OR	93.RD	5P30HS024380-04	194,713	814,317
Reducing Disparities in Birth Outcomes: A Randomized Controlled Trial on Centering Pregnancy	93.RD	5R01HD82311-05	418,173	525,645
Reverse Engineering Quantitative Genetic Variation	93.RD	5R01GM128974-02	-	299,551
Rural Communities Opioid Response (Planning)	93.RD	6G25RH32414-01-04	34,060	34,060
SC COBRE for Translational Research Improving Musculoskeletal Health (SCTRIMH)	93.RD	1P20GM121342-01A1	-	17,407
SC COBRE for TRIMH - Admin	93.RD	1P20GM121342-01A1	26,083	260,005
SC COBRE for TRIMH - AFT	93.RD	1P20GM121342-01A1	-	71,267
SC COBRE for TRIMH - Harman	93.RD	1P20GM121342-01A1	-	92,551
SC COBRE for TRIMH - MCM	93.RD	1P20GM121342-01A1	-	149,046
SC COBRE for TRIMH - Peng	93.RD	1P20GM121342-01A1	-	155,076
SC COBRE for TRIMH - Richardson	93.RD	1P20GM121342-01A1	-	135,075
SC COBRE for TRIMH - Sanabria	93.RD	1P20GM121342-01A1	-	85,919
SC COBRE for TRIMH - Ye	93.RD	1P20GM121342-01A1	-	73,958
SC County Health Extension: High Obesity Prevention and Elimination	93.RD	5NU58DP006562-02	-	218,877
SLC6A8 mutant zebrafish as a high throughput screening tool to identify candidate therapeutics of Creatine Deficiency Syndrome	93.RD	R03MH115354	-	99,922
SLC7A5-MTOR Regulation of Neural Development	93.RD	1R15NS096562-01A1	-	90,141
Strategies for continuous biologics purification with new affinity membranes	93.RD	1R15GM131341-01	-	10,798
Structure-function relationships between human temporomandibular lateral capsule-ligament complex tensile stiffness, collagen ultrastructure and ECM composition: Investigation of sexual dimorphisms.	93.RD	1F325DE027864-01	-	41,655
Systems Mechanobiology Modeling for Patient-Specific Cardiac Fibrosis Predictions	93.RD	R01HL144927	-	16,163
Targeting flagellar motility in the treatment of kinetoplastid diseases	93.RD	1R15AI137979-01A1	-	30,010
The Role of CAR and PXR in Gender Predominant P450 Expression and Induction	93.RD	2R15ES017321-03	-	104,437
Theranostic Approach to Treat Abdominal Aortic Aneurysms	93.RD	5R01HL133662-03	102,206	367,660
Translational Control of Ecystation in the Entamoebae	93.RD	5R21AI08287-02	-	83,795
Undergraduate Education and Device Innovation Through Clinical and Translational	93.RD	5R25EB016589-05	-	19,324
Using Context to Validate and Improve Wrist-Tracking	93.RD	5R01HL118181-03	-	98,261
Pass-through programs from:				
Albert Einstein College of Medicine				
Comprehensive Pediatric Hypertension Diagnosis and Management	93.RD	311386 / PO 720024	-	6,905
Pediatric Ambulatory Healthcare-Associated Infections	93.RD	311229 / PO 720023	-	1,667
Coastal Carolina University				
Southeast Xlerator Network	93.RD	31-2083 SXN-2	-	125
Colorado State University				
Merging Yoga and Self-Management to Develop Skills (MY-Skills)	93.RD	G-40408-01	-	25,958
Cornell University				
Quantifying Molecular Consequences of Human Missense Variants with Large-scale Interactome Perturbation Studies	93.RD	82513-11007	-	91,765
Doxy.me LLC				
Expanding teleconsent capabilities to improve clinical research recruitment	93.RD	NIH Prime # 1R41LM012547-	-	5,525

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
Department of Health and Human Services, continued				
Pass-through programs from, continued:				
Duke University				
Inflammasomes Mediate Inflammation in Bladder Outlet Obstruction	93.RD	2037268	-	39,241
Inflammasomes Mediate Inflammations in Bladder Outlet Obstruction	93.RD	2034859	-	(2,560)
Greenwood Genetics Center				
5214: Development of a Behavioral Outcome Measure for Rett Syndrome (RettBe)	93.RD	RTT5214-DELPHINE-2016	-	(557)
Happy People Games LLC				
Interactive Digital Intervention to Prevent Violence among Young Adults	93.RD	2017000938	-	28,892
Icahn School of Medicine				
Data Coordination and Integration Center for LINC5-BD2K - DSR	93.RD	0255-7895-4609	-	76,378
Drug Combination Signatures for Prediction and Mitigation of Toxicity	93.RD	0255-8864-4609	-	67,963
Medical University of South Carolina				
A Work Systems Analysis of Sterile Processing	93.RD	MUSC17-076-8C877	-	3,774
Identifying and Reducing Errors in Perioperative Anesthesia Medication Delivery	93.RD	MUSC18-134-8D662	-	44,907
Impact of Integrated HIV/NCD Screening on HIV Testing Uptake and Engagement in HIV Care: an RCT in Kisarawe, Tanzania	93.RD	MUSC16-104-8C312/PO#296562	-	29,643
Multi-site Study of Dyslexia	93.RD	MUSC19-19-89225	-	14,355
Physical Activity Interventions for Leg Ulcer Patients	93.RD	MUSC15-041	-	5,828
South Carolina Clinical and Translational Research Institute (SCTR)	93.RD	MUSC18-038-8B122	-	13,951
Using Connectomics to Characterize Risk for Alzheimer's Disease	93.RD	MUSC17-119-8D017	-	43,069
North Carolina Central University				
Development of New Photo-Activated Antibacterial Agents	93.RD	P0069772	-	18,577
NUBAD, LLC.				
Aminoglycosides with Reduced Ototoxicity	93.RD	CLEM-004	-	68,089
Nucleobase Aminosugars with Reduced Ototoxicity	93.RD	NARO	-	5,219
Screening the Ribosome for new Target Sites	93.RD	CLEM-003	-	85,108
Oregon Health & Science University				
Extrinsic Perturbations of Cell Physiology and Associated Regulatory Networks	93.RD	1004937_Clemson	-	15,250
Pennsylvania Department of Health				
PA Department of Health, Olweus Bullying Prevention Program for Community Youth Organizations	93.RD	SAP#: 4100080792	3,788	232,220
Purilogs, LLC				
High-capacity Multimodal Anion-exchange Membranes for Purification of Biologics	93.RD	PSI0003	-	67,621
Protein A Membrane Columns for Rapid Protein Purification SBIR Phase I	93.RD	PSI0002	-	31,879
SBIR Phase II: Protein A membrane Absorbers for Rapid Protein Purification	93.RD	R44GM125429	-	30,464
Research Foundation for the SUNY				
Single Molecule Analysis of MAGUK Structure and Ligand Binding	93.RD	81534/2/1147013	-	97,756
South Carolina Campaign to Prevent Teen Pregnancy				
Accelerating Progress: Strengthening Teen Pregnancy Initiatives Among High Need South Carolina Populations (Tier 1A)	93.RD	NONE	-	121
Accelerating Progress: Strengthening Teen Pregnancy Prevention Initiatives among High Need SC Populations (Tier 1A)	93.RD	1 TP1AH000133-04-00	-	2,746
South Carolina Department. of Health & Human Services				
Quality Assurance Services for the Bureau of Long Term Care Services (Federal)	93.RD	A202111999A (Federal) - FY18	-	13,278
Quality Assurance Services for the Bureau of Long Term Care Services (Federal) - Year 3	93.RD	A202111999A (Federal) - FY19	-	540,005
South Carolina Department Social Services				
ICSS Employment and Training - Year 3	93.RD	4400011567 Year 3	-	592,447
ICSS Employment and Training - Year 4	93.RD	4400011567 Year 4	-	1,372,642
		4400011567 Training Inst		
ICSS Employment and Training Institute - Year 3	93.RD	Year 3	-	90,902
		4400011567 Training Inst (CQI)		
ICSS Employment and Training Institute (CQI) - Year 4	93.RD	Year 4	-	202,398
University of California-Merced				
Focused x-ray Luminescence at uCT Resolution and uM-level of Sensitivity	93.RD	SA29066	-	187,419
University of Colorado - Denver				
		FY16.714.002 /		
Mechanisms of Mast Cell Directed Carbon Nanotube Toxicity	93.RD	FY19.714.002_AMD4	-	42,532
		FY17.347.005 /		
Rocky Mountain Center for Total Worker Health	93.RD	FY19.347.009_AMD2	-	13,488
University of Florida				
Probiotics That Moderate PH and Antagonize Pathogens to Promote Oral Health	93.RD	UFDSP00011201 00125985	-	38,922
University of Kentucky				
Southeast Center for Agricultural Health and Injury Prevention	93.RD	PO#7800003833 3210000531-18-	-	(7,021)
Southeast Center for Agricultural Health and Injury Prevention	93.RD	PO# 7800004263 3210000731-	-	7,378
		3210001069-19-257 /		
Southeast Center for Agricultural Health and Injury Prevention - CROPS	93.RD	PO# 7800004846	-	10,239
University of NC - Charlotte				
Characterization of Various Multifunctional Nucleic Acid Nanoparticles and Understanding Their Immunotoxicity	93.RD	20170356-02-CLE	-	96,966
University of Nebraska - Lincoln				
Group Testing for Infectious Disease Detection: Multiplex Assays and Back End Screening	93.RD	24-0548-0008-002	-	54,959

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RESEARCH AND DEVELOPMENT CLUSTER, Continued				
Department of Health and Human Services, continued				
Pass-through programs from, continued:				
University of South Carolina				
Carolina Center on Alzheimer's Disease and Minority Research (CCADMR) - Admin Core	93.RD	19-3748/PO#2000043650	-	11,652
Carolina Center on Alzheimer's Disease and Minority Research (CCADMR) - Research Education Core (Training)	93.RD	19-3752/PO#2000045107 (15900 FA79)	-	4,599
South Carolina IDeA Network of Biomedical Research Excellence (SC INBRE)	93.RD	22050-ZA01/ PO No. 2000035000	-	7,248
South Carolina IDeA Network of Biomedical Research Excellence (SC INBRE)	93.RD	19-3736 PO#2000042911/ USC No.18020-FB66	-	195,757
University of Texas El Paso				
BUILDing SCHOLARS (Research Enrichment Core)	93.RD	226141238E	-	128
BUILDing Scholars-Research Enrichment Core	93.RD	226141271E	-	14,170
Upstate Affiliate Organization d/b/a				
Managing Abstinence in Newborns (MAIN) 2.0, Expansion	93.RD	A202212651A-01CU; GHS Grant # G001217	-	178,408
Virginia Polytechnic Institute				
DPM Research: Monitoring Responses to Ventilation and Control by Water Sprays, and Capacity Building for Mine Ventilation Expertise	93.RD	431827-19244	-	48,460
Total Department of Health and Human Services			1,833,486	16,741,403
Corporation for National and Community Service				
2017 National Civic Engagement Research Cooperative Agreement	94.RD	17REHSC001	-	16,985
Pass-through programs from:				
Furman University				
Implementation Evaluation for Greenville Health System School Based Health Centers	94.RD	1003017.02	-	19,246
Total Corporation for National and Community Service			-	36,231
Total Research and Development Cluster			10,239,409	79,361,377
Department of Education				
Student Financial Assistance Cluster				
Federal Direct Loans	84.268	Unknown	-	109,738,513
Federal Pell Grant Program	84.063	Unknown	-	15,453,049
Federal Perkins Loan Program Federal Capital Contributions	84.038	Unknown	-	7,293,559
Federal Supplemental Educational Opportunity Grants	84.007	Unknown	-	920,221
Federal Work Study Program	84.033	Unknown	-	906,608
Federal Work Study Program - Federal Job Location and Development	84.033	Unknown	-	60,000
Post Secondary Education Scholarships for Veteran's Dependents (Iraq and Afghanistan Service Grant)	84.408	Unknown	-	5,717
Teacher Education Assistance for College and Higher Educations Grants (TEACH GRANTS)	84.379	Unknown	-	27,136
Total Student Financial Assistance Cluster			-	134,404,803
Special Education Cluster				
Pass-through programs from:				
South Carolina Department of Education				
SC CREATE: Centers for the Re-Education and Advancement of Teachers in Special Education and Related Services Personnel	84.027	SC CREATE	-	34,927
South Carolina Educational Interpreter Center	84.027	Funds Reservation #4000037496	-	262,638
Total Special Education Cluster			-	297,565
Total Department of Education			-	134,702,368
Department of Agriculture				
SNAP Cluster				
Pass-through programs from:				
South Carolina Department of Social Services				
SNAP-ED: CATCH (Coordinated Approach to Child Health)	10.561	4400017414	-	59,668
SNAP-ED: CATCH (Coordinated Approach to Child Health)	10.561	4400019920	-	135,406
SNAP-ED: Cooking Matters	10.561	4400019913	-	132,069
SNAP-ED: Cooking Matters (03)	10.561	4400017401	-	61,739
SNAP-Ed: Go-NAP SACC Community Partnership	10.561	4400019924	-	99,870

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SNAP Cluster, continued				
SNAP-ED: Implementation of Sesame Street Healthy Habits for Life	10.561	4400019930	-	123,844
SNAP-ED: Implementation of Sesame Street Healthy Habits for Life/Let's Move	10.561	4400017384	-	49,241
SNAP-ED: Implementation of Walk with Ease	10.561	4400019931	-	100,337
SNAP-ED: Policy, System Environment (PSE) Strategies and Outreach	10.561	4400017366	-	49,850
SNAP-ED: Policy, System, Environment (PSE) Strategies and Outreach	10.561	4400019912	-	139,809
Total SNAP Cluster			-	951,833
Total Department of Agriculture			-	951,833
Department of Transportation				
Highway Planning and Construction Cluster				
Pass-through programs from:				
South Carolina Department of Transportation				
State Work Zone Safety Training Program	20.205	CBSA-002 1982; WBS No.	-	327,130
Transportation Technology Transfer Service (T3S) 2018	20.205	88P036997A0.2560	-	197,019
Transportation Technology Transfer Service (T3S) 2019	20.205	2113	-	262,215
Total Highway Planning and Construction Cluster			-	786,364
Total Department of Transportation			-	786,364
OTHER PROGRAMS				
Department of Agriculture				
2019 Imported Fire Ant	10.025	AP19PPQF0000C080	-	12,039
CAPS-Tier 1 Infrastructure	10.025	AP19PPQF0000C079	-	22,629
Clemson Sustainable Community Project	10.500	2013-41520-21027	12,923	43,292
FY18 D2 SC ADT	10.025	AP18VSSPRS00C076	-	87,386
FY18 D2 SC UMB	10.025	AP18VSSPRS00C014	-	245,152
FY19 D1 SC ADT	10.025	AP19VSSPRS00C018	-	1,542
Improving Energy Efficiency in South Carolina Animal Facilities and Greenhouses: A Partnership for Education, Outreach and Technology Adoption	10.054	68-4639-15-0002	72,467	163,192
Increase Awareness of Communities' Abilities to Develop Their Own Food Systems and Economics	10.902	69-4639-15-0001	-	16,783
National Surveillance and Response for Animal Health Activities (Umbrella) (FY19 D1 SC UMB)	10.025	AP19VSSPRS00C002	-	11,378
Production and Marketing Risk Management Education for South Carolina Livestock Producers	10.460	RM18RMEPP522C055	-	8,042
Production and Marketing Risk Management for Turf Grass Sod Producers in South Carolina	10.460	RM17RMEPP522C033	-	4,407
SC FY17 Junior Invasive Inspectors Farm	10.025	AP17PPQF0000C182	-	9,717
SC FY17 National Honey Bee Survey Farm	10.025	AP17PPQF0000C179	-	1
SC FY18 CAPS/Combined Survey (Pests of National Concern)	10.025	AP18PPQF0000C131	-	18,257
SC FY18 Exotic Woodborer Bark Beetle Survey	10.025	AP18PPQF0000C178	-	13,617
SC FY18 Forest Pest Outreach FB Goal 5.0	10.025	AP18PPQF0000C367	-	37,422
SC FY18 Honey Bee Survey FG Goal 1S.0589	10.025	AP18PPQF0000C176	-	12,381
SC FY18 Imported Fire Ant	10.025	AP18PPQF0000C366	-	46,919
SC FY18 Junior Invasive Inspectors FB Go	10.025	AP18PPQF0000C368	-	21,275
SC FY18 Level 2 Member Lab Agreement	10.025	AP18VSNVSL00C018	-	137,000
SC FY18 P.ramorum Survey FB Goal 1S.0311	10.025	AP18PPQF0000C180	-	19,085
SC FY18 Palm Commodity Survey FB Goal 1S	10.025	AP18PPQF0000C179	-	13,378
SC FY18 Pathways Survey FB Goal 1S.0014	10.025	AP18PPQF0000C177	-	23,660
SC FY19 CAPS Survey	10.025	AP19PPQF0000C083	-	7,243
SC FY19 Exotic Wood Borer Beetle Survey	10.025	AP19PPQF0000C241	-	1,003
SC FY19 Honey Bee Survey PPA 1S.0563.29	10.025	AP19PPQF0000C242	-	432
SC FY19 Palm Commodity Survey PPA Goal 1	10.025	AP19PPQF0000C244	-	1,017
SC FY19 Pathways Survey PPA Goal 1S.0312	10.025	AP19PPQF0000C243	-	3,615
SC NAHLN FY 18 LIMS Agreement	10.025	AP18VSNVSL00C001	-	59,402
SF FY18 CAPS Infrastructure (Tier 1)	10.025	AP18PPQF0000C132	-	45,830
South Carolina Meat-Poultry Inspection Department - (All Other)	10.475	BASE18 (12-37-A307)	-	131,746
South Carolina Meat-Poultry Inspection Department - (All Other)	10.475	BASE19 (12-37-A307)	-	236,698
South Carolina Meat-Poultry Inspection Department - (Compliance)	10.475	BASE18 (12-37-A307)	-	26,256
South Carolina Meat-Poultry Inspection Department - (Compliance)	10.475	BASE19 (12-37-A307)	-	95,578
South Carolina Meat-Poultry Inspection Department - (In-Plant)	10.475	BASE18 (12-37-A307)	-	267,939
South Carolina Meat-Poultry Inspection Department - (Laboratory)	10.475	BASE18 (12-37-A307)	-	6,871
South Carolina Meat-Poultry Inspection Department - (Laboratory)	10.475	BASE19 (12-37-A307)	-	18,745
South Carolina Meat-Poultry Inspection Department - Cross Utilization	10.475	FY19 Cross Utilization	-	228,426
South Carolina Meat-Poultry Inspection Department - Cross Utilization '18	10.475	Cross Utilization '18	-	76,514

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OTHER PROGRAMS, Continued				
Department of Agriculture, continued				
South Carolina Meat-Poultry Inspection Department - In-Plant	10.475	BASE19 (12-37-A307)	-	948,098
South Carolina Meat-Poultry Inspection Department - PHDCIS/FAIM18	10.475	PHDCIS18 (12-37-A307)	-	967
South Carolina Meat-Poultry Inspection Department - PHDCIS19	10.475	PHDCIS19 (12-37-A307)	-	3,362
South Carolina Meat-Poultry Inspection Department- Cross Utilization '17	10.475	Cross Utilization	-	(124)
Cooperative Extension Service - Smith Lever	10.500	Unknown	-	6,188,201
Web Based Nutrition Education and Evaluation Reporting System (WebNEERS)	10.500	2017-41510-26791	8,333	159,508
Statewide Demonstration of Improved Irrigation Management to Conserve Water and Enhance Farm Profits Utilizing Real-Time and Site-Specific Weather Information	10.902	69-4639-16-266	-	26,525
Pass-through programs from:				
Kansas State University				
2018 4-H Military Partnership Grant	10.500	S17121.01	-	12,848
2019 4-H Military Partnerships and Outreach Support Program	10.500	S19105	-	13,254
Mississippi State University				
South Carolina Forestry Commission				
Cogongrass and Invasive Forest Pests Detection and Education Project	10.000	None	-	77,130
The Longleaf Alliance				
Education and Outreach to Increase Longleaf Pine Ecosystem Restoration in SC	10.902	33.2019.01.00	-	2,636
University of Arkansas				
Developing a Successful Farm Transition Plan Educational Program	10.500	31000-08	-	35,171
University of Florida				
Southern Plant Diagnostics Network	10.304	UFDSP00011536/P0019073	-	37,083
Southern Regional Center for Food Safety Training, Outreach and Technical Assistance	10.328	P0099377 /UFDSP00012355	-	1,046
Southern Training, Education, Extension, Outreach and Technical Assistance Center to	10.328	UFDSP00011131	-	4,838
University of Georgia				
Southern Region SARE Professional Development Program - Model State Program Assistant	10.001	SUB00001747	-	22,149
Sustainable Ag Research and Education. SARE program - Model State Program	10.215	RD309-137/S001447	-	28,846
Wholesale Success: Building the capacity of farmers to meet demand for locally and sustainably grown produce	10.215	RD309-137/S001411	-	17,414
Total Department of Agriculture			93,723	9,754,821
Department of the Interior				
Digitize and Transcribe Historical Documents, Oversized Documents, Video Tapes, Audio Tapes, and Photographic Materials	15.945	P17AC01647	-	9,996
Digitize Archeological Oversized Documents and Photographic Materials	15.945	P16AC01783	-	962
Digitize Photographic Materials for Everglades and Biscayne National Parks	15.945	P16AC01406	-	18,326
Total Department of the Interior			-	29,284
Department of Justice				
Pass-through programs from:				
National 4-H Council				
South Carolina 4-H Mentoring Project	16.726	15474/ NMP9	-	9,259
South Carolina Mentoring Program	16.726	NMP8-841	-	46,957
Total Department of Justice			-	56,216
National Endowment for the Arts				
Pass-through programs from:				
College of Charleston				
Call My Name: African Americans in Early Clemson University History	45.130	ZR-256734-18	-	1,527
Riley Mayors' Design Project	45.025	MOU 2019-054-CACC	-	4,452
South Carolina Humanities				
Lincoln's Unfinished Work	45.129	18-1814-1	-	7,000
Lincoln's Unfinished Work	45.129	19-1894-4	-	3,000
Total National Endowment for the Arts			-	15,979
Small Business Administration				
Pass-through programs from:				
University of South Carolina				
Small Business Development Center - Federal Operating Grant 2019	59.037	Federal2019/ SBAHQ19B0036	-	295,332

Clemson University, Clemson, South Carolina

Schedule of Expenditures of Federal Awards

For the year ended June 30, 2019

Federal Grantor/Pass-Through Grantor/Program Title	Federal CFDA Number	Pass-through Entity Identifying Number	Passed Through to Subrecipient	Total Federal Expenditures
OTHER PROGRAMS, Continued				
Small Business Administration, continued				
Pass-through programs from, continued:				
Small Business Development Center - Operating Grant (Federal) 2018	59.037	Federal 21250ZL85/ SBAHQ-18-B-0039	-	104,593
Total Small Business Administration			-	<u>399,925</u>
Department of Veterans Affairs				
Pass-through programs from:				
US Department of Veterans Affairs				
Grants for Adaptive Sports Programs for Disabled Veterans and Disabled Members of the Armed Forces				
	64.034	2019-ASG-25	-	65,764
Total Department of Veterans Affairs			-	<u>65,764</u>
Environmental Protection Agency				
Consolidated Pesticide Compliance Monitoring - Certification and Training	66.700	E-98463817	-	115,347
Consolidated Pesticide Compliance Monitoring - Enforcement	66.700	E-98463617	-	201,709
Consolidated Pesticide Compliance Monitoring - Special Programs	66.700	E-98463717	-	153,645
Fiscal Year 2015 Pollution Prevention Grant Program	66.708	NP00D41716	-	20,899
Pass-through programs from:				
Commonwealth of Virginia				
Animal Waste Analysis for the Commonwealth of Virginia	66.460	319-2016-01-PT	-	3,456
eXtension Foundation				
Pesticide Safety	66.716	SA-2019-17	-	1,840
Tennessee Valley Authority				
Establish a Landscape Conservation Fellowship for the Tennessee River Basin Biodiversity Network	66.000	13373 / PO# 4796468	-	71,423
Total Environmental Protection Agency			-	<u>568,319</u>
Department of Energy				
Pass-through programs from:				
Cummins, Inc.				
Advancing Platooning with ADAS Control Integration and Assessment--Cummins--AOI 3d	81.086	none	-	32,840
Total Department of Energy			-	<u>32,840</u>
Department of Education				
Exemplary Personnel for Education, Research, and Teaching in Special Education (EXPERTISE)				
Pass-through programs from:				
Monaview Elementary				
Monaview Magic Initiative	84.325	H325D140044	-	247,694
National Writing Project				
2017-2018 i3 Scale-up the College Ready Writers Program (CRWP) Advanced Institute Grant	84.287	1st PO #203214 // 2nd PO #211132	-	13,632
2017-2018 NWP CRWP-SEED Professional Development in High-Need Middle or High School Grant with its partner: Carver Middle School	84.411	01-SC11-2017i3A1 // Prime# U411A160004	-	5,838
NWP 2018-2019 i3 Scale-up C3WP AI&PD Grant	84.367	01-SC11-SEED2017-CRWPPD	-	4,483
NWP 2018-2019 i3 Scale-up C3WP AI&PD Grant	84.411	01-SC11-2018i3C3WP	-	188,012
NWP 2019-2020 Year 3 i3 Scale-Up C3WP Professional Development	84.411	01-SC11-2018i3C3WP	-	7,967
SEED: High Need PD for Orangeburg 05	84.411	01-SC11-2019i3C3WP	-	3,357
South Carolina Department of Education	84.367	01-SC11-SEED2018-C3WPPD	21,089	2,494
2017-18 Agriculture Teacher Education and Professional Development	84.048	Agriculture Education	43,963	12,372
21st CCLC After-School Program at Cedar Grove, Palmetto, LaFrance, Townville, and Pendleton Elementary	84.287	H63010006917 18 21st CCLC-40 H63010006918/	61,338	21,396
21st CCLC After-School Program at Chastain Elementary and Liberty Elementary	84.287	19 21st CCLC-50 H63010006918/	70,308	91,590
21st CCLC After-School Program at Palmetto Elementary & Cedar Grove Elementary	84.287	19 21st CCLC-41 H63010006918/	24,885	101,377
21st CCLC After-School Program at Spearman Elementary and West Pelzer Elementary	84.287	19 21st CCLC-20	-	119,111
21st Century Community Learning Centers - Summer Bridge Program at Chastain Elementary and Liberty Elementary	84.287	H63010006917 18 Summer Bridge-91	29,687	36,392
21st Century Community Learning Centers - Summer Bridge Program at Chastain Elementary and Liberty Elementary Schools	84.287	19 21st CCLC Summer Bridge-91	10,411	7,361
21st Century Community Learning Centers - Summer Bridge Program at LaFrance, Townville, and Pendleton Elementary	84.287	H63010006917 18 Summer Bridge-92	-	37,983
21st Century Community Learning Centers - Summer Bridge Program at Spearman Elementary and West Pelzer Elementary	84.287	H63010006917 18 Summer Bridge-90	2,432	20,692

Clemson University, Clemson, South Carolina

Schedule of Expenditures of Federal Awards

For the year ended June 30, 2019

Federal Grantor/Pass-Through Grantor/Program Title	Federal CFDA Number	Pass-through Entity Identifying Number	Passed Through to Subrecipient	Total Federal Expenditures
OTHER PROGRAMS, Continued				
Department of Education, continued				
Pass-through programs from, continued:				
National Writing Project, continued				
21st Century Community Learning Centers - Summer Bridge Program at Spearman Elementary and West Pelzer Elementary Schools				
84.287		19 21st CCLC Summer Bridge-90 H63010006917	16,283	6,505
84.287		18 21st CCLC-50 H63010006917	-	2,745
84.287		18 21st CCLC-20	-	17,065
84.048		19ClemsonAgEd-42	-	32,519
84.048		FFA Program Assistant	-	1,988
84.048		19ClemsonFFA-42	-	21,863
The Ohio State University				
Improving Literacy Outcomes for Beginning Readers with Disabilities				
84.411		60046517	-	8,171
Total Department of Education			280,396	1,012,607
Department of Health and Human Services				
Advanced Nurse Education-Sexual Nurse Assault Examiner program				
93.247		6 T96HP325020101	-	73,082
Mental Health Awareness Training				
93.243		5H79SM081359-02	35,659	35,659
Pass-through programs from:				
South Carolina Department of Health and Environmental Control				
DHEC Farm-to Retail				
93.757		CY-7-785	-	44,931
South Carolina Department. of Agriculture				
Food Safety Modernization Act (FSMA) Position - Year 2				
93.103		FSMA Year 2	-	4,572
Food Safety Modernization Act (FSMA) Position - Year 3				
93.103		P16010PSR117-1	-	98,627
University of South Carolina				
Faith, Activity, and Nutrition: Dissemination in Underserved Communities - Year 4				
93.135		18-3457/PO#2000035993 USC No.11570-FB38	-	260
Faith, Activity, and Nutrition: Dissemination in Underserved Communities - Year 5				
93.135		19-3778/PO#2000043072 USC No.11570-FB46	-	5,382
Upstate Affiliate Organization d/b/a				
Total Department of Health and Human Services			35,659	262,513
Department of Homeland Security				
Pass-through programs from:				
South Carolina Emergency Management Division				
FEMA Public Assistance - 4286 Hurricane Matthew (Type E - Public Buildings and Equipment)				
97.036		F#1171 CUDL02E	-	15,061
FEMA Public Assistance - 4394 Hurricane Florence (Type B - Emergency Protective Measures)				
97.040		F#41 68197	-	8,738
FEMA Public Assistance - 4394 Hurricane Florence (Type Z - State Management Costs)				
97.040		F#107 68205	-	583
Total Department of Homeland Security			-	24,382
Total Other Programs			409,778	12,222,650
Total Federal Expenditures			\$ 10,649,187	\$ 228,024,592

Clemson University**Clemson, South Carolina*****Notes to the Schedule of Expenditures of Federal Awards******June 30, 2019***

Note 1. Basis of Presentation

The accompanying schedule of expenditures of federal awards (the Schedule) includes the federal award activity of Clemson University (the University) and is presented on the accrual basis of accounting. The information in the Schedule is presented in accordance with the requirements of Title 2 U.S. Code of Federal Regulations Part 200, *Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards* (Uniform Guidance). Because the Schedule presents only a selected portion of the operations of Clemson University, it is not intended to and does not present the financial position, changes in net position, or cash flows of the University.

Note 2. Summary of Significant Accounting Policies for Federal Award Expenditures

Expenditures for student financial aid programs include the federal share of students' Federal Supplemental Educational Opportunity Grant (FSEOG) program grants and Federal Work Study (FWS) program earnings, certain other federal financial aid for students and administrative cost allowances, where applicable.

Expenditures for federal research and development programs are determined using the cost accounting principles and procedures set forth in either OMB Circular A-21, *Cost Principles for Educational Institutions* or in Uniform Guidance, as applicable, wherein certain types of expenditures are not allowable or are limited as to reimbursement.

Negative amounts shown on the Schedule represent adjustments or credits made in the normal course of business to amounts reported as expenditures in prior years.

Expenditures for nonfinancial aid awards include indirect costs, related primarily to facilities operation and maintenance and general, divisional and departmental administrative services, which are allocated to direct cost objectives (including federal awards) based on negotiated formulas commonly referred to as facilities and administrative cost rates. Facilities and administrative costs allocated to such awards for the year ended June 30, 2019, were based on predetermined fixed rates negotiated with the University's cognizant federal agency. The University has elected not to use the 10-percent de minimis indirect cost rate as allowed under the Uniform Guidance.

Note 3. Federal Perkins Loan Program (CFDA Number 84.038)

The Federal Perkins Loan Program is administered directly by the University and balances and transactions relating to the program are included in the University's financial statements. Federal expenditures reported on the face of the schedule include loans outstanding at the beginning of the year, loan cancellations, interest subsidies and administrative expenses. Due to the expiration of the Federal Perkins Loan Program on September 30, 2017, the University did not disburse any Perkins loans to students during the year ended June 30, 2019. The balance of loans outstanding under the Federal Perkins Loan Program was \$6,171,496 as of June 30, 2019.

Clemson University**Clemson, South Carolina***Notes to the Schedule of Expenditures of Federal Awards**June 30, 2019*

Note 4. Contingencies

The University receives funds under various federal grant programs and such awards are to be expended in accordance with the provisions of the various grants. Compliance with the grants is subject to audit by various government agencies which may impose sanctions in the event of non-compliance. Management believes that they have complied with all aspects of the various grant provisions and the results of adjustments, if any, relating to such audits would not have any material financial impact.

**Independent Auditor's Report on Internal Control Over Financial Reporting
and on Compliance and Other Matters Based on an Audit of
Financial Statements Performed in Accordance with
*Government Auditing Standards***

Members of the Board of Trustees
Clemson University
Clemson, South Carolina

We have audited, in accordance with the auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States, the financial statements of the business-type activities and discretely presented component units of Clemson University (the University), as of and for the year ended June 30, 2019, and the related notes to the financial statements, which collectively comprise the University's basic financial statements, and have issued our report thereon dated September 27, 2019. Our report includes a reference to other auditors who audited the financial statements of the Clemson University Foundation, the Clemson University Land Stewardship Foundation and IPTAY, as described in our report on Clemson University's financial statements. This report does not include the results of other auditors' testing of internal control over financial reporting or compliance and other matters that are reported on separately by those auditors. The financial statements of the Clemson University Foundation, the Clemson University Land Stewardship Foundation and IPTAY were not audited in accordance with *Government Auditing Standards*.

Internal Control over Financial Reporting

In planning and performing our audit of the financial statements, we considered the University's internal control over financial reporting (internal control) to determine the audit procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the University's internal control. Accordingly, we do not express an opinion on the effectiveness of the University's internal control.

A deficiency in internal control exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A *material weakness* is a deficiency, or a combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected on a timely basis. A *significant deficiency* is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies. Given these limitations, during our audit we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses may exist that have not been identified.

Compliance and Other Matters

As part of obtaining reasonable assurance about whether the University's financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the determination of financial statement amounts. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion. The results of our tests disclosed instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards* and which are described in the accompanying schedule of findings and questioned costs as items 2019-001 and 2019-002.

University's Response to Findings

The University's response to the findings identified in our audit is described in the accompanying schedule of findings and questioned costs. The University's response was not subjected to the auditing procedures applied in the audit of the financial statements and, accordingly, we express no opinion on it

Purpose of this Report

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the entity's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the entity's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.



Greenville, South Carolina
September 27, 2019

**Independent Auditor's Report on Compliance for
Each Major Federal Program; Report on Internal Control Over
Compliance; and Report on the Schedule of Expenditures of
Federal Awards Required by the Uniform Guidance**

Members of the Board of Trustees
Clemson University
Clemson, South Carolina

Report on Compliance for Each Major Federal Program

We have audited Clemson University's (the University) compliance with the types of compliance requirements described in the *OMB Compliance Supplement* that could have a direct and material effect on each of the University's major federal programs for the year ended June 30, 2019. The University's major federal programs are identified in the summary of auditor's results section of the accompanying schedule of findings and questioned costs.

Management's Responsibility

Management is responsible for compliance with federal statutes, regulations, and the terms and conditions of its federal awards applicable to its federal programs.

Auditor's Responsibility

Our responsibility is to express an opinion on compliance for each of the University's major federal programs based on our audit of the types of compliance requirements referred to above. We conducted our audit of compliance in accordance with auditing standards generally accepted in the United States of America; the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States; and the audit requirements of Title 2 *U.S. Code of Federal Regulations Part 200, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards* (Uniform Guidance). Those standards and the Uniform Guidance require that we plan and perform the audit to obtain reasonable assurance about whether noncompliance with the types of compliance requirements referred to above that could have a direct and material effect on a major federal program occurred. An audit includes examining, on a test basis, evidence about the University's compliance with those requirements and performing such other procedures as we considered necessary in the circumstances.

We believe that our audit provides a reasonable basis for our opinion on compliance for each major federal program. However, our audit does not provide a legal determination of the University's compliance.

Opinion on Each Major Federal Program

In our opinion, the University complied, in all material respects, with the types of compliance requirements referred to above that could have a direct and material effect on each of its major federal programs for the year ended June 30, 2019.

Other Matters

The results of our auditing procedures disclosed instances of noncompliance which are required to be reported in accordance with the Uniform Guidance and which are described in the accompanying schedule of findings and questioned costs as item 2019-001 and 2019-002. Our opinion on each major federal program is not modified with respect to these matters.

The University's response to the noncompliance findings identified in our audit is described in the accompanying schedule of findings and questioned costs. The University's response was not subjected to the auditing procedures applied in the audit of compliance and, accordingly, we express no opinion on the response.

Report on Internal Control Over Compliance

Management of the University is responsible for establishing and maintaining effective internal control over compliance with the types of compliance requirements referred to above. In planning and performing our audit of compliance, we considered the University's internal control over compliance with the types of requirements that could have a direct and material effect on each major federal program to determine the auditing procedures that are appropriate in the circumstances for the purpose of expressing an opinion on compliance for each major federal program and to test and report on internal control over compliance in accordance with Uniform Guidance, but not for the purpose of expressing an opinion on the effectiveness of internal control over compliance. Accordingly, we do not express an opinion on the effectiveness of the University's internal control over compliance.

A deficiency in internal control over compliance exists when the design or operation of a control over compliance does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, noncompliance with a type of compliance requirement of a federal program on a timely basis. *A material weakness in internal control over compliance* is a deficiency, or combination of deficiencies, in internal control over compliance, such that there is a reasonable possibility that material noncompliance with a type of compliance requirement of a federal program will not be prevented, or detected and corrected, on a timely basis. *A significant deficiency in internal control over compliance* is a deficiency, or a combination of deficiencies, in internal control over compliance with a type of compliance requirement of a federal program that is less severe than a material weakness in internal control over compliance, yet important enough to merit attention by those charged with governance.

Our consideration of internal control over compliance was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control over compliance that might be material weaknesses or significant deficiencies and therefore, material weaknesses or significant deficiencies may exist that have not been identified. We did not identify any deficiencies in internal control over compliance that we consider to be material weaknesses. However, we did identify a certain deficiency in internal control over compliance, described in the accompanying schedule of findings and questioned costs as item 2019-001 that we consider to be a significant deficiency.

The University's response to the internal control over compliance findings identified in our audit is described in the accompanying schedule of findings and questioned costs. The University's response was not subjected to the auditing procedures applied in the audit of compliance and, accordingly, we express no opinion on the response. The purpose of this report on internal control over compliance is solely to describe the scope of our testing of internal control over compliance and the results of that testing based on the requirements of the Uniform Guidance. Accordingly, this report is not suitable for any other purpose.

Report on Schedule of Expenditures of Federal Awards Required by the Uniform Guidance

We have audited the financial statements of the business-type activities and the aggregate discretely presented components of the University, a component unit of the State of South Carolina, as of and for the year ended June 30, 2019, and the related notes to the financial statements, which collectively comprise the University's basic financial statements. We issued our report thereon dated September 27, 2019, which contained unmodified opinions on those financial statements. We did not audit the financial statements of the Clemson University Foundation (a discretely presented component unit), the Clemson University Land Stewardship Foundation (a discretely presented component unit), and IPTAY (a discretely presented component unit). Those statements were audited by other auditors whose reports have been furnished to us, and our opinions, insofar as they relate to the amounts included for these discretely presented components units, are based solely on the reports of the other auditors. Our audit was conducted for the purpose of forming opinions on the financial statements as a whole. The accompanying schedule of expenditures of federal awards is presented for purposes of additional analysis as required by the Uniform Guidance and is not a required part of the basic financial statements. Such information is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the basic financial statements. The information has been subjected to the auditing procedures applied in the audit of the financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the schedule of expenditure of federal awards is fairly stated in all material respects in relation to the basic financial statements as a whole.



Greenville, South Carolina

October 1, 2019

Clemson University
Clemson, South Carolina
Schedule of Findings and Questioned Costs
For the year ended June 30, 2019

Section I. Summary of Auditor's Results

Financial Statements

Type of report the auditor issued on whether the financial statements were prepared in accordance with GAAP: Unmodified

Internal control over financial reporting:

- Material weakness identified? _____ yes X no
- Significant deficiency identified? _____ yes X none reported

Noncompliance material to financial statements noted? _____ yes X no

Federal Awards

Internal control over major federal programs:

- Material weakness identified? _____ yes X no
- Significant deficiency identified? X yes _____ none reported

Type of auditor's report issued on compliance for major federal programs: Unmodified

Any audit findings disclosed that are required to be reported in accordance with 2 CFR 200.516 (a)? X yes _____ no

Identification of major federal programs:

<u>CFDA Numbers</u>	<u>Name of federal program or cluster</u>
10.RD; 11.RD; 12.RD; 15.RD; 16.RD; 17.RD; 19.RD; 20.RD; 43.RD; 45.RD; 47.RD; 62.RD; 64.RD; 66.RD; 77.RD; 81.RD; 84.RD; 93.RD; 94.RD	Research and Development Cluster

Dollar threshold used to distinguish between Type A and Type B Programs \$3,000,000

Auditee qualified as low-risk auditee? X yes _____ no

Section II. Financial Statement Findings

None reported

Section III. Federal Award Questioned Costs and Findings

Finding 2019-001 Procurement, Suspension and Debarment

Federal Agency: Various

Program: Research and Development Cluster

Criteria or Specific Requirement: Non-Federal entities are prohibited from contracting with or making subawards under covered transactions to parties that are suspended or debarred. "Covered transactions" include contracts for goods and services awarded under a non-procurement transaction (e.g., grant or cooperative agreement) that are expected to equal or exceed \$25,000 or meet certain other criteria as specified in 2 CFR section 180.220. All non-procurement transactions entered into by a pass-through entity (i.e., subawards to subrecipients), irrespective of award amount, are considered covered transactions, unless they are exempt as provided in 2 CFR section 180.215.

When a non-Federal entity enters into a covered transaction with an entity at a lower tier, the non-Federal entity must verify that the entity, as defined in 2 CFR section 180.995 and agency adopting regulations, is not suspended or debarred or otherwise excluded from participating in the transaction. This verification may be accomplished by (1) checking the *Excluded Parties List System (EPLS)* maintained by the General Services Administration (GSA) and available at <https://governmentcontractregistration.com/sam-registration-and-renewal/>, (2) collecting a certification from the entity, or (3) adding a clause or condition to the covered transaction with that entity (2 CFR section 180.300).

Condition/Context: The University did not have sufficient controls in place during the year to meet the Uniform Guidance requirements discussed above. While the University did have controls covering the applicable suspension and debarment provisions for subrecipient transactions, there were no such controls in place over other covered transactions. There was no control in place to verify whether all vendors contracted for covered transactions were suspended or debarred, nor was there a certification, clause or condition meeting the requirements of 2 CFR section 180.300 included in the University's standard contracts executed under covered transactions. During our testing of this program for the fiscal year ended June 30, 2019, we selected five vendors out of a population of 46 and found no evidence the University had complied with Uniform Guidance requirements regarding suspension and debarment verification for any of the vendors in our sample. The sample was not statistically valid. No vendors selected in our test work were listed as suspended or debarred.

Questioned Costs: None; no vendors in our samples were listed as suspended or debarred.

Clemson University
Clemson, South Carolina
Schedule of Findings and Questioned Costs
For the year ended June 30, 2019

Finding 2019-001, continued

Effect: The University is at risk of entering into a covered transaction with an entity that is debarred, suspended, or otherwise excluded.

Cause: The University's policies regarding procurement, suspension, and debarment were not compared to Uniform Guidance to ensure all elements were incorporated.

Recommendation: Control procedures should be implemented to ensure that all vendors under covered transactions are checked against the federal website for vendors that could be suspended or debarred prior to transacting with such vendors or another process as allowed by the federal regulations discussed above.

Views of Responsible Officials: Management concurs with the auditor's recommendation. The University has taken immediate steps to comply with 2CFR 180 and has implemented or is in process of implementing the following actions:

1. As part of the University's Standard Terms of Purchase, effective August 2019, the "Contractor certifies its organization or principals are not debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency from doing business with the Federal Government or by the State of South Carolina. If Contractor or principal becomes debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded during this contract, then University may, at its option, terminate the contract."
2. The University is in the process of purchasing the software "Visual Compliance" to integrate with the Jaggaer procurement system. In addition to the step taken in action 1 above, the integration will provide active monitoring of vendors to ensure compliance. Anticipated completion December 1, 2019.
3. To ensure that the University has not entered into any covered transaction with a debarred or suspended vendor using federal funds, a review was performed for covered transactions on Federal awards incurred over the past three fiscal years. Our review indicated that no debarred or suspended vendors were engaged with Federal funds.

Finding 2019-002 **Period of Performance**

Federal Agency: National Science Foundation

Program: Research and Development Cluster

Criteria or Specific Requirement: Under 2 CFR section 200.309, "A non-Federal entity may charge to the Federal award only allowable costs incurred during the period of performance (except as described in § 200.461 Publication and printing costs) and any costs incurred before the Federal awarding agency or pass-through entity made the Federal award that were authorized by the Federal awarding agency or pass-through entity."

Clemson University
Clemson, South Carolina
Schedule of Findings and Questioned Costs
For the year ended June 30, 2019

Finding 2019-002, continued

Condition/Context: In a sample of 28 awards tested with a period of performance ending within the fiscal year, we found 2 awards with expenditures incurred after the period of performance had ended. Total costs incurred outside the period of performance for these 2 awards was \$15,632. Total expenditures reported on the SEFA for the projects tested in our sample was \$1,483,109 for the year ended June 30, 2019. The sample was not statistically valid. Total expenditures reported on the SEFA for all projects with a period of performance end date during the fiscal year were \$11,412,824. These costs were primarily payroll costs that were incurred after the end date and the related facilities and administrative cost recovery charged as a result of the incorrect payroll costs being included in the cost recovery base.

CFDA	Program	Federal Grant Number	Federal Expenditures during the Year	Questioned Costs
47.RD	III: CGV: Medium: Collaborative Research: Computational Design and 3D Printing of Textiles	1722997	\$14,207.15	\$14,207.15
47.RD	CloudLab: Flexible Scientific Infrastructure to Support Fundamental Advances in Cloud Architectures and Applications	PO# 166490 10034358-CLEM	\$7,575.84	\$1,425.21

Questioned Costs: Known questioned costs of \$15,632

Effect: Expenditures charged to a Federal award that were not incurred during the authorized period of performance could be subject to disallowance by the Federal grantor agency.

Clemson University
Clemson, South Carolina
Schedule of Findings and Questioned Costs
For the year ended June 30, 2019

Finding 2019-002, continued

Cause: In discussing these findings with University officials, the identified errors were a result of a manual override to the preventative system controls in place to ensure expenses could not be charged to an award after the period of performance had ended. The University had processes in place requiring College post-award grant specialists and administrators to verify charges as appropriate to the grant. In the more significant (by dollar value) of the two cases, the College post-award grant specialist confirmed charges were appropriate to the grant when actually the summer pay was outside the project performance period. In the same incident, the University grant administrators failed to perform the financial compliance review as part of their closeout process. Both individuals involved are no longer working in grants administration. At the time of both errors, secondary reviews of final financial documents and award close-out were not in place to verify that expense postings were appropriate to the award's period of performance.

Recommendation: We recommend the University review its current processes to identify any additional procedures necessary to ensure expenditures are within the period of performance.

Views of Responsible Officials: Existing system controls are in place within the PeopleSoft Financial System to prevent charges from posting to a sponsored project after its end date unless manually overridden and approved by a Central University-Level Grants Administrator. To strengthen the control processes, internal procedures were updated in March 2019 to include secondary reviews to be performed on all final reports and invoices. The purpose of this review is to ensure that the verification of expenditures had been properly performed to be within project dates and to improve the overall accuracy of the report. In response to the expenditures incurred on the two identified awards, corrective action has been taken by the institution to refund the sponsors.