

Biodiversity on a Changing Planet (BoCP)

PROGRAM SOLICITATION NSF 23-542

REPLACES DOCUMENT(S) NSF 22-508



National Science Foundation

Directorate for Biological Sciences
Division of Environmental Biology
Division of Biological Infrastructure
Division of Integrative Organismal Systems

Directorate for Geosciences
Division of Earth Sciences
Office of Polar Programs
Division of Ocean Sciences



National Natural Science Foundation of China



The Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP)



National Research Foundation (NRF) of South Africa

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

March 29, 2023

March 21, 2024

Third Thursday in March, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

Expectations for the two submission tracks in the BoCP program-- Design and Implementation proposals-- have been clarified.

The term functional biodiversity has been clarified as well as its relationship with biodiversity dynamics.

Specific proposal preparation instructions that duplicate those in the PAPPG have been removed.

The requirement for a supplementary document called "Recruitment, Training and Mentoring Plan" has been removed. Clear plans for recruitment, training and mentoring must be described elsewhere in the proposal.

The National Science Foundation's Biological Oceanography program is now participating in the Biodiversity on a Changing Planet program.

Important Information

The Directorates for Biological Sciences and Geosciences at NSF require that proposers who include off-campus or off-site research as part of their project submit, as supplementary documentation, a Plan for Safe and Inclusive Working Environments. This is in addition to the new certification required of all proposers submitting to NSF in which off-campus or off-site research is proposed (see Chapter II.E.9 in the PAPPG, NSF 23-1). Instructions for inclusion of the Plan for Safe and Inclusive Working Environments can be found in the additional Proposal Preparation Instructions in this solicitation.

Any proposal submitted in response to this solicitation should be submitted in accordance with the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) that is in effect for the relevant due date to which the proposal is being submitted. The NSF PAPPG is regularly revised and it is the responsibility of the proposer to ensure that the proposal meets the requirements specified in this solicitation and the applicable version of the PAPPG. Submitting a proposal prior to a specified deadline does not negate this requirement.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Biodiversity on a Changing Planet (BoCP)

Synopsis of Program:

The biodiversity found in nature is essential for healthy ecosystems and human well-being. However, the disruption and decline of Earth's biodiversity is currently occurring at an unprecedented rate. The resulting shifts in biodiversity dynamics-- including changes in the scope and structure of biodiversity-- are increasingly significant but not well-understood. Shifting biodiversity dynamics in turn influence functional biodiversity, which includes the roles of traits, organisms, species, communities, and ecosystem processes in natural systems. Changes in biodiversity dynamics and functional biodiversity are essential factors for future planetary resilience under environmental change, including climate change. The connection between functional biodiversity and biodiversity dynamics on a changing planet is the main focus of the Biodiversity on a Changing Planet (BoCP) program. The program encourages proposals that integrate pattern- and process-based research approaches in the context of the constant gain, loss, and reorganization of biodiversity on a changing planet. To advance a comprehensive understanding of functional biodiversity requires a highly integrative approach - including consideration of spatial and temporal dimensions from the organismal to the ecosystem level and from recent to deep timescales. The program therefore places a strong emphasis on multidisciplinary research among climatic, geological, paleontological, ecological, organismal, phylogenetic and evolutionary sciences.

The BoCP program is a cross directorate and international program led by NSF that invites submission of interdisciplinary proposals addressing grand challenges in biodiversity science within the context of unprecedented environmental change, including climate change. Successful BoCP proposals will test novel hypotheses about functional biodiversity and its connections to shifting biodiversity dynamics on a changing planet, with an emphasis on integrative research into the complex intersections among climatic, geological, paleontological, and biological processes. Integrative research is likely to combine multiple perspectives--including organismal, species, ecological, evolutionary, phylogenetic, geological, and/or paleontological approaches-- at various scales. Proposals that seek to improve predictive capability about functional biodiversity across temporal and spatial scales by considering the linkages between past, present, and future biological, climatic, and geological processes are also encouraged. While this focus complements several core programs at NSF, it differs by requiring an integrative approach to understanding functional biodiversity as it relates to shifting biodiversity dynamics under changing environmental conditions.

The program supports both US-only collaborative proposals and proposals with international partnerships with the National Natural Science Foundation of China (NSFC), the São Paulo Research Foundation (FAPESP) of Brazil, and the National Research Foundation (NRF) of South Africa. International collaborative proposals are to be submitted jointly, with the US PIs submitting to NSF and the collaborating Chinese, Brazilian, or South African PIs submitting to their appropriate national funding agencies. These agreements do not preclude other international collaborations (see below for additional details).

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Matthew D. Carling, telephone: (703) 292-2134, email: biodiversity@nsf.gov
- Jean X. Gao, telephone: (703) 292-7253, email: biodiversity@nsf.gov
- Rebecca Gast, telephone: (703) 292-2356, email: biodiversity@nsf.gov
- Maureen M. Kearney, telephone: (703) 292-8239, email: biodiversity@nsf.gov
- Kendra Mclauchlan, telephone: (703) 292-2217, email: biodiversity@nsf.gov
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- Colette M. St. Mary, telephone: (703) 292-4332, email: biodiversity@nsf.gov
- Daniel J. Thornhill, telephone: (703) 292-8143, email: biodiversity@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.050 --- Geosciences
- 47.074 --- Biological Sciences

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 8 to 12

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

Anticipated Funding Amount: \$14,000,000 to \$17,000,000

Depending on the quality of proposals, 4-6 awards are estimated to be made for each award track (Design/Implementation).

Anticipated Funding Amount: \$14,000,000 to \$17,000,000

For the US portion of the budget, up to \$500,000 per proposal are available for the Design track, and up to \$2.5M per proposal are available for the Implementation track.

These upper limits for proposal budgets do not include the costs of NSF facilities or logistics support.

Funding for Design track US-China collaborative proposals will be at a level of up to ¥ 1.0M for 3-year projects (Chinese portion of the project). The number of Design track US-China collaborative proposals funded will depend on the quality of the projects submitted. For Implementation track US-China Collaborative Research Proposals the expected funding from NSFC will be at a level of up to ¥4.5M for 5-year projects (Chinese side of the budget). A maximum of three Implementation track projects will be funded, depending on the quality of the submitted proposals and the availability of funds. Please consult the NSFC guidelines for how the funds should be allocated per allowed activities.

The expected funding for the FAPESP portion of US-FAPESP collaborative proposals will be at a level of R\$15.5M (Real) for up to five Regular Research Grants with 2 years of postdoctoral fellowship (to match with NSF's Design track) and up to three awards, in any combination of Thematic Research Grants and Young Investigator Grants (to match with NSF's Implementation track). Please consult the FAPESP guidelines for how the funds should be allocated per allowed activities.

The expected funding from NRF for the South African portion of US-South Africa collaborative Design proposals will be up to two 3-year at a level of up to R1.8M (Rand), R600k per annum. Up to two 5-year US-South Africa Collaborative Research awards may be funded for Implementation track proposals at a level of up to R10.0M (Rand), R2.0M per annum from NRF. Please consult the NRF guidelines for how the funds should be allocated per allowed activities.

Multilateral collaborative proposals, involving NSF and more than one international partner among NSFC, FAPESP, and NRF will also be considered.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or co-PI:

There are no restrictions or limits.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
 - Full Proposals submitted via Research.gov: *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - Full Proposals submitted via Grants.gov: *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov* guidelines apply (Note: The *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:**

Inclusion of voluntary committed cost sharing is prohibited.

- **Indirect Cost (F&A) Limitations:**

Not Applicable

- **Other Budgetary Limitations:**

Not Applicable

C. Due Dates

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

March 29, 2023

March 21, 2024

Third Thursday in March, Annually Thereafter

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review criteria apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions:

Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements:

Standard NSF reporting requirements apply.

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I. INTRODUCTION

The Biodiversity on a Changing Planet supports projects using an integrative approach to understand the connections between biodiversity dynamics and functional biodiversity under changing environmental conditions, including climate conditions. Successful projects will address theoretical, methodological, infrastructure, and data gaps regarding biodiversity dynamics and functional biodiversity, and their interactions with climate and Earth systems. **Biodiversity dynamics** refer to shifts in scope, structure, and interactions of biodiversity. **Functional biodiversity** refers to the numerous roles of traits, organisms, species, communities, and ecosystem processes in natural systems. Functional biodiversity also includes the roles of emergent properties and processes across all levels of biological organization.

Interdisciplinary research across ecology, evolutionary biology, geology, and paleontology is necessary to achieve a deeper understanding of biodiversity dynamics and functional biodiversity. The BoCP program therefore encourages proposals from collaborative and diverse teams of scientists including, for

example, evolutionary biologists, ecologists, paleontologists, organismal biologists, systematists, biogeographers, marine scientists, geobiologists, geochemists, critical zone scientists, hydrologists, modelers and/or climatologists. Prospective principal investigators (PIs) must develop proposals that work across scientific, disciplinary, geographic, and organizational divides, push conceptual boundaries, and contribute new theory regarding the understanding of functional biodiversity and its relationship to shifting biodiversity dynamics under environmental change. Proposals must be comprehensive and well-integrated and should make a convincing case that the collaborative contributions of the project team will be greater than the sum of each of their individual contributions.

The program encourages inclusive science teams with meaningful involvement of individuals and institutions traditionally underrepresented in STEM. NSF is committed to the inclusion of all people and institutions in the research enterprise because all are vital to the nation's health, security, and global leadership in STEM. The nation's changing demographics make this commitment all the more timely. Therefore, to be competitive, proposers must be intentional regarding broadening participation in their projects through efforts to promote diversity, equity, and inclusion of individuals and institutions traditionally underrepresented in STEM. NSF is interested in ensuring the inclusion of individuals from diverse social categories and/or identities including but not limited to: race, ethnicity, gender, sexual orientation, socio-economic status, disability status, veteran status, or geography—recognizing that underrepresentation can vary by career stage and discipline and that there are additional considerations of intersectionality. Proposers submitted to this solicitation *are strongly encouraged* to involve PIs, co-PIs, postdoctoral fellows, students, and other personnel who are members of these groups. MCB also recognizes that STEM research and education occurs at a wide range of institutions, including Minority-Serving Institutions (MSIs), Primarily Undergraduate Institutions (PUIs), and two-year colleges, as well as major research institutions. NSF welcomes single-institution and multi-institutional collaborative proposals from all types of institutions and encourages authentic and substantive collaborations and partnerships across diverse geographies and types of institutions. Proposals from EPSCoR jurisdictions are especially encouraged.

II. PROGRAM DESCRIPTION

The goal of the BoCP Program is to achieve a deeper understanding of functional biodiversity and biodiversity dynamics given significant changes in biotic and abiotic conditions. The program encourages proposals that integrate pattern and process-based approaches to enhance understanding of functional biodiversity. Consideration of complex feedbacks involving biodiversity across temporal and spatial scales is likely to achieve this deeper understanding, as well. Overall, projects should pursue development of a synthetic understanding of the constant loss, gain, maintenance, and reorganization of biodiversity on a changing planet. Projects should consider the full context of past and current ecological and evolutionary processes, including biodiversity dynamics, to enhance understanding of functional biodiversity under various types of global environmental change. Successful proposals may take advantage of phylogenetic and biogeographic frameworks as well as insights from neontology (extant biodiversity) and paleontology (extinct biodiversity), fossil records, -omics approaches, remote sensing, and/or the use of models and forecasting approaches (see Infrastructure section below).

Examples of research areas include, but are not limited, to:

- *Understanding fundamental principles related to shifting biodiversity dynamics on a changing planet.* Examples include: research on speciation/diversification/extinction rates and dynamics under changing environmental conditions; the effects of phylogenetic history and relatedness on trait evolution and functional biodiversity.
- *Understanding the range of interactions and feedbacks between biodiversity dynamics and functional biodiversity.* Examples include: how diverse life histories, genetic architecture, and other traits influence evolutionary responses to environmental disruption; how ancient and current environmental changes lead to evolutionary and/or ecological novelty.
- *Understanding how functional biodiversity change may trigger population-, species-, phylogenetic-, community-, and ecosystem-level responses, under changing environments.* Examples include: research into integrated macroecological, macroevolutionary approaches to investigating community assembly, species coexistence, and ecosystem responses along changing environmental gradients; the relationships among trait diversity, species diversity, phylogenetic diversity and functional diversity on ecological and evolutionary timescales.
- *Understanding the interconnection between ecosystem-level events and climatic and geological processes, and their relationship to functional changes in biodiversity in a changing environment.* Examples include: how changes in functional biodiversity impact biophysical and biogeochemical processes, climate, and nutrient and water cycles; analyses of the paleorecord to identify environmental tipping points and associated shifts in biodiversity dynamics and functional effects.
- *Conceptual and theory development pertaining to shifting biodiversity dynamics and functional biodiversity on a changing planet.* Examples include: the role of emergent and non-linear properties in complex biodiversity dynamics and functional biodiversity; connections between macroecology and macroevolutionary theory and causality as they pertain to functional biodiversity.

These examples are illustrative only. Proposals may focus on any of these areas, a combination of these areas, or topics outside of these areas.

All proposals to the National Science Foundation must include plans for broader impacts which are expected to provide benefits to society. We encourage broader impact activities that aim to increase the participation of individuals who are members of groups who have been excluded from participating in biodiversity research. Additionally, the BoCP program will prioritize proposals that describe effective plans to find synergies between broader impacts and biodiversity science. Specific broader impacts may include plans to improve societal understanding of the roles of biodiversity, improve societal understanding of biodiversity change in the context of climate change, and/or translate specific research outcomes to education or conservation actions.

Special Information:

A. Tracks:

Proposals submitted to this solicitation must be responsive to either the Design Track or the Implementation Track, both described below. Proposals will be considered for funding only within their selected track. A proposal cannot attempt to respond to more than one track.

Both tracks should provide opportunities to train and build successful partnerships with a diverse next generation of scientists and to engage society in topics related to biodiversity responding to a changing planet.

Both tracks are strongly encouraged to provide an organizational structure that supports collaborative involvement in leadership and broad participation in activities by all team members.

Design Track: NSF will fund collaborative US-only or international collaborative grants of up to \$500,000 over a maximum of three (3) years in this track. Design proposals are aimed at building new teams with no prior collaborative track record and must combine specific team building activities over the three years of the project with the development of creative research and technical approaches that start to address critical, but perhaps untested, novel, or high-risk aspects of the functional axes of biodiversity in the context of a changing planet. It is not expected that projects be funded first in the Design track prior to being considered in the Implementation track. Design proposals should include details explaining the nature of this new collaboration, strengths of the new team to address proposed biodiversity research challenges, inclusive team science, and specific activities to facilitate communication, coordination, and participation of all team members and participating institutions.

Implementation Track: NSF will fund collaborative US-only or international collaborative grants of up to \$2.5M over a maximum of five (5) years in this track. Implementation proposals are suitable for diverse collaborative teams at a more developed research stage, ready to implement a large-scale project addressing functional biodiversity on a changing planet. Projects should tackle research themes that have high potential to engender substantial research advances in understanding functional biodiversity on a changing planet and must clearly articulate a compelling vision of advances beyond existing efforts. Plans for data management and project management are expected to be of the highest quality. Submission or award of a Design Grant is not required to participate in Implementation proposal submission. The proposal should include clear plans to facilitate project coordination and communication and integration of team members.

B. Infrastructure: This program recognizes that advances in methods to characterize biodiversity and its function in a rapidly changing world require adaptable tools, training, and infrastructure. Proposals that use current or planned data, samples, or assignable assets from NSF-supported activities (e.g., NEON, ACCESS, Critical Zone Collaborative Network (CZCN)) or those that enhance broader scientific infrastructure are especially encouraged. These resources could include biological collections, fossil collections, Earth observing satellites and aircraft, long-term research sites and persistent observatories, large trait and -omics databases, modeling capabilities and climatic, paleoclimatic and paleoecological records spanning continental to global scales. This program welcomes proposals that are entirely based on data reuse. Some examples of national and international infrastructure with strong relevance to biodiversity research under this solicitation include (but are not limited to): biological collections (including live and preserved specimens of extant and extinct taxa); model organisms; digital and digitized collections (iDigBio; MorphoSource); cyberinfrastructure (supercomputers, 5G networks, fiber); remote sensing at multiple spatial scales using various instruments (GEDI, MODIS), spacecraft (LANDSAT), and types of instruments (LiDAR, multispectral, hyperspectral, thermal); research networks (NutNet, AccelNet, LTER, ForestGeo, Ameriflux, FluxNet, CZCN, AON, NGEE); facilities (NEON, N-CALM, CSDCO, NCAR, OOI, CAUHSI); and databases and data aggregators (GBIF, Neotoma, Paleobiology Database, DRYAD, EDI, OpenTree, TRY, Arctic Data Center, BCO-DMO, EarthChem). Several relevant data campaigns, such as the BioScape campaign focused on the Cape Floristic region of South Africa, are providing data that could be used to answer research questions about biodiversity on a changing planet.

The use of these resources, data management, and training opportunities for team members and participants should be clearly described in the Project Description, Project Management Plan and the Data Management Plan, as appropriate.

C. Proposals Involving Polar and/or Marine Fieldwork:

Proposals centered on Polar and/or Marine habitats must be discussed prior to submission with a Cognizant BoCP program officer for additional guidance and logistics requirements. Polar projects should explore logistics available for Arctic (https://www.nsf.gov/geo/opp/arctic/res_log_sup.jsp) and Antarctic (<https://www.nsf.gov/geo/opp/ail/>) fieldwork. For marine projects, requests for ship time on a vessel in the U.S. Academic Research Fleet (ARF) must be submitted via the UNOLS Marine Facility Planning (MFP) website at: <https://mfp.us/> with a Ship Time and Marine Equipment (SME) form included in the proposal as a supplementary document.

D. International Collaboration: The Biodiversity on a Changing Planet Program broadly welcomes, but does not require, that projects include international collaborators. PIs considering BoCP research in non-U.S. locations need to be sure to partner with local scientists as full collaborators in the design and conduct of the research project and the nature of this collaborative partnership should be fully described in the project proposal.

Three specific forms of international collaboration are described below. These specific activities do not preclude other international collaborations. Any proposal submitted to the BoCP program with these three international partners must include researchers that are eligible to be supported by the NSFC of China, the FAPESP of Brazil, and/or the NRF of South Africa. All international collaborators are expected to seek support from their respective funding organizations.

International Partners

US-China Collaborative Research Projects

Recognizing the potential for international collaboration to advance biodiversity research and education objectives, NSF continues its partnership with the NSFC. The Chinese component of the US-China Collaborative Projects will be funded by the NSFC using funds provided by the Chinese government.

Chinese researchers applying under this heading can apply to both tracks, but must meet NSFC eligibility requirements, and must apply through an institution eligible to receive NSFC funding. Please see NSFC eligibility rules: <http://www.nsf.gov.cn/publish/portal0/tab948/>.

Applications with non-eligible China partners will not be considered for funding as US-China Collaborative Projects. The proposal budget submitted to NSF should include only the costs of US participants; the anticipated budget for Chinese participants should be submitted as a supplementary document.

The deadline for NSFC submission is March 29, 2023.

US-São Paulo Collaborative Research Projects

Recognizing the potential for international collaboration to advance biodiversity research and education objectives, NSF continues its partnership with the FAPESP of Brazil to facilitate coordinated funding.

These projects can focus on any topic that falls within the scope and the two tracks of this solicitation and the corresponding FAPESP call for proposals published at <https://www.fapesp.br/biota/dimensions-NSF2021>. The deadline for the FAPESP submission is March 30, 2023. The deadline for the eligibility pre-consultation is March 4, 2023 (details following below).

São Paulo state researchers applying to FAPESP under this heading must meet FAPESP eligibility requirements and must apply through an institution eligible to receive FAPESP funding. Researchers should meet the FAPESP eligibility requirements for either a Regular Research Grant (<https://www.fapesp.br/apr/>), the 5 year Thematic Projects (<https://www.fapesp.br/tematico>) or Young Investigator Grants (<https://www.fapesp.br/jp/>). In addition, for Thematic Project and Young Investigator Grants, São Paulo state researchers must send the documents as described in item 4.1 (Eligibility Pre-consultation) of the FAPESP call published at <https://www.fapesp.br/biota/dimensions-NSF2021> no later than March 4, 2023, to assess eligibility as a PI.

The proposal budget submitted to NSF should include only the costs of US participants and an anticipated budget for São Paulo state participants as a

supplementary document. The proposal budget submitted to FAPESP should include only the costs of São Paulo participants and an anticipated budget for US participants submitted as a supplementary document (more information on limits, restrictions, and allowable items at <https://www.fapesp.br/biota/dimensions-NSF2021>). Proposal budgets submitted to NSF and FAPESP do not have to request equal funding from each agency; each proposal should have a budget that reflects the participation of scientists from each region.

Further details for requirements for FAPESP submissions are available at <https://www.fapesp.br/biota/dimensions-NSF2021>.

US-South Africa Collaborative Research Projects

Recognizing the potential for international collaboration to advance biodiversity research and education objectives, NSF continues to partner with the NRF for US-South Africa Collaborative projects. NRF has agreed to provide up to R11.8M (Rand) to South African participants. The proposal budget submitted to NSF should include only the costs of US participants; the anticipated budget for South African participants should be submitted as a supplementary document.

Applications to both tracks must be submitted through an online application process to the NRF using NRF Connect at <https://nrfconnect.nrf.ac.za/>. Applicants must attach the required documents in PDF format in the following order: CV of partner/s, the budget of partner/s, budget division of the South African team, in particular budget sharing between the historically advantaged and HDIs and completed Impact Pathway Template. Failure to submit compulsory documents will result in the disqualification of the application. Applicants are further advised to consult the 'NRF General Application Guide 2024' for assistance on the steps to follow when applying for international research grants. The link to the guide will be published on this web page: <https://www.nrf.ac.za/funding/>.

The deadline for the NRF submission is March 24, 2023 (23:59 SAST).

Multilateral International Projects

Multilateral projects – those that will be supported by NSF and FAPESP, NRF, and/or NSFC – will also be considered and should follow the instructions provided above for bilateral projects. Please note that for multilateral collaborative projects, proposals must be submitted to each agency involved in the project.

E. Educational Supplements and other programs: The BoCP program only considers support for proposals submitted to the annual competition. Except for Career-Life-Balance supplements, program funds are not used to provide post-award supplements to existing awards. If activities that align with REU, RET, and RAHSS educational supplements are planned, these activities should be described and budgeted for in the original proposal submission.

The BoCP program does not participate in the CAREER, RCN, and RUI/ROA programs and does not consider RAPID, EAGER, conference, or other proposals that are not externally reviewed.

F. Collection and Transfer of Samples: Plans to collect and transfer samples should be approved by the appropriate government authorities. Arrangements for the incorporation of traditional knowledge or the collection of samples from the lands and waters of local peoples should be based upon full disclosure and informed consent of those peoples. Under best practices, such arrangements develop as a partnership with early and ongoing full participation of community representatives in project design. If Indigenous peoples, based on religious or other concerns, object to specific uses, widespread dissemination or other treatments of the knowledge or resources they provide, these concerns should be respected. Any dissemination of samples or data that were collected in a foreign country, or dissemination of results based on samples or data collected in a foreign country, should be done with the full knowledge and consent of collaborators in that country, and under any agreements that exist with government agencies in that country.

G. Environmental Policy Considerations of Fieldwork: Federal agencies must comply with the National Environmental Policy Act and other applicable laws and policies such as the Endangered Species Act, the Marine Mammal Protection Act, and the National Historic Preservation Act (NHPA). Projects will be assessed for environmental impacts prior to award and additional consultations, or mitigation efforts may be required. PIs should expect to be involved in the assessment and environmental compliance process for their projects. Investigators may need to travel to communities or meetings as part of the environmental compliance for projects and should request these funds in their award. Researchers proposing work that may affect cultural or historic properties, or whose work involves tribal lands, must cooperate with NSF in complying with the consultation requirements of section 106 of the NHPA and the Native American Graves Protection and Repatriation Act (NAGPRA). For additional information on cultural or historic preservation issues, see the Advisory Council on Historic Preservation's web site at <http://www.achp.gov/work106.html>; for information concerning NAGPRA see <http://www.nps.gov/nagpra/>.

H. Safe and Inclusive Work Environments and Off-Campus or Off-Site Research:

All proposals submitted to this solicitation that include research that will be conducted off-campus or off-site must submit a plan for safe and inclusive working environments as a supplemental document that will be considered under the broader impacts review criterion. Off-campus or off-site research is defined as data/information/samples being collected off-campus or off-site, such as fieldwork and research activities on vessels and aircraft.

It is NSF policy to foster safe and harassment-free environments wherever science is conducted. Work conducted off-campus or off-site should be an enriching experience for everyone and help draw researchers to biological sciences research. By requiring advanced planning and attention to maintaining an inclusive environment, NSF is working to ensure that off-campus or off-site research is safe and inclusive for all participants.

For additional information, see the NSF policies at <https://www.nsf.gov/od/oecr/harassment.jsp>.

III. AWARD INFORMATION

Award size: Under this solicitation, the US components of a collaborative research project may receive a maximum of \$2.5 million for the Implementation Track and \$500,000 for the Design Track per award duration. This upper limit does not include costs of NSF facilities.

Award Duration: The maximum award duration is three years for the Design Track proposals and five years for Implementation Track proposals.

Award number: Approximately 8-12 new awards are anticipated in fiscal year 2023, depending on the quality of submissions. NSF anticipates that at least \$14.0-17.0M will be available in fiscal year 2023, but estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

For **US-China Collaborative Research Projects**, the Chinese component of the collaboration will be awarded through the NSFC in accordance with its policies and regulations. The collaborative proposal must be submitted to the NSFC application submission system by the Chinese scientists by the NSFC-established deadline.

For **US-São Paulo Collaborative Research Projects**, the São Paulo component of the collaboration will be awarded through FAPESP in accordance with its policies and regulations. São Paulo state researchers must confirm eligibility with FAPESP prior to submission according to FAPESP guidelines (<https://www.fapesp.br/biota/dimensions-NSF2021>).

For **US-South Africa Collaborative Research Projects**, the South African component of the collaboration will be awarded through NRF in accordance with its policies and regulations. The collaborative proposal must be submitted to the NRF by the NRF-established deadline.

Multilateral projects, involving NSF and two or more international partners from FAPESP, NRF and NSFC, will also be considered. Funding partner specific deadlines, as well as eligibility criteria apply (see: International Partners).

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or co-PI:

There are no restrictions or limits.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Research.gov or Grants.gov.

- Full Proposals submitted via Research.gov: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal and Award Policies and Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov. The Prepare New Proposal setup will prompt you for the program solicitation number.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov*. The complete text of the *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via Research.gov. PAPPG Chapter II.E.3 provides additional information on collaborative proposals.

See PAPPG Chapter II.D.2 for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the PAPPG instructions.

Proposals must adhere strictly to the specified page limitations (below). **Proposals that are not compliant with the guidelines will be returned without review.** The submitting organization is responsible to ensure compliance with the guidelines.

Additional Guidance on Proposal Submission

For **US-China collaborative research projects**, an identical scientific research project description must be submitted to NSF by the US researcher and to NSFC by the Chinese collaborator(s).

For **US-São Paulo collaborative research projects**, an identical scientific research project description must be submitted to NSF by the US researcher and to FAPESP by the FAPESP eligible collaborator(s).

For **US-South Africa collaborative research projects**, an identical scientific research project description must be submitted to NSF by the US researcher, and to NRF by the South African collaborator(s).

Proposal Title: Informative proposal titles must begin with "BoCP-Design:" or "BoCP-Implementation:", depending on the track being proposed. Proposals with specific international partnerships will also include the designation of one or more international partnership programs, and then the substantive title.

Titles of US-China collaborative research proposals should begin with "BoCP-Design or BoCP-Implementation: US-China:" followed by the substantive title.

Titles of US-São Paulo collaborative research proposals should begin with " BoCP-Design or BoCP-Implementation: US-São Paulo:" followed by the substantive title.

Titles of US-South Africa collaborative research proposals should begin with " BoCP-Design or BoCP-Implementation: US-South Africa:" followed by the substantive title.

Project Summary: As part of the Overview section, the proposal must explicitly summarize how the project addresses functional biodiversity in the context of a changing planet as defined in this solicitation.

Project Description: In addition to the reporting requirement format described by the PAPPG, the Results from Prior NSF Support section must include evidence of deposition of samples, data and/or data products in recognized, accessible, community-accepted repositories by listing such repositories and, if practical, metadata. All publications, data, data products, programs and/or scripts that are specifically mentioned in the Results from Prior NSF Support section must be referenced in the References Cited section and must provide unique, resolvable, and persistent identifiers (such as Digital Object Identifiers [DOIs]; Uniform Resource Locators (URLs), or similar).

For Design proposals, the project description must describe how building a new team is combined with the development of creative research and technical approaches that start to address critical, but perhaps untested, novel, or high-risk aspects of the functional axes of biodiversity. Successful Design proposals will articulate how the team formation includes diverse perspectives and approaches, collaboration, and coordination strategies.

For Implementation proposals, the project description must describe how the proposed research has a high potential to engender substantial research advances in understanding functional biodiversity on a changing planet, and clearly articulate a compelling vision of advances beyond existing efforts.

Special Information and Supplementary Documentation:

Supplementary Document – Data Management Plan (DMP):

The BoCP program encourages appointment of a data management coordinator and/or data scientists where appropriate.

The PAPPG requires the inclusion of a DMP with all full proposal submissions. For BoCP projects, the DMP must include two sections: (1) *Data Plans* and (2) *Intellectual Property Plans*. Those sections should address the following points:

1. *Data Plans.* All projects must ensure that data and biological materials are collected, archived, digitized, and made available using methods that allow current and future investigators to access data and material. Funded projects must disseminate project data broadly in a timely and responsible manner, using widely accepted electronic data standards, a named community-accepted, publicly accessible data repository and with as few restrictions as possible. Data and digital products should be identified, and the following described for *each* of them: Format and standard of primary data; Metadata to be collected and disseminated with the primary data; Timetable of release of ALL data, consistent with privacy and other concerns regarding sensitive information; Public repository to be used; License for use, with an emphasis on open source licenses such as MIT and GPL; Any constraints on release, which must be clearly justified; and person(s) responsible for the release.

All software and code must be in a versioned code repository (e.g., GitHub, BitBucket). We strongly encourage release of ready-to-use software and code through integration with computing resources (e.g., Galaxy, CyVerse), in Virtual Machines (e.g., AWS, JetStream), and/or in Containers (e.g., Docker/DockerHub). Published results should always include information on how to access the supporting data.

The NSF encourages appointment of a data management coordinator and/or data scientists where appropriate.

Additional guidance about the development of Data Management plans, including domain-specific guidance, is provided by the [Directorate for Biological Sciences](#).

Projects focused on organisms in Polar Regions: The data plan structure must be compliant with the specific Office of Polar Programs Data, Code, and Sample Management Policy described in [NSF 22-106](#).

Projects focused on marine organisms: The data plan structure must use the Biological and Chemical Oceanography Data Management Office (BCO-DMO) as the primary data management source and be compliant with guidelines specified in the Division of Ocean Sciences Data and Sample Policy described in [NSF 17-037](#).

Projects focused on Earth sciences: The data plan must adhere to the [EAR Division Data Sharing Policy](#) with the goal of making EAR-supported data products findable, accessible, interoperable, and reusable (FAIR). PIs are strongly encouraged to identify long-lived disciplinary repositories most appropriate for the data types to be collected.

2. *Intellectual Property Plans (IP).* The DMP MUST provide a protocol and timeline for the development of intellectual property agreements. The agreement should indicate:

- Who the owners are of any data or other intellectual property;
- How financial benefits of the intellectual property will be allocated;
- How authorship of publications will be determined; and
- How Intellectual Property disputes will be adjudicated.

A reasonable charge for community resources is permissible, but the fee structure must be outlined clearly in the IP plan. If a Material Transfer Agreement is required, the terms must be described in detail. No reach-through rights are allowed. Data or materials resulting from NSF-funded research obtained with proprietary materials must be readily available without any restrictions to the users. For this reason, the terms of any usage agreements should be stated clearly in the IP plan.

For multi-institutional projects, the lead institution is responsible for coordinating and managing the intellectual property resulting from the award. A complete IP agreement MUST be included with the first annual report of the project.

Supplementary Document – Project Management Plan (PMP, maximum 2 pages):

All proposals, regardless of track, must include a PMP. The PMP should describe strategies for developing collaborative teams that include diverse perspectives, facilitate effective and timely accomplishment of goals, develop leadership capacity, and foster teamwork skills. For Implementation proposals, naming a designated project manager is highly encouraged. The PMP should (1) include roles and intellectual contributions of each US and international partner (PI, co-PI, and senior personnel), (2) specify their expertise relevant to the project scope, and (3) describe the specific tasks each member of the research team is expected to oversee, and (4) explain how education and training activities will enhance the future workforce for the field of biodiversity science. Professional expertise or significant experience in project management should be demonstrated in this document. The Project Management Plan must include a Project Timeline that specifies milestones and expected completion dates of project deliverables. Proposals without a PMP or deviating from the page limit outlined above will be returned without review.

Supplementary Document - Polar and/or Marine Fieldwork Logistics, Assignable Assets:

Projects including facilities, logistics, or assignable asset costs (e.g., NEON, Arctic Research Support and Logistics, SME for use of Academic Research Fleet) must provide evidence showing that requests have been submitted for appropriate support and use.

Proposals centered on Polar and/or Marine habitats need to be discussed prior to submission with a Cognizant BoCP program officer for additional guidance and logistics requirements.

PIs are responsible for filing the appropriate requests for major research platforms; a copy of the request must be submitted as a Supplementary Document. Any science support provided by third-party organizations must be described in a 1–2-page Supplementary Document that outlines the scope of support and a cost estimate. Please allow service providers 4–6 weeks to prepare Supplementary Documents to include in proposals and initiate the request far in advance of proposal submission. For any instrument or infrastructure deployed to the field, investigators should include the scope and cost for the demobilization or other disposal of the property.

Proposals requesting support for polar and/or marine fieldwork should expect to go to the field no sooner than 12 months after proposal submission, or 18 months for proposals requesting ship time from the Academic Research Fleet (<https://www.unols.org/>), to allow time to plan, budget, and complete environmental compliance documentation. Per the NSF PAPPG, awardees are responsible for acquiring and complying with all permits necessary for their work and are responsible for all activities conducted under the award. NSF is not responsible for costs associated with medical evacuations or other interruptions to scheduled fieldwork and reserves the right to seek reimbursement for costs incurred for search, rescue, or medical evacuation. Proposers should ensure all members of the field team are covered by institutional medical evacuation insurance or request funds to purchase medical evacuation insurance, which is an allowable grant cost. All investigators should have a risk management plan for their fieldwork including a plan for emergencies.

Supplementary Document – Safe and Inclusive Work Environments Plan

All proposals submitted to this solicitation that include research that will be conducted off-campus or off-site must submit a plan for safe and inclusive working environments as a supplemental document that will be considered under the broader impacts review criterion. More information regarding review of the plan is under Additional Solicitation Specific Review Criteria.

It is NSF policy to foster safe and harassment-free environments wherever science is conducted. Work conducted off-campus or off-site should be an enriching experience for everyone and help draw researchers to biological sciences research. By requiring advanced planning and attention to maintaining an inclusive environment, NSF is working to ensure that off-campus or off-site research is safe and inclusive for all participants.

Off-campus or off-site research is defined as data/information/samples being collected off-campus or off-site, such as fieldwork and research activities on vessels and aircraft. The plan must be no longer than two pages.

The plan for safe and inclusive working environments must include:

- a brief description of the field setting and unique challenges for the team;
- 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, e.g., codes of conduct, trainings, mentor/mentee mechanisms and field support that might include regular check-ins, and/or developmental events;
- communication processes within the off-site team and to the organization(s) that minimize singular points within the communication pathway (e.g., there should not be a single person overseeing access to a single satellite phone); and
- the organizational mechanisms that will be used for reporting, responding to, and resolving issues of harassment if they arise.

Supplementary Documents - International Partners:

US-China Collaborative Research Proposals. Information for the Chinese portion of the proposal submitted to NSF should be included as Supplementary Documents written in English. That information should include only the following:

Biographical sketches of Chinese senior personnel: Biographical sketches should be submitted for Chinese Senior Personnel and prepared in accordance with the standard biographical sketch format described in the PAPPG.

Collaborators & Other Affiliations (COA): This information should be submitted as a supplementary document for the Chinese PIs/co-PIs/Senior Personnel using the spreadsheet template found on the [Collaborators and Other Affiliations Information website](#).

NSFC budget: A PDF version of the consolidated budget for NSFC should be included as a supplementary document in the NSF proposal. Except for justification of the requested budget, this document must not include any additional project information; all such information should be included in the Project Description.

Letters of collaboration: Letters of collaboration from Chinese scientists are required. These letters must be restricted to a statement of intent to collaborate only

following PAPPG guidelines. Additional information on the nature of the collaboration and the roles of the investigators should be included in the Project Description.

Institutional endorsement: An institutional acknowledgement of the submission must be a signed letter from an authorized Chinese institutional representative with the following text: "I confirm on behalf of [insert name of Chinese institution] that the US-China Collaborative proposal between [insert name of US PI and institution] and [insert name of Chinese PI] is endorsed and has been submitted by [name of US Research Office]."

The NSF submission must be mirrored by a proposal submitted to NSFC by close of business on March 29, 2023. We strongly encourage the Chinese PIs to confer with the NSFC program officer(s) on all the documentation needed for the NSFC submission prior to the NSFC submission deadline.

US-São Paulo Collaborative Research Proposals. Information for the FAPESP portion of the proposal submitted to NSF should be included as Supplementary Documents written in English. That information should include only the following:

Senior Personnel Biographical Sketches: A PDF version of the São Paulo state Senior Personnel Biographical Sketches, following the format required by FAPESP, should be included as a Supplementary Document in the proposal submitted to NSF.

Collaborators & Other Affiliations (COA): This information should be submitted as a supplementary document for the São Paulo PIs/co-PIs/Senior Personnel using the spreadsheet template found on the [Collaborators and Other Affiliations Information website](#).

São Paulo budget: A PDF version of the FAPESP's SAGE platform budget tab should be included as a supplementary document in the NSF proposal. Except for justification of the requested budget, this document must not include any additional project information; all such information should be included in the Project Description.

Letters of collaboration: Letters of collaboration from São Paulo scientists are required. These letters must be restricted to a statement of intent to collaborate only. Additional information on the nature of the collaboration and the roles of the investigators should be included in the Project Description.

Institutional endorsement: An institutional acknowledgement of the submission must be a signed letter from an authorized São Paulo state institutional representative and should consist of the following text: "I confirm on behalf of [insert name of São Paulo institution] that the US-São Paulo Collaborative proposal between [insert name of US PI and institution] and [insert name of São Paulo PI] is endorsed and has been submitted by [name of US Research Office]."

The NSF submission must be mirrored by a proposal submitted to FAPESP by close of business on March 30, 2023. The following documents must be included in the FAPESP submission:

A PDF version of the US Senior Personnel Biographical Sketches, following the format required by NSF, should be included as a Supplementary Document in the proposal submitted to FAPESP.

A PDF version of the NSF budget pages containing the cost for the US components of the project should be included as a Supplementary Document in the proposal submitted to FAPESP by the São Paulo PI. Except for justification of the requested budget, this document must not include any additional project information; all such information should be included in the Project Description.

We strongly encourage the Brazilian PIs to confer with the FAPESP program officer(s) on all the documentation needed for the FAPESP submission prior to the FAPESP submission deadline.

US-South Africa Collaborative Research Proposals. Information for the South African portion of the proposal submitted to NSF should be included as Supplementary Documents. That information should include only the following:

Biographical sketches of South African senior personnel: Biographical sketches should be submitted for South African Senior Personnel and prepared in accordance with the standard biographical sketch format described in the PAPPG.

Collaborators & Other Affiliations (COA): This information should be submitted as a supplementary document for the South African PIs/co-PIs/Senior Personnel using the spreadsheet template found on the [Collaborators and Other Affiliations Information website](#).

South Africa budget: A PDF version of the consolidated NRF budget should be included as a supplementary document in the NSF proposal. Except for justification of the requested budget, this document must not include any additional project information; all such information should be included in the Project Description.

Letters of collaboration: Letters of collaboration from South African scientists are required. These letters must be restricted to a statement of intent to collaborate only. Additional information on the nature of the collaboration and the roles of the investigators should be included in the Project Description.

Institutional endorsement: An institutional acknowledgement of the submission must be a signed letter from an authorized South African institutional representative (Designated Authorities) with the following text: "I confirm on behalf of [insert name of South African institution] that the U.S.-South Africa Collaborative proposal between [insert name of US PI and institution] and [insert name of South African PI] is endorsed and has been submitted by [name of US Research Office]."

The NSF submission must be mirrored by a proposal submitted to NRF by close of business on March 24, 2023, through the NRF Online Submission System at <https://nrfconnect.nrf.ac.za/>.

We strongly encourage the South African PIs to confer with the NRF program officer(s) on the documentation needed for the NRF submission prior to the NRF submission deadline.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Budget Preparation Instructions:

Subawards

In accordance with the applicable award terms and conditions, proposers are reminded of their responsibilities with regard to subawardees. Should an award be made, the primary awardee is responsible for ensuring compliance with the appropriate terms and conditions to, as well as the management and oversight of, any subawardees on the project, including any foreign subawardees.

C. Due Dates

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

March 29, 2023

March 21, 2024

Third Thursday in March, Annually Thereafter

D. Research.gov/Grants.gov Requirements

For Proposals Submitted Via Research.gov:

To prepare and submit a proposal via Research.gov, see detailed technical instructions available at: https://www.research.gov/research-portal/appmanager/base/desktop?nfpb=true&pageLabel=research_node_display&nodePath=/researchGov/Service/Desktop/ProposalPreparationandSubmission.html. For Research.gov user support, call the Research.gov Help Desk at 1-800-673-6188 or e-mail rgov@nsf.gov. The Research.gov Help Desk answers general technical questions related to the use of the Research.gov system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: <https://www.grants.gov/web/grants/applicants.html>. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to Research.gov for further processing.

Proposers that submitted via Research.gov may use Research.gov to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Leading the World in Discovery and Innovation, STEM Talent Development and the Delivery of Benefits from Research - NSF Strategic Plan for Fiscal Years (FY) 2022 - 2026*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to

the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter II.D.2.d(i). contains additional information for use by proposers in development of the Project Description section of the proposal). Reviewers are strongly encouraged to review the criteria, including PAPPG Chapter II.D.2.d(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
 - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
 - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and other underrepresented groups in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

In addition to the standard NSF review criteria, reviewers will be asked to consider the following questions for Biodiversity on a Changing Planet proposals:

- Does the research proposal describe a collaborative, comprehensive and integrative approach to significantly advance our understanding of the

- functional roles of biodiversity on a changing planet?
- To what degree does the Project Management Plan engender confidence that the research team will effectively coordinate activities and achieve the goals of the proposed project?
- Does the Recruitment, Training, and Mentoring Plan describe high-quality opportunities for workforce development and/or broadening participation?
- For proposals with Broader Impact activities that specifically aim to increase the participation of individuals from groups historically underrepresented in biodiversity research, to what degree does the activity convey that work is genuinely led by, or developed and led in authentic partnership with, individuals and communities from groups underrepresented in biodiversity research?
- For the US-China, US-São Paulo, US-South Africa and multilateral collaborative research projects, to what extent do they demonstrate substantial collaboration between the US and China, São Paulo, and/or South African partners? The most competitive projects will be those in which the international collaboration brings substantial additional value to the project.

Reviewers will also be instructed to evaluate the **Plan for Safe and Inclusive Work Environments** within the Broader Impacts review criterion, specifically:

- Is there a compelling plan (including the procedures, trainings, and communication processes) to establish, nurture, and maintain inclusive off-campus or off-site working environment(s)?
- Does the proposed plan identify and adequately address the unique challenges for the team and the specific off-campus or off-site setting(s)?
- Are the organizational mechanisms to be used for reporting, responding to, and resolving issues of harassment, should they occur, clearly outlined?

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each reviewer and/or panel. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements or the Division of Acquisition and Cooperative Support for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by an NSF Grants and Agreements Officer. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

Administrative and National Policy Requirements

Build America, Buy America

As expressed in Executive Order 14005, [Ensuring the Future is Made in All of America by All of America's Workers](#) (86 FR 7475), it is the policy of the executive branch to use terms and conditions of Federal financial assistance awards to maximize, consistent with law, the use of goods, products, and materials produced in, and services offered in, the United States.

Consistent with the requirements of the Build America, Buy America Act (Pub. L. 117-58, Division G, Title IX, Subtitle A, November 15, 2021), no funding made available through this funding opportunity may be obligated for an award unless all iron, steel, manufactured products, and construction materials used in the project are produced in the United States. For additional information, visit NSF's [Build America, Buy America](#) webpage.

Special Award Conditions:

As a condition of funding, any digitized data and/or digital media (e.g., images, audio files) of voucher material from this project must be made available through the online National Resource for Digitized Collections (iDigBio.org), located at the University of Florida and funded by NSF.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Proposal & Award Policies & Procedures Guide (PAPPG)* Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Matthew D. Carling, telephone: (703) 292-2134, email: biodiversity@nsf.gov
- Jean X. Gao, telephone: (703) 292-7253, email: biodiversity@nsf.gov
- Rebecca Gast, telephone: (703) 292-2356, email: biodiversity@nsf.gov
- Maureen M. Kearney, telephone: (703) 292-8239, email: biodiversity@nsf.gov
- Kendra Mclauchlan, telephone: (703) 292-2217, email: biodiversity@nsf.gov
- Andrea Porras-Alfaro, telephone: (703) 292-2944, email: biodiversity@nsf.gov
- Dena M. Smith-Nufio, telephone: (703) 292-7431, email: biodiversity@nsf.gov
- Colette M. St. Mary, telephone: (703) 292-4332, email: biodiversity@nsf.gov
- Daniel J. Thornhill, telephone: (703) 292-8143, email: biodiversity@nsf.gov

For questions related to the use of NSF systems contact:

- NSF Help Desk: 1-800-673-6188
- Research.gov Help Desk e-mail: rgov@nsf.gov

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF [Grants Conferences](#). Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on [NSF's website](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this mechanism. Further information on Grants.gov may be obtained at <https://www.grants.gov>.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.F.7 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <https://www.nsf.gov>

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 - Send an e-mail to: nsfpubs@nsf.gov
 - or telephone: (703) 292-8134
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory

committee members. See [System of Record Notices](#), NSF-50, "Principal Investigator/Proposal File and Associated Records," and NSF-51, "Reviewer/Proposal File and Associated Records." Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Policy Office, Division of Institution and Award Support
Office of Budget, Finance, and Award Management
National Science Foundation
Alexandria, VA 22314

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