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Long Term Research in Environmental Biology (LTREB)

PROGRAM SOLICITATION

NSF 17-513

REPLACES DOCUMENT(S):

NSF 16-500



National Science Foundation

Directorate for Biological Sciences
Division of Environmental Biology

Preliminary Proposal Due Date(s) (required) (due by 5 p.m. submitter's local time):

January 23, 2017

January 23, Annually Thereafter

Annually thereafter

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

August 02, 2017

August 2, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

The Project Description page limit for LTREB Renewal proposals is increased from eight to ten pages.

The window for submission by email of a Personnel List Spreadsheet is limited to 1 business day after proposal submission.

The definition of eligible institutions is clarified.

The purpose and applicability of full proposal submission deferral are clarified.

The requirement to report on results of prior NSF support in full proposals is clarified.

Preliminary Proposals submitted in response to this solicitation should be submitted in accordance with the *NSF Proposal & Award Policies & Procedures Guide (PAPPG)* ([NSF 16-1](#)).

Invited Full Proposals submitted in response to this solicitation should be submitted in accordance with the revised NSF PAPPG ([NSF 18-1](#)), which is effective for proposals submitted, or due, on or after January 29, 2018.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Long Term Research in Environmental Biology (LTREB)

Synopsis of Program:

The Long Term Research in Environmental Biology (LTREB) Program supports the generation of extended time series of data to address important questions in evolutionary biology, ecology, and ecosystem science. Research areas include, but are not limited to, the effects of natural selection or other evolutionary processes on populations, communities, or ecosystems; the effects of interspecific interactions that vary over time and space; population or community dynamics for organisms that have extended life spans and long turnover times; feedbacks between ecological and evolutionary processes; pools of materials such as nutrients in soils that turn over at intermediate to longer time scales; and external forcing functions such as climatic cycles that operate over long return intervals.

The Program intends to support decadal projects. Funding for an initial, 5-year period requires submission of a preliminary proposal and, if invited, submission of a full proposal that includes a 15-page project description. Proposals for the second five years of support (renewal proposals) are limited to a ten-page project description and do not require a preliminary proposal.

Continuation of an LTREB project beyond an initial ten year award will require submission of a new preliminary proposal that presents a new decadal research plan.

Successful LTREB proposals address three essential components:

A Decadal Research Plan that clearly articulates important questions that cannot be addressed with data that have already been collected, but could be answered if ten additional years of data were collected. This plan is not a research timeline or management plan. It is a concise justification for ten years of support in order to advance understanding of key concepts, questions, or theories in environmental biology.

Core Data: LTREB proposals require that the author has studied a particular phenomenon or process for at least six years **up to the present** and for long enough to generate a contemporary time series that contains at least six data points. These data constitute Core Data on which the proposed project is based. Analysis of these data should generate new questions, on the same phenomena or processes, that cannot be answered with the existing core data, require ten years of additional data to be answered, and that therefore provide the focus of the LTREB project. Requirements for core data are described in more detail in the solicitation. Please read these carefully.

A Plan for Data Management and Dissemination that details information management and plans for data sharing with the broader research community and the interested public. Data from long-term research projects have value beyond the peer-reviewed and other publications generated by the investigators collecting the data.

Specific review criteria for LTREB proposals and renewals are explained in Section VI of the current program solicitation. Prospective applicants are advised to read this solicitation carefully.

All proposals submitted to the LTREB program are co-reviewed by participating Clusters in the Division of Environmental Biology: Ecosystem Science, Population and Community Ecology, and Evolutionary Processes. Proposals must address topics supported by these programs. Researchers who are uncertain about the suitability of their project for the LTREB Program are encouraged to contact the cognizant Program Officer.

The Division of Integrative Organismal Systems (IOS) no longer accepts proposals submitted to the LTREB solicitation. Long-term projects that address questions of a) development, mechanisms, adaptive value, or evolutionary history of behavior, b) mechanisms and processes mediating antagonistic and beneficial symbioses, c) growth, development, stress adaptation mechanisms, energetics and metabolism, or other physiological processes, and d) structural and physiological traits that underlie organisms' capacities to live in various environments will no longer be supported through LTREB. Core IOS programs supporting all of these areas will entertain proposals based on long-term data https://nsf.gov/funding/pgm_summ.jsp?pims_id=503623&org=IOS&from=home.

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.

- Kendra McLaughlan, telephone: (703) 292-2217, email: Kmclauch@nsf.gov
- Mary Beth (Betsy) Von Holle, telephone: (703) 292-4974, email: mvonholl@nsf.gov

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

- 47.074 --- Biological Sciences

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 10

per year (Inclusive of New and Renewal awards)

Anticipated Funding Amount: \$5,000,000

per year, pending availability of funds

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: 2

All LTREB proposals are reviewed by one or more of the appropriate, participating core programs in the Division of Environmental Biology. The Division limits the number of preliminary proposals on which a given individual may participate. Submission of LTREB preliminary proposals counts towards the limit for DEB core programs.

In a given year, an individual may participate as a PI, co-PI, or PI of a subaward, on **no more than two preliminary proposals**. Preliminary proposals in excess of the limit for any person will be returned without review in the reverse order received. "PI, co-PI, or PI of a subaward" refer to how an individual would appear on a cover page or budget of a full proposal including all parts of a collaborative proposal. Exercised options to defer an Invited Full Proposal submission or bypass subsequent Preliminary Proposal submission count against this limit. Proposals submitted to the DEB Core Program Solicitation for joint consideration with the Natural Environment Research Council (NERC) of the United Kingdom or the U.S. Israel Binational Science Foundation (BSF) count against this limit.

Participating in a proposal as other senior personnel does not count against this limit.

Submission of an LTREB preliminary proposal in response to this solicitation will count toward the annual limit of 2 submissions per individual to the Division. An investigator who submits an LTREB preliminary proposal that is appropriate for review by one of the participating clusters in DEB will be allowed to participate, as PI co-PI, or PI of a subaward, in only one other preliminary proposal submitted to DEB.

LTREB renewal proposals for the second five years of funding do not count toward this limit, because preliminary proposals are not required for these renewals. If an individual is eligible to submit an LTREB renewal proposal, he or she may participate in up to 2 preliminary proposals submitted to the Division in the same year.

It is the responsibility of the submitters to confirm that the research team is within these eligibility guidelines. Changes to the team post-submission to meet eligibility limits will not be allowed.

This limit does not include proposals to other solicitations [e.g., Research Coordination Networks (RCN), Opportunities for Promoting Understanding through Synthesis (OPUS), Ecology and Evolution of Infectious Diseases (EEID), Dynamics of Coupled Natural and Human Systems (CNH), Doctoral Dissertation Improvement Grants (DDIG), Genealogy of Life (GoLife), Dimensions of Biodiversity, Long-Term Ecological Research (LTER), Faculty Early Career Development Program (CAREER)] or to core programs in other BIO Divisions [Molecular and Cellular Biosciences (MCB), Integrative Organismal Systems (IOS) and Division of Biological Infrastructure (DBI)]. However other solicitations may have their own limit guidelines so be sure to review those carefully for details.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.
- **Full Proposals:**
 - Full Proposals submitted via FastLane: *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:**

Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. submitter's local time):

January 23, 2017

January 23, Annually Thereafter

Annually thereafter

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

August 02, 2017

August 2, Annually Thereafter

Proposal Review Information Criteria

Merit Review Criteria:

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

Award Administration Information

Award Conditions:

Standard NSF award conditions apply.

Reporting Requirements:

Standard NSF reporting requirements apply.

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I. INTRODUCTION

Many important questions in ecology, ecosystem science, and evolutionary biology require data collected for 10 or more years to be answered. Research areas include, but are not limited to, the effects of natural selection or other evolutionary processes on populations; the effects of interspecific interactions that vary over time and space; population and community dynamics for organisms that have extended life spans and long turnover times; feedbacks between ecological and evolutionary processes; pools of materials such as nutrients in soils that turn over at intermediate to longer time scales; and external forcing functions such as climatic cycles that operate over long return intervals. Investigators often are constrained in addressing questions in these areas by the relatively short support periods associated with typical research awards. In recognition of this problem, the Division of Environmental Biology (DEB) established the Long Term Research in Environmental Biology (LTREB) program. LTREB awards are designed to provide the funding to maintain an ongoing, long-term research project for a period of a decade or perhaps longer.

The usefulness of long-term data sets extends beyond typical scientific publications. Therefore, a means of sharing data with other investigators in order to stimulate data reuse, synthesis, and the generation of novel ideas is an important requirement of all proposals. Results should be of interest to and available to the general public. To take advantage of the data collected by these long-term projects, LTREB investigators are required to implement mechanisms of data sharing in the broadest manner possible.

II. PROGRAM DESCRIPTION

The Long Term Research in Environmental Biology Program intends to support decadal projects. Funding for an initial, 5-year period requires submission of a preliminary proposal and, if invited, submission of a full proposal following the guidelines described in Section V and the additional review criteria in Section VI, below.

Essential components of an LTREB proposal include:

Decadal Research Plan: Proposals must pose questions that require long-term data collection to be answered. Investigators must present a research plan that spans ten years. This plan should clearly articulate important questions that cannot be addressed with data that have already been collected, but could be answered if ten additional years of data were collected. It is not a research timeline or management plan, but rather is a concise justification for ten additional years of support in order to advance understanding of key concepts, questions, or theories in environmental biology. The decadal plan is a critical component of an initial 5-year proposal, and questions or hypotheses outlined in this framework must guide any subsequent renewal.

Core Data: LTREB proposals require that the author has studied a particular phenomenon or process for at least six years up to the present and for long enough to generate a contemporary time series that contains at least six data points. Analysis of these data should generate new questions on the same phenomena or processes; these questions provide the basis for LTREB support. Gaps or breaks in data collection compromise analyses of time series data. Time series that include significant or repeated gaps in data collection do not meet LTREB criteria. Investigators must have on hand at least six consecutive measures for each response variable and sampling site included in the proposal. Preliminary proposals that do not meet these requirements will be returned without review.

Plan for Data Management and Dissemination: Data from long-term research projects have value beyond the peer-reviewed and other publications generated by the investigators collecting the data. Other researchers may re-use long-term data to address different questions and new ideas may arise from a combination of long-term data sets. Long-term data may also be of special interest to the public. Therefore, all proposals must describe details of information management, access, and sharing. This plan should be submitted as a Supplementary Document, following guidelines in the NSF Grant Proposal Guide.

LTREB Renewals: To implement the decadal time frame intended for LTREB projects, proposals for renewed support during a second, five-year period do not require submission of a preliminary proposal. Instructions for writing a renewal proposal are provided in Section V, below. Renewal proposals will be evaluated using review criteria described in Section VI of this solicitation. Renewal proposals should be submitted to the August full proposal deadline in the fourth year of the existing award.

Continuation of LTREB projects beyond the initial ten years of support will require submission of a new preliminary proposal, based on a new decadal research plan. If a full proposal is invited, it will follow the same sequence of an initial proposal and a subsequent renewal.

All proposals submitted to the LTREB Program are co-reviewed by participating Clusters in the Division of Environmental Biology (Ecosystem Science, Population and Community Ecology, and Evolutionary Processes). Proposals must address topics supported by these core programs. Researchers are strongly encouraged to contact cognizant Program Officers to ensure that their projects are appropriate for the LTREB program.

Ecological research on marine populations, communities and ecosystems is not supported by LTREB and should be directed to the Biological Oceanography Program: (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=11696&org=OCE). However, research that examines the evolutionary dynamics of marine populations or communities will be accepted. Investigators who are uncertain about the suitability of their research for LTREB are strongly encouraged to contact the managing Program Officers listed in this solicitation.

The Division of Integrative Organismal Systems (IOS) no longer accepts LTREB proposals. Long-term research that addresses questions of a) development, mechanisms, adaptive value, or evolutionary history of animal behavior, b) mechanisms and processes mediating symbiotic interactions, c) growth, development, stress adaptation, energetics, metabolism, or other physiological processes, and d) structural and physiological traits that underlie organisms' abilities to live in various environments should be submitted to appropriate core IOS programs, as noted above.

Examples of current LTREB awards can be viewed at <https://www.nsf.gov/awardsearch/> by including 'LTREB' in a title search.

Special Categories

Research in Undergraduate Institutions (RUI): Preliminary proposals from predominantly undergraduate institutions must be submitted to the LTREB program via this solicitation by the stipulated deadline. Invited **full RUI proposals** should comply with the instructions in this solicitation, include the required RUI documentation and **be submitted to the current RUI solicitation**. If the invited full proposal is a collaborative, only the undergraduate institution(s) should submit to the RUI solicitation. Other institutions should submit to this DEB solicitation. Additional information on the scope of RUI projects and the additional, specific content and format requirements of those proposals can be found at https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5518). Please note: Neither preliminary nor full proposals from RUI-eligible institutions are required to use the RUI designation. An invited full proposal from an RUI-eligible institution may choose to submit through the RUI solicitation or not regardless of whether the preliminary proposal was identified as an RUI.

Review Process

A two-stage review process will be used by all Division core programs:

Preliminary Proposals: All proposers must submit a preliminary proposal that outlines the major goals of the project including the components described below. Preliminary proposals typically will be reviewed by a panel of outside experts. The Program Officers will communicate the decision to Invite/Do Not Invite full proposals via FastLane and those decisions will be based on the panel recommendations and additional portfolio considerations. Invite/Do not Invite decisions are binding.

Full Proposals: Invited full proposals will receive panel review and *ad hoc* review at the discretion of the program as described in Section VI of this Solicitation. Full proposals that were not invited will be returned without review.

Deferred Full Proposal Submission: The invitation to submit a full proposal refers to the upcoming August submission deadline; deferring submission to a later year is not generally allowed. However, if a serious and unexpected situation arises that would prevent timely submission of an invited full proposal, the PI may contact the managing Program Officer and request permission to defer submission until the next full proposal deadline. If the request is well-justified, the Program Officer may grant a deferral. All deferral requests must be initiated at the earliest opportunity. Only in an emergency would a deferral be granted on short notice. A deferred full proposal counts as 1 against the limit of 2 preliminary proposal submissions for each PI, co-PI, or PI of a subaward at the next preliminary proposal deadline. The lead PI must submit an updated Personnel List, using the original preliminary proposal number, at the next preliminary proposal deadline. Deferred full proposals must follow the full proposal submission instructions in the most current version of this solicitation.

Preliminary Proposal Bypass: A proposal that a panel ranks in the top category at the full proposal stage (e.g., High Priority), but that is not recommended by the program for funding may exercise a one-time bypass of the preliminary proposal stage of the next review cycle and be submitted as an invited full proposal at the next full proposal deadline, using the original preliminary proposal number. The bypass submission counts as 1 against the limit of 2 preliminary proposal submissions for each PI, co-PI, or PI of a subaward at the bypassed stage. The lead PI must notify the managing Program Officer of intent to exercise the bypass before the next preliminary proposal deadline and confirm this by submission of a new Personnel List, using the original preliminary proposal number, for the bypassed deadline. The option to exercise a bypass is limited to the preliminary proposal deadline immediately following the invited full proposal review and may not be deferred. Submitters exercising a bypass must follow the full proposal submission instructions in the most current version of this solicitation.

III. AWARD INFORMATION

LTREB awards are not to exceed \$90,000 per year (direct and indirect costs) and \$450,000 over a 5-year (60 month) effort. NSF anticipates making 10 awards annually to new or renewing projects, pending availability of funds. Involvement of undergraduate and graduate students is encouraged. Researchers may request up to one month of salary per year. These requests must be justified carefully and proposers are encouraged to contact the cognizant Program Officer prior to proposal development. Because data management is a key aspect of these research projects, the proposed budget can include the establishment or periodic upgrading of information technology to provide for data sharing with other researchers and the general public. Under unusual circumstances, the purchase of major equipment (over \$5,000) will be entertained if these expenses are well justified. Support from the LTREB Program does not preclude support from other NSF programs.

The number of awards made through the LTREB program is subject to the availability of funds.

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: 2

All LTREB proposals are reviewed by one or more of the appropriate, participating core programs in the Division of Environmental Biology. The Division limits the number of preliminary proposals on which a given individual may participate. Submission of LTREB preliminary proposals counts towards the limit for DEB core programs.

In a given year, an individual may participate as a PI, co-PI, or PI of a subaward, on **no more than two preliminary proposals**. Preliminary proposals in excess of the limit for any person will be returned without review in the reverse order received. "PI, co-PI, or PI of a subaward" refer to how an individual would appear on a cover page or budget of a full proposal including all parts of a collaborative proposal. Exercised options to defer an Invited Full Proposal submission or bypass subsequent Preliminary Proposal submission count against this limit. Proposals submitted to the DEB Core Program Solicitation for joint consideration with the Natural Environment Research Council (NERC) of the United Kingdom or the U.S. Israel Binational Science Foundation (BSF) count against this limit.

Participating in a proposal as other senior personnel does not count against this limit.

Submission of an LTREB preliminary proposal in response to this solicitation will count toward the annual limit of 2 submissions per individual to the Division. An investigator who submits an LTREB preliminary proposal that is appropriate for review by one of the participating clusters in DEB will be allowed to participate, as PI co-PI, or PI of a subaward, in only one other preliminary proposal submitted to DEB.

LTREB renewal proposals for the second five years of funding do not count toward this limit, because preliminary proposals are not required for these renewals. If an individual is eligible to submit an LTREB renewal proposal, he or she may participate in up to 2 preliminary proposals submitted to the Division in the same year.

It is the responsibility of the submitters to confirm that the research team is within these eligibility guidelines. Changes to the team post-submission to meet eligibility limits will not be allowed.

This limit does not include proposals to other solicitations [e.g., Research Coordination Networks (RCN), Opportunities for Promoting Understanding through Synthesis (OPUS), Ecology and Evolution of Infectious Diseases (EEID), Dynamics of Coupled Natural and Human Systems (CNH), Doctoral Dissertation Improvement Grants (DDIG), Genealogy of Life (GoLife), Dimensions of Biodiversity, Long-Term Ecological Research (LTER), Faculty Early Career Development Program (CAREER)] or to core programs in other BIO Divisions [Molecular and Cellular Biosciences (MCB), Integrative Organismal Systems (IOS) and Division of Biological Infrastructure (DBI)]. However other solicitations may have their own limit guidelines so be sure to review those carefully for details.

Additional Eligibility Info:

Note that institution types, other than those listed in the "Who May Submit Proposals" section, are allowed to receive subawards through an eligible institution, but there are limitations on what can be supported by those subawards. The PI should discuss with a program officer any plans to incorporate a subaward to an institution not eligible to submit directly to this solicitation.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Preliminary Proposals (required): Preliminary proposals are required and must be submitted via the NSF FastLane system, even if full proposals will be submitted via Grants.gov.

The following exceptions and additions to the NSF PAPPG apply to preliminary proposals submitted to this solicitation:

Submission of a Preliminary Proposal is required to be eligible for invitation to submit a Full Proposal. Preliminary proposals that are not compliant with NSF guidelines (described both in the PAPPG and in this solicitation) will be returned without review. It is the submitting organization's responsibility to ensure that the proposal is compliant with all applicable guidelines.

For collaborative proposals, a single preliminary proposal should be submitted by **ONLY the lead institution**. This single preliminary proposal must include documentation from all collaborative partners (e.g., all project personnel should be indicated on the list of personnel in the project description and provide required documents). See instructions for each preliminary proposal section below.

Preliminary proposals must contain the items listed below and adhere to the specified page limitations. **No additional information may**

be provided as an appendix or by links to Web pages. Figures and tables must be included within the specified page limit. All elements of the proposal, including legends and tables, must meet the formatting requirements for font size, characters per inch, margins, etc., as specified in the PAPPG.

Results from prior support and responses to prior reviewer comments are neither required in, nor excluded from, preliminary proposals. It is up to the individual submitters to determine if either represents an efficient use of the limited Project Description space in support of their request.

Preliminary proposals should contain an overview of the proposed research with sufficient detail to allow assessment of the major ideas and approaches to be used. Preliminary proposals must include the following components:

Cover Sheet: Select the LTREB program solicitation from the pull-down list, and check the box indicated for a preliminary proposal. Entries on the Cover Sheet are limited to the Principal Investigator and a maximum of four co-Principal Investigators. Beginning Investigators (individuals who have not been a Principal Investigator or a co-Principal Investigator on a Federally-funded award with the exception of doctoral dissertation, postdoctoral fellowship or research planning grants) must check the box for "Beginning Investigator" on the proposal Cover Sheet. Leave blank the fields for Requested Amount, Requested Duration, and Starting Date for the project. Additional FastLane instructions can be found below in section V.D.

Project Title: The project title must begin with 'LTREB Preliminary Proposal:', followed by the substantive title.

Project Summary (1 page): Provide an overview of the proposed research, addressing separately the intellectual merit and broader impacts. The summary should be written in the third person, informative to those working in the same or related field(s), and understandable to a scientifically or technically literate reader. **Preliminary proposals that do not contain the Project Summary, including an overview and separate statements on intellectual merit and broader impacts will not be accepted by FastLane or will be returned without review. Note: Project Summaries entered in the FastLane form are displayed with standardized formatting and subject to a 1-page length limit.**

Project Description: Maximum 5 pages total, containing the following two sections:

I. Personnel (This section is limited to one page. Any remaining space should be left blank).

Provide a list of project personnel that includes any individual for whom a biographical sketch is included in the preliminary proposal. Indicate the institutional affiliation for each individual, and provide a minimal description of that person's role(s) in the project. The description of role(s) may not exceed two lines per person and cannot include external links. You should not list students, or technicians. Divide the list into two sections:

The **first section** of the list should be labeled "Key personnel" and must contain all PIs, co-PIs, and PIs of intended subawards for what is envisioned to be the full proposal, including those from all parts of a collaborative proposal. This constitutes the list of key personnel subject to the submission cap of no more than two preliminary proposals.

The **second section** of the list should be labeled "All other personnel" and must contain any other personnel whose biosketches are included in the preliminary proposal (i.e., other senior personnel or postdoctoral scholars). This section of the list should not include any individual who will be listed on the cover page of the full proposal submission or cover pages of any associated non-lead collaborative full proposal submissions (i.e., no PIs or co-PIs should be listed). This section should also not include any individual who will be receiving a subaward through the planned budget of the full proposal (i.e., PI on a subaward). The individuals listed on the personnel page should match the list of personnel submitted by email using the debpersonnelist.xlsx template (see below). If there is any discrepancy between the listing of personnel on the submitted template and the proposal personnel page, the template listing will be considered definitive for purposes of enforcing the individual cap on preliminary proposal submissions, and for the allowed role of individuals on the full proposal submission. If researchers are at different institutions, consider carefully the planned collaborative mechanism – collaborative proposal, subaward, or consultant services – as that will affect the described role – PI or co-PI, PI of a subaward, or other senior personnel, respectively. A change in role from the preliminary proposal to the full proposal requires prior PO approval and will be allowed only in rare circumstances. Please note that the only mechanisms by which to fund someone in a full proposal who was listed on a preliminary proposal as other senior personnel are through the senior personnel salary & wages (Budget Line A) or consultant services (Budget Line G3) of a budget where a different individual is listed as PI. Any other mechanism would be an unapproved change to their role on the full proposal and cause the full proposal to be returned without review. Please keep in mind that preliminary proposals in excess of the submission cap for any person will be returned without review in the reverse order received. It is the responsibility of the submitters to confirm that the entire team is within the eligibility guidelines. Changes to the team post-submission to meet the eligibility limits will not be allowed.

II. Project (This section is limited to four pages and must address separately both the intellectual merit and broader impacts. We suggest the use of the sub-sections listed below, organized as appropriate. For the purposes of DEB programs, sub-sections 1 through 3 are equivalent to an explicit "intellectual merit" header

1. Conceptual Framework
2. Decadal Research Plan and rationale for 10 years of data collection
3. Proposed Research, including questions or hypotheses and the research approach
4. Broader Impacts

References Cited are limited to 3 pages; see the PAPPG for format.

As a Supplementary Document no longer than 1 page, include a description of the long-term (6 or more years) core data that provide the basis for the proposed research. As described above, the proposer must have studied a particular process or phenomenon for at least six years up to the present and for long enough to generate a contemporary time series that includes at least six data points. These data should be presented as a **table** that includes, for each measured variable and each sampling location, the time period over which data were collected. **The table should only include those sites or variables for which 6 consecutive measurements or data points, without gaps in sampling, are available.** Enough detail should be provided to allow reviewers to understand how these data provide the basis for the proposed research. For example, if the proposed research is to compare traits across four species, the

table should indicate data available for each trait for each of the four species and the time frame over which these data have been collected. If the research questions address the role of fire on a biological process, the PI must demonstrate at least 6 years of data on fire at all proposed study sites. Preliminary proposals that do not include a core data table as a supplementary document, or that do not meet these core data requirements, will be returned without review.

Although data management is an important aspect of LTREB proposals, a Data Management Plan is not required for preliminary proposals.

Biographical Sketches (2-page limit per individual) should be included for each person listed on the Personnel page. Each biographical sketch must be uploaded separately. Biographical sketches should **follow the standard format described in the PAPPG**. Note: Do not bundle Biographical Sketches for multiple individuals into a single file. Use the "Add/Delete Non-Co-PI Senior Personnel" button on the FastLane proposal preparation screen to enable submission of separate files for individuals not listed on the cover page.

No budget or budget justification should be submitted. Please leave blank the Requested Amount box on the FastLane Cover Sheet.

Collaborators & Other Affiliations Information. The following information regarding collaborators and other affiliations must be provided for each individual who has a biographical sketch in this preliminary proposal. This information is to be uploaded under Single Copy Documents. If you have correctly added biographical sketches for all persons, there should be a separate space within Single Copy Documents to upload each individual's file. For each person include, as described in the PAPPG, (1) Collaborators and Co-Editors, (2) Graduate Advisors and Postdoctoral Sponsors, and (3) Thesis Advisor and Postgraduate-Scholar Sponsor. In addition, this document should list other potential conflicts including (4) spouse or other relative, and (5) any other individuals with whom or institutions with which the senior personnel (PI, co-PIs, and any named personnel) have financial ties, including advisory committees, boards of directors, or prospective employers (specify type). Note: Collaborations involving junior authorship on a multi-authored paper (>5 authors) may be limited to the senior author. Note: This document may be organized in text or table form. This information is used in the selection of reviewers to help identify potential conflicts or bias.

Personnel List Spreadsheet. The template found at <https://www.nsf.gov/bio/deb/debpersonnelist.xlsx> contains a single tab. Please read the instructions carefully and follow guidance. In particular, if researchers are at different institutions, consider carefully the collaborative mechanism that will be used in the full proposal: collaborative proposal, subaward, or consultant contract when assigning a role of PI or co-PI, PI of a subaward, or other senior personnel, respectively. Using the template, compile an Excel Workbook that provides information for all persons listed on the Personnel page of the project description. The completed file **must include the FastLane proposal ID (Not the Temporary ID #) assigned after submission of your proposal**. The completed file should be submitted by email to debtemplate@nsf.gov within one business day of proposal submission.

Proposers must include the above documents, prepared in accordance with standard NSF formatting guidelines).

Proposers must complete the Proposal Classification form. This form is required for all submissions to the BIO Directorate; FastLane will not allow processing of your proposal without it.

No other supplementary documents or appendices are permitted for preliminary proposals.

Items that should NOT be included in a preliminary proposal:

Budget, Budget Justification, Facilities, Equipment and Other Resources, Current and Pending Support, Letters of Collaboration, **Data Management Plan**, Postdoctoral Mentoring Plan, RUI Impact Statement, Certification of RUI Eligibility, or any additional Supplementary Documents.

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

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal & Award Policies & 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) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- 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) 292-7827 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 the NSF FastLane system. PAPPG Chapter II.D.3 provides additional information on collaborative proposals.

See PAPPG Chapter II.C.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.

For new LTREB projects, full proposals will be accepted only from PIs who have submitted Preliminary Proposals and have

been invited to submit a full proposal. LTREB Renewal proposals requesting the second five years of funding are excepted from the required Preliminary Proposal. See "Special Categories" above for submission of invited, full Research in Undergraduate Institutions (RUI) proposals.

The full proposal must not deviate substantially from the preliminary proposal in the scope of the project. PIs may incorporate responses to the preliminary proposal panel summary.

Results of Prior NSF Support. Results of prior NSF support must be reported for each PI or co-PI identified on the proposal who has received any NSF funding with a start date in the past five years, regardless of whether the support was directly related to this proposal or not. Funding includes not just salary support, but any funding awarded by NSF. Results of prior NSF support must follow the format described in the PAPPG.

Changes to senior personnel (names and roles) from the preliminary proposal stage are generally not allowed except to remove a person, to replace a person rendered incapable of participating, to recognize the promotion of a post-doctoral fellow to a faculty position, or to account for institutional changes by senior personnel. Any changes to senior personnel require approval from the cognizant PO. No changes are allowed that result in a person exceeding the individual submission limit on participation as PI, co-PI, or PI of a subaward established at the preliminary proposal stage. By making a request, the PI takes responsibility that all personnel remain within the eligibility guidelines. Proposals with unapproved changes and/or changes in excess of an individual's submission limit will be returned without review. Reminder: the only mechanisms by which to fund someone in a full proposal who was listed on a preliminary proposal as other senior personnel are through the senior personnel salary & wages (Budget Line A) or consultant services (Budget Line G3) of a budget where a different individual is listed as PI. Any other mechanism would be an unapproved change to their role on the full proposal and cause the full proposal to be returned without review.

Project Description (maximum 15 pages, including Results from Prior NSF Support for PI and all co-PIs): The proposal should address the following three themes in the Project Description or where otherwise indicated:

Conceptual Framework. Proposals must address timely and important concepts in environmental biology. The research must demonstrate an ability to advance general understanding in evolutionary biology, ecology, and ecosystem science. Clearly defined hypotheses must guide the research. These hypotheses must be motivated by at least 6 years of recently-collected data on the study system and must be grounded in appropriate concepts or theory.

Decadal Research Plan: The Project Description must include a specific section, entitled 'Decadal Research Plan,' that identifies questions or hypotheses that require an additional 10 years of investigation to be answered. These questions or hypotheses should form the crux of the proposal. Investigators must demonstrate that the questions posed cannot be answered with data already on hand, or with data collected from typical three-to-five-year awards made by core programs. Clear justification must be provided for needing an additional 10 years of data to answer these questions. The decadal research plan should provide the overarching motivation for the initial 5-year investigation as well as for a 5-year renewal.

Core Data Set. Central to all successful LTREB projects is a set of core data that are already being collected continually in the laboratory or at an existing site or sites. As described above, the proposer should have studied a particular process or phenomenon for at least six years, up to the present, and for long enough to generate a time series that includes at least six data points. Analysis of these data should serve as the basis for new questions that motivate the current proposal, and these questions should focus on the same phenomena or processes that constitute the core data. Proposals should clearly state the data that have been collected, the sites at which they have been collected, how long they have been collected, if they will continue to be collected, and how these data generate the new questions posed. These data can be documented in a table or as a narrative description. They must be presented as part of the Project Description.

New research activities such as the addition of new sites or the initiation of a new manipulation can be proposed with the following conditions: these activities cannot compromise continued collection of the core data that form the basis for the research and must clearly improve the ability to answer questions that arise from analyses of the core data. An example is the initiation of a new, short-term experiment to reveal mechanisms responsible for observed, longer-term trends.

Questions concerning the appropriateness of an existing data set as the basis for an LTREB proposal or of new research activities should be discussed with the cognizant NSF Program Officer prior to proposal development. The LTREB Program does not provide support solely for monitoring, for the analysis of long-term historical data, or for the continuation of an ongoing study that is not question- or hypothesis-driven.

Data Management and Dissemination (Supplementary Document, 2-page maximum): Long-term data are a valuable resource that can stimulate and support investigations well beyond the scope of the initial study. Data and metadata collected as part of an LTREB-funded project must be made available to other researchers and to the general public within a reasonable period of time after their collection. The required Data Management Plan should articulate how, where, and when the data will be archived; how and when they will be made available to the broader scientific community; and how future access to the data will be guaranteed. As data maintenance is an iterative process, the information technology used should have sufficient flexibility to allow periodic updates. Proposers may wish to consult with the cognizant Program Officer on the best manner in which to achieve this component of the project.

Postdoctoral Researcher Mentoring Plan: Each project that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. FastLane will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See the PAPPG for further information about the implementation of this requirement. Multiple institutions involved in a collaborative project may submit only a single postdoctoral mentoring plan, and this must conform to the page length specified in the NSF PAPPG.

Research Experiences for Undergraduates (REU): Projects anticipating the inclusion of undergraduate research experiences are encouraged to include these as part of the research proposal itself, rather than seeking subsequent supplemental funds. Such requests should follow the guidelines for REU supplement requests (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5517&from=fund). REU projects involve students in meaningful ways in ongoing research programs or in research projects specifically designed for or by the REU student. If the intent is to engage students as technicians, then an REU is not the appropriate support mechanism; instead, salary support should be entered on the Undergraduate Students line of the proposal budget.

REU, RET, and RAHSS Funds. If Research Experiences for Undergraduates (REU), Research Experiences for Teachers (RET), or

Research Assistantships for High School Students (RAHSS) funds are requested as part of the full proposal, descriptions of these activities should be included as a Supplementary Document. The description is limited to 3 pages in all circumstances. If funds are requested for multiple categories of activity (REU, RET and RAHSS), or if multiple institutions on a collaborative proposal are requesting funds for one or more categories, the three page limit still applies. The entire budget for these activities should be included in Participant Support Costs, including stipends, travel, and supplies. A detailed breakdown of the budget for each separate category of request must be explained in the budget justification. Budgets for REU activities are generally under \$7,500 per student. Budgets for RET activities are generally under \$15,000 per teacher. Budgets for RAHS activities are generally under \$6,000 per student. Funds requested for these educational supplements are in addition to the \$90,000 per year funding limit for LTREB projects.

Biographical Sketches and Current and Pending Support. Biographical sketches and Current and Pending Support Statements should be submitted for all senior personnel in the full proposal. Biographical sketches should **follow the format described in the PAPPG**. All senior personnel biographical sketches should be placed in that section of the proposal. Biographical sketches for post-doctoral fellows can optionally be included, but if included, must be added as Non PI/Co-PI Senior Personnel. No biographical sketches should be included in supplementary documents. Biographical sketches should not be included for anyone providing a "Letter of Collaboration".

Collaborators & Other Affiliations Information. The following information regarding collaborators and other affiliations must be provided for each individual who has a biographical sketch in this proposal. This information is to be uploaded under Single Copy Documents. If you have correctly added biographical sketches for all persons, there should be a separate space within Single Copy Documents to upload each individual's file. For each person include, as described in the PAPPG, (1) Collaborators and Co-Editors, (2) Graduate Advisors and Postdoctoral Sponsors, and (3) Ph.D. Advisor. In addition, this document should list other potential conflicts including (4) spouse or other relative, and (5) any other individuals with whom or institutions with which the senior personnel (PI, co-PIs, and any named personnel) have financial ties, including advisory committees, boards of directors, or prospective employers (specify type). Note: Collaborations involving junior authorship on a multi-authored papers (>5 authors) may be limited to the senior author. Note: This document may be organized in text or table form. This information is used in the selection of reviewers to help identify potential conflicts or bias.

Please note: Do not bundle Biographical Sketches, Current and Pending Support, or Collaborators & Other Affiliations documents for multiple individuals into a single file. Use the "Add/Delete Non-Co-PI Senior Personnel" button on the FastLane proposal preparation screen to enable submission of separate files for individuals not listed on the cover page.

Letters of Collaboration. Supplementary Documents may include letters of collaboration from individuals or organizations that are integral to the proposed project but are neither senior personnel nor supported by subawards. This may include subsidiary involvement in some aspect of the project, cooperation on outreach efforts, or documentation of permission to access materials or data. Letters of collaboration must focus solely on affirming that the individual or organization is willing to collaborate on the project as specified in the Project Description or Facilities, Equipment and Other Resources section of the proposal. No endorsements of the potential value or significance of the project may be included. Each letter of collaboration **must** be signed by the designated collaborator. Requests to collaborators for letters of collaboration should be made by the PI well in advance of the proposal submission deadline, because they **must** be included at the time of the proposal submission. The recommended template for letters of collaboration is provided below.

Template for letters of collaboration:

To: NSF _____ (Program Title) _____ Program

From: _____

(Printed name of the individual collaborator or name of the organization and name and position of the official submitting this memo)

By signing below (or transmitting electronically), I acknowledge that I am listed as a collaborator on this proposal, entitled "_____(proposal title)_____" with _____ (PI name) _____ as the Principal Investigator. I agree to _____ (description up to 140 characters) _____, as described in the Project Description or Facilities, Equipment and Other Resources section of the proposal.

Signed: _____

Organization: _____

Date: _____

Please note that inclusion of extra description of the collaborative activities is not allowed.

Please note that general letters of support are not allowed.

Personnel List Spreadsheet. The template found at <https://www.nsf.gov/bio/deb/debpersonnellist.xlsx> contains a single tab. Please read the instructions carefully and follow guidance. Using the template, compile an Excel file that provides information for all persons identified as PI, co-PI, PI of any subaward, Other Senior Personnel, or Post-doctoral fellow in the full proposal, including all parts of multi-institutional collaborative proposals. The completed file **must include the FastLane proposal ID (Not the Temporary ID # or Grants.gov ID #) assigned after submission of your proposal**. The completed file should be submitted by email to debtemplate@nsf.gov within one business day of proposal submission.

PROPOSAL PREPARATION INSTRUCTIONS FOR LTREB RENEWAL PROPOSALS

To implement the decadal time frame intended for LTREB projects, and following an initial 5-year LTREB award, renewal proposals for a second, five-year period will be accepted. Renewal proposals are exempt from the submission of a preliminary proposal, and should be submitted to the full proposal August deadline in the fourth year of the initial award. The project description of a renewal proposal is limited to **10 pages**; all other sections described above for a full proposal must be included. Renewal proposals will be evaluated using the standard NSF Merit Review Criteria and three additional criteria described in Section VI below. Titles for renewal proposals must begin with "LTREB Renewal:" followed by the substantive title.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

Proposals will be limited to \$90,000 per year and a total of \$450,000 over five years.

C. Due Dates

- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. submitter's local time):

January 23, 2017

January 23, Annually Thereafter

Annually thereafter

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

August 02, 2017

August 2, Annually Thereafter

D. FastLane/Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane 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: <http://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 the NSF FastLane system for further processing.

Proposers that submitted via FastLane are strongly encouraged to use FastLane 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 *Building the Future: Investing in Discovery and Innovation - NSF Strategic Plan for Fiscal Years (FY) 2018 – 2022*. 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.C.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.C.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 underrepresented minorities 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

Preliminary and Full Proposals

In addition to the two standard review criteria established by the National Science Board, reviewers will evaluate preliminary and full LTREB proposals for (1) A compelling, conceptually- or theoretically-motivated decadal research plan and (2) Core Data - at least 6 years of contemporary data collected up to the present by the investigator should be in hand at the time of submission, and should motivate or provide the foundation for the research questions proposed.

Reviewers will evaluate **full proposals** for the additional criterion of (3) A plan for data management and dissemination to other researchers and the general public.

LTREB Renewal Proposals

Proposals submitted for a second, 5-year award to complete a decadal research plan will be evaluated using the standard NSF Merit Review Criteria and the following additional criteria:

1. progress made toward the decadal research plan outlined in the initial proposal
2. a description of planned research activities to complete this decadal plan
3. evidence that previously-collected data are available to the broader research community, and
4. a description of how results at the end of the ten years of funding will be integrated to resolve the original questions posed.

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 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 a Grants Officer in the Division of Grants and Agreements. 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) 292-7827 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=pappp.

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=pappp.

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:

- Kendra McLaughlan, telephone: (703) 292-2217, email: Kmclauch@nsf.gov
- Mary Beth (Betsy) Von Holle, telephone: (703) 292-4974, email: mvonholl@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@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 <http://www.grants.gov>.

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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.E.6 for instructions regarding preparation of these types of proposals.

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

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- **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: nspubs@nsf.gov
 - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

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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 Systems of Records, [NSF-50](#), "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and [NSF-51](#), "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). 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
Office of the General Counsel
National Science Foundation
Alexandria, VA 22314

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