PennState
College of Agricultural Sciences

AgScience

RESEARCH

Ensure a safe, affordable and abundant food supply

Utilize our air, water, and soils sustainably

Intersection of Human, Agricultural and Life Sciences

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Topics for Discussion

- Pennsylvania Agriculture
- College of Agricultural Sciences
  - Ag Experiment Station
  - Graduate Education
- Research Administration vs. Development
- Priorities and Directions
- Future Challenges

Pennsylvania Agriculture – Statistics

- 59,000 farms and 9,000,000 acres (mostly small-medium size)
- ~16 million acres of forest land or 57% of total
- 4th largest producer of food products in U.S.
- Livestock products account for 69% of farm income
- Highest proportion of farmers under the age of 35

Team PA Economic Study (2021)

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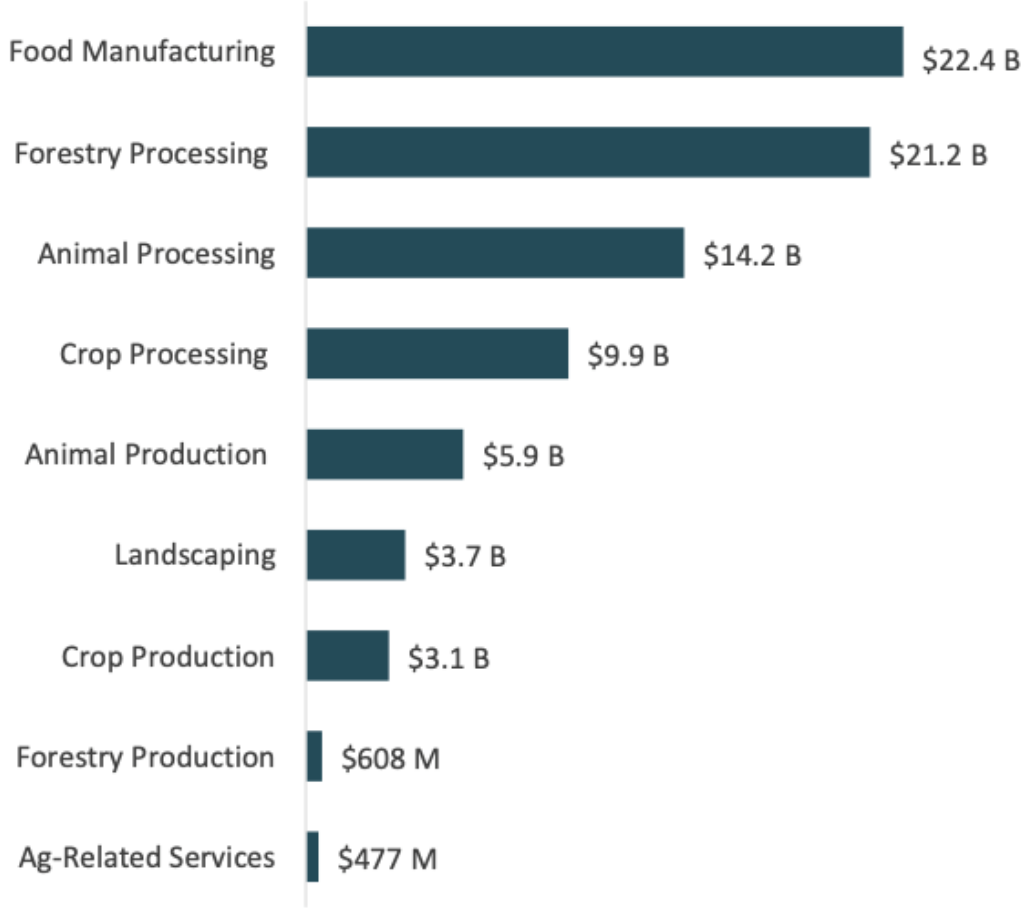
Economics of Pennsylvania - Agriculture

- Total direct economic output of $81.5 billion (3% decline since 2018)
- Agriculture contributes $1 out of every $16 in gross state product
- Every dollar of direct output generates $0.63 in additional economic activity
- Agriculture supports 1 out of every 10 jobs in Pennsylvania



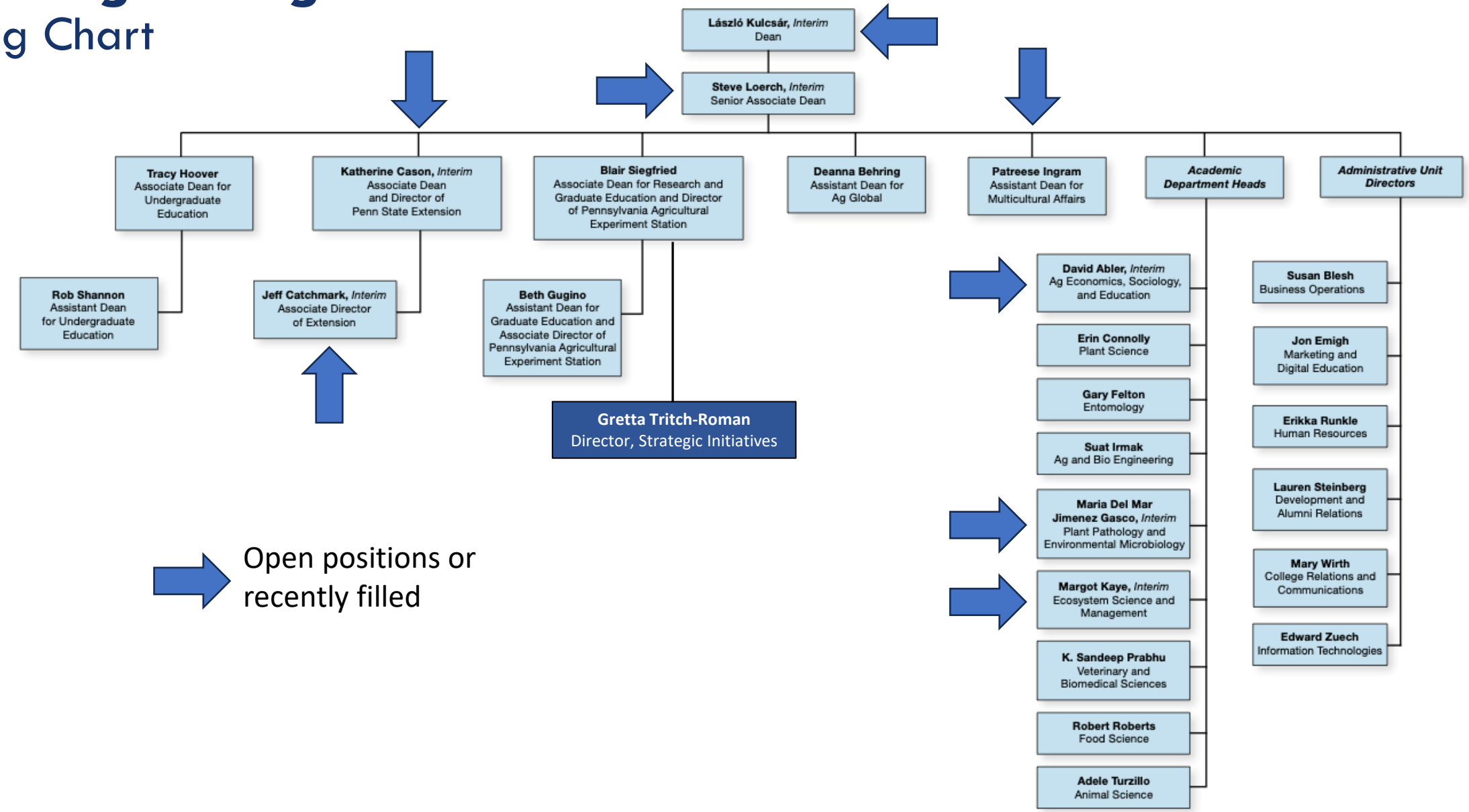
Sources: IMPLAN (2019), ESI (2021)

Pennsylvania Agriculture - National Rankings

- 1st in mushroom production
- 1st in hardwood lumber harvest
- 3rd in organic sales
  - 167% increase in last decade
- 4th in poultry
- 4th in dairy
- 4th in Christmas trees
- 5th in apples
- 5th in grapes
- 7th in number of

College of Ag Sciences

Org Chart



Open positions or recently filled

College of Agricultural Sciences - Stats

- 9 Academic Departments
  - Agricultural Economics, Sociology and Education
  - Agricultural and Biological Engineering
  - Animal Science
  - Plant Science
  - Entomology
  - Plant Pathology and Environmental Microbiology
  - Ecosystem Sciences and Management
  - Food Science
  - Veterinary and Biomedical Science

2022

College of Agricultural Sciences

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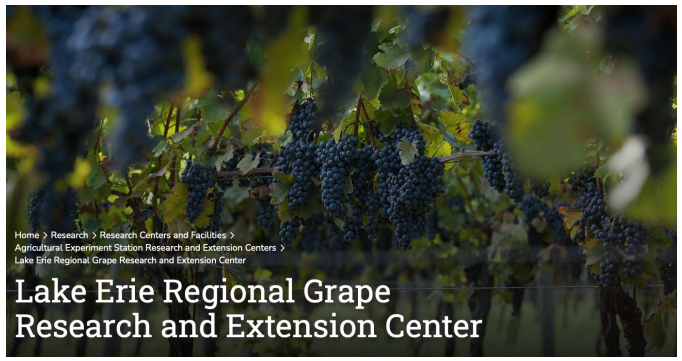
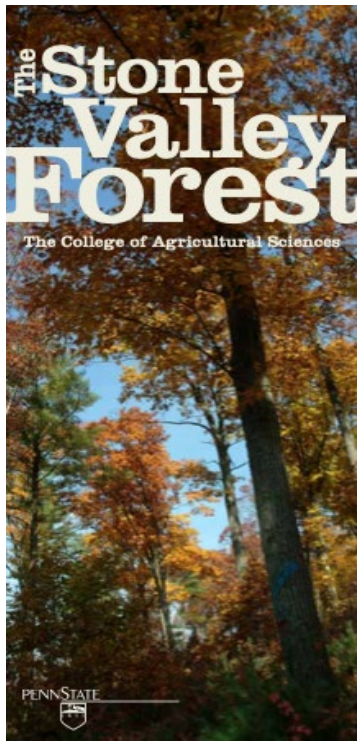
Field Sites & Facilities



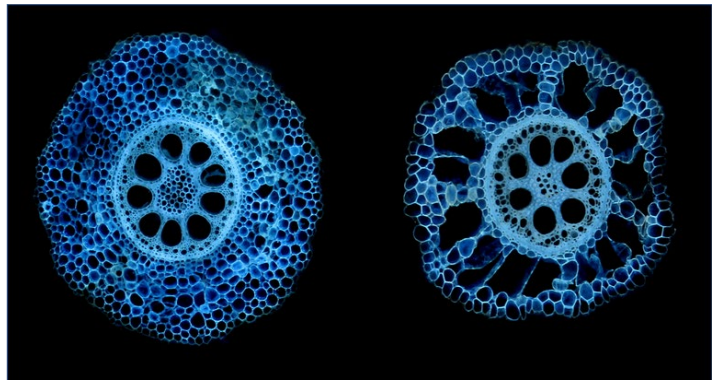


Departmental Facilities

- Beef sheep center
- Chemical Ecology Lab
- Swine Educ. and Research Center
- Horse and Dairy Barns
- Deer Research Center
- Dry and Wet Pilot Plants
- Food Safety Pilot Plant
- Joseph E. Valentine Turfgrass Research Facility
- Mushroom Research Center
- Poultry Education and Research Center
- Greenhouses and plant growth facilities

Interdisciplinary Research Institutes

- **Interdisciplinary Research Institutes**
  - Huck Institute for Life Sciences
    - ✓ Center for Root and Rhizosphere Biology
    - ✓ Center for Chemical Ecology
    - ✓ One Health and Microbiome Center
    - ✓ Center for Pollinator Research
  - Institute for Energy and the Environment
  - Social Sciences Research Institute
  - Materials Research Institute



Center for Pollinator Research

Administrative Responsibilities of the Office for Research & Grad Ed

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Agricultural Experiments Station (AES)

- Plan for and report on AES capacity grant projects
- Coordinate with college Administrative Services for federal appropriations
- Provide leadership to Research and Extension Centers (dual reporting line)
- Liaison with USDA NIFA

Graduate Education

- Allocate GIA and GA
- Administer recruitment fellowships and awards
- Coordinate endowed awards for graduate education
- Liaison with Penn State Graduate School

Miscellaneous

- Oversee Office of Grants and Contracts (pre and post award)
- Administer grant matching requests
- Emeritus and Retired Faculty MOUs
- Research Civil Rights
- STEM-OPT
- **COMPLIANCE**

AES Plan of Work and Current Research Projects

administered by AES staff in the Office for Research and Graduate Education

260
Active AES Projects

6
Critical issues submitted as a part of the Plan of Work

~270
Faculty with research appointments

~184
Research FTEs in the college

Only faculty with research appointments (TT and NTT) and considered independent researchers are required to have an AES project.

1. Biologically Based Materials and Products
2. Advancing Agricultural and Food Systems
3. Environmental Resilience
4. Integrated Health Solutions
5. Global Engagement
6. Community Resilience and Capacity

Federal Capacity Grants and Pennsylvania Agricultural Land Scrip Funds

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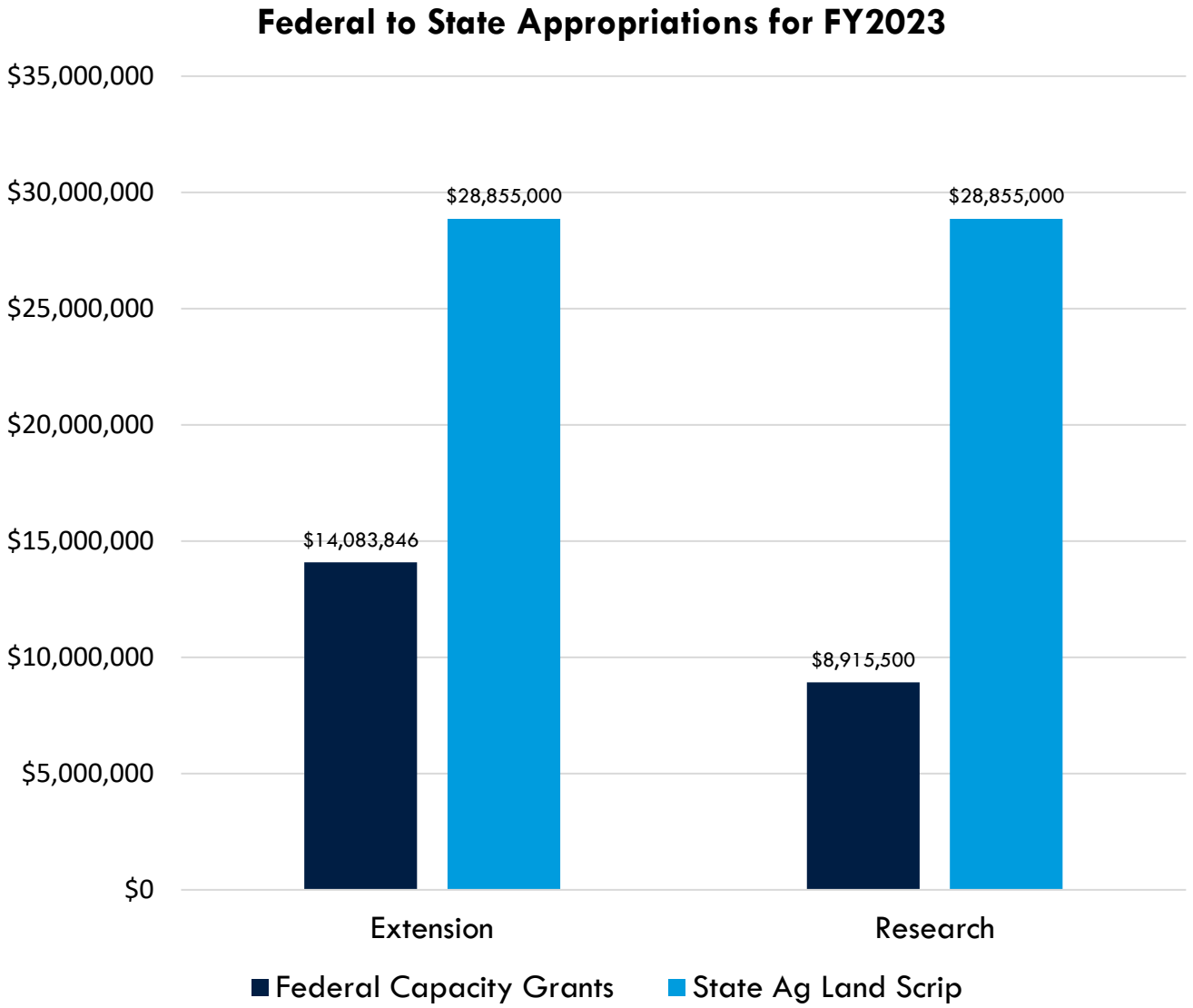
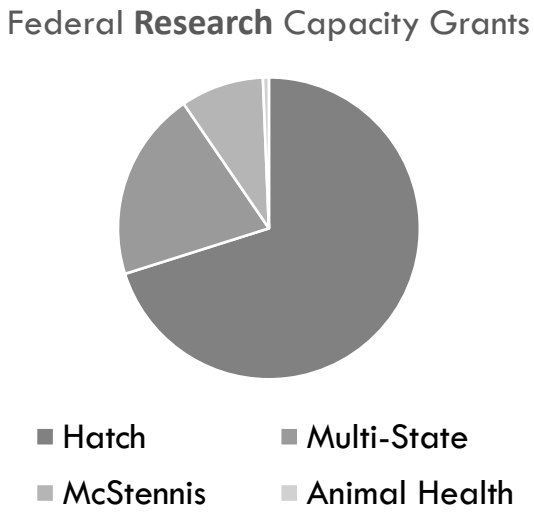
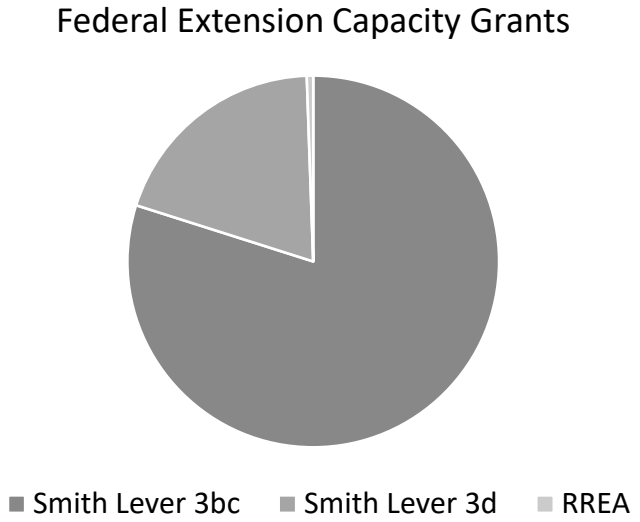
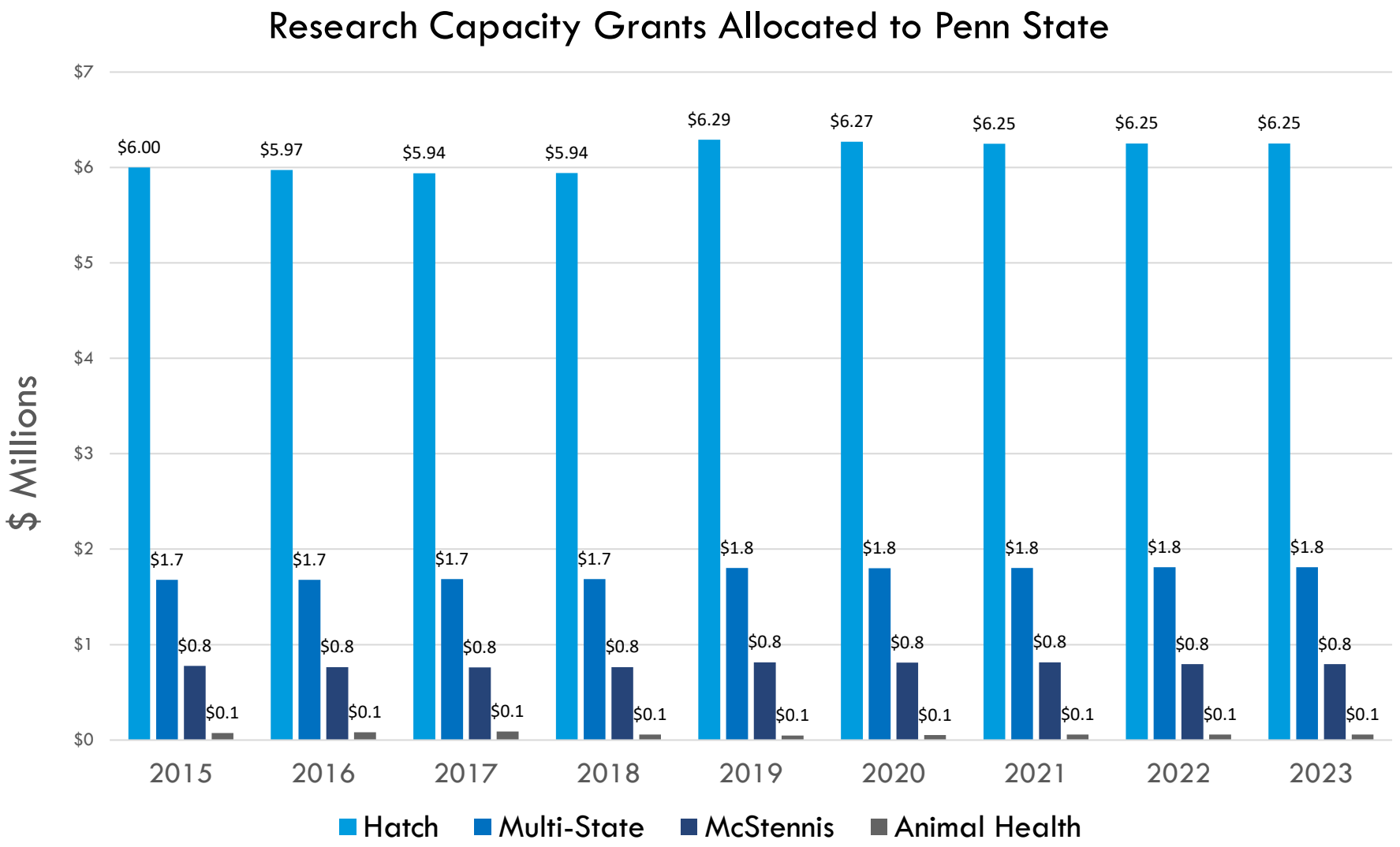






Research Capacity Grant Programs

trend across the last several years in federal appropriations



Receive capacity funding to support **four research programs** :

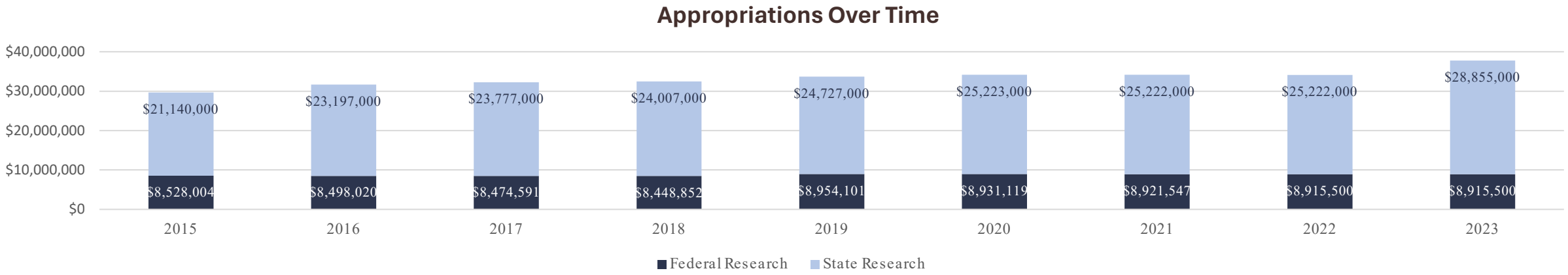
- Hatch
- Hatch Multistate (25% of the total Hatch allocation)
- McIntire-Stennis
- Animal Health and Disease Research

Hatch funding in FY22 comparable to:

- Texas A&M
- North Carolina State
- Ohio State

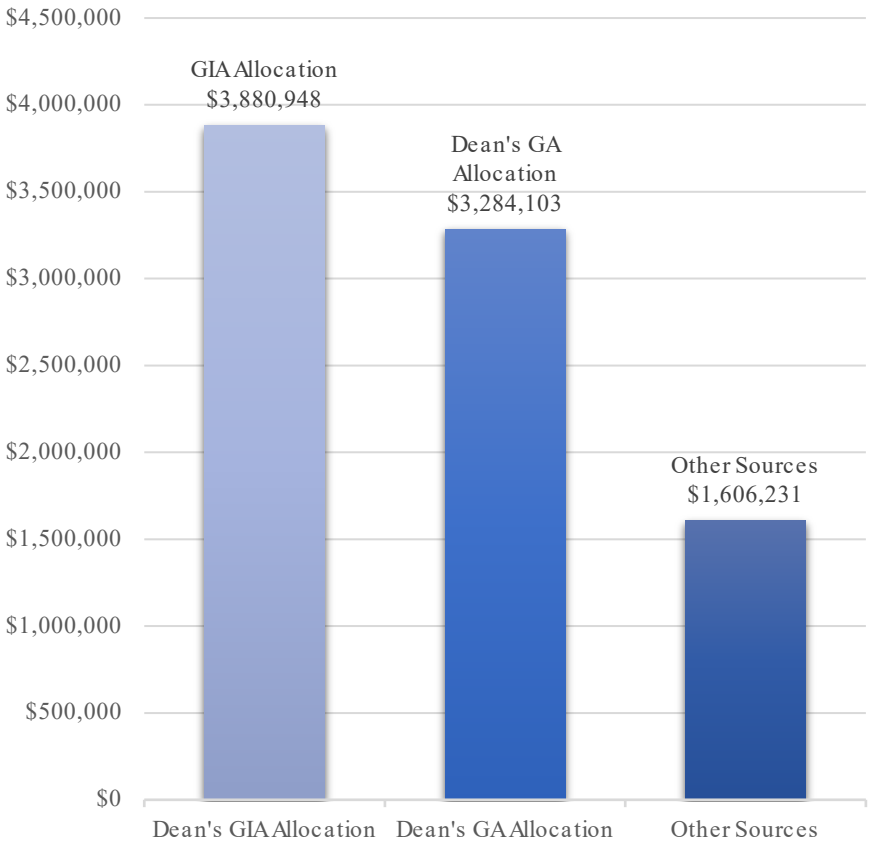
State and Federal Appropriations

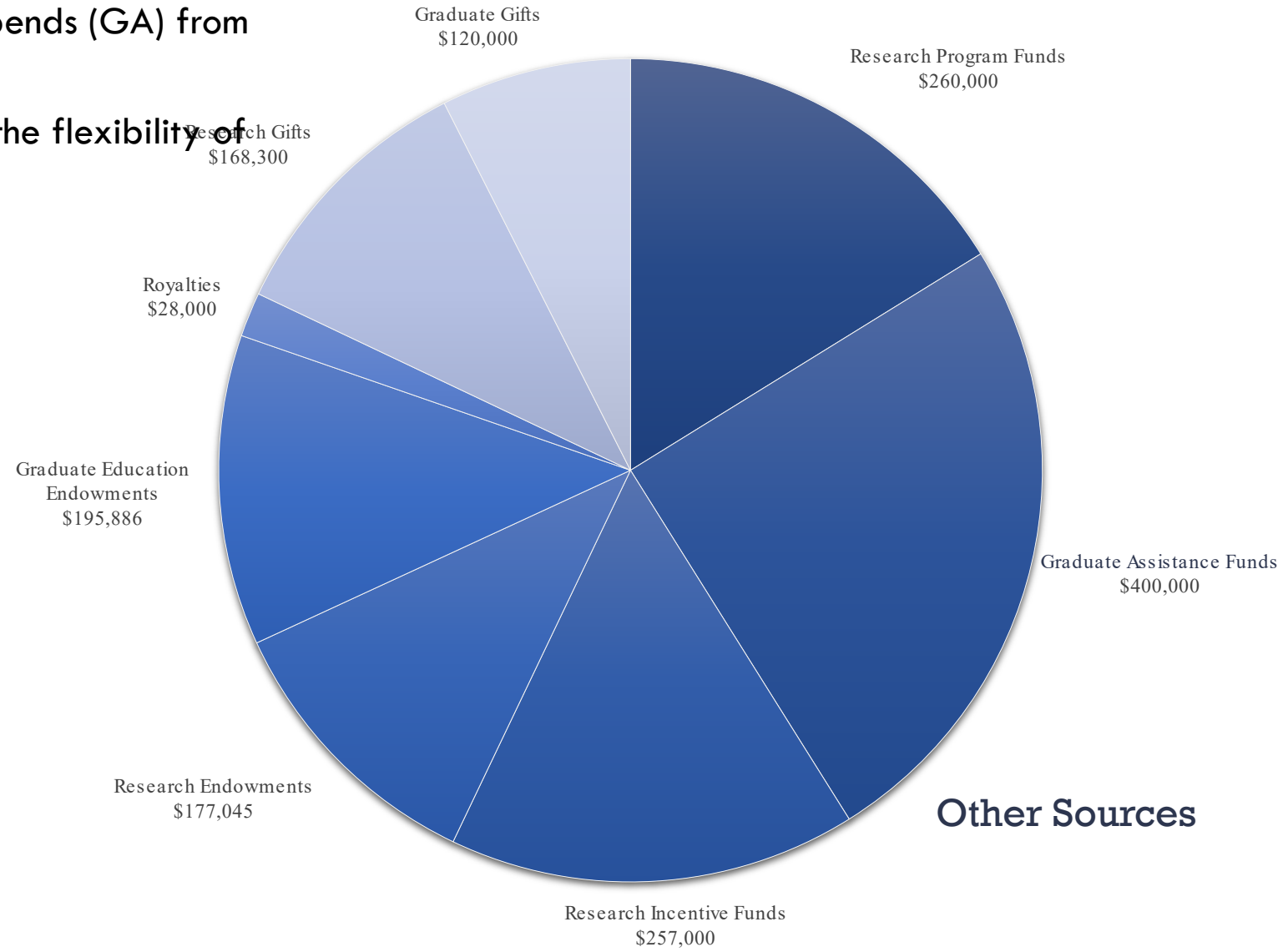
- CoAS responsible for administering the federal appropriations from the four capacity grant programs.
- The Commonwealth of PA supports agricultural research through the separate line of the **Agricultural Land Scrip fund.**
  - These funds are used for the required match for our federal appropriations and other college operations.
- Both funding lines **<u>are primarily used to support faculty and staff salaries</u>** **(~90%)** **<u>and Dept allocations</u>**.
  - **<u>Only a small portion of these funds are available to us to use strategically.</u>**



Overview of State and Federal Funding

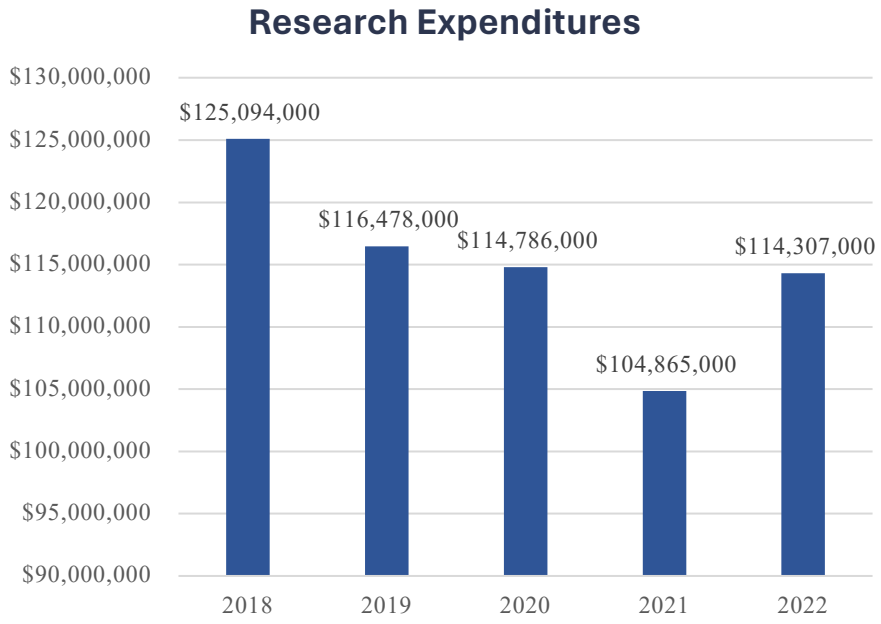
- Largest funding source is from the grad school to support tuition (GIA) and from college to support stipends (GA) from Land Scrip
- Other sources can vary year to year and in the flexibility of their use

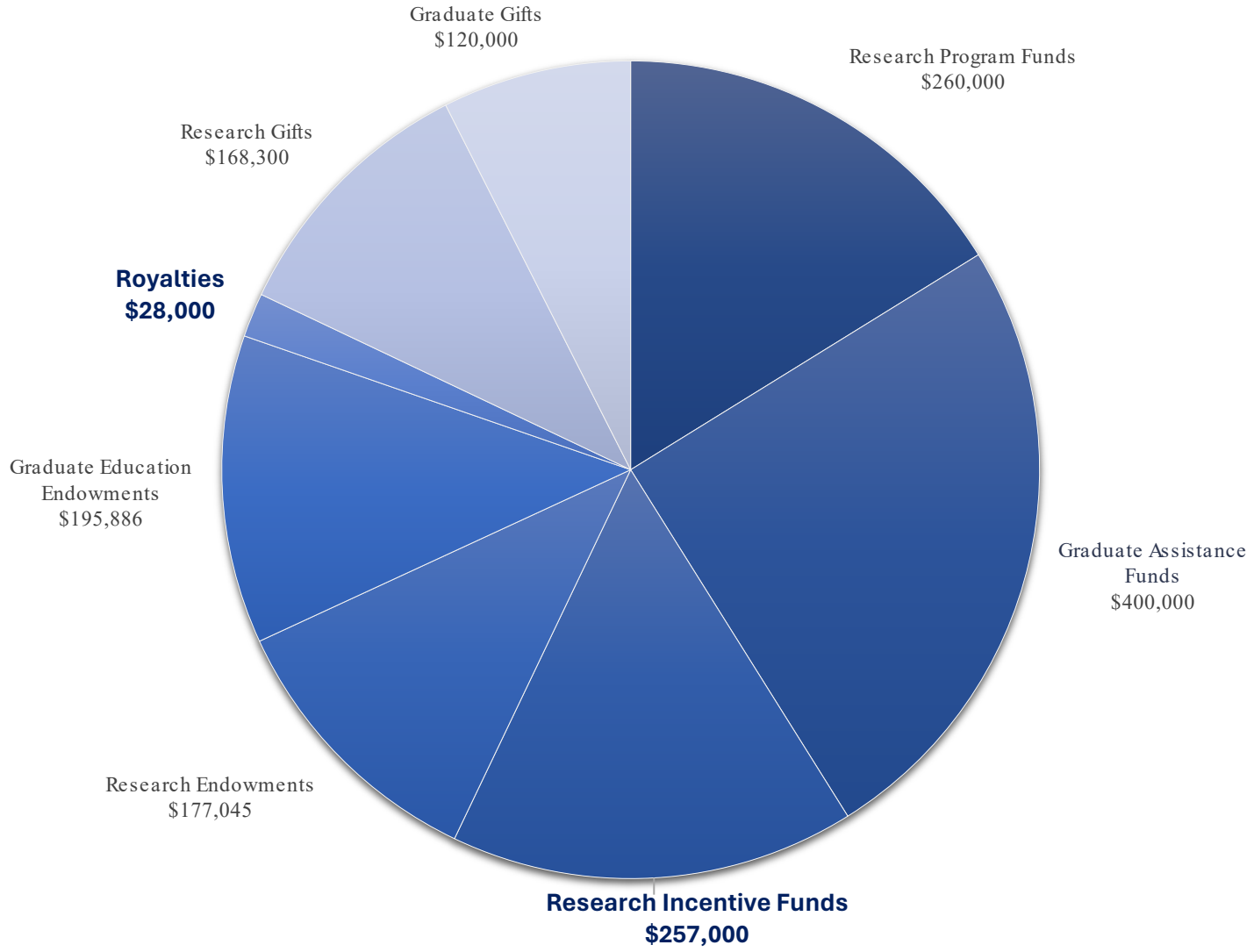




Funds Based on Performance

- The amount of these funds varies year to year.
- Research Incentive Funds (RIF) are derived from the indirect costs (F&A) returned to the college
  - **12%** of F&A with rates >15% are returned to the college (**9% to departments; 3% to RGE**)
- RIF fluctuates with research expenditures each year.
- RIF used to support internal grant programs
- Royalties used for support of innovation program

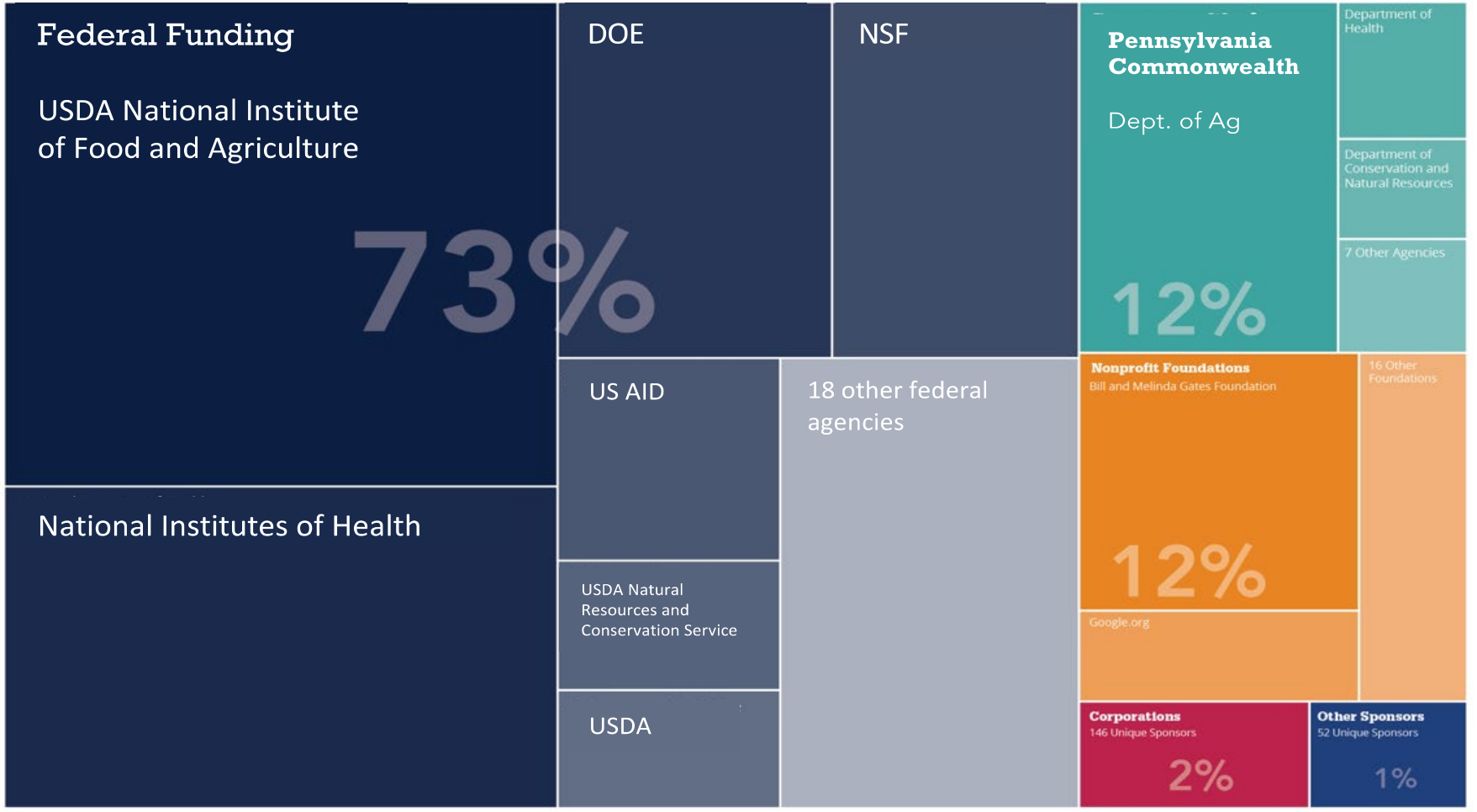




Competitive Awards

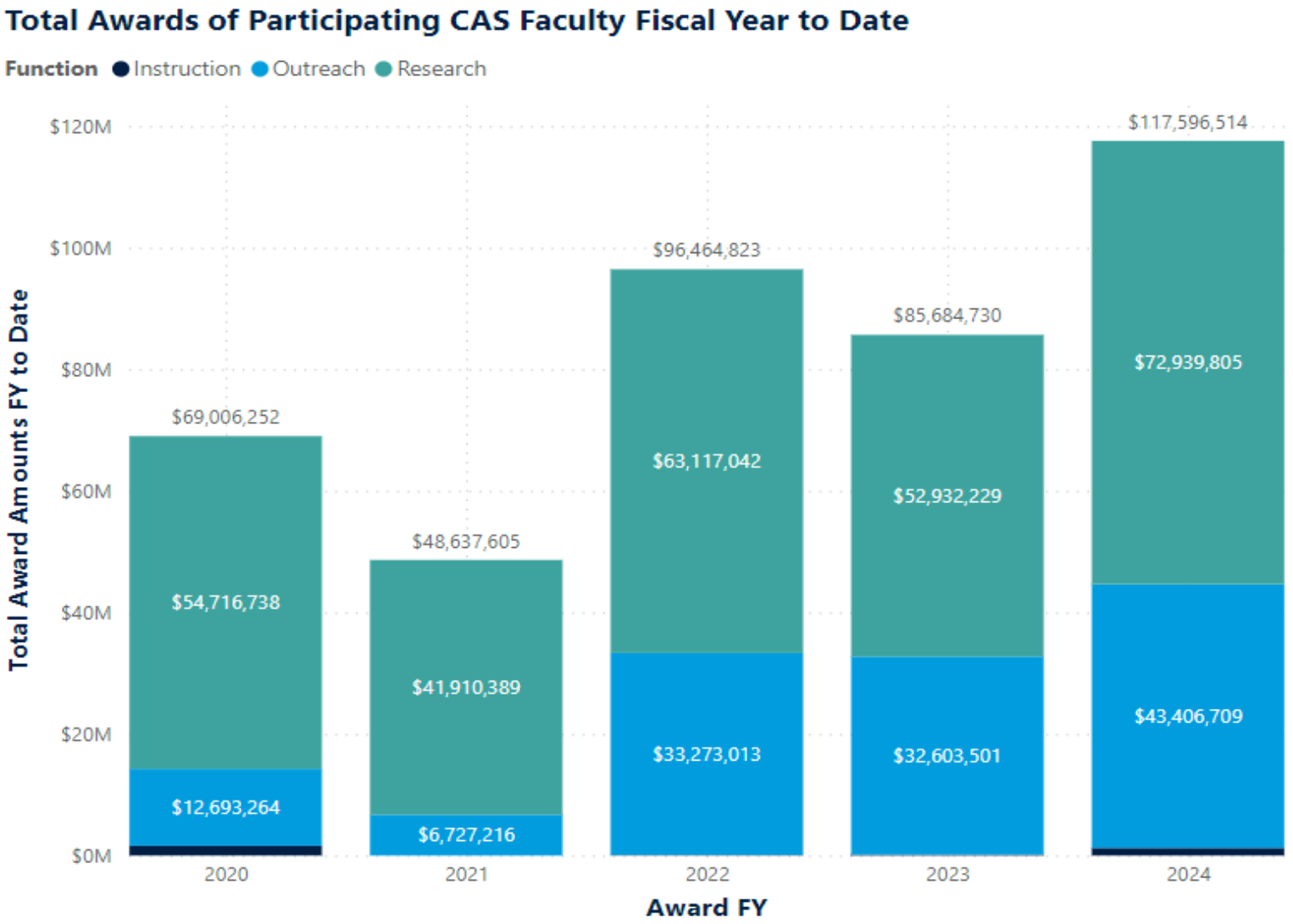
- Faculty in the college were awarded extramural grants totaling **$133.75**
- Research awards accounted the largest portion and hit a high mark of **$95 million.**

Fiscal Year 2022



Competitive Awards

- The College is on track to have an all-time high record of total awards, with **$117.6 million** by January 31, 2024.



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Graduate Education

"Recognition that successful research depends on a successful graduate program and commitment to professional development and mentoring."

Research Development & Research Administration

College of Ag Sciences; Research Development

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Research Development Pillars

Strategic Research Advancement

- Research priorities
- Strategic planning
- Adviser/consultant
- Internal funding
- Internal and external liaison (gov't relations, agencies, industry, etc.)
- Engagement and translation (broader impacts)

Team Science

- Convene multidisciplinary groups
- Sponsor/organize research events
- Maintain database of expertise
- Facilitate collaborations within and beyond institution
- Concierge services

Communication

- Manage marketing of research
- Raise profile of strengths
- Metric tracking
- Disseminate funding opportunities
- Workshops for professional development

Proposal Support

- Coach/assist in finding opportunities
- Assist with navigating institutional structures
- Proposal development for large proposals
- Critical reviews
- Liaison with funding agencies
- Competitive intelligence

Pixabay

Strategic Research Advancement

Internal Funding | Collaborative Research and Team Science

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Strategic Networks and Initiatives Program (SNIP)

- Three levels of funding (Launch, Pursuit, Cohort)
- Provides funds for **network building activities** that aren't usually a part of a grant
- Supports teams in the **preliminary work** toward a large-scale grant that requires an interdisciplinary team
- **Reinvests** the college's money in supporting faculty research

https://agsci.psu.edu/research/resources/funding/

Strategic Research Advancement

Internal Funding | Collaborative Research

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Science to Practice (S2P)

- Grants that are renewable for up to three years
- Builds **collaborative and integrated** research & extension teams
- Supports **applied research-based activities** that prioritize the development of **collaborative networks**
- Increases competitiveness for integrated extramural funding

Forest Carbon and Climate Change Adaptation & Mitigation Team

https://agsci.psu.edu/research/resources/funding/

Strategic Research Advancement

Internal Funding | Research Commercialization

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Research Applications for Innovation (RAIN)

- Helps investigators explore the **feasibility of commercializing** their research
- Can be used to take the next steps in **transitioning technologies** generated through research to commercialization
  - To overcome hurdles faced in the process
  - To validate commercial application of a technology
  - To strengthen the IP position with further testing and data collection

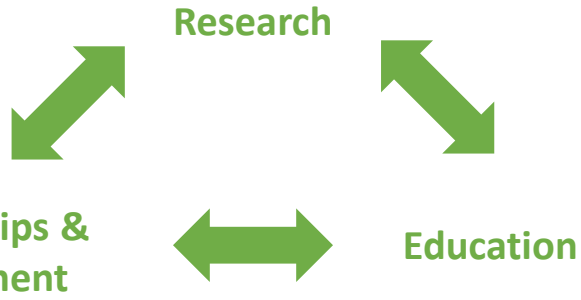
ConidioTec
Natural Urban Pest Control

Beating Bed Bugs

https://agsci.psu.edu/research/resources/funding/

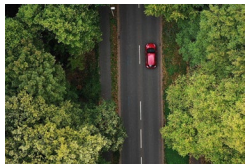
Team Science

Institute for Sustainable Agricultural, Food, and Environmental Science (SAFES)



Critical Issue Initiatives

Agricultural Sustainability in Urbanized Landscapes

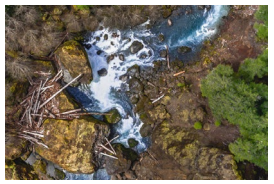


Bioeconomy Solutions

Stakeholder Engagement Science and Practice

Contaminants of Emerging Concern

Food Choice & Health



Managing Earth's Critical Zone

Precision Biodiversity

Regenerative and Climate-Smart Landscapes

Transformative Water Quality Strategies

SAFES is based on a science-to-practice model where a transdisciplinary network of investigators, students, and stakeholders engage in an iterative co-production of knowledge – "shared discovery."

https://agsci.psu.edu/safes

Communication

Positioning Research
& Building an Identity

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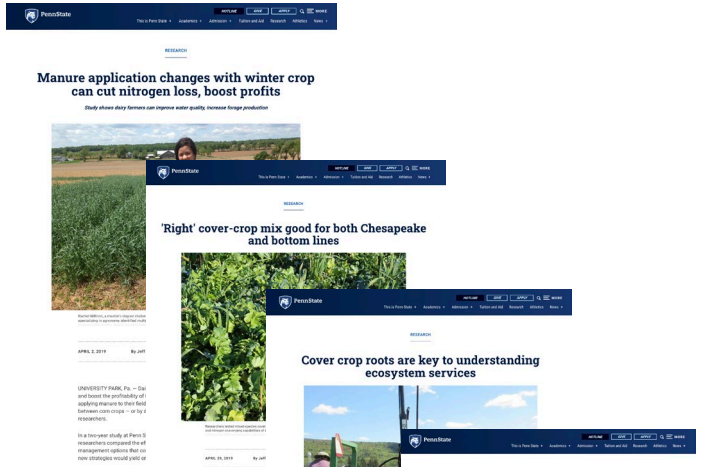
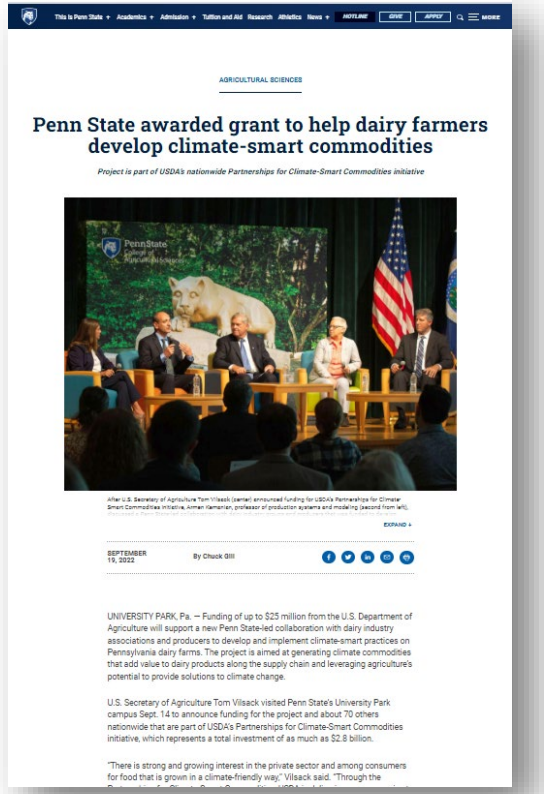
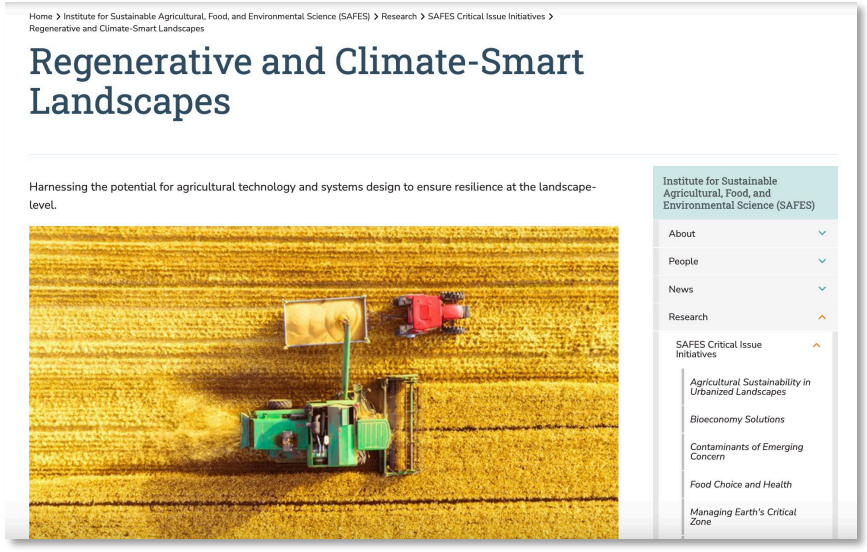
Climate-smart Agriculture and Forestry







Proposal Strategy

Collecting competitive intelligence

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https://www.nifa.usda.gov/about-nifa/what-we-do/nifa-strategic-plan-fiscal-years-2022-2026

https://www.usda.gov/sites/default/files/documents/usda-science-research-strategy.pdf

https://www.nsf.gov/pubs/2022/nsf22068/nsf22068.pdf

College Research Priority Areas

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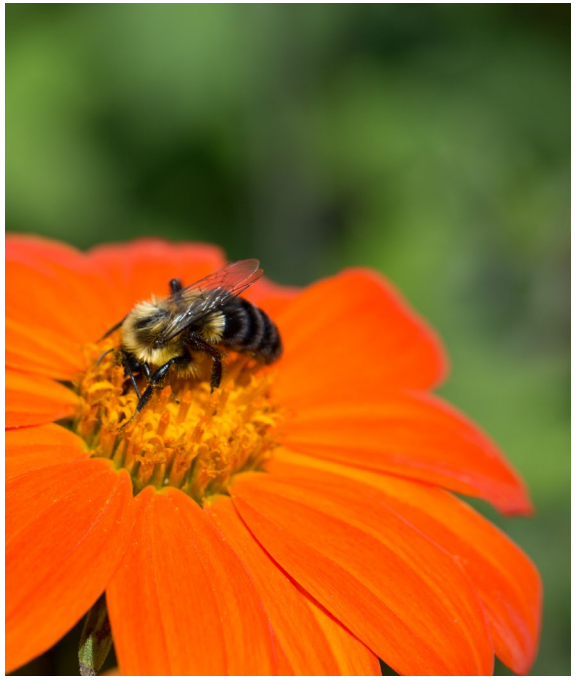
Biodiversity

Research strengths

- Pollinator health (native and non-native)
- Microbiome (soils, plants, animals)
- Invasives species (insects, plants, animals, microbial)
- Conservation genetics (wildlife, forests, pollinators)



College Research Priority Areas

Biodiversity

Example

- **Center for Pollinator Research (Christina Grozinger, director)**
  - Interdisciplinary researchers partnering with PA Department of Agriculture, private industry, statewide associations, and non-profit organizations
  - Successful in obtaining millions of dollars in grants to support research discovery and graduate training
  - Hosts a biannual international conference on pollinator biology, health, and policy
  - Organized the production of the Pennsylvania Pollinator Protection Plan

https://pollinators.psu.edu

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College Research Priority Areas

SAFES
Institute for Sustainable Agricultural, Food, and Environmental Science
agsci.psu.edu/safes

Healthy Watersheds

Research strengths

- Nutrient pollution (watershed and field modeling, cover crops, reduced/no tillage, riparian buffers)
- Emerging contaminants (PFAS, microplastics, harmful algae blooms)
- Stormwater and groundwater (private wells, urban runoff)
- Driven largely through concerted effort to protect the Chesapeake Bay

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College Research Priority Areas

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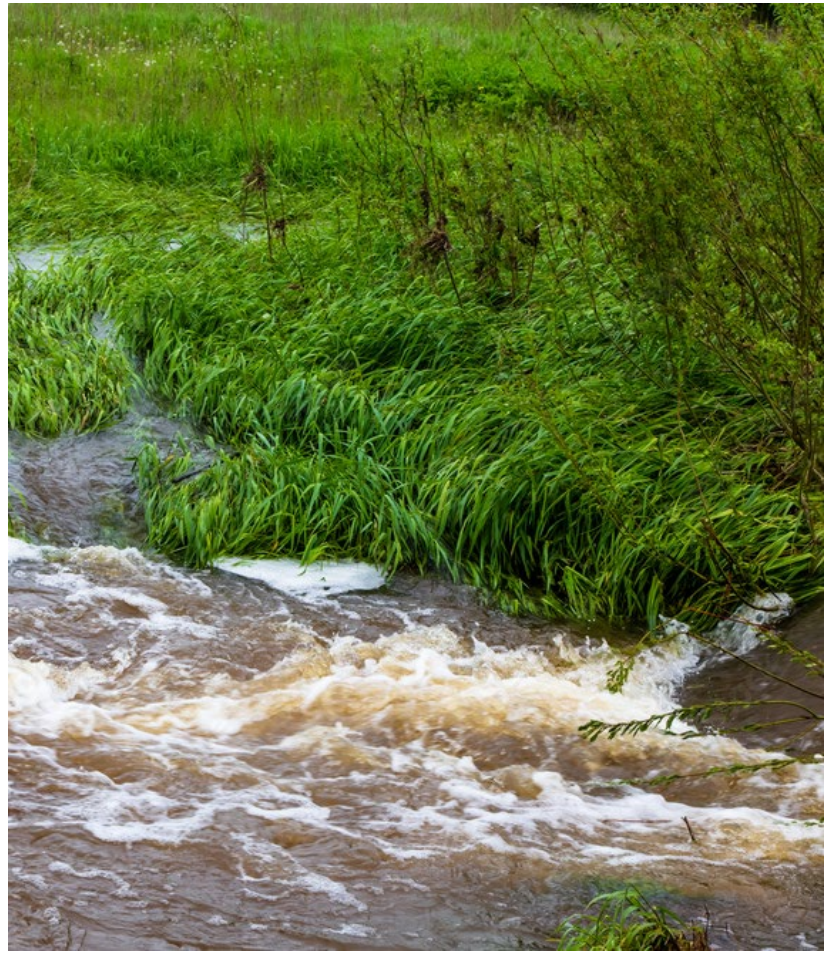
Healthy Watersheds

Examples

- Institute for Sustainable Agricultural, Food, and Environmental Science (SAFES)
  - Supports five initiatives addressing complex water issues
- Sustainable Dairy Cropping Systems
  - Sustained research on cover crops at the Russell E. Larson Agricultural Research farm since 2009
- Agriculture and Environment Center
  - Organized multiple PA in the Balance conferences to provide a collaboration forum to convene diverse stakeholders to identify new solutions to meet water quality goals for the Chesapeake Bay watershed
- Center for Agricultural Conservation Assistance Training
  - Funded collaboration with the State Conservation Commission, USDA, and NRCS to support workforce development pipelines for conservation professionals and implement best practices for farmers and ag landowners



SAFES
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agsci.psu.edu/safes

https://agsci.psu.edu/safes

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College Research Priority Areas

Climate-Smart Agriculture

Research strengths

- GHG emission measurement and modeling
- Feed strategies for livestock
- Nutrient pollution (watershed and field modeling, cover crops, reduced/no tillage, riparian buffers)
- Technical assistance training

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College Research Priority Areas

Climate-Smart Agriculture

Example

- Climate-smart Agriculture that is profitable, Regenerative, Actionable, and Trustworthy (CARAT)
  - $25M project (funded by the Partnerships for CS Commodities program) to build trusted partnerships among scientists, dairy producers, industry organizations, climate smart markets, and government agencies
  - Builds on nearly 30 years of research on climate-smart practices and stakeholder engagement at Penn State and leverages established networks
  - Combining monitoring of GHG reductions, technical assistance with implementation, and development of markets for climate-smart commodities

CARAT

https://agsci.psu.edu/carat

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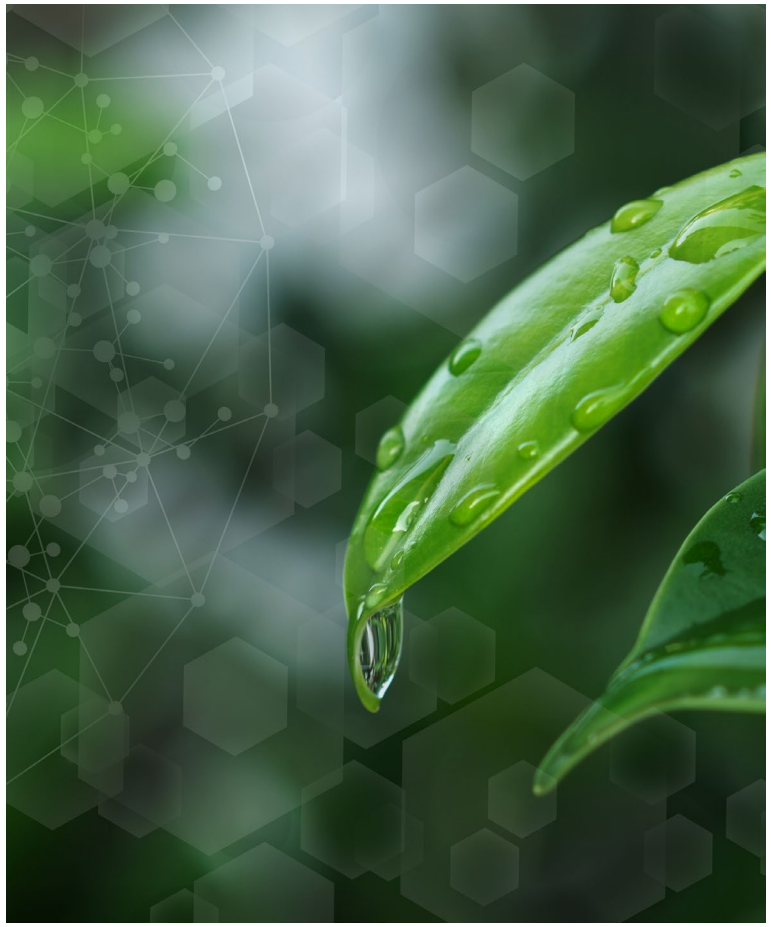
College Research Priority Areas

Technologies for Agriculture & Living Systems

Research strengths

- Precision agricultural management (automation, machine vision, AI/ML, geospatial intelligence)
- Remote monitoring (insects, disease, habitat, water/moisture)
- Decision support (automation, modeling)
- Biodiversity estimation
- Focus on small to medium farms



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College Research Priority Areas

Technologies for Agriculture & Living Systems

Example

- Interdisciplinary Studies in Entomology, Computer Science and Technology NETwork (INSECT NET)
  - Innovative interdisciplinary graduate training program; students collaborate with stakeholders to design monitoring systems for these partners
  - Non-destructive tools to monitor habitat and populations in difficult to reach locations
  - Provides platform for building a college-led initiative to support integration ag production, natural resource conservation, and community health

https://agsci.psu.edu/talis

College Developing Priorities

Industry Engagement

- Entrepreneurship & Innovation (E&I) team of specialists to support the navigation of Penn State's entrepreneurial ecosystem
- Facilitate building partnerships with industry
- Piloting graduate student engagement programs as pathways to form partnerships
- Growing interest among early career faculty to engage more with industry

Integrated Health

- Research strengths across multiple relevant areas:
  - vector-borne diseases
  - antimicrobial resistance
  - food safety
  - zoonotic diseases
- Have the PA Animal Diagnostic Labs (in cooperation with PA Dept of Ag) to track animal disease outbreaks
- Tasked by the state PDA to form One Health consortium with other state universities

Research Infrastructure

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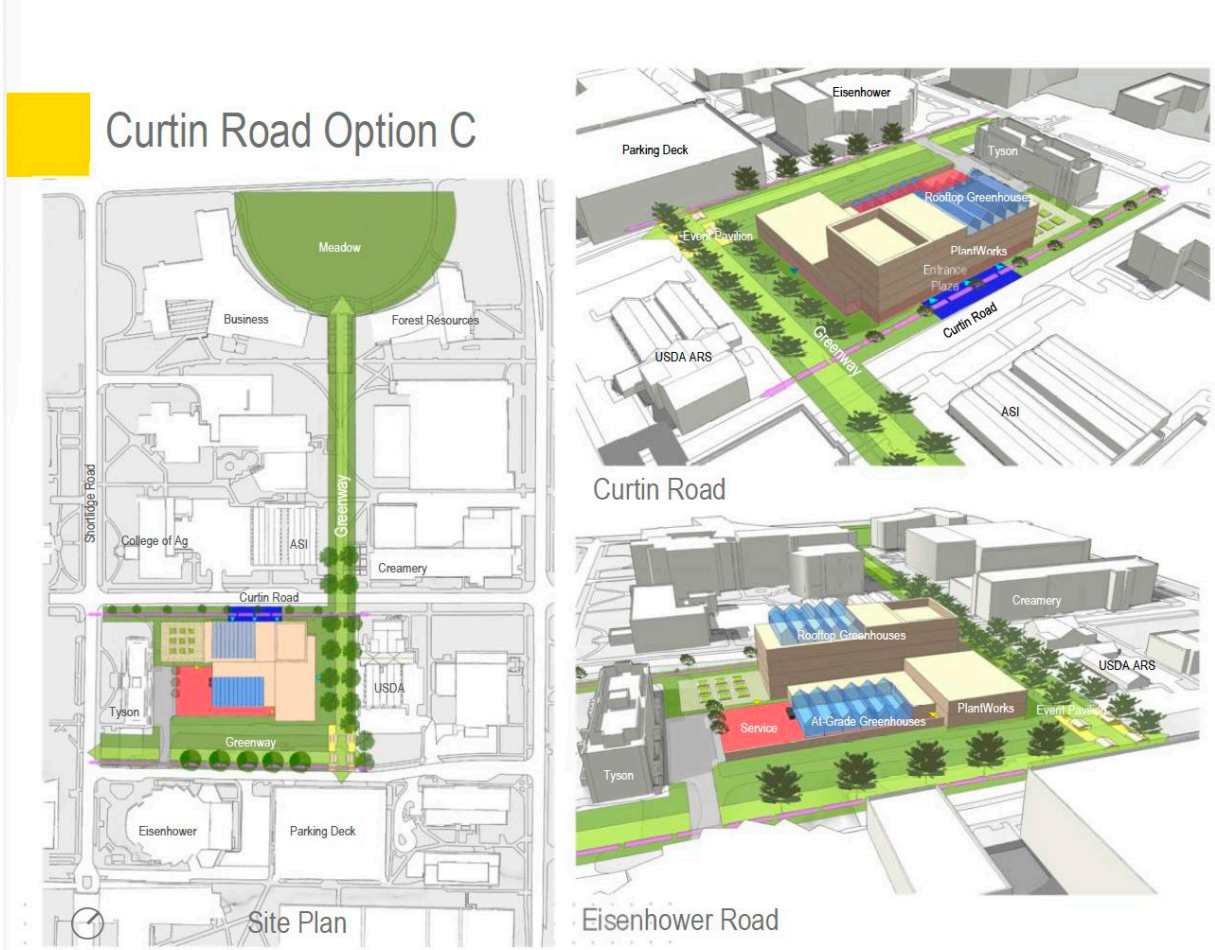
- Lots of Needs!
- Highest priority involves Plant Sciences Facilities (aka, *Plantworks*)



- Vision is to have state of the art facilities to support research and education from modern labs to greenhouses and field sites

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Future Challenges

- Administrative burden on faculty
- Increasing expenses in face of flat budget
- Research facilities and deferred maintenance
- Increase demand for F&A return
- Identifying willing and capable leaders
- **University budgeting decisions and lack of understanding of College of Ag Science**