

# The Ecosystem of Biodiversity Research Funding at the National Science Foundation

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Biological Sciences Directorate

Division of Environmental Biology

Systematics and Biodiversity Science Program

Digital Data in Biodiversity Research Conference

Yale University, June 10-12, 2019



# NSF Mission and Vision

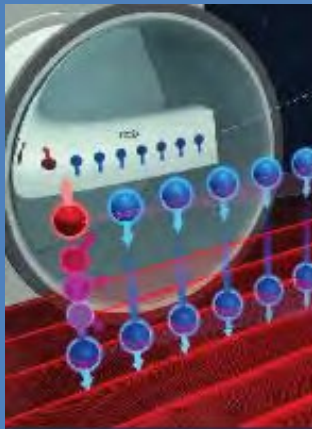
*To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense...*

*A Nation that is the global leader in research and innovation.*



# NSF's 10 Big Ideas: Six Research Ideas

The Quantum Leap: Leading the Next Quantum Revolution



The Future of Work at the Human-Technology Frontier



Windows on the Universe: The Era of Multi-messenger Astrophysics



Navigating the New Arctic



Harnessing the Data Revolution



Understanding the Rules of Life: Predicting Phenotype



# NSF's 10 Big Ideas: Four Process Ideas

**NSF INCLUDES: Enhancing STEM through Diversity and Inclusion**



**Mid-scale Research Infrastructure**



**NSF 2026**

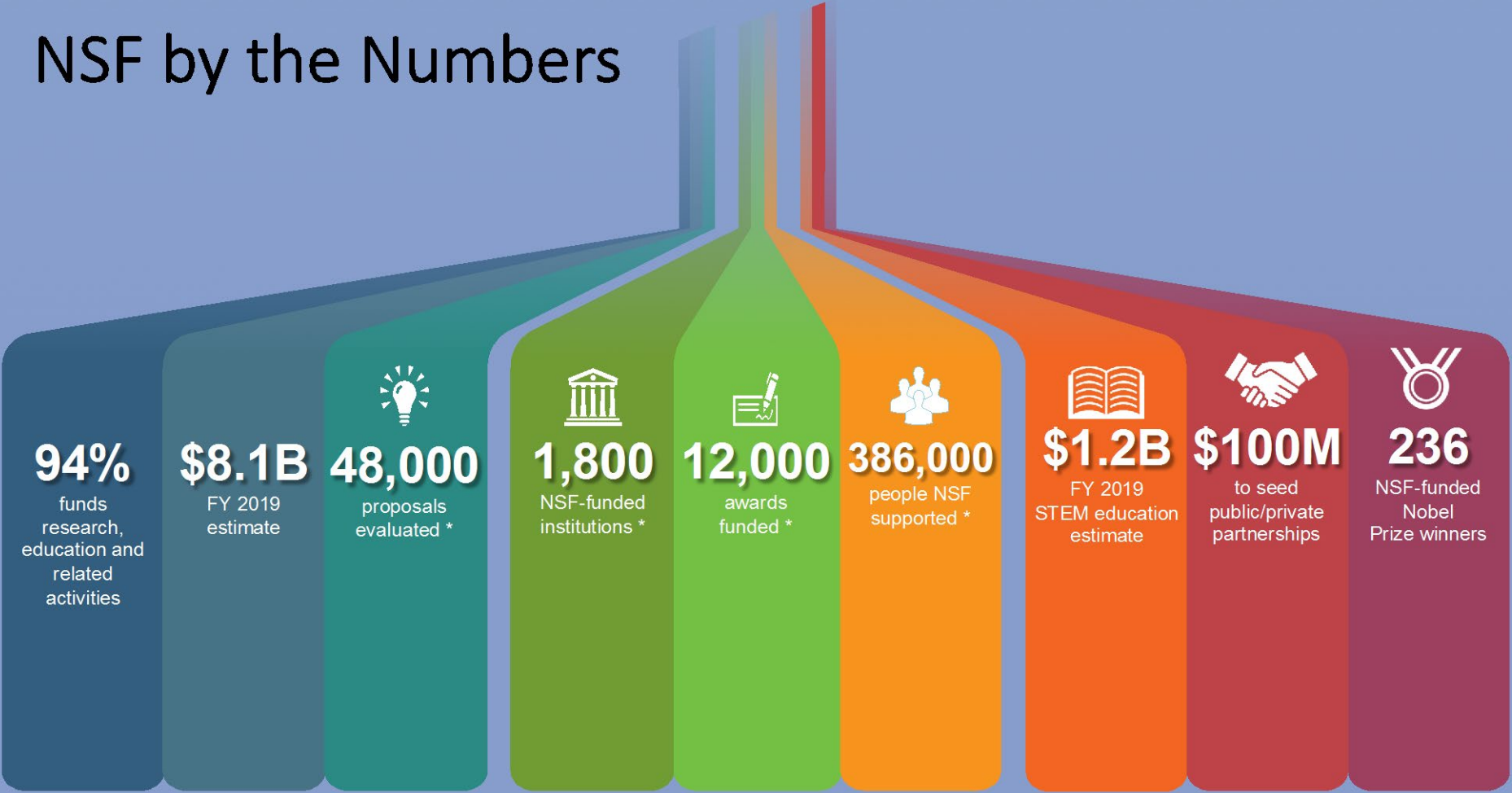


**Growing Convergent Research**



# 223,781

## NSF by the Numbers



\* Numbers shown are based on FY 2018 activities, the last full year of data.

# NSF Current Portfolio

**Over \$28 billion in total award funding**

**Over 41,000 active awards**

- Standard and continuing grants
- Cooperative agreements
- Graduate research fellowships
- Other awards

**Over 3,000 Awardees**

- Universities / 4-year colleges
- Non-profit organizations
- Community colleges
- For-profit organizations
- Other awardees



# Who is supporting biodiversity research at NSF?



■ OD ■ MPS ■ SBE ■ CISE ■ GEO ■ ENG ■ BIO ■ EHR

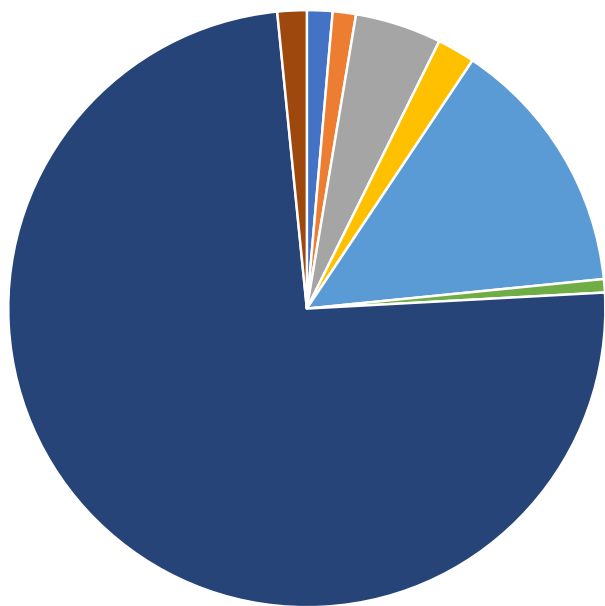
ca. 40% of Program Directors and ca. 30% of Division Directors are rotators from the community



# Active awards in Directorates by keyword search

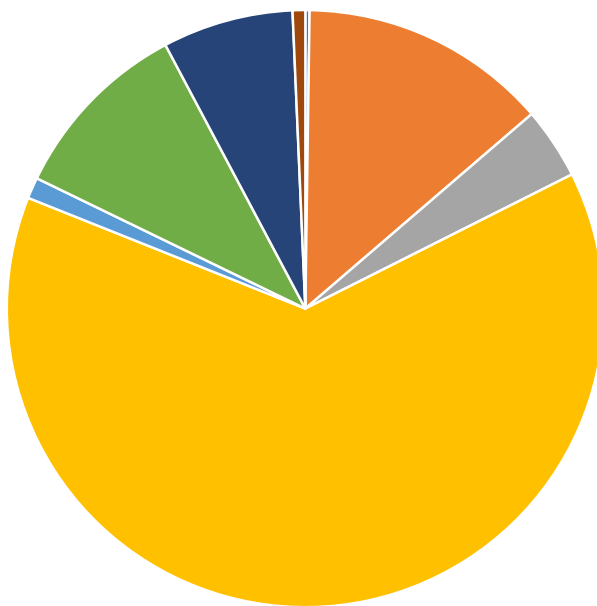
Biodiversity

N=1505



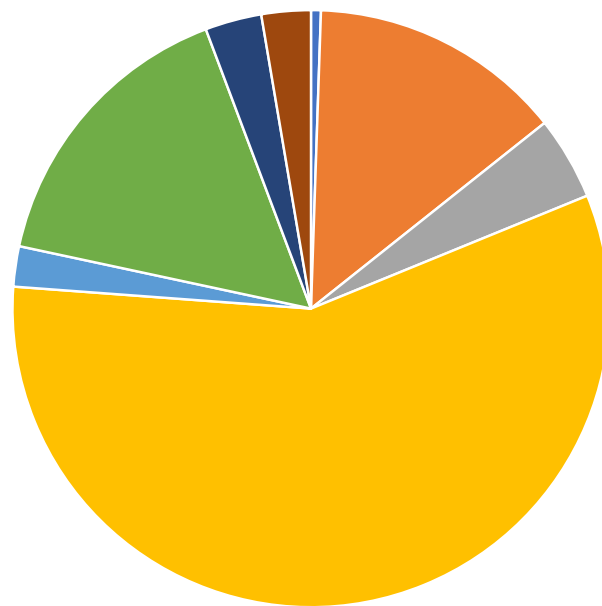
Computer Vision

N=438



Machine Learning

N=2061



OD MPS SBE CISE GEO ENG BIO EHR



# Solicitations incl. capacity building, examples

Advancing Informal STEM Learning (AISL) **NSF 17-573**

Innovative Technology Experiences for Students and Teachers (ITEST) **NSF 19-583**

Research Experiences for Undergraduates (REU) **NSF 19-582**

HBCU Undergrad. Program, Excellence in Research track (HBCU-UP) **NSF 18-522**

International Research Experiences for Students (IRES) **NSF 19-585**

Graduate Research Fellowship Program (GRFP) **NSF 18-573**

National Science Foundation Research Traineeship Program (NRT) **NSF 19-522**

Postdoctoral Research Fellowships in Biology (PRFB) **NSF 15-501\***

Faculty Early Career Development Program (CAREER) **NSF 17-537**

Opportunities for Promoting Understanding through Synthesis (OPUS) **NSF 19-584**

incl. mid- and senior career tracks

**All of these funding opportunities have deadlines**



# Solicitations for cross-cutting or high-risk ideas

## **Early-concept Grants for Exploratory Research (EAGER) NSF 19-1**

Up to \$300K/2 yr, "high risk-high payoff": radically different approaches, applies new expertise, or engages novel disciplinary or interdisciplinary perspectives. Contact PO to determine fit.

## **Research Advanced by Interdisciplinary Science and Engineering (RAISE) NSF 19-1**

Up to \$1M/5 yr, Scientific advances lie in great part outside the scope of a single program or discipline, promise transformational advances, reside at the interfaces of disciplinary boundaries that may not be recognized through traditional review or co-review. Contact at least two POs in intellectually distinct programs to determine fit.

**Many more Special Program Solicitations and tracks within Core Solicitations.**





## Directorate for Biological Sciences (BIO)

*“To enable discoveries for understanding life, advance the frontiers of biological knowledge, increase our understanding of complex systems, and provide a theoretical basis for original research in many other scientific disciplines.”*



Asst. Dir. Joanne Tornow

# Directorate for Biological Sciences (BIO)

Emerging Frontiers (EF)

## Division of Biological Infrastructure (DBI)

Human Resources

Research Resources

## Division of Environmental Biology (DEB)

Population and Community Ecology

Ecosystem Science

Evolutionary Processes

Systematics & Biodiversity Science

## Division of Integrative Organismal Systems (IOS)

Behavioral Systems

Developmental Systems

Neural Systems

Physiological & Structural Systems

Plant Genome Research Program

## Division of Molecular and Cellular Biosciences (MCB)

Molecular Biophysics

Cellular Dynamics And Function

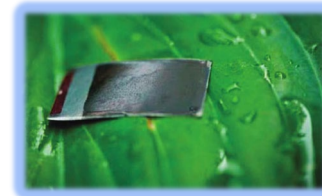
Genetic Mechanisms

Systems and Synthetic Biology

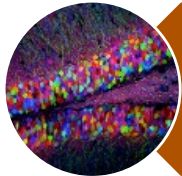
# Priorities, changes and opportunities in BIO



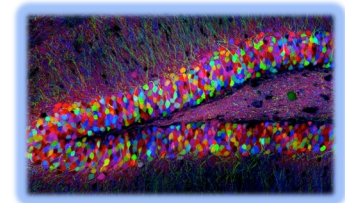
Understanding the  
Rules of Life



NEON / NEON  
Science



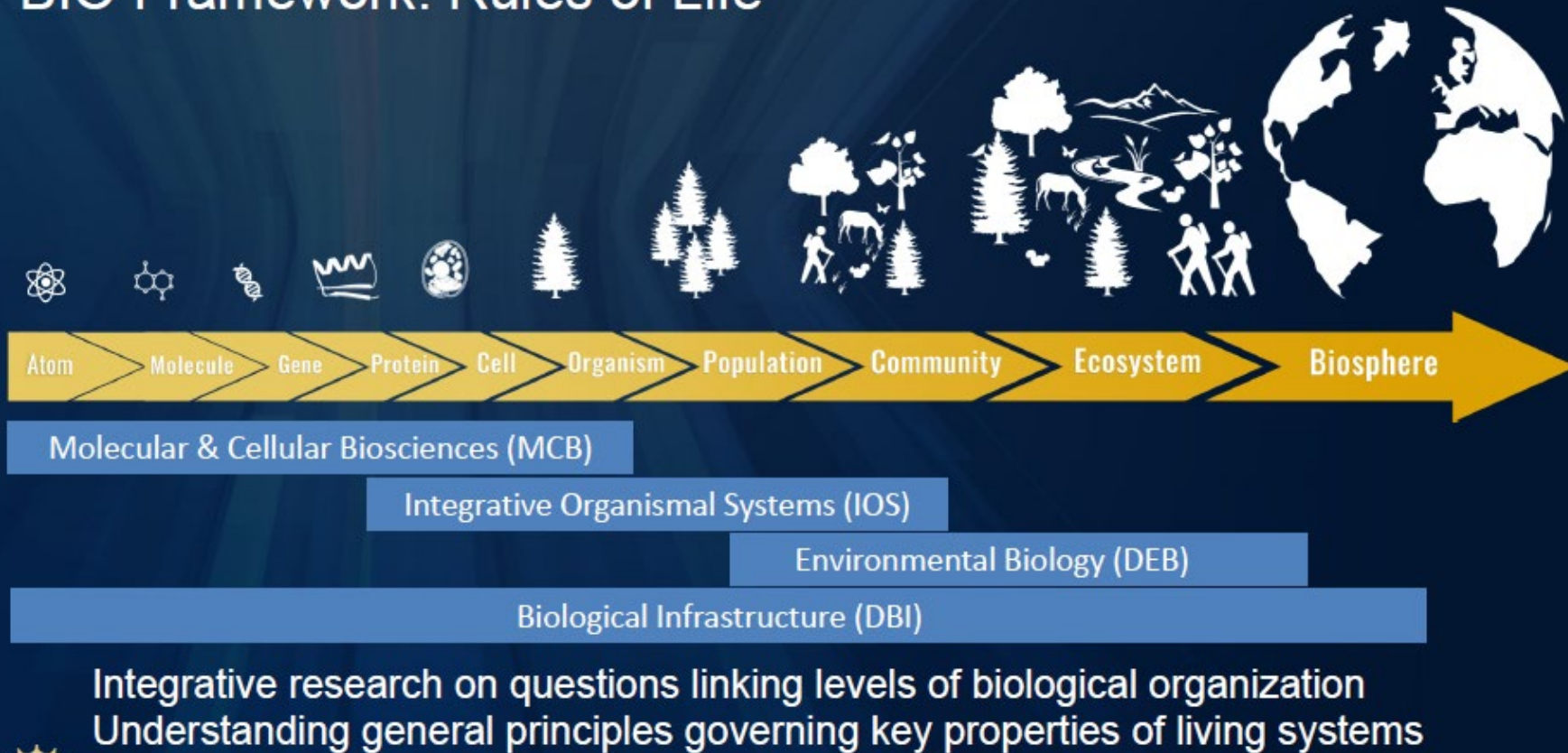
Understanding the  
Brain



Fundamental Research and  
Workforce Development

# Rules of Life: a BIO Priority

## BIO Framework: Rules of Life



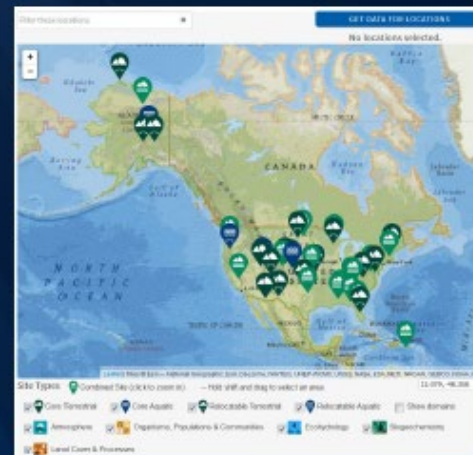
# NEON: a BIO Priority

## National Ecological Observatory Network (NEON)



- Enable regional to continental scale research
- Enable individual and team science
- Democratize and standardize ecological research

- Geographically distributed field and lab infrastructure
- Fully networked research platforms
- Internet accessible, data, computational, analytical, and modeling capabilities



100% fully operational in May 2019; [www.neonscience.org](http://www.neonscience.org)  
Macrosystems Biology & NEON-Enabled Science **NSF 19-538**



# Recent BIO Changes

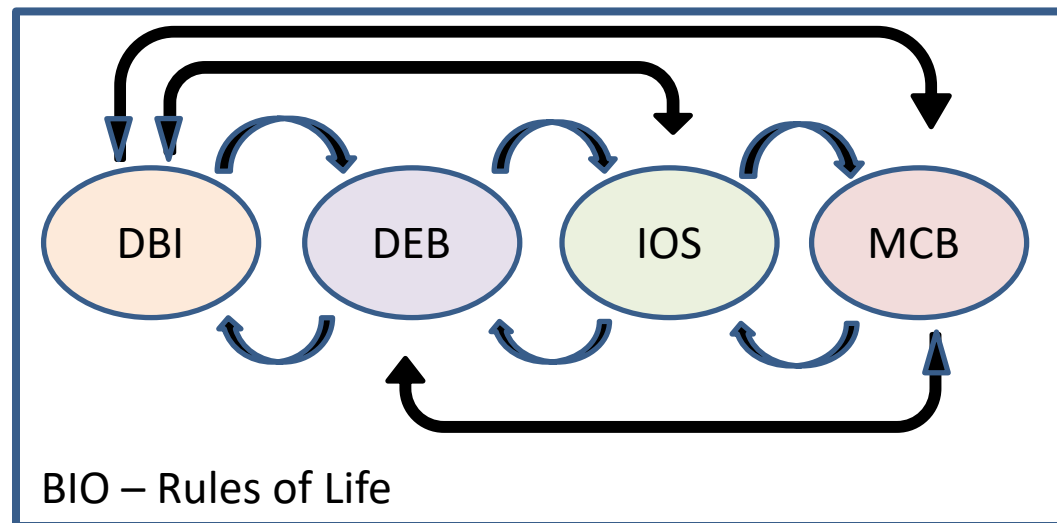
- Pre-proposals removed
- No deadlines for all **core** solicitations
- No submission caps for **core** solicitations
- New solicitations for core and special programs





# Recent BIO Changes

- **Rules of Life (ROL:)** track in the core solicitations of **all BIO Divisions**. Seeks to support integrative research and training that aims to identify the underlying general principles that operate across hierarchical levels of living systems, from molecules to organisms to ecosystems, and that explain emergent properties, e.g., robustness, adaptability.





# Environmental Biology (DEB)

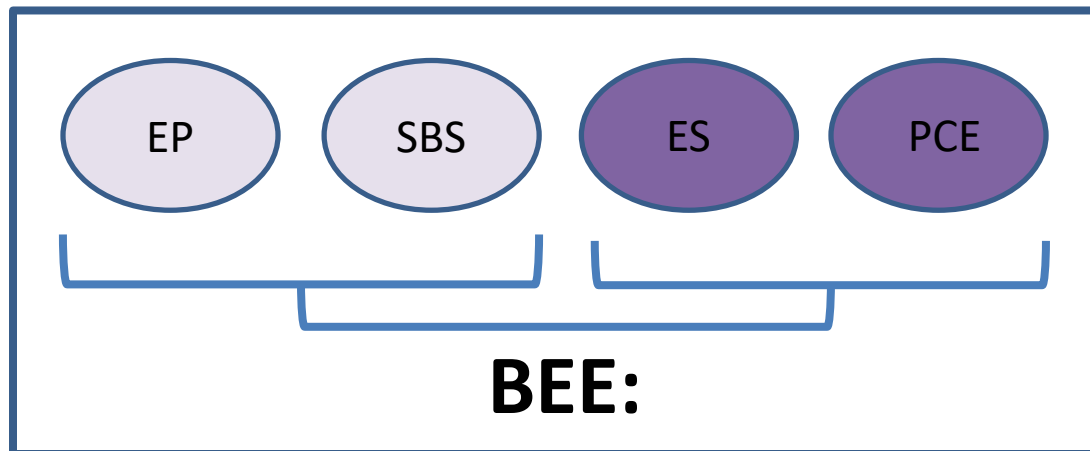
**Supports research on origins, functions, relationships, interactions, and evolutionary history of populations, species, communities, and ecosystems**

- Ecosystem Science
- Evolutionary Processes
- Population and Community Ecology
- Systematics and Biodiversity Science
- [18-587](#) includes RoL track



# Recent DEB Changes

- Bridging Ecology and Evolution (BEE) track
  - Applies to all DEB core programs
  - Targets research that spans ecology and evolution, reciprocally addresses hypotheses in both disciplines.
  - Coordinates cross-disciplinary review, (co-)funding



# Recent DEB Changes

- Systematics & Biodiversity Sciences Cluster
  1. **Single SBS Core Program**
    - distinction between Phylogenetic Systematics and Biodiversity Discovery & Analysis removed.
  2. **New track: PurSUiT** (Poorly Sampled and Unknown Taxa) to illuminate dark areas in the TOL.
    - ARTS (Advancing Revisionary Taxonomy and Systematics) is continued.



# Recent DEB Changes

- Evolutionary Processes Cluster

- 1. Single EP Core Program**

- distinction between Evolutionary Ecology and Evolutionary Genetics removed.



# Division of Biological Infrastructure DBI



## Human Resources

**Supporting the training of next generation of scientists**

- **Research Coordination Networks in Undergraduate Biology Education (RCN-UBE)**
- **REU sites**
- **Postdoctoral Research Fellowships in Biology (PRFB)**



Photo Courtesy David Campbell/Alabama State University

## Research Resources

**Supporting the infrastructure that makes science possible**

- **Innovation (IIBR)**
- **Capacity (ICB)**
- **Sustaining (SABI)**
- **Advancing Digitization of Biodiversity Collections (ADBC)**
- **NEON (National Ecological Observatory Network)**



# Stay connected

- **Subscribe** to NSF blogs and list-serves to receive latest DCL's, solicitations and tips.
- **Volunteer** as ad hoc reviewer and/or panelist
- **Serve** as a rotating Program Director
- **Contact** a Program Director via email [to set up a phone call] if you have questions.
- **Provide** input and feedback



# NSF solicits community input

via Advisory Committees, Dear Colleague Letters, Workshops

## Directorate for Biological Sciences Advisory Committee (BIO AC)

### ABOUT THE BIO ADVISORY COMMITTEE

The Biological Sciences Advisory Committee (BIO AC) advises the Directorate (BIO) on such issues as:

- How BIO's mission, programs, and goals can best serve the scientific community;
- Institutional administration and policy;
- How BIO can promote quality graduate and undergraduate education in the biological sciences;
- Priority investment areas in biological research; and
- Government Performance and Results Act, including Committees of Visitors.

[www.nsf.gov/bio/advisory.jsp](http://www.nsf.gov/bio/advisory.jsp)

NSF 18-013

## Dear Colleague Letter: Request for Information on Mid-scale Research Infrastructure

October 6, 2017

### Overview

This Request for Information (RFI) is issued in response to the American Innovation and Competitiveness Act (AICA, Public Law No. 114-329), Section 109. NSF seeks information on existing and future needs for mid-scale research infrastructure projects from the US-based NSF science and engineering community.

JULY 27, 2018 BY DEB SCIENCE STAFF

## Coastlines and People (CoPe) Scoping Sessions: Apply to attend workshops Sept. 26-28, 2018

☆☆☆☆☆ ⓘ Rate This

We're encouraging you to apply to attend scoping sessions to identify priorities for a research initiative focused on coastal regions. Applications are due by August 12, 2018 (11:59pm local time) and the workshops will be held September 26-28, 2018. More information is available on the CoPe scoping session website

<https://coastlinesandpeople.org/>.

[nsf.gov/pubs/2018/nsf18013/nsf18013.jsp?org=NSF](http://nsf.gov/pubs/2018/nsf18013/nsf18013.jsp?org=NSF)

[debblog.nsfbio.com/2018/07/27/cope-scoping-sessions/](http://debblog.nsfbio.com/2018/07/27/cope-scoping-sessions/)





[www.nsf.gov](http://www.nsf.gov)

Sign up for automatic email blog posts from BIO and its divisions: [www.nsfbio.com](http://www.nsfbio.com)

BIO Buzz

MCB Blog

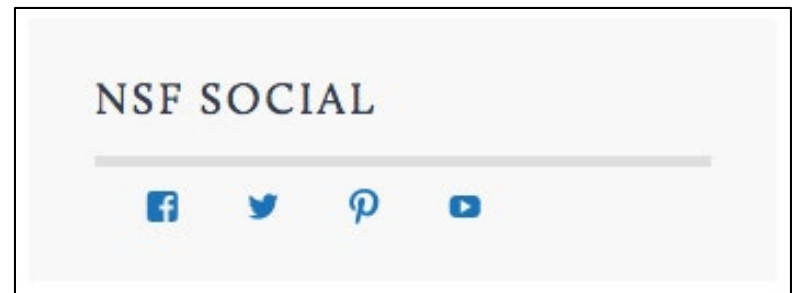
IOS InFocus

DEBrief

DBInfo

Follow on social media:

[www.nsf.gov/social](http://www.nsf.gov/social)

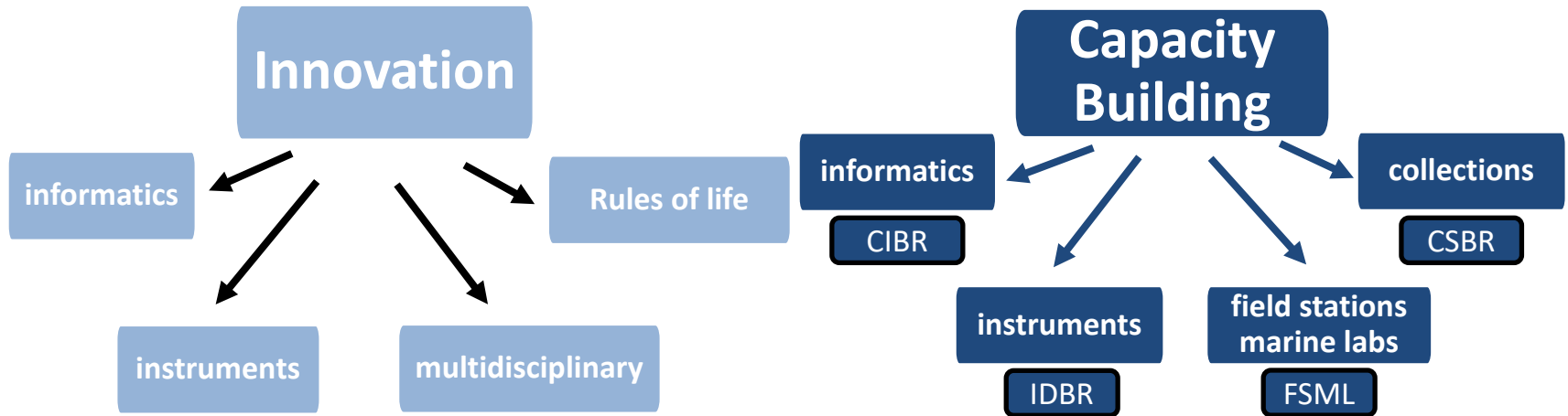


**Thank you**



[www.nsf.gov](http://www.nsf.gov)

# Research Resources Infrastructure

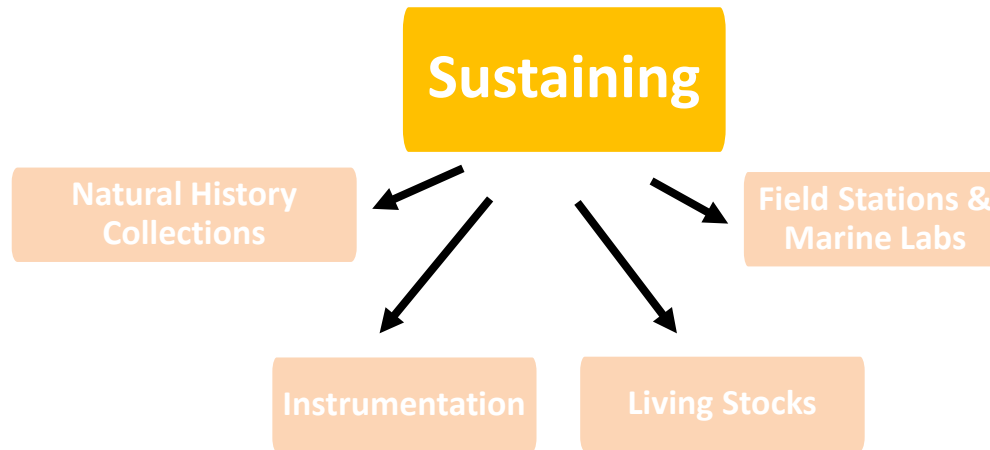


Infrastructure Innovation for  
Biological Research (IIBR)  
**NSF18-595**

Infrastructure Capacity for Biology (ICB)  
**NSF18-594**



# Research Resources Infrastructure



Sustained Availability of Biological Infrastructure (SABI)  
**NSF19-569**



Advancing Digitization of Biodiversity Collections  
(ADBC) **NSF15-576**

Supports theme-based digitization of  
existing vouchered biological collections

