This solicitation has been archived and replaced by NSF 15-596

Long-Term Ecological Research (LTER)
Renewal

PROGRAM SOLICITATION
NSF 13-588

National Science Foundation

Directorate for Biological Sciences
    Division of Environmental Biology

Directorate for Geosciences
    Division of Polar Programs
    Division of Ocean Sciences

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

    March 14, 2014

IMPORTANT INFORMATION AND REVISION NOTES

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), NSF 13-1, was issued on October 4, 2012 and is effective for proposals submitted, or due, on or after January 14, 2013. Please be advised that the guidelines contained in NSF 13-1 apply to proposals submitted in response to this funding opportunity.

Please be aware that significant changes have been made to the PAPPG to implement revised merit review criteria based on the National Science Board (NSB) report, National Science Foundation's Merit Review Criteria: Review and Revisions. While the two merit review criteria remain unchanged (Intellectual Merit and Broader Impacts), guidance has been provided to clarify and improve the function of the criteria. Changes will affect the project summary and project description sections of proposals. Annual and final reports also will be affected.

A by-chapter summary of this and other significant changes is provided at the beginning of both the *Grant Proposal Guide* and the *Award & Administration Guide*.

Please note that this program solicitation may contain supplemental proposal preparation guidance and/or guidance that deviates from the guidelines established in the Grant Proposal Guide.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

    Long-Term Ecological Research (LTER)

Synopsis of Program:

    NSF currently supports 25 LTER sites, and the solicitation is open to renewal proposals only.

    To address ecological questions that cannot be resolved with short-term observations or experiments, NSF established the Long Term Ecological Research Program (LTER) in 1980. Three components differentiate LTER research from projects supported by other NSF programs: 1) the research is located at specific sites chosen to represent major ecosystem types or natural biomes; 2) it emphasizes the study of ecological phenomena over long periods of time based on data collected in five core areas; and 3) projects include integrative, cross-site, network-wide research. Ongoing research at LTER sites must test important, current ecological theories and significantly advance understanding of the long-term dynamics of populations, communities and ecosystems. It often integrates multiple disciplines and, through cross-site interactions, examines patterns or processes over broad spatial scales. Recognizing that the value of long-term data extends beyond use at any individual site, NSF requires that data collected by all LTER sites be made broadly accessible.

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.

- Saran Twombly, Division of Environmental Biology, telephone: (703) 292-8133, email: stwombly@nsf.gov

- David L. Garrison, Division of Ocean Sciences, telephone: (703) 292-7588, email: dgarriso@nsf.gov

- Lisa M. Clough, Division of Polar Programs, telephone: (703) 292-4746, email: lclough@nsf.gov

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

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

Award Information

Anticipated Type of Award: Continuing Grant

Estimated Number of Awards: 7

In FY 2014 seven sites are scheduled for renewal.

Anticipated Funding Amount: $8,200,000

Projects currently funded at $980,000 per year may, with convincing justification, increase their annual request by up to 15%, to an annual request not to exceed $1,127,000.

Projects currently funded at $1,280,000 per year may not request an increased annual budget for this renewal.

All awards will be pending availability of funds.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- The LTER program is currently accepting only renewal proposals. Only organizations with active LTER awards are eligible to apply. Collaborative proposals must be submitted using the "single proposal" method as described in Chapter II, Section D.4.a. of the GPG. Separately submitted collaborative proposals will be returned without review.

PI Limit:

The LTER program is currently accepting only renewal proposals. Only organizations and PIs with active LTER awards are eligible to apply.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable

- **Preliminary Proposal Submission:** Not Applicable

- **Full Proposals:**
    - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
    - 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: http://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

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

    March 14, 2014

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

All ecological communities and ecosystems face long-term change. Identifying the nature of these changes and the mechanisms or processes driving them requires the collection, analysis, and interpretation of data over long periods of time. To address questions that cannot be resolved with short-term observations or experiments, NSF established the Long Term Ecological Research Program (LTER). Three components characterize LTER research: 1) it is located at specific sites chosen to represent major ecosystem types or natural biomes, 2) it emphasizes the study of phenomena over long periods of time based on data collected in five core areas, and 3) projects often include integrative, cross-site research. Ongoing research at LTER sites must test important, current ecological theories and significantly advance understanding of the long-term dynamics of populations, communities and ecosystems.

Over thirty years of LTER research have produced unique and valuable knowledge about ecological change in response to natural and human influences. LTER research has advanced the field of ecology and helped to provide the empirical data needed to forecast change. It has also advanced understanding of continental-scale processes, through cross-site analyses of ecological change. At some sites, social scientists have been engaged to examine questions of socio-ecological connections among organisms, biological processes, and the abiotic environment.

As the LTER Program enters its fourth decade, it faces new demands for long-term research. Long-term data are necessary to advance our understanding of complex biological systems, important ecological processes that are context-dependent and non-linear, ecological and evolutionary processes that interact continually through feedbacks, and the effects of ongoing climate change that are currently unknown. These are a few of the frontiers particularly appropriate to the LTER program.

II. PROGRAM DESCRIPTION

Successful renewal proposals must test major ecological theories or concepts. Proposed research should be organized around a suite of integrated questions that arise from the analysis of long-term data. It should have the goals of achieving a mechanistic understanding of biological responses to past and present environmental change at multiple scales and of using this understanding to predict ecological, evolutionary, and - if appropriate - social responses to future environmental change. Renewal projects must clearly define questions that demand study on decadal time scales.

Core data collection at LTER sites will continue to center on the five areas of 1) primary production, 2) population dynamics and trophic structure, 3) organic matter accumulation, 4) inorganic inputs and movements of nutrients through the ecosystem, and 5) patterns and frequency of disturbances. Analyses of these data provide the foundation for testing major theories, for challenging existing paradigms in ecology, and for developing new paradigms.

In renewal proposals, LTER investigators are encouraged to broaden the spatial scales of their long-term analyses through comparative research with other LTER or non-LTER projects. These broader scale activities should extend the conceptual framework proposed for innovative site-based research. They also should contribute to a broader understanding of the mechanisms underlying ecological responses to climate change, nutrient loading, loss of biodiversity, or changes in trophic structure, for example. The research must thoroughly justify the need for long-term support to understand ecological systems and processes.

The scientific goals of the proposed research will be evaluated based on the following principles:

1. focus on important and general ecological questions that a) derive from key theories, b) are motivated by the analysis of long-term data, and c) require additional, long-term data collection to be answered
2. encouragement of or demand for new conceptual frameworks or theory that will significantly advance understanding of site-specific dynamics and relate site-specific results to other ecosystems at different spatial scales
3. refinement of models to incorporate sources of uncertainty and model-data assimilation
4. collaborations with other LTER or non-LTER researchers to understand ecosystem dynamics across broad spatial and temporal scales

Please read carefully the program-specific review criteria described below.

Renewal proposals also must articulate milestones and deliverables for data management that, at the very least, include timelines for data release, publication of discovery-level metadata, and online access for all core data through the LTER Network Information System.

NSF recognizes that human decisions, behavior, and actions may contribute to LTER research. LTER renewal projects may elect to include social science research if it helps to advance or to understand key, conceptually motivated ecological questions.

III. AWARD INFORMATION

At the end of each 6 year award, active LTER sites in good standing are eligible for renewal. Projects currently funded at $980,000 per year may, with convincing justification, increase their annual request by up to 15% but not to exceed $1,127,000 per year. Projects currently funded at $1,280,000 per year may not request increased budgets for this renewal.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- The LTER program is currently accepting only renewal proposals. Only organizations with active LTER awards are eligible to apply. Collaborative proposals must be submitted using the "single proposal" method as described in Chapter II, Section D.4.a. of the GPG. Separately submitted collaborative proposals will be returned without review.

PI Limit:

The LTER program is currently accepting only renewal proposals. Only organizations and PIs with active LTER awards are eligible to apply.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

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 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 Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG 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: (http://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.

The following instructions supplement the GPG and NSF Grants.gov Application Guide guidelines:

Proposal Format

The page limits contained in this solicitation take precedence over those given in the NSF *Grant Proposal Guide (GPG)*. Each project must be managed by a single organization with other organizations involved via sub-awards. Proposals will be subjected to initial screening for the requirements in the *GPG* and this solicitation. Those that do not meet specific requirements will be returned without review.

Proposals must include the following key components:

- An integrated, six-year research plan that addresses a set of focused questions. Questions should arise from analyses of long-term data and advance understanding of key ecological concepts. Justification must be provided for at least 6 more years of data collection to answer these questions. Proposed cross-site or non-LTER collaborative research must fit within this cohesive research plan.
- Information Management and Technology, including milestones and deliverable products from data management that result in availability of all data via the LTER Network Information System.
- Project Management, including personnel, fiscal, administrative, institutional, and logistical issues. Involvement of new or early-career researchers in project activities is encouraged.
- Outreach and Education including training of students, K-12 Schoolyard activities, application of results to management or policy decisions, outreach to the public, and others as relevant.

Each of these components will be evaluated for quality, productivity, and impact.

Cover Sheet: The title must start with the acronym, "LTER:" followed by the substantive title.

Project Description: a maximum of 25 pages of text, with an additional 7 pages allowed for figures. No substitution of text for figures, or figures for text, will be accepted. Please include the following sections:

Results from Prior Support: Describe results of prior LTER support, including the 10 most significant publications resulting from the last 6 years of funding. Include broader impacts and results of supplemental support in these results. To provide a context for the current renewal, it may be useful to summarize, in one or two sentences, the major foci of previous LTER proposals.

Proposed Research: Essential to this section is a clear articulation of the conceptual framework and individual questions that constitute an integrated research plan. New research questions should arise from analyses of long-term data. Authors should describe in appropriate detail the experiments and observations that will be carried out, and explain how they fit into the proposed conceptual framework. Methods and data analyses must be described in enough detail that reviewers can critically evaluate the quality of these efforts. Likewise, proposed models or model development must be presented in sufficient detail to allow evaluation, including the model structure and how the models account for different sources of uncertainty. New activities should be conceptually integrated with ongoing, longer-term studies. They may require increased budgets; new activities and budget increases must be thoroughly justified. Cross-site or other collaborative efforts must fit intellectually within the overarching research plan, and authors should describe how these will advance understanding of site-specific dynamics or relate site-specific results to communities or ecosystems at different spatial scales. This section of the proposal should conclude with a synthesis that ties together the proposed research activities and shows how they will significantly advance understanding of ecological dynamics at different spatial and temporal scales.

Methodological detail is important for new activities. Less detail is needed for ongoing projects, particularly when methods have been published in peer-reviewed journals. **Reference to established methods through links to websites is no longer allowed.**

Related Research Projects: Many LTER projects leverage NSF and other funds to obtain additional research support. Some of these complement the long-term research supported through the LTER program, but are not essential to it. Please use this section to report other research efforts that are **essential** to address the questions posed in this renewal, and describe how they contribute to answering these questions.

Education and Outreach Activities: New educational activities planned through ongoing Schoolyard LTER programs should be presented, along with plans for public outreach, media interactions, and applications of your research to policy and management. If well justified, support will be provided for 2 REU students. Plans for their involvement in research and for their mentoring must be included. Funds requested for REU activities must be requested as Participant Support and described separately in the budget justification, as explained in more detail below.

References Cited: pages as required, following GPG format

Budget and Budget Justification: Annual budgets vary across LTER projects. With convincing justification, projects that currently receive $980,000 per year may request up to a 15% increase not to exceed $1,127,000 per year. Projects currently funded at $1,280,000 per year may not request an increase in annual budgets. Please contact the Program Director managing your current award for clarification or with questions about your budget.

All awards are subject to the availability of funds. Thorough justification of items requested in the budget is required. Explain why you need the funds requested to carry out specific aspects of the proposed research. Justification for general purpose equipment such as boats and other field vehicles must describe its primary or exclusive use for the proposed research.

Describe other sources of funding, how LTER funds are leveraged at your site, and what other in-kind services are provided, and by whom. **The description should be included in the *Facilities, Equipment and Other Resources* section of the proposal, should be narrative in nature and should not include any quantifiable financial information.** For further information please see the Grant Proposal Guide (GPG), Chapter II.C.2i

Funds for REU supplements must appear as Participant Support Costs. They should be justified and accompanied by a table that includes requests for stipends, travel, supplies, and other expenses.

Budgets should include all costs charged to the project for necessary platforms and facilities supporting the research except for those facilities separately supported by NSF (e.g., UNOLS research vessels, research aircraft, or field equipment). For research involving UNOLS vessels, a UNOLS ship request should be appended to proposals as a Supplementary Document. Likewise, research involving polar regions should follow established guidelines for requesting logistical assets, as discussed in the relevant proposal solicitations (for Antarctic Sciences, see NSF 13-527; for Arctic Sciences, see NSF 10-597). Principal Investigators are responsible for filing the appropriate requests for major research platforms, if applicable; a copy of the request must be attached as a Supplementary Document.

Biographical Sketches: Provide a one-page biographical sketch for each PI and senior scientist listed in the proposal. List up to ten publications or products per investigator on each Bio Sketch but do not list conflicts of interest and collaborators on the Bio Sketch. Conflicts are to be listed separately as indicated below within Supplementary Documents.

Current and Pending Support: as specified in the GPG. This proposal is considered a pending support activity.

Supplementary Documents must include the following (order is not important):

1. A table that lists all data sets from the site that have been deposited into the LTER Network Information System.

2. An alphabetical, combined Conflict of Interest document. This should be presented as an alphabetized table identifying conflicts of interest for the PI, all co-PIs, and all Senior Personnel. The table should be organized, by columns, as: A. Last and first name of the individual in conflict, B. institutional affiliation of the conflict, C. type of conflict, and D. name of the PI, co-PI, or Senior Personnel holding the conflict. Conflicts to be identified are (1) Ph.D. advisors or advisees, (2) collaborators or co-authors within the past 48 months, (3) postdoctoral researchers and Masters students within the past 48 months, (4) any other individuals with whom, or institutions with which, the research personnel (PIs, co-PIs, other named personnel) have financial or other professional ties, including advisory committees (specify type), and (5) friends, family members, or other individuals from whom an objective evaluation would be unlikely. Do not list conflicts separately on each biographical sketch.

3. Data Management Plan (maximum of 5 pages): Core data sets generated at a site must be available electronically and accompanied by metadata that meet LTER standards for the Network Information System. This section must provide a description of the data and information management system and metadata standards to be used at the site. It is expected that data derived from LTER funding will be made freely and publicly available as soon as possible, and not to exceed 2 years after collection, via the Network Information System. This section should include milestones and deliverable products from data management. NSF places high priority on the availability of site-based data to a broad research community. This section should include descriptions of how data management will be implemented in the design of research projects; how the data manager will be involved in designing research projects; and the mechanisms employed to ensure that researchers contribute their data to the LTER databases. Proposers should describe the resources dedicated to harvesting, documenting, archiving, managing, and making data accessible; and should detail any anticipated major changes and why these are necessary.

4. Project Management Plan (maximum of 3 pages): Describe how the proposed research, which could involve a number of individuals and diverse projects, will be managed. This must include a cohesive management plan that is adequate for a project of the size and complexity proposed. The plan should describe how funding and research decisions will be made and implemented, and efforts to integrate non-LTER scientists into research activities. Describe efforts to increase diversity among site participants. The Project Management Plan also must address continuity of leadership, succession planning, and the recruitment of new scientists to the project. Explain any major changes anticipated or proposed.

5. Postdoctoral Mentoring Plan (maximum 1 page): A single postdoctoral mentoring plan must be included if salaries are listed for post-doctoral researchers on the appropriate line in the budgets requested.

6. Ship time - Proposals may require the scheduling of ship time. These proposals must include a completed NSF-UNOLS Request Form (NSF Form 831). The UNOLS form may be obtained from the NSF Division of Ocean Sciences Ship Operations Program by calling (703) 292-8581, or directly from the UNOLS World Wide Web site at http://www.unols.org/.

7. Logistical Support for Antarctic and Arctic LTER sites: Three current LTER sites rely on research support and logistics provided through the Division of Polar Programs. The Arctic Research Support and Logistics (RSL) Program supports the field component of research projects, usually through third party contractors. Third party logistics providers include CH2MHILL Polar Services, which manages support at many Arctic sites and includes a subcontract to Umiaq-UIC (Ukpeagvik Iñupiat Corporation), which supports work on Alaska's North Slope; and the Toolik Field Station, which is operated by the Institute of Arctic Biology at the University of Alaska Fairbanks. The Antarctic Infrastructure and Logistics Section provides logistical support for US Antarctic Program (USAP) research projects in Antarctica via support contractors or agreements with Department of Defense organizations. The scope of polar fieldwork at both poles must be outlined in the proposal so NSF and logistics providers can evaluate the feasibility of requested support and institute appropriate planning.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

Other Budgetary Limitations:

Federal agency scientists and scientists based in other countries may participate contingent on funding from other federal agency or foreign agency partners, but not via NSF funding.

Up to $24,000 for LTER Schoolyard activities and $16,000 for REU expenses may be requested if well justified.

C. Due Dates

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

    March 14, 2014

D. FastLane/Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

  Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are 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.

  Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: https://www.fastlane.nsf.gov/fastlane.jsp.

- **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://www07.grants.gov/applicants/app_help_reso.jsp. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding 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.

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 the GPG as Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: http://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 *Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for Fiscal Years (FY) 2011-2016*. 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 core strategies 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 provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students, and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the variety of learning perspectives.

Another core strategy in support of NSF's mission is broadening 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. (GPG 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 GPG 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

The following additional merit review criteria will be used to evaluate the scientific goals of the proposed research. To what extent does the research:

- propose a cohesive research plan that focuses on major ecological questions.
- rely on analyses of existing long-term data to generate new research questions.
- require additional, long-term (6 years or more) data to answer the questions posed.
- advance understanding of key concepts, questions, or theories in ecology.
- encourage new conceptual frameworks and develop new models that incorporate sources of uncertainty and allow for model-data assimilation.
- expand the research at a particular site by including other LTER or non-LTER collaborators and by attracting other researchers, approaches, and questions.

Proposals involving fieldwork in the polar regions will also be evaluated for operational feasibility, which includes resource availability, environmental protection and waste management provisions, safety and health measures, and safeguards of radioactive materials.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. 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 is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, 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.

In all cases, 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 and 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.

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 letter, 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 letter; (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 letter. 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 http://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 *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

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 at least 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). Within 90 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 *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

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:

- Saran Twombly, Division of Environmental Biology, telephone: (703) 292-8133, email: stwombly@nsf.gov

- David L. Garrison, Division of Ocean Sciences, telephone: (703) 292-7588, email: dgarriso@nsf.gov

- Lisa M. Clough, Division of Polar Programs, telephone: (703) 292-4746, email: lclough@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, "My NSF" 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. "My NSF" also is available on NSF's website at http://www.nsf.gov/mynsf/.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at http://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 provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 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 http://www.nsf.gov

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230

- **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) 292-7827

- **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 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
Arlington, VA 22230

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