Plant Genome Comparative Sequencing Program (PGCSP)

Program Solicitation
NSF 06-555

National Science Foundation
Directorate for Biological Sciences
    Division of Biological Infrastructure

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

    June 16, 2006

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

    Plant Genome Comparative Sequencing Program (PGCSP)

Synopsis of Program:

The goal of this program is to support the development of genome sequence resources that would contribute to a conceptual framework for the interpretation of the structure, function and evolution of genomes of economically important plants. Projects are solicited that focus on a biological question that is enabled by the proposed sequence resources and was unanswerable with existing resources. Proposers must provide clear justification for the plant or plants selected and the type of resource to be generated. Projects should also advance the goals of the Plant Genome Research Program (PGRP).

Types of sequence resource to be supported include, but are not limited to, whole genome sequences of varying coverage, survey sequences (including gene-enriched and end sequences of large insert clones), as well as Expressed Sequence Tags (ESTs). Plant sequencing targets may include, but are not limited to, key nodes of plants in the tree of Life, members of a specific taxon, genus or family, or intraspecific populations.

Cognizant Program Officer(s):

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

- 47.074 --- Biological Sciences

Eligibility Information

- **Organization Limit:** Proposals may only be submitted by U.S. academic institutions, U.S. non-profit research organizations including museums, research laboratories, professional societies and similar organizations in the U.S. that are directly associated with educational or research activities, and consortia of only the eligible organizations listed here. A proposal from a multi-institutional consortium must be submitted by the lead organization as a single proposal. When a consortium submits a proposal, a single principal investigator must be designated as the project director and a single organization must accept overall management responsibility including the management of any intellectual property issues. Organizations ineligible to submit to this program solicitation cannot receive subawards.
- **PI Eligibility Limit:** None Specified.
- **Limit on Number of Proposals:** None Specified.

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant or Cooperative Agreement
- **Estimated Number of Awards:** 5 to 10 - Up to 10 awards of up to $2,000,000 per year for up to 2 years, pending availability of funds.
- **Anticipated Funding Amount:** $10,000,000 Up to $5,000,000 in FY 2006 and up to $5,000,000 in FY 2007 will be allocated to this program, pending availability of funds.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Full Proposal Preparation Instructions:** This solicitation contains information that deviates from the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required by NSF.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Not Applicable.

C. Due Dates

- **Full Proposal Deadline Date(s)** (due by 5 p.m. submitter's local time):
  June 16, 2006

Proposal Review Information

- **Merit Review Criteria:** National Science Board approved criteria apply.

Award Administration Information

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

TABLE OF CONTENTS

I. INTRODUCTION

The Plant Genome Research Program announces its intention to support development of sequence resources that would contribute to a conceptual framework for the interpretation of the structure, function and evolution of genomes of economically important plants. The Plant Genome Comparative Sequencing Program (PGCSP) is specifically soliciting proposals that focus on biological questions that would be enabled by a particular sequence or sequences. Sequence resources may include, but are not limited to, whole genome sequences, survey sequences, and physical maps.

The Plant Genome Research Program (PGRP) began in FY 1998 as part of the National Plant Genome Initiative (NPGI). The overall goals of the Plant Genome Research program are to support basic research in plant genomics and to accelerate the acquisition and utilization of new knowledge and innovative approaches to understanding fundamental biological processes in plants. The focus is on plants of economic importance and plant processes of potential economic value. For the past eight years, the NSF Plant Genome Research Program has followed the long-range plans for the NPGI and, working closely with the US Department of Agriculture (USDA), Department of Energy (DOE), National Institutes of Health (NIH) and more recently the US Agency for International Development (USAID) and the National Aeronautic and Space Agency (NASA), the NSF Program has contributed to tremendous advances in plant genomics and plant sciences.

The PGRP is currently following the second five-year plan (National Plant Genome Initiative: 2003-2008; http://www.ostp.gov/NSTC/html/npgi2003/index.htm) published in January 2003 by the Interagency Working Group on Plant Genomes, the group that oversees the NPGI. This plan builds on the significant advances made since the start of the NPGI and charts a course for advancing the frontiers of plant science through genomics research. Proposers are strongly encouraged to consult this plan for guidance regarding program goals prior to submission of a proposal.

Proposals to sequence non-plant, plant-associated organisms are not eligible for support. Proposals to sequence plant-associated microbes should be sent to the NSF/USDA Joint Program on Microbial Sequencing (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5688&org=MCB). You are strongly encouraged to contact a PGCSP Program Director (cswg@nsf.gov) to determine the suitability of your proposal for this program prior to submission.

Simultaneous submission of proposals to this program and another federal agency is permissible with prior written approval of the agencies involved (for example, the Department of Energy Joint Genome Institute Community Sequencing Program: point of contact is Dr. Daniel Drell at daniel.drell@science.doe.gov). A proposal from the same submitter that is a duplicate of, or substantially similar to, a proposal already under consideration by NSF will be returned without review.

II. PROGRAM DESCRIPTION

The goal of the PGCSP is to support the development of sequence resources that would contribute to a conceptual framework for the interpretation of the structure, function and evolution of the genomes of economically important plants. In the eight years since the NPGI began, there has been a considerable increase in the publicly available plant sequence resources, including a wealth of expressed sequence tags (ESTs), as well as whole genome sequences for *Arabidopsis thaliana*, *Oryza sativa,* and *Populus trichocarpa*. Additional whole genomes sequences are under way for *Medicago truncatula*, *Solanum lycopersicon*, *Zea mays*, and *Vitis vinifera*. The DOE Community Sequencing Program has also supported the ongoing sequencing of *Mimulus guttatus*, *Selaginella moelendorffii*, *Physcomitrella patens*, *Sorghum bicolor*, *Capsella rubella*, *Arabidopsis lyrata,* and *Triphysaria*. However, despite this dramatic increase in plant sequence information, there is still a tremendous need for additional sequences to enable researchers to effectively address fundamental questions in plant biology through comparative approaches.

The PGSCP is specifically soliciting proposals that focus on biological questions that would be enabled by a particular sequence or sequences. In this way, the program will lead to the strategic addition of plant sequences. For example, if the goal of a project is to compare the structure and function of a network of genes across a genus or a family, specific species and sequence types would be selected and justified based on the type of analysis proposed. Similarly, if the goal is to understand natural variation within a species, the type of sequence and degree of coverage would be justified on the basis of the analysis proposed. In all cases, it should be explained why the resources are essential to the specific question being posed. Proposers are encouraged to consider the available resources and to leverage existing resources as much as possible. If other projects are under way that have overlapping goals, including international projects, proposers should present a clear plan for coordination. Projects that have a potentially broad impact will be given priority for funding.

Given the focus of addressing a specific biological question or questions, the proposed analysis of the project data will play a critical role determining the value of the project outcomes. Proposals must describe clearly how the sequence data will be analyzed and disseminated. To have the greatest impact possible, it is essential that the outcomes of projects be made accessible widely and in a format that is best suited for integration into existing community databases. Beyond deposit of sequence data and trace files in GenBank, projects must also plan to provide assemblies, maps, annotations and the like to the appropriate community database(s) such as Gramene, MaizeGDB, TAIR, or LIS. Proposers should consult with the database staff prior to submission the type of information that will be provided, the format, and a letter of support from the database staff detailing plans. If additional funds are required to support database activities, they should be included in the proposal budget.

Types of Sequence Resources

A wide range of sequence resources are eligible for support, including but not limited to: whole genome sequences of varying fold coverage; survey sequences, including gene-enriched and Bacterial Artificial Chromosome (BAC)-end and fosmid-end sequences; and ESTs.

Resources developed should be forward-compatible with any future sequencing efforts. Where appropriate, support may also be requested for development of physical maps.

Sequencing Targets

The plant genome or genomes selected for sequencing should be justified on the basis of a biological question that would be enabled by the resources to be developed. In addition, the type of resource to be developed (whole genome sequence or survey sequence) should be clearly justified in the context of the biological question. Phylogenetic comparisons are welcome but should be justified and proposed at a scale appropriate to the biological question posed. In all cases, the relevance to the goals of the PGRP should be clearly justified and the relationship to existing resources stated. Existing resources should be leveraged where appropriate.

Sequencing targets may include, but not be limited to:

- Key nodes or groups of plants in the Tree of Life that would enable researchers to answer specific biological questions relevant to the goals of the PGRP
- Members of a specific taxon, genus or family
- Intraspecific populations

Proposers are strongly encouraged to contact a PGCSP Program Director (cswg@nsf.gov) prior to submission to determine the suitability of the proposal for this program.

Additional Considerations

- All data must be released in a timely manner and be accessible to all. Where appropriate, sequence data should be released according to the Bermuda/Ft. Lauderdale Agreement (see http://www.genome.gov/10506537). Plans for release of other data types must be clearly spelled out.
- If appropriate, access to the plant and nucleic acid materials to be sequenced should be described. If plant material that requires a permit for collection or use is to be sequenced, the proposal should clearly state the status of any requests. Where appropriate, preliminary data indicating that high molecular weight nucleic acid isolation is feasible from the sequencing targets should be presented.
- In order to broaden participation, the Directorate for Biological Sciences (BIO) particularly encourages proposals involving collaborations between institutions and research universities/organizations including Minority-Serving Institutions (MSI) such as Historically Black Colleges and Universities (HBCU), Tribal Colleges and Universities (TCUP), Hispanic-Serving Institutions (HSI), and community colleges.
- PGCSP projects offer an ideal opportunity to train young scientists at the interface of modern sequencing technologies, bioinformatics, and evolutionary biology, and to promote increased participation by members of underrepresented groups. All proposals are expected to integrate research and education, taking advantage of opportunities unique to the project. Training and outreach activities should be integrated into the research plan commensurate with the scale and scope of the project.
- Private industry has already made significant investments in plant genome research. Innovative collaborations with industry are encouraged when they advance the goals of the proposed project. Funds awarded under this solicitation cannot be used to support industrial partners, and release of data and information must comply with the requirements set out in this solicitation. Requests for funding to pay for commercial fee-for-service sequencing are permitted. However, a draft of the sequencing contract must be provided with the proposal that includes specific information about what will be delivered as well as a timetable for sequence production.
- International research collaborations are welcomed. When applicable, proposed research activities should be coordinated with similar efforts in other countries to maximize efficiency and avoid unnecessary duplication of effort. However, foreign participants should secure support for their component of the collaboration from their own national programs.

III. ELIGIBILITY INFORMATION

Organization Limit: Proposals may only be submitted by U.S. academic institutions, U.S. non-profit research organizations including museums, research laboratories, professional societies and similar organizations in the U.S. that are directly associated with educational or research activities, and consortia of only the eligible organizations listed here. A proposal from a multi-institutional consortium must be submitted by the lead organization as a single proposal. When a consortium submits a proposal, a single principal investigator must be designated as the project director and a single organization must accept overall management responsibility including the management of any intellectual property issues. Organizations ineligible to submit to this program solicitation may not receive subawards.

PI Eligibility Limit: None specified

Limit on Number of Proposals: None specified

IV. AWARD INFORMATION

It is anticipated that $5,000,000 will be available in FY 2006 and $5,000,000 in FY 2007. NSF expects to make 5-10 awards of up to $2,000,000 per year for up to 2 years, pending availability of funds and the quality of proposals. Awards will be made either as standard or continuing grants, or cooperative agreement. Awardees are expected to attend the Annual Plant Genome Awardee Meeting at NSF.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Instructions:

Proposals submitted in response to this program announcement/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 pubs@nsf.gov.

The following instructions deviate from the GPG guidelines.

Project Summary (maximum 1 page): The project summary should consist of three separate parts in the following order:

1. A list of senior personnel (PI, Co-PIs, key-collaborators) along with their home organizations.

2. A summary of the scientific objectives and approaches.

3. Expected broader impacts of the proposed research.

   Both the scientific aspects and the anticipated broader impacts must be addressed or the proposal will be returned without review. Please read the Important Notice from the Director of NSF, which can be found at http://www.nsf.gov/pubs/2002/iin127/imptnot.pdf.

Project Description (maximum 15 pages): In addition to the standard description in the GPG, the guidelines below should be followed, noting that the page allowances listed are part of the overall 15-page maximum:

Progress Report (2 pages): Groups that have received prior funding for developing plant genome sequence resources should include the grant title and number, the funding agency, and a summary of exactly what has been released or developed (e.g. information about the status of a map, or bases sequenced and deposited in GenBank as finished sequence, the number of sequences which are in the process of being sequenced, sequence read lengths and quality scores).

Research Plan: Describe the goals of the project, scientific and technical approaches, including informatics and information management where appropriate, with expected outcomes. Descriptions must be sufficiently detailed to allow adequate review.

DNA substrate and sequencing strategy: Include the source of the DNA (genomic DNA, BAC clones), the method of library preparation, and any other pertinent information. Describe the overall strategy to be used and the key anticipated outcomes.

Sequence Quality and Quantity: The discussion of sequence quality and quantity should contain the following elements:

- The overall approaches to be used (for example, whole genome shotgun, fosmids, BACs, selected genomic regions).
- The type(s) of sequence to be generated (e.g. Phase I, Phase II, or Phase III).
- For shotgun projects, the number of attempted sequence reads to be performed and anticipated read lengths (in bases of phred20, or equivalent, quality).
- The anticipated amount of shotgun sequence to be delivered including such metrics as the number of successful sequence reads, total phred20 bases, paired end rate, where applicable, and fold coverage as appropriate.
- Timetable for and location(s) of sequence production.
- Steps to be taken to evaluate sequence quality, and the quality metrics to be used.
- If appropriate, plans for assembly, finishing, and annotation, including how the sequence will be assembled onto a genome map, and how gaps will be captured or closed.
- Summary sequencing costs: Provide the following information in tabular form for each type of sequence to be generated. Cost estimates should include direct costs for labor and materials, total number of attempted and successful sequencing reads budgeted, anticipated sequence read length (in phred20 bases), anticipated paired end rate, estimated cost of library preparation, estimated cost per phred20 base, and estimated cost per finished base

Plan to Integrate Research and Education: The proposal should include a thoughtful training/educational component that takes advantage of unique and specific opportunities the proposed project would provide. The following items must be included: (1) a well designed plan to increase participation of members of under-represented groups that is specific to the proposed project, (2) an education plan for project trainees, and (3) a description of how these plans are integrated with the proposed research plan. A clear and realistic

discussion of how the plan will be implemented should be included in the proposal. Simply describing general policies at the investigators' organizations will not be sufficient.

References Cited: Follow the GPG guidelines for all references cited. Indicate with an asterisk any cited publications that resulted from prior research funded by NSF for the PI, or Co-PI.

Biographical Sketches: (2 pages each): Biographical sketches following the GPG guidelines must be listed for the PI, Co-PIs and each of the Senior Personnel listed on the Project Summary page.

Proposal Budget: Provide yearly budgets and a summary budget for the duration of the proposed project. When subawards are involved, yearly and summary budgets are required for each subaward. A Budget Justification (maximum 3 pages per budget and subaward budget) must be provided. A careful and realistic budget will add to the overall strength of a proposal. Funds for facility construction or renovation may not be requested. Funds to cover the cost of attendance of one project representative at each year's annual awardee meeting in Arlington, VA should be requested.

Current and Pending Support: Current and Pending Support following the GPG guidelines must be listed for the PI, Co-PIs and each of the Senior Personnel listed on the Project Summary page.

Facilities, Equipment and Other Resources: Provide a description of available facilities and priorities for its use. For projects requiring additional equipment, justify the need for these resources in the context of the work proposed.

Special Information and Supplementary Documentation: Include the following materials, clearly labeled (A-1, A-2, etc.), and submit them under the "Supplementary Documents" section of FastLane:

(A-1) Sharing of Results and Management of Intellectual Property (maximum 5 pages): Describe the management of intellectual property rights related to the proposed project, including plans for sharing data, information, and materials resulting from the award. This plan must be specific about the nature of the results to be shared, the timing and means of release, and any constraints on release. The proposed plan must take into consideration the following conditions where applicable:

- Sequences must be released to GenBank according to the currently accepted community standard (Bermuda and Ft. Lauderdale agreements), following the current guidelines for quality assessment (see http://www.genome.gov/page.cfm?pageID=10506537). For large-insert clone projects, it is expected that DNA sequence assemblies of 2kb or greater will be deposited in GenBank within 24 hours of generation. For whole genome shotgun projects, sequence traces are to be deposited to the NCBI Trace repository within one week of production, with whole genome assemblies deposited in GenBank as soon as possible after the assembled sequence has met the quality evaluation criteria stated in the Project Description. Deposited data should be available to all for use without restriction.
- If the proposed project produces additional resources (libraries, software, etc.), these should be made available as soon as their quality is checked to satisfy the specifications approved prior to funding. The timing of release should be stated clearly in the proposal. The resources produced must be available to all segments of the scientific community, including industry and the international community. A reasonable charge is permissible for distribution, but the fee structure must be outlined clearly in the proposal. If accessibility differs between industry and the academic community, the differences must be clearly spelled out. If a Material Transfer Agreement is required for release of project outcomes, the terms must be described in detail.
- When the project involves the use of proprietary data or materials from other sources, the data or materials resulting from research supported by this program must be readily available without any restrictions to the users (no reach-through rights). The terms of any usage agreements should be stated clearly in the proposal.
- Budgeting and planning for short-term and long-term distribution of the project outcomes must be described in the proposal. If a fee is to be charged for distribution of project outcomes, the details should be described clearly in the proposal.
- In case of a multi-organizational proposal, the lead organization is responsible for coordinating and managing the intellectual property resulting from this award. Organizations participating in multi-organizational projects should formulate a coherent plan for the project prior to submission of the proposal.
- Please note that key project personnel may be required, prior to an award decision, to submit copies of any intellectual property agreements or material transfer agreements they have signed, or are planning to sign, that would impact the unrestricted and timely distribution of the outcomes of the research funded though this program.

(A-2) Management Plan (maximum 3 pages): The management plan should include plans for internal means of communication, coordination of data, and information management across the project, evaluation, and assessment of progress, as well as allocation of funds and personnel. Each investigator's role should be described and a table summarizing the role of each investigator provided. The exact time commitment of each key project member should be indicated in the management plan, regardless of any request for his/her salary from NSF. A project timetable with yearly goals should be provided that includes benchmarks for the major anticipated outcomes and expected dates for their release.

(A-3) Sequencing Provider Profile (maximum 10 pages): Please provide the following information for all participating sequence providers:

- Total annual sequencing capacity.
- A list of ongoing projects with the capacity and time committed to each.
- The proportion of production sequencing dedicated to whole genome shotgun and BAC-based shotgun reads.
- The average length of production sequencing reads (in bases of phred20, or equivalent, quality) and the average usable read length.
- The amount of data deposited in a public database (bases deposited in a public nucleotide sequence database and reads deposited in a trace archive). All of this sequence must be available to reviewers.
- The provider's total current monthly production capacity based on an average of the last six months of sequencing, including the number of attempted and successful reads, the number of base pairs per read of at least phred20 (or equivalent) quality, and the frequency of double ended reads, if appropriate.
- The internal metrics (e.g., reads per month, failed lanes, base pairs per lane) used to evaluate and manage progress.
- Sequence assembly experience at all scales (large-insert clones through whole genomes), including any draft genome assemblies deposited in public databases.
- Finishing process (if appropriate), from draft-level sequence or whole genome shotgun assemblies, including gap closing and building of contiguous finished sequence.
- The amount of finished genomic sequence in finished base pairs produced in the last 12 months and how much of this has been deposited in a public database. All of this sequence must be available to reviewers.
- Procedures used to check the quality of sequences and assemblies at each scale produced.

(A-4) Letters of collaboration: Letters from collaborators who are not requesting funds from the proposal should be attached, describing the nature of the collaboration and the source of their support. General letters of support are not allowed.

Color Images (if applicable): Be advised that NSF cannot accommodate the printing of color images as part of proposal submission through the FastLane system, and submitted proposals that require the use of color or of very high resolution photographic images will necessitate additional steps. Further instructions will be provided after the proposal has been received.

Any material not specifically requested or in excess of the page allowances will be removed prior to review. It is the submitting organization's responsibility to ensure that the proposal is compliant with the guidelines. Non-compliant proposals may be returned without review.

Single Copy Documents: Correspondence to the program not intended to be sent to reviewers such as the Conflict of Interest Document, a list of potential reviewers, or confidential materials, can be sent through the "Single Copy Document" section of FastLane.

Conflict of Interest Document (no page limit): This document should be provided in **table or spreadsheet form only**, and should be sent as a single document through the Single Copy Document section of FastLane at the time of proposal submission. The document should consist of a list, **in the form of a single alphabetized table**, with the full names (Last name, first name, middle initial) of all people having a conflict of interest with any senior personnel (PI and Co-PIs) and any named personnel member whose salary is requested in the project budget. Conflicts to be identified are (1) Ph.D. thesis advisors or advisees, (2) collaborators or co-authors for the past 48 months, including postdoctoral advisors or advisees, and (3) any other individuals or organizations with which the investigator has financial ties (please specify type). Members of current Advisory Committees who receive reimbursement for travel or honoraria should be included in this last category.

Proposers are reminded to identify the program announcement/solicitation number (06-555) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing:

Cost sharing is not required by NSF in proposals submitted under this Program Solicitation.

C. Due Dates

Proposals must be submitted by the following date(s):

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

June 16, 2006

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this announcement/solicitation through the FastLane system. Detailed instructions for proposal 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 announcement/solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement/solicitation.

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. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane Website at: http:// www.fastlane.nsf.gov

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The National Science Board approved revised criteria for evaluating proposals at its meeting on March 28, 1997 (NSB 97-72). All NSF proposals are evaluated through use of the two merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

On July 8, 2002, the NSF Director issued Important Notice 127, Implementation of new Grant Proposal Guide Requirements Related to the Broader Impacts Criterion. This Important Notice reinforces the importance of addressing both criteria in the preparation and review of all proposals submitted to NSF. NSF continues to strengthen its internal processes to ensure that both of the merit review criteria are addressed when making funding decisions.

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised proposal preparation guidelines relating to the development of the Project Summary and Project Description. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

Effective October 1, 2002, NSF will return without review proposals that do not separately address both merit review criteria within the Project Summary. It is believed that these changes to NSF proposal preparation and processing guidelines will more clearly articulate the importance of broader impacts to NSF-funded projects.

The two National Science Board approved merit review criteria are listed below (see the Grant Proposal Guide Chapter III.A for further information). The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which he/she is qualified to make judgments.

What is the intellectual merit of the proposed activity?
How important is the proposed activity to advancing knowledge and understanding within its own field or across

different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?
How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

NSF staff will give careful consideration to the following in making funding decisions:

Integration of Research and Education
One of the principal strategies in support of NSF's goals 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 diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities
Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- 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.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Ad Hoc and/or 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.

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 Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

NSF is striving to be able to tell proposers whether their proposals have been declined or recommended for funding within six months. The time interval begins on the closing date of an announcement/solicitation, or the date of proposal receipt, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

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 Division

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.A. 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 (NSF-GC-1); * or Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

Consistent with the requirements of OMB Circular A-16, *Coordination of Geographic Information and Related Spatial Data Activities*, and the Federal Geographic Data Committee, all NSF awards that result in relevant geospatial data must be submitted to Geospatial One-Stop in accordance with the guidelines provided at: www.geodata.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpm. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Website at http://www.gpo.gov/.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/. Paper copies of these documents may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for the PI and all Co-PIs. 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 FastLane, for preparation and submission of annual and final project reports. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding this program should be made to:

- Jane Silverthorne, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 690 N, telephone: (703) 292-8470, fax: (703) 292-9063, email: cswg@nsf.gov
- Rita A Teutonico, Deputy Division Director, Directorate for Biological Sciences, Division of Molecular & Cellular Biosciences, 655 S, telephone: (703) 292-8440, fax: (703) 292-9061, email: cswg@nsf.gov
- Gary Thompson, Program Director, Directorate for Biological Sciences, Division of Integrative Organismal Biology, 685 S, telephone: (703) 292-8423, fax: (703) 292-9153, email: cswg@nsf.gov
- Saran Twombly, Program Director, Directorate for Biological Sciences, Division of Environmental Biology, 635 N, telephone: (703) 292-8133, fax: (703) 292-9064, email: cswg@nsf.gov

All email correspondence regarding PGCSP should be sent to cswg@nsf.gov.

For questions related to the use of FastLane, contact:

- Lauren Kitchen, Science Assistant, Directorate for Biological Sciences, Division of Biological Infrastructure, 690 N, telephone: (703) 292-8470, fax: (703) 292-9063, email: biofl@nsf.gov

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at http://www.nsf.gov/cgi-bin/getpub?gp. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF E-Bulletin, which is updated daily on the NSF Website at http://www.nsf.gov/home/ebulletin, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's MyNSF News Service (http://www.nsf.gov/mynsf/) to be notified of new funding opportunities that become available.

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NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF, although some programs may have special requirements that limit eligibility.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the GPG Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

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**   (703) 292-5111
  (NSF Information Center)**:**

- **TDD (for the hearing-impaired):**   (703) 292-5090

- **To Order Publications or Forms:**

Send an e-mail to:	pubs@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; 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 applicant 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 needing information as part of the review process or in order to coordinate programs; 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," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). 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 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 this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230.

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