Directorate for Biological Sciences (BIO)

NSF Virtual Grants Conference
June 5-8. 2023

Colette St. Mary (Integrative Organismal Systems)
Matt Herron (Division of Biology Infrastructure)
Jeremy Wojdak (Division of Environmental Biology)
Bianca Gardner (Molecular and Cellular Biosciences)

Agenda

BIO
Overview

BIO
Programs

How to
Learn More & Reach Us

Post questions through Q&A

Directorate for Biological Sciences (BIO)

"To enable discoveries for understanding life, advance the frontiers of biological knowledge, and provide a theoretical basis for prediction within complex, dynamic living systems through an integration of scientific disciplines.

BIO by the Numbers

$831.73M
FY2022 Current Plan

4,237
Proposals evaluated

27%
Funding rate

1,113
Awards made

416
institutions supported

143
postdoctoral fellowships

14,000+
Individuals from Sr. Researchers to Undergrads

10
New Biology Integration Institutes

81
NEON sites providing publicly accessible data

28
Sites in the LTER Network examining long-term change

Partnerships with
7
International funders across areas of biology

99
Awards under the Understanding the Rules of Life Big Idea, which BIO stewards

3
New programs with a focus on Broadening Participation

All data represents FY 2022 Actuals unless otherwise noted

Support for Biological Research Across Scales (Four BIO Divisions)

Molecule → Gene → Protein → Cell → Organism → Population → Community → Ecosystem → Biosphere

Molecular & Cellular Biosciences (MCB)

Integrative Organismal Systems (IOS)

Environmental Biology (DEB)

Biological Infrastructure (DBI)

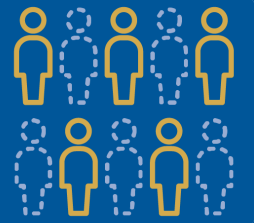
BIO Priorities in FY 2023

Emerging Infectious Diseases

Life on a Warming Planet

Biotecnnology to Advance the U.S. Bioeconomy

Integration Across the Biological Sciences



Broadening Participation

Agenda

BIO Overview

BIO Programs

How to Reach Us

- **BIO's Four Divisions**
- Cross-BIO/NSF & Interagency Programs
- Building Capacity
  - People
  - Infrastructure

Post questions through Q&A

MCB Structure

Core Programs

- **Cellular Dynamics and Function**
- **Genetic Mechanisms**
- **Molecular Biophysics**
- **Systems and Synthetic Biology**

Special Programs & Tracks

- Accelerating Innovations in Biomanufacturing Approaches through Collaboration Between NSF and the DOE BETO- funded Agile BioFoundry **(NSF-DOE/ABF Collaboration)**
- Building Synthetic Microbial Communities for Biology, Mitigating Climate Change, Sustainabilityy and Biotechnology **(Synthetic Communities)**
- Designing Synthetic Cells Beyond the Bounds of Evolution **(Designer Cells)**
- Reproducible Cells and Organoids via Directed-Differentiation Encoding **(RECODE)**
- Synthesis Center for Molecular and Cellular Sciences **(SCMCS)**
- Transitions to Excellence in Molecular and Cellular Biosciences Research **(Transitions)**

IOS Structure

Core Programs

Behavioral Systems
Animal Behavior

Developmental Systems
Plant, Fungal, and Microbial Developmental Mechanisms
Animal Developmental Mechanisms
Evolution of Developmental Mechanisms

Neural Systems
Organization
Activation
Modulation

Physiological and Structural Systems
Symbiosis, Infection, and Immunity
Physiological Mechanisms and Biomechanics
Integrative Ecological Physiology
Plant Biotic Interactions (NSF-NIFA)

Plant Genome Research Program

Special Programs & Tracks

Enabling Discovery through GEnomics **(EDGE)**	Organismal Response to Climate Change **(ORCC)**	Organismal Systems and Infection Biology **(OSIB)**	Bio Inspired Design (**BIODesign)**

DEB Structure

Core Programs

Ecology

Ecosystem Sciences
Population and Community Ecology

Evolution

Evolutionary Processes
Systematics and Biodiversity Science

PurSUiT and ARTS

Special Programs & Tracks

Biodiversity on a Changing Planet **(BoCP)**	Ecology and Evolution of Infectious Diseases **(EEID)**	Long-Term Ecological Research **(LTER)**	Long-Term Research in Environmental Biology **(LTREB)**	Macrosystems Biology and NEON-Enabled Science **(MSB-NES)**	Opportunities for Promoting Understanding through Synthesis **(OPUS)**

DBI Structure

Core Programs

Human Resources

Postdoctoral Research Fellowships in Biology (PRFB)
Research Coordination Networks in Undergraduate Biology Education (RCN-UBE)
Research Experiences for Undergraduates (REU)
Building Research Capacity for New Faculty in Biology (BRC-BIO)
Research and Mentoring for Postbaccalaureates in Biological Sciences (RaMP)
Research Experiences for Teachers Sites in Biological Sciences (BIO-RETS)
Leading Culture Change through Professional Societies of Biology (BIO-LEAPS)

Research Resources

Infrastructure Innovation for Biological Research (Innovation)
Infrastructure Capacity for Biological Research (Capacity)
Sustaining Infrastructure for Biological Research (Sustaining)
Major Research Instrumentation Program

Centers, Facilities, and Additional Research Infrastructure

Biology Integration Institutes (BII)
Center for Advancement of Synthesis of Open Environmental Data and Sciences
Management of Operations and Maintenance of the National Ecological Observatory Network (NEON)
Mid-scale Research Infrastructure-1
Mid-scale Research Infrastructure-2

BIO and Biomedical Research: What Isn't Funded

- Biological research on mechanisms of disease **in humans**, including on the etiology, diagnosis, or treatment of disease or disorder, **is normally not supported**.
- Biological research to develop animal models of such conditions, or the development or testing of procedures for their treatment, also are **not normally eligible for support**.
- However, research with etiology, diagnosis - or treatment-related goals that advances knowledge in **engineering, mathematical, physical, computer, or information sciences** is eligible for support. Bioengineering and assistive information technology research to aid persons with disabilities also is eligible.

When Should I Submit my Proposal?

- The Biological Sciences Directorate has no deadlines for investigator-initiated research proposals
  - Submit your proposal when you think it is ready
  - No limit on number of (non-overlapping) proposal submissions as PI or Co-PI
  - Panels are held periodically throughout the year to ensure timely review (avg time to decision ~6 months)
- Some special programs do have deadlines (check the solicitation/DCL)

Blog post: When should I submit my proposal?

Division of Molecular and Cellular Biosciences: Investigator-initiated research projects (MCB)

PROGRAM SOLICITATION
NSF 21-509

REPLACES DOCUMENT(S):
NSF 18-585

National Science Foundation

Directorate for Biological Sciences
Division of Molecular and Cellular Biosciences

Full Proposal Deadline(s) (due by 5 p.m. submitter's local time):

Proposals Accepted Anytime

Enabling Discovery through GEnomics (EDGE)

PROGRAM SOLICITATION
NSF 21-546

REPLACES DOCUMENT(S):
NSF 20-532

National Science Foundation

Directorate for Biological Sciences
Division of Integrative Organismal Systems

National Institutes of Health

National Human Genome Research Institute

Full Proposal Deadline(s) (due by 5 p.m. submitter's local time):

March 16, 2021

February 17, 2022

Third Thursday in February, Annually Thereafter

Agenda

- BIO's Four Divisions
- **Cross-BIO/NSF & Interagency Programs**
- Building Capacity
  - People
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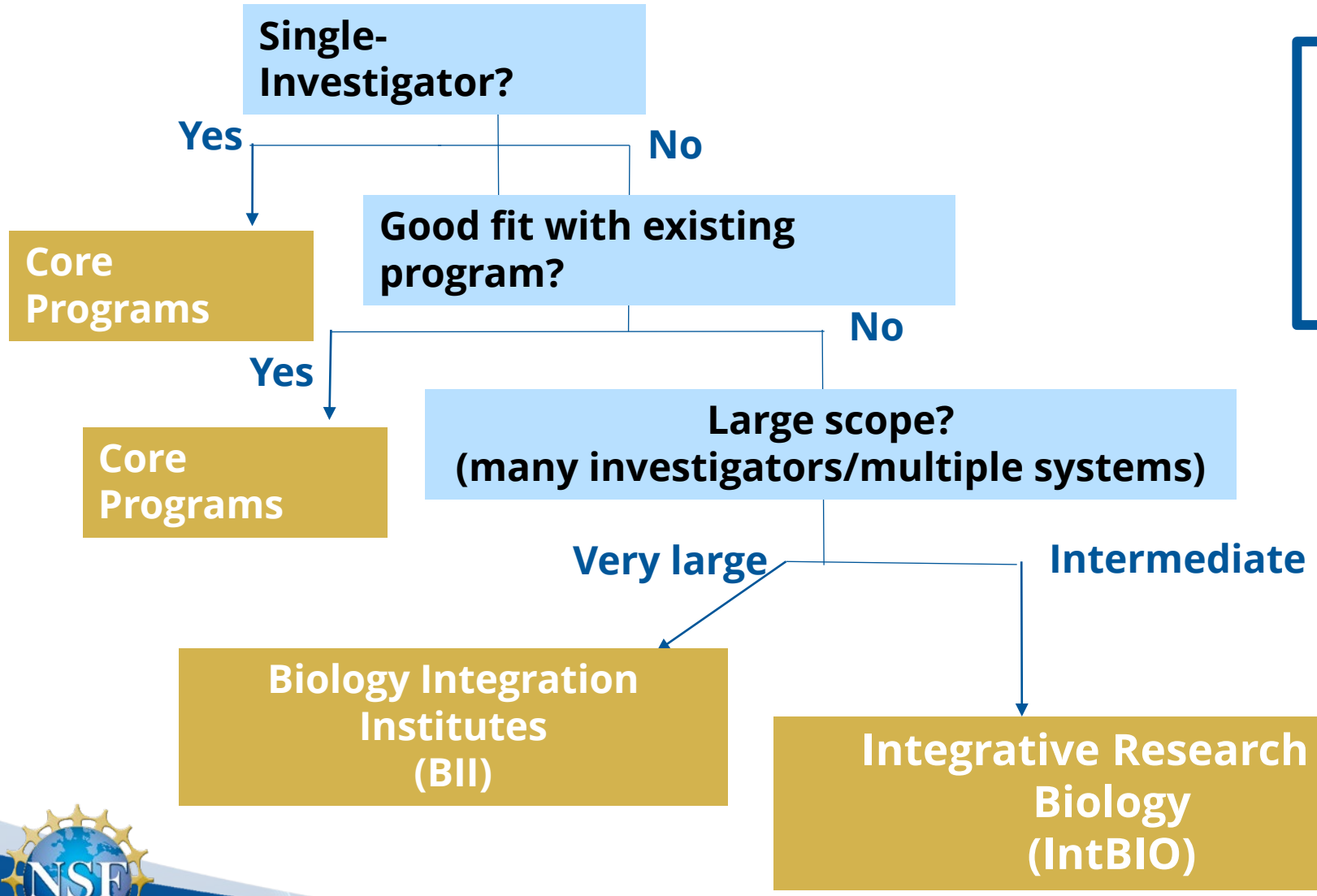
IntBIO Integrative Research in Biology

- **Who:** There are no restrictions
- **What:** *Track within BIO core programs* that supports integrative biological research spans subdisciplines and incorporates cutting-edge methods, tools, and concepts from each to produce groundbreaking biological discovery. Research should be synergistic and produce novel, holistic understanding of how biological systems function and interact across different scales of organization.
- **Where:** At any U.S. Institution of Higher Education or non-profit organization
- **When:** Proposals accepted anytime

Possibilities for Integrative Projects



Our Best Advice: Talk to a Program Officer!

URoL solicitations are topic specific

IOS Synthesis Center for Understanding Organismal Resilience

- **Who:** An individual may be designated as PI or co-PI on at most one preliminary proposal and at most one full proposal
- **What:** Establishes a center to advance our ability to explain and predict organismal resiliency and plasticity in response to complex and dynamic environmental circumstance encountered over a lifespan through the synthesis of varies data sets at multiple scales and levels.
- **Where:** At any U.S. Institution of Higher Education or non-profit organization
- **When:** Preliminary proposals due January 12, 2024

Program webinars planned for August 2023 and November 2023

BoCP Biodiversity on a Changing Planet

- **Who:** There are no restrictions
- **What:** Interdisciplinary proposals addressing grand challenges in biodiversity science within the context of unprecedented environmental change. Proposal may include researchers that will be supported by the federal science agencies of China, Brazil, and/or South Africa.
- **Where:** At any U.S. Institution of Higher Education or non-profit organization
- **When:** Deadline to be posted

EDGE Enabling Discovery through Genomic Tools

- **Who:** There are no restrictions
- **What:** Supports the development of tools and resources, and the testing of hypotheses in non-model systems
- **Where:** At any U.S. Institution of Higher Education or non-profit organization
- **When:** 3rd Thursday in February, annually

NSF-DOE/ABF Collaboration Accelerating Innovations in Biomanufacturing Approaches through Collaboration Between NSF and the DOE BETO funded Agile BioFoundry

- **Who:** No restrictions or limits on who can serve as a PI
- **What:** Supports using the Design-Build-Test-Learn capabilities at the Agile BioFoundry to develop testable prototypes based on the latest advances in synthetic engineering biology.
- **Where:** At any U.S. Institution of Higher Education or non-profit organization
- **When:** March 15, annually

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BIO-LEAPS Leading Cultural Change through Professional Societies of Biology

- **Who:** There are no restrictions
- **What:** Leverage the work of professional societies towards facilitating necessary culture change in the biological sciences to advance diversity, equity, and inclusion at scale.
  - Evaluation Track: Assessment and research of the values, norms, priorities, and practices associated with the culture of the discipline or sub-discipline.
  - Design Track: Develop an evidence-based plan to address broad-scale culture change within a discipline or sub-discipline.
  - Implementation Track: Implement evidence-based cultural change strategies that leverage the influence of biological professional societies.
- **Where:** Institution of higher education or other non-profit organization in the U.S.
- **When:** July 3, 2023

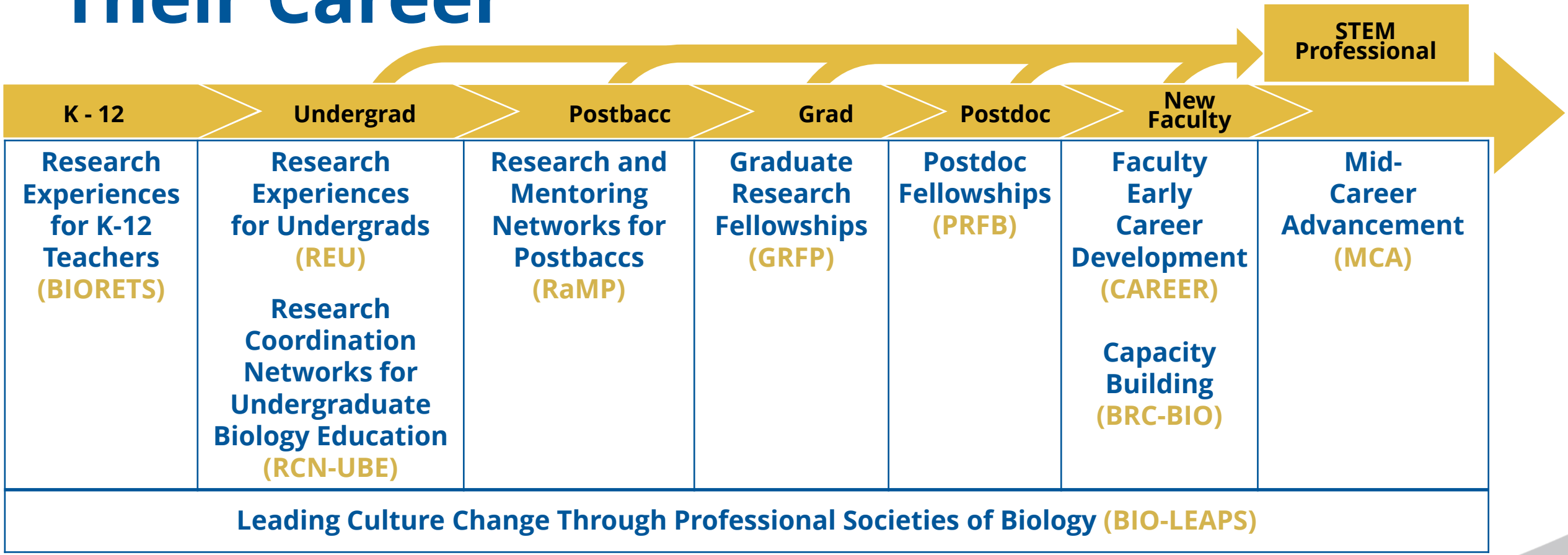
Safe and Inclusive Work Environments Plan

Required 2-page supplement including*:

1. a brief description of the field setting and unique challenges for the team;
2. the steps the proposing organization will take to nurture an inclusive off-campus or off-site working environment, including processes to establish shared team definitions of roles, responsibilities, and culture;
3. communication processes within the off-site team and to the organization(s) that minimize singular points within the communication pathway; and
4. the organizational mechanisms that will be used for reporting, responding to, and resolving issues of harassment if they arise.

*plan is in lieu of AOR certification when submitting to programs included in the pilot

Supporting Researchers Throughout Their Career



BIORETS Research Experiences for Teachers Sites in Biological Sciences

- **Who:** Individuals in a position with significant research and/or teaching responsibilities at a submitting institution where research is support in fields supported by BIO
  - Teachers supported with NSF funds in BIORETS projects must be U.S. citizens, U.S. nationals, or permanent residents of the United States.
- **What:** Active research in the biological sciences by cohorts of middle school teachers, high school teachers and/or community college faculty. BIORETS awards are expected to leverage the teachers' research experiences for curriculum development, with the goal of enriching their classroom teaching practices and inspiring a broad swath of students to consider higher education and careers in STEM.
- **Where:** Institution of higher education or other non-profit organization in the U.S.
- **When:** July 31, annually

RaMP Research and Mentoring for Postbaccalaureates in Biological Sciences

- **Who:** There are no restrictions
- **What:** Networks to support full-time research, mentoring, and training for recent college graduates who have had few or no research or training opportunities during college in research fields typically supported by BIO.
  - Proposals are expected to create strong evidence-based and inclusive mentorship programs that will advance the goal of creating a competitive and highly representative science, technology, engineering, and mathematics (STEM) workforce in the U.S.
  - Transitions into the STEM workforce could include pathways into research-focused M.S. or Ph.D. programs, industry, federal or state agencies, education and research centers, and other STEM careers.
- **When:** Deadline to be posted
- **Where:** Institution of higher education or other non-profit organization in the U.S.

PRFB Postdoctoral Research Fellowship in Biology

- **Who:** Recent recipients of doctoral degrees (Past 15 months); US citizen or national or us permanent resident
- **What:** 3-year postdoctoral fellowship
- **Current themes:** Rules of Life, Plant Genomics, Broadening Participation
- **Where:** At any Institution of Higher Education or non-profit organization
- **When:** Application deadline is in the Fall
- **Contact:** bio-dbi-prfb@nsf.gov or dbipgr@nsf.gov (Plant Genomics)

BRC-BIO Building Research Capacity of New Faculty in Biology

- **Who:** Primary investigators must hold at least a 50% tenure-track (or tenure-track equivalent) position as an assistant professor (or equivalent rank), who are untenured, have both research and teaching components to their appointment, and are within the first three years of their appointment.
- **What:** Proposed projects should enable the establishment of research programs for new faculty to position them to apply for future grants to sustain their research and should also enrich undergraduate research experiences and thereby grow the STEM workforce.
- **Where:** Minority-serving institutions (MSIs), predominantly undergraduate institutions (PUIs), and other universities and colleges that are not among the nation's most research-intensive and resourced institutions.
- **When:** Proposal windows are December 1-30, 2022 and June 1-30, 2023

MCA Mid-Career Advancement

- **Who:** Scientists and engineers at the Associate Professor rank (or equivalent) with at least 3 years at that rank
  - Pilot Track in BIO and GEO extends eligibility to Full Professors (or equivalent) at Primarily Undergraduate Institutions (PUIs) only
- **What:** An opportunity to substantively enhance and advance the PI's research program and career trajectory through synergistic and mutually beneficial mentored partnerships
- **Where:** At any U.S. Institution of Higher Education or non-profit organization
- **When:** Submission window between February 1 and March 1, annually

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- BIO's Four Divisions
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- **Building Capacity**
  - People
  - **Infrastructure**

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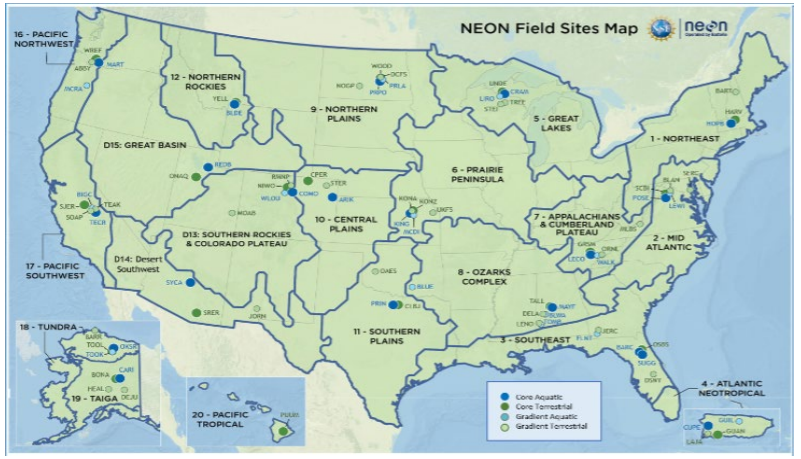
National Ecological Observatory Network (NEON)

81 field sites across 20 eco-climatic regions, including Alaska, Hawaii, and Puerto Rico



Data Products, Education & Training Opportunities

- Data for teaching and training modules
- Data science workshops
- Code Hub software code
- Online tutorials
- Teaching modules and data sets
- Faculty Mentoring Networks

Research Support & Assignable Assets

Supports community research and activities by providing research support services and access to infrastructure.

https://www.neonscience.org/

Long-Term Ecological Research Network (LTER)

Research programs at 28 sites support ecological discovery on the influence of long-term and large-scale phenomena

- Data from almost 40 years of sustained observations is publicly available
- Train a diverse group of graduate students, undergraduates and others in ecological science
- Provide educational outreach through the LTER Schoolyard Series and other efforts

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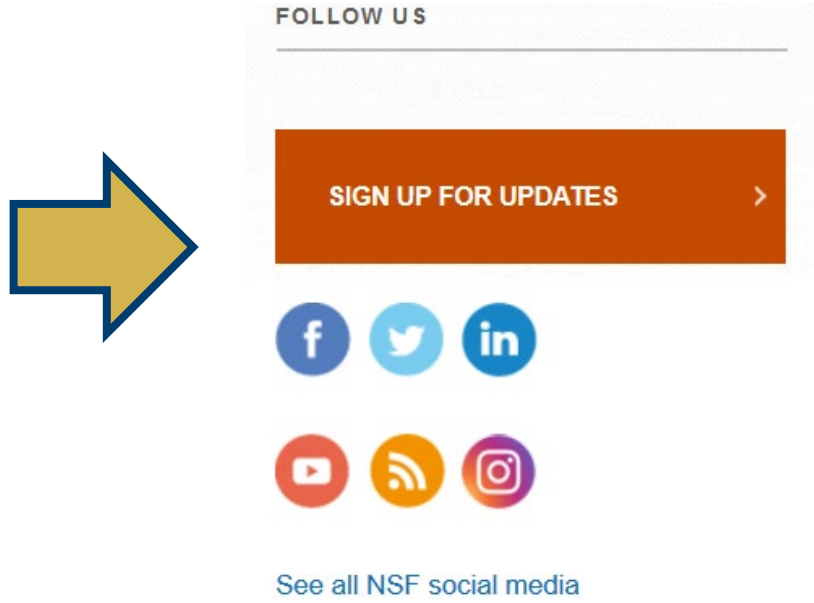
BIO News and Updates

Sign-up for emails on new solicitations; events; due date reminders; and BIO's quarterly newsletter, including information on new priorities and solicitations, highlights from the community, and more!

Visit www.nsf.gov and scroll down until you see the orange sign-up box, click, and follow the prompts.



BIO Blogs

News, features, highlights, and more from OAD and the BIO Divisions

- BIO Buzz (OAD): https://oadblog.nsfbio.com/
- DBInfo (DBI): https://dbiblog.nsfbio.com/
- DEBrief (DEB): https://debblog.nsfbio.com/
- IOS in Focus (IOS): https://iosblog.nsfbio.com/
- MCB Blog (MCB): https://mcbblog.nsfbio.com/

BIO Virtual Office Hours (VOH)

- Informational webinar focused on:
  - New and ongoing funding opportunities
  - Topics of general interest
  - Open questions from audience to be answered live

- Days & Times by Division (occasionally rescheduled due to holidays)
  - Division of Biological Infrastructure – 3rd Tuesday from 3-4 p.m.
  - Division of Environmental Biology – 2nd Monday from 1-2 p.m.
  - Division of Integrative Organismal Systems – 3rd Thursday from 1-2 p.m.
  - Division of Molecular and Cellular Biosciences – 2nd Wednesday from 2-3 p.m.

Take-Home Messages

- BIO core programs have no deadlines – submit your proposal when ready
- Multiple funding mechanisms support:
  - interdisciplinary research
  - researchers across different career stages
  - infrastructure
  - education, outreach and broadening participation in STEM
- **Contact relevant Program Officer to discuss your ideas**
  - Send a 1-page summary of your research and broader impacts plans (Tips for preparing summary)

NSF Needs You!


Questions?
Post to Q&A