



U.S. NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

NSF 24-069

Dear Colleague Letter: Innovative Use of Scientific Collections (IUSC)

March 18, 2024

Dear Colleagues:

With this Dear Colleague Letter (DCL), the National Science Foundation (NSF) encourages submission of proposals to participating NSF programs (listed below) that foster Innovative Use of Scientific Collections (IUSC) and/or associated digital data for novel research, education, and training applications within and across STEM disciplines.

INTRODUCTION

Scientific collections are a fundamental resource underpinning scientific understanding and discovery. A [2014 memo from the White House Office of Science and Technology Policy \(OSTP\)](#) defines scientific collections as "sets of physical objects, living or inanimate, and their supporting records and documentation, which are used in science and resource management and serve as long-term research assets." The [2018 NASEM report](#), "Open Science by Design: Realizing a Vision for 21st Century Research," emphasized the importance of preservation of and access to scientific collections and associated digital records to support scientific transparency, reproducibility, and discovery. A [2020 NASEM report](#) concluded that threats to the sustainability of the nation's biodiversity collections include "...a general lack of understanding of their value and their contributions to research and education." Specific language in the Chips and Science Act, HR4346 emphasizes the importance of NSF's continued support for securing and improving collections and collection-related data, and NASEM decadal surveys in the geosciences (e.g., the 2015 "[Sea Change](#)" report for the ocean sciences and the 2020 "[Earth in Time](#)" report for the earth sciences) have identified the critical need for curation, preservation, and expansion of access to physical samples to address scientific priorities. ***One way to improve this situation is to increase and diversify the ways in which the research community can access and use scientific collections and collections-associated digital data and metadata.***

NSF has made significant investments in collections and collections-associated data over the

last decade. Collections-focused NSF initiatives in the recent past have included the Advancing Digitization of Biodiversity Collections program and the Collections competitive area of the Postdoctoral Research Fellowships in Biology. Currently, investments in collections include the [Capacity: Biological Collections](#) programmatic area in the BIO Division of Biological Infrastructure as well as collection of biological, genomic, and geological samples and specimens collected by the National Ecological Observatory Network (NEON) from terrestrial and aquatic sites and housed at the NEON Biorepository. The Geosciences Directorate has long supported samples and collections through its core and sample repositories, and NSF cyberinfrastructure-oriented programs have supported projects to manage collections-associated data and metadata, such as iDigBio and certain projects funded through EarthCube and GEO Open Science Ecosystem programs. In addition, disciplinary research-oriented programs across the foundation have supported efforts to use collections and physical samples, either embedded into research projects or as standalone efforts. ***Increasing and diversifying the use of collections and collections-associated data would maximize the research, training, and education return on these investments.***

Collections and the associated data are powerful yet underutilized research and educational resources. While collection use is routine and vital in several biology, geoscience, and anthropology subdisciplines, an ***immense untapped potential exists for their use in other fields and subfields such as the social and behavioral sciences, epidemiology, cell and molecular biology, microbial ecology, engineering and materials science, conservation biology, Earth science, critical minerals, ocean science, polar science, and computer science, as well as in training, education, and broadening participation in STEM. Collections of physical samples and resulting data are also a critical long-term archive of biodiversity, climate change, and fluctuations in other Earth systems and can contribute to research towards a sustainable bioeconomy.*** Furthermore, the cost of increasing research and educational use of collections is in many cases small, since the resources already exist and are often freely accessible. This creates an opportunity for low-cost but high-impact research projects that also engage students in authentic research experiences. In addition, developing community partnerships between established collections (such as in natural history museums), and training programs at primarily undergraduate institutions or [minority-serving institutions](#), creates a strong potential to broaden participation.

Increasing and diversifying the use of collections and collections-associated data thus has the potential to improve understanding of their value in research, training, and education; contribute to fundamental research in fields and subfields that currently underutilize them; and broaden participation by increasing opportunities for developing or strengthening partnerships.

GOALS OF THE DCL

NSF encourages the submission of proposals that foster Innovative Use of Scientific Collections and/or associated digital data for novel research, education, and training applications within and across STEM disciplines.

Examples of such proposals include, but are not limited to, those that:

- Propose innovative use of existing biodiversity, living stocks, geological, anthropological, and/or behavioral collections, images and other digital media, and collections-associated data, including to develop or apply new analytical techniques or to answer new scientific questions beyond the original intention of the collections
- Integrate the use of existing collections and collections-associated data in fields that traditionally have made little use of collections
- Create partnerships to use existing collections and collections-associated data in research, training, and education by primarily undergraduate institutions, minority-serving institutions, and other under-resourced institutions
- Make use of biological, genomic, and/or geological samples and specimens collected by the National Ecological Observatory Network (NEON) from terrestrial and aquatic sites and housed at the NEON Biorepository
- Include as a Broader Impact the use of existing collections to engage students in authentic research experiences

The following NSF programs welcome submission of proposals responsive to this DCL:
Directorate for Biological Sciences

- Division of Biological Infrastructure/[Capacity: Biological Collections](#)
- Division of Environmental Biology/[Evolutionary Processes](#)
- Division of Environmental Biology/[Population and Community Ecology](#)
- Division of Environmental Biology/[Systematics and Biodiversity Science](#)
- Division of Environmental Biology/[Ecosystem Science](#)

Directorate for Computer & Information Science & Engineering

- Division of Information and Intelligent Systems/[Human-Centered Computing](#)
- Division of Information and Intelligent Systems/[Information Integration and Informatics](#)
- Division of Information and Intelligent Systems/[Robust Intelligence](#)

Directorate for Geosciences

- Division of Earth Sciences/[Frontier Research in Earth Sciences](#)
- Division of Earth Sciences/[Geobiology and Low-Temperature Geochemistry](#)
- Division of Earth Sciences/[Geomorphology and Land-use Dynamics](#)
- Division of Earth Sciences/[Geoinformatics](#)

- Division of Earth Sciences/[Petrology and Geochemistry](#)
- Division of Earth Sciences/[Sedimentary Geology and Paleobiology](#)
- Division of Ocean Sciences/[Marine Geology and Geophysics](#)
- Office of Polar Programs/[Arctic Sciences](#)
- Office of Polar Programs/[Antarctic Sciences](#)

Directorate for Social, Behavioral, and Economic Sciences

- Division of Behavioral and Cognitive Sciences/[Biological Anthropology](#)
- Division of Behavioral and Cognitive Sciences/[Cognitive Neuroscience](#)
- Division of Behavioral and Cognitive Sciences/[Cultural Anthropology](#)
- Division of Behavioral and Cognitive Sciences/[Developmental Sciences](#)
- Division of Behavioral and Cognitive Sciences/[Human Networks and Data Science – Infrastructure](#)
- Division of Behavioral and Cognitive Sciences/[Perception, Action & Cognition](#)
- Division of Social and Economic Sciences/[Science and Technology Studies](#)

HOW TO RESPOND TO THIS DCL

In advance of submitting a proposal in response to this DCL, interested proposers are strongly encouraged to contact a cognizant Program Officer in the relevant NSF program(s).

Proposals should follow the guidelines, deadlines (if any), budget limitations (if any), and solicitation-specific criteria of the relevant NSF program(s). Awards for projects responsive to this DCL will be funded through the relevant NSF program(s).

The proposal title should begin with "IUSC:" after any PAPPG and/or solicitation-specific title requirements, if applicable. Proposals that fail to address the objectives and guidance described in this DCL and in the relevant funding opportunity may be returned without review.

NSF is broadly interested in enabling discovery through the use and reuse of existing resources with untapped potential. Proposals responsive to this DCL should be primarily focused on innovative use of physical specimens and of data tracing back to physical specimens. Proposals primarily focused on the use of data from environmental time series may be appropriate for [DCL 24-081](#), and we encourage PIs to consider that document.

Questions should be directed to Program Directors in the relevant NSF research program(s); not the signatories to this DCL.

Sincerely,

Susan Marqusee
Assistant Director

Directorate for Biological Sciences

Alexandra Isern
Assistant Director
Directorate for Geosciences

Dilma Da Silva
Acting Assistant Director
Directorate for Computer & Information Science & Engineering

Sylvia Butterfield
Acting Assistant Director
Directorate for Social, Behavioral & Economic Sciences