# Arctic SEES (ArcSEES)

## Science, Engineering, and Education for Sustainability

## PROGRAM SOLICITATION

### NSF 12-553

**National Science Foundation**

Office of Polar Programs
Division of Arctic Sciences

Directorate for Biological Sciences

Directorate for Computer & Information Science & Engineering

Directorate for Engineering

Directorate for Geosciences

Directorate for Mathematical & Physical Sciences
Division of Mathematical Sciences

Directorate for Social, Behavioral & Economic Sciences

Bureau of Ocean Energy Management, Environmental Studies Program

Environmental Protection Agency

US Fish and Wildlife Service, Global Programs, Division of International Conservation

US Geological Survey

Centre National de la Recherche Scientifique (CNRS)

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

September 14, 2012

## 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. Proposers who opt to submit prior to January 14, 2013, must also follow the guidelines contained in NSF 13-1.**

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.*

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), NSF 11-1, was issued on October 1, 2010 and is effective for proposals submitted, or due, on or after January 18, 2011. Please be advised that the guidelines contained in NSF 11-1 apply to proposals submitted in response to this funding opportunity. Proposers who opt to submit prior to January 18, 2011, must also follow the guidelines contained in NSF 11-1.

**Cost Sharing:** The PAPPG has been revised to implement the National Science Board's recommendations regarding cost sharing. Inclusion of voluntary committed cost sharing is prohibited. In order to assess the scope of the project, all organizational resources necessary for the project must be described in the Facilities, Equipment and Other Resources section of the proposal. The description should be narrative in nature and must not include any quantifiable financial information. Mandatory cost sharing will only be required when explicitly authorized by the NSF Director. See the PAPP Guide Part I: *Grant Proposal Guide (GPG)* Chapter II.C.2.g(xi) for further information about the implementation of these recommendations.

**Data Management Plan:** The PAPPG contains a clarification of NSF's long standing data policy. All proposals must describe plans for data management and sharing of the products of research, or assert the absence of the need for such plans. FastLane will not permit submission of a proposal that is missing a Data Management Plan. The Data Management Plan will be reviewed as part of the intellectual merit or broader impacts of the proposal, or both, as appropriate. Links to data management requirements and plans relevant to specific Directorates, Offices, Divisions, Programs, or other NSF units are available on the NSF website at: http://www.nsf.gov/bfa/dias/policy/dmp.jsp. See Chapter II.C.2.j of the GPG for further information about the implementation of this requirement.

**Postdoctoral Researcher Mentoring Plan:** As a reminder, each proposal that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. Please be advised that if required, FastLane will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See Chapter II.C.2.j of the GPG for further information about the implementation of this requirement.

**Proposal preparation requirements for French proposers:** All proposals submitted by French scientists to this ArcSEES competition require a budget to be included as a supplementary document. For more information, please see the last paragraph of the Program Description or contact the appropriate program officer.

## SUMMARY OF PROGRAM REQUIREMENTS

### General Information

**Program Title:**

Arctic SEES (ArcSEES)
Science, Engineering, and Education for Sustainability

**Synopsis of Program:**

In the twenty years since the Arctic Council first emphasized the need for science for sustainability in the high north, the Arctic environment and population has changed considerably. NSF's Science, Engineering, and Education for Sustainability (SEES) investment highlights the changing Arctic as a priority area for research, “to meet the needs of present and future generations while substantially reducing poverty and conserving the planet’s life support systems.” (From the National Academy of Science report on Sustainability Science and Engineering, http://www.pnas.org/site/misc/sustainability.shtml)

ArcSEES is a multi-year, interdisciplinary program which seeks both fundamental research that improves our ability to evaluate the sustainability of the Arctic human-environmental system as well as integrated efforts which will provide community-relevant sustainability pathways and engineering solutions. For this competition, interdisciplinary research will be focused in four thematic areas: the natural and living environment, the built environment, natural resource development, and governance.

It is recognized that there are gaps in our understanding of the rapidly changing environmental, social, economic, built and managed systems in the Arctic as well as their complex interactions. Fundamental research is needed to understand the integrated Arctic system in this era of rapid change, how sustainability is defined in that context, whether necessary data and statistical techniques are available to make this assessment, and the stability and predictability of the Arctic system state. ArcSEES encourages the informed observation, synthesis of data sets and development of theories, methodologies, network designs, physical infrastructure, models, tools, and educational approaches necessary to evaluate and communicate the sustainability, trajectory, and uncertainty of these systems and interactions.

In a rapidly changing Arctic, there is a demonstrated and immediate need for sustainability solutions (e.g., imperiled Arctic communities and threatened marine ecosystems). There is also a need for large, integrated efforts that bring together the expertise of disciplinary and interdisciplinary scientists and engineers to bear on community-specific problems. These larger, integrated efforts would promote understanding of Arctic systems and would develop optimized models, multiple stable state scenarios, sustainable pathways, decision matrices, visualization techniques and data infrastructure to aid decision making and communication, and structural, energy and communications technology solutions which would inform community practices, management, and policy for a more sustainable Arctic environment.

ArcSEES plans to support fundamental, pilot efforts and larger, outcomes-relevant research. All proposers are required to provide context for how the project advances science for sustainability and to identify the communities and real-world scenarios to which the research products are relevant. While community-based participatory research projects that engage Arctic resident and indigenous populations in the conception and implementation of the research are encouraged, ArcSEES also welcomes activities that entrain other classes of stakeholders and facilitate education through participation of tribal colleges and minority-serving institutions.

Since Arctic change and sustainability is of global concern and research on sustainability has potential global application, proposers may apply methodologies from more southern latitudes to the Arctic or upscale ArcSEES results to other regions. To encourage a more pan-Arctic or broadly international perspective, proposers may also develop synergistic collaborations with foreign colleagues and international programs. These collaborations may capitalize on already-funded sustainability or relevant research by a single partner country or by consortia of countries or seek to establish connections with communities around the Arctic. Similarly, proposers are encouraged to avail themselves of the capacity-building and to-date efforts of the multitude of US agencies currently working in the Arctic. Significant expertise, facilities, observing networks, and partnership with local communities, state

organizations, and stakeholders have been developed to address Arctic social, environmental, and engineering systems under pressure from regional and global change. These resources can be used to translate observed change and community priorities into sustainability pathways for Arctic Alaskan and similar communities around the north and the rest of the globe.

In FY13, NSF is partnering with the Bureau of Ocean Energy Management (BOEM), US Environmental Protection Agency (EPA), US Geological Survey (USGS), US Fish and Wildlife Service (US FWS), and a consortium of French agencies – including Commissariat à l'énergie atomique et aux energies alternatives (CEA), Centre National d'Etudes Spatiales (CNES), Centre National de la Recherche Scientifique (CNRS), Institut Français de Recherche pour l'Exploitation de la MER (IFREMER), and Météo-France – to bring a broad range of expertise to bear on these research questions and underscore the importance of a cohesive approach to achieving resiliency in a shared environment such as the circumpolar Arctic.

**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.*

- Anna M. Kerttula de Echave, Division of Polar Programs (OPP), telephone: (703) 292-7432, email: akerttul@nsf.gov
- Erica Key, Division of Polar Programs (OPP), telephone: (703) 292-8029, email: ekey@nsf.gov
- Nancy B. Grimm, Directorate for Biological Sciences (BIO), telephone: (703) 292-5377, email: ngrimm@nsf.gov
- Krishna Kant, Directorate for Computer and Information Science and Engineering (CISE), telephone: (703) 292-8950, email: kkant@nsf.gov
- Bruce M. Kramer, Directorate for Engineering (ENG), telephone: (703) 292-5348, email: bkramer@nsf.gov
- Paul E. Filmer, telephone: (703) 292-8551, email: pfilmer@nsf.gov
- Thomas F. Russell, Directorate for Mathematical and Physical Sciences (MPS), telephone: (703) 292-4863, email: trussell@nsf.gov
- David McGinnis, Directorate for Social, Behavioral, and Economic Sciences (SBE), telephone: (703) 292-7307, email: dmcginni@nsf.gov
- Guillermo Auad, Bureau of Ocean Energy Management (BOEM), Environmental Studies Program, telephone: (703) 787-1759, email: Guillermo.Auad@boem.gov
- Jackie Kramer, US Environmental Protection Agency (EPA), telephone: (907) 271-3541, email: Kramer.Jackie@epamail.epa.gov
- Leslie Holland-Bartels, US Geological Survey (USGS), telephone: (907) 786-7055, email: lholland-bartels@usgs.gov
- Carl Markon, US Geological Survey (USGS), telephone: 907-786-7023, email: markon@usgs.gov
- Krishna Roy, US Fish and Wildlife Service (US FWS), telephone: (703)358-2645, email: Krishna_Roy@fws.gov
- Denis-Didier Rousseau, Centre National de la Recherche Scientifique, Institut National des Sciences de l'Univers (CNRS-INSU), telephone: +33 (0) 1 44 96 4387, email: Denis.Rousseau@lmd.ens.fr

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

- 15.423 --- Bureau of Ocean Energy Management, Environmental Studies Program
- 15.625 --- Division of International Conservation
- 15.808 --- US Geological Survey
- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences
- 47.078 --- Office of Polar Programs
- 66.509 --- Science To Achieve Results (STAR) Research Program

## Award Information

**Anticipated Type of Award:** Standard Grant or Continuing Grant

**Estimated Number of Awards:** 5 to 15

**Anticipated Funding Amount:** $12,000,000 pending availability of funds. This estimate is the total for all funding sources (NSF, EPA, USGS, BOEM, US FWS, and the French consortium of agencies) combined. It is anticipated that the EPA's contribution will be in-kind. The maximum award size is $2,000,000 over a period of 3 to 5 years. Smaller, pilot type projects will also be considered.

## Eligibility Information

**Organization Limit:**

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs,

professional societies and similar organizations in the U.S. associated with educational or research activities.

- For-profit organizations: U.S. commercial organizations, especially small businesses with strong capabilities in scientific or engineering research or education.
- Foreign organizations: Please see Additional Eligibility Information section of this solicitation.

  NSF-sponsored Federally Funded Research and Development Centers (FFRDCs): NSF-sponsored FFRDCs are eligible to submit proposals to this competition.

  Other Federal Agencies and FFRDCs: Contact the appropriate program officer before preparing a proposal for submission.

**PI Limit:**

None Specified

**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:** Not Applicable

**C. Due Dates**

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

  September 14, 2012

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

**Reporting Requirements:** Additional reporting requirements apply. Please see the full text of this solicitation for further information.

## TABLE OF CONTENTS

## I. INTRODUCTION

A sustainable world is one in which human needs are met equitably without harm to the environment, and without sacrificing the ability of future generations to meet their needs. Meeting this formidable challenge requires a substantial increase in our understanding of the integrated system of society, the natural world, and the alterations humans bring to Earth. NSF's Science, Engineering, and Education for Sustainability (SEES) activities aim to address this need through support for interdisciplinary research and education.

Fundamental to all sustainability research is the simultaneous consideration of social, economic, and environmental systems and the long-term viability of those systems. Concepts that underlie the science of sustainability include complex adaptive systems theory, emergent behavior, multi-scale processes, as well as the vulnerability, adaptive capacity, and resilience of coupled human-environment systems. An important research goal is to understand how patterns and processes at the local and regional scales are shaped by - and feed into - processes and patterns that manifest at the global scale over the long term. These topics guide research to explore alternate ways of managing the environment, migrating from finite resources to renewable or inexhaustible resources, and applying technology to improve human well-being. Conceptual frameworks for sustainability, including general theories and models, are critically needed for such informed decision-making.

SEES activities span the entire range of scientific domains at NSF and aim to:

1. support interdisciplinary research and education that can facilitate the move towards global sustainability;

2. build linkages among existing projects and partners and add new participants in the sustainability research enterprise; and

3. develop a workforce trained in the interdisciplinary scholarship needed to understand and address the complex issues of sustainability.

These activities are particularly resonant with the needs of Arctic communities.

In recent decades, the Arctic has become synonymous with rapid and unbounded change. Whether this is in reference to the dramatic decline in sea ice extent and volume, the extensive erosion of entire sections of the more than 200,000 km of Arctic coastline, the growing demand for northern oil and development of energy infrastructure, the loss and endangerment of indigenous languages, or the rise in occurrence of suicide among Alaska Native residents, the changes have been measurable and pervasive. Ice and weather conditions, once predictable for hunting and gathering, have become increasingly erratic and the traditional methods for predicting them unreliable. As the ice recedes from the coastline and thaws on the land surface, the terrestrial and marine ecosystems it protected from wind, waves, and warming are now exposed, as are the natural resources and greenhouse gas reserves contained below the surface. Migrating animals, such as birds, whales, and rangifers - still a staple of the local diet - relocate to new habitats or suffer reproductive decline as their food sources and breeding grounds change or disappear. Warming not only induces shifts in ecosystems, limiting access to traditional foods, but also releases pollutants once trapped in the ice and introduces new disease vectors, affecting overall health in an already stressed population.

The effects of these changes on Arctic communities are as diverse as the communities themselves. Approximately 4 million people live in the Arctic of which 400,000 are indigenous people. The economic and population base of these communities spans a range from small subsistence hunting, fishing, gathering, and herding communities to regional business and government centers to large resource extraction cities. Industrialization, while present, is not the norm. Many communities are isolated by a lack of access to connecting regional highways, to technological advances such as broadband internet, and to subsidies from more southern capitals. While advanced educational opportunities are available across the Arctic either through campus settings or remote learning, the tendency towards migration of educated minorities out of the Arctic contributes to the lack of skill professionals available in needed fields, such as health care. Since many communities in the Arctic fail to meet the Arctic Human Development Report's standard of a place " in which people are able to dwell and prosper, for some period, finding sources of income and meaningful lives", much of the Arctic is classified as vulnerable.

Planning for a sustainable Arctic requires an understanding of the pathways and potential outcomes or possible states to which systems or communities might move. There are questions about which resilience strategies, in the face of these complex and non-linear changes, are appropriate. For many Arctic communities and stakeholders, the immediacy and relevance of possible scenarios has been met by increased participation in local science and engineering activities and a more engaged role in governance structures. As Arctic change demands more global attention -- whether for economic opportunity or conservation efforts -- education, technology innovation, and capacity building within the Arctic itself are critical to allow communities to develop sustainability solutions that best serve their needs.

While the Arctic environment has never been static, the rapidity and severity of current climate change poses new challenges to researchers, communities and the stakeholders who maintain close economic, social, and cultural ties to their natural environment. Indeed, careful planning for increased human activity and commerce will need to be informed by continuously improving scientific

knowledge and proven mitigation strategies. Internal and regional stressors, such as a diminishing sense of fate control and a shrinking cryosphere, are compounded by external, global pressures for natural resource development and territorial access. These stressors, whether natural or human-induced, have elements of potential benefit and also possible harm for the Arctic system and human well-being. These changes contribute directly and interactively to the cumulative effects on the natural systems, infrastructure, and human populations that inhabit the Arctic.

For example, oil and gas extraction in an increasingly ice-free Arctic Ocean presents both opportunity in terms of economic prosperity and challenges in the form of environmental impacts in an area where the baseline and climate-stressed ecosystem states are little known, and effective prevention and response strategies to spills have not yet been developed among the Arctic Nations. Permafrost thaw, retreating glaciers, and a greening of the Arctic are modifying the terrestrial landscape, which may induce shifts in the ecological cycle of entire biomes, affect subsistence practices, and contribute to the deterioration of communication and transportation systems, housing structures, and food storage methods. On the other hand, these changes may also motivate the engineering of climate-resilient structures and materials and open the possibility for developing natural resources, highly efficient green technologies, adaptable communications solutions, and innovative transport design, while also ensuring that indigenous communities and Arctic residents retain for future generations their culture, language, traditions, and connection to the land.

The influence of these changes is not confined to the Arctic and research targeted at these Arctic system issues may well have application to other vulnerable regions of the globe. It has been suggested that a warming Arctic may be partly responsible for altering global climate patterns, affecting the frequency of extreme weather events, such as blizzards, floods, and prolonged cool temperatures in the northern mid-latitudes. Quantifying and predicting these seasonal linkages through improved global circulation models would better inform disaster preparedness and response for regional planning, building requirements and zoning and risk assessment. It is also important to note that dramatic environmental changes and migrations in the Arctic have occurred repeatedly throughout history. Detailed reconstructions of those events and the critical elements that necessitated a shift in lifeways and/or ecosystem structure may provide insights into the current system progression.

## II. PROGRAM DESCRIPTION

ArcSEES is a multi-year, interdisciplinary program, which seeks both fundamental research that improves our ability to evaluate the sustainability of the Arctic human-environmental system as well as integrated efforts, which will provide community-relevant sustainability pathways and engineering solutions.

It fulfills the SEES goals by soliciting proposals that:

1) promote interdisciplinary research at the environment-society-engineering nexus with a special focus on Arctic priorities and needs;

2) inform and innovate sustainability practices, engineering solutions, and pathways in cooperation and collaboration with northern communities towards a more resilient Arctic;

3) encourage capacity building, education, and training to develop a workforce capable of informing sustainable practices in the Arctic; and

4) effectively translate sustainability scenarios and provide metrics for stakeholders, managers, and policy makers.

To fulfill these goals, this solicitation is open to proposers from a diverse range of scientific and engineering communities, including partner agencies Bureau of Ocean Energy Management, US Environmental Protection Agency, US Geological Survey, US Fish and Wildlife Service, as well as French researchers.

It is widely acknowledged that significant changes to the Arctic cryospheric, ecological, terrestrial, political, and social systems have been occurring in recent decades. What is less well known is how to attribute this change, where these changes will lead and over what time scales, whether they presage a permanent shift towards a new state, if the infrastructure is in place to observe and quantify shifts, and what measures are needed to respond, mitigate, and adapt to this change.

Fundamental research is needed to understand the complex Arctic system in this era of rapid change; how sustainability is defined in that context; whether necessary data, modeling tools, and statistical techniques are available to make assessments; and the resilience and predictability of the Arctic system state. ArcSEES encourages the informed observation, synthesis of data sets and development of theories, methodologies, network designs, physical infrastructure, models, tools, and educational approaches necessary to evaluate and communicate the sustainability, trajectory, and uncertainty of these systems and interactions. These activities need to draw on the expertise of a range of scientists, engineers, education practitioners, and stakeholders, including but not limited to environmental, social, mathematical, computer, and information scientists, materials and network engineers, informal learning specialists, commercial industry, and non-governmental organizations.

**Proposals are welcome which address fundamental and systematic understanding of the sustainability of one or more of the following themes:**

(i) ***the natural and living environment***, which explores the interaction between the social and biophysical systems. Since changes in natural environments, including landscapes, ice, water, and soil may have long-range influence, the focus here is on in-depth understanding of the complex, nonlinear biophysical platform and the human-environmental interchanges that manifest themselves within the Arctic and also between the Arctic and the rest of the globe.

(ii) ***the built environment***, including but not limited to housing and transportation structures, energy and communications technologies, climate-resilient materials, and sustainable observing designs. Proposals that focus on computing and communications technologies to enhance effectiveness, energy efficiency, resilience, and sustainability of built environments are also welcome.

(iii) ***natural resource development***, comprising both the potential positive regional-to-global impacts of Arctic resource development as well as the hazards.

(iv) ***governance***, addressing the interactions between political, economic, scientific, and cultural organizations that govern Arctic futures, from the tribal to the multi-national scale.

Where there is already capacity for assessing sustainable elements of the Arctic system or there is a demonstrated and immediate need for sustainability solutions (e.g., imperiled Arctic communities and threatened marine ecosystems), ArcSEES welcomes large, integrated efforts that will provide support for management solutions. It is expected that integrated efforts will address two or more of

the thematic areas and bring together the expertise of disciplinary and interdisciplinary scientists and engineers to bear on community-specific problems. These **larger, integrated efforts are needed to evaluate emerging understanding of Arctic systems and develop optimized models, multiple stable state scenarios, sustainable pathways, decision matrices, visualization techniques and data infrastructure to aid decision making and communication, and structural, energy and communications technology solutions that will inform community practices, management, and policy for a more sustainable Arctic environment.**

In both the fundamental efforts (1 theme) and the larger, integrated projects (2 or more themes), proposers are required to provide context for how the project advances science for sustainability and to identify the communities and real-world scenarios to which the research products are relevant. The integrated efforts that are providing support for management solutions, should have a plan for how their results will be disseminated to target communities. Communication and translation of these results would be strengthened through the inclusion of computer and/or information scientists on the proposal. Proposers are encouraged to partner with scientists from collaborating ArcSEES agency labs (BOEM, EPA, USGS, US FWS, and French agencies) who are cognizant of management needs and community priorities for sustainable solutions. Please see Section IX of this document for more information about individual agency priorities within the context of ArcSEES.

Relevance of ArcSEES research results may extend south of the Arctic Circle. Arctic sustainability is an international research area that has broader application beyond the Arctic itself. The rapidity of Arctic environmental change, teleconnections between the Arctic and the rest of the globe, the interconnectedness of Arctic residents with their natural environment, the potential for engineering solutions and communications growth, and the political and commercial interest in the region make the Arctic a compelling testbed where sustainability theories and solutions may be evaluated for global application. Sustainability research conducted under this solicitation may have elements that are community-specific, but should include a plan for upscaling findings to their broader application, either elsewhere in the Arctic or to vulnerable areas at lower latitudes. Likewise, sustainability research, methods, and tools developed for other parts of the globe may be proposed for Arctic application. To encourage a more pan-Arctic or broadly international perspective, proposers may also develop synergistic collaborations with foreign colleagues and related international programs. These collaborations may capitalize on already-funded sustainability or relevant research by a single partner country or by consortia of countries or seek to establish connections with communities around the Arctic.

In FY13, a consortium of French scientific laboratories, led by the Centre National de la Recherche Scientifique (CNRS) and including the Comissariat à l'énergie atomique et aux energies alternatives (CEA), Centre National d'Etudes Spatiales (CNES), Institut Français de Recherche pour l'Exploitation de la MER, and Météo-France, is an ArcSEES solicitation partner. French scientists are welcome to collaborate on and submit proposals that further the goals of ArcSEES. The breadth of activities represented by the consortium encompasses the full scope of ArcSEES. In this competition, the French agencies encourage proposals relevant to all four of the ArcSEES themes.

Truly relevant solutions and understanding cannot be gained in the absence of community involvement. The ArcSEES program stresses the interconnectedness of the Arctic environment and its resident population and encourages stakeholder participation in the conception, development and implementation of the proposed research as well as in education activities and training of underrepresented groups in STEM research. Community-based participatory research projects that engage Arctic resident and indigenous populations in a collaborative research project are welcome, as are capacity building activities which entrain other classes of stakeholders (e.g., NGOs, for-profit industry, state, local, and tribal government) and facilitate education through participation of tribal colleges and minority-serving institutions.

Proposals that include new observations should demonstrate how the new data advances our understanding of processes that influence or determine sustainability. A new observing platform, the ***R/V Sikuliaq***, will be available for research missions in the Arctic, including community participatory research at sea starting in early 2014. Proposals will also be considered that advance the design of sensors and broadband infrastructures to be climate-resilient, reliable, and contribute to sustainable observation of the rapidly changing Arctic. Projects that involve field work with communities should include a social scientist on their proposing team. Community-based participatory research proposals require a pre-planning document as well as letters of support from the involved community.

Proposers are also encouraged to utilize and synthesize data available through the Arctic Observing Network (AON) via CADIS (Cooperative Arctic Database and Information Service). These data may be used to generate sustainability indicators, develop methodologies for assessing sustainability pathways and identify tipping points and behaviors of the Arctic system. Proposals that study theoretical issues of sustainability pathways, tipping points, or data analysis would benefit from the inclusion of a computer scientist, mathematician or statistician, as appropriate, on their proposing team.

Models which advance understanding of processes that influence sustainability and improve the ability to project and predict sustainable pathways are welcome. These efforts should show demonstrable links to users and how they inform human choices. Models need not focus solely on the Arctic, but should help determine the Arctic's position in the global system, including feedbacks between global and Arctic environmental and economic change.

Research supported by the ArcSEES program is expected to inform, model, design, and project sustainability pathways using the rapid pace of Arctic change as a real-time laboratory for implementation. Proposals that take a broader Arctic view and reflect balanced, integrated perspectives representing one or more of the social sciences, environmental sciences, engineering, and education communities will be given priority.

NSF's Division of Polar Programs (POLAR) will coordinate and manage the review of proposals jointly with participating domestic and foreign funding organizations. All proposals to the ArcSEES competition must be written in English and contain all of the sections of an NSF proposal, including a data management plan and a postdoctoral mentoring plan, when applicable. All senior personnel, whether from US or participating foreign institutions must include a 2-page biographical sketch. The sketch includes information about former students and postdoctoral fellows, collaborators, a list of resources and current and pending support. **In some instances, additional information is required by the U.S. and/or foreign funding organizations.** French proposers should include their budget as a supplementary document in the proposal. Only proposals from French scientists that include this information will be considered for funding by CNRS. Relevant information about proposals will be shared between the participating organizations as appropriate. Prior to final NSF funding recommendations, PIs whose proposals are selected for ArcSEES awards may be asked to submit additional information, including relevant budget details, to co-funding organizations to enable completion of their co-funding decisions.

## III. AWARD INFORMATION

Pending availability of funds, up to $12 million will be available for proposals to this solicitation. This does not include logistics support that may be provided through the Arctic Research Support and Logistics program. NSF estimates 5 to 15 awards as

standard or continuing grants. The number of awards and average award size and duration are subject to the availability of funds.

This is an interagency partnership between NSF, BOEM, EPA, USGS, US FWS, and a consortium of French agencies, including the Commissariat à l'énergie atomique et aux énergies alternatives (CEA), Centre National d'Etudes Spatiales (CNES), Centre national de la recherche scientifique (CNRS), Institut français de recherche pour l'exploitation de la mer (IFREMER), and Météo-France. Therefore, meritorious proposals may be funded by one or more agencies at the option of the agencies, not the proposer. For proposals selected for funding entirely by EPA, USGS, US FWS, or the French consortium, PIs will be asked to withdraw their proposal from NSF and resubmit it to the identified funding agency in accordance with instructions given by the cognizant USGS, US FWS, EPA, or appropriate French program officer. French funding from the consortium of agencies will be coordinated through CNRS. Subsequent grant administration procedures will be in accordance with the individual policies of the awarding agency. All BOEM awards will be made via interagency agreement to NSF and administered by NSF and BOEM program officers.

## IV. ELIGIBILITY INFORMATION

**Organization Limit:**

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
- For-profit organizations: U.S. commercial organizations, especially small businesses with strong capabilities in scientific or engineering research or education.
- Foreign organizations: Please see Additional Eligibility Information section of this solicitation.

  NSF-sponsored Federally Funded Research and Development Centers (FFRDCs): NSF-sponsored FFRDCs are eligible to submit proposals to this competition.

  Other Federal Agencies and FFRDCs: Contact the appropriate program officer before preparing a proposal for submission.

**PI Limit:**

None Specified

**Limit on Number of Proposals per Organization:**

None Specified

**Limit on Number of Proposals per PI:**

None Specified

**Additional Eligibility Info:**

A French consortium of agencies, including the Comissariat à l'énergie atomique et aux energies alternatives (CEA), Centre National d'Etudes Spatiales (CNES), Centre National de la Recherche Scientifique (CNRS), Institut Français de Recherche pour l'Exploitation de la MER, and Météo-France, is the sole international partner for the FY13 ArcSEES competition. For NSF to consider co-funding of projects including French scientists, the collaborative effort must also include scientists from eligible US institutions. All funding of French participants will be handled by the relevant French agency and coordinated through CNRS.

US agency partners for the FY13 ArcSEES competition also include BOEM, EPA, USGS, and US FWS. Projects involving BOEM, EPA, USGS, and US FWS scientists will only be considered for co-funding by NSF if they are collaborative efforts that include non-federally funded partner institutions. This is necessitated solely by NSF rules for funding collaborative grants and should not be construed as a comment on capability.

## 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.

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

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.4 of the Grant Proposal Guide provides additional information on collaborative proposals.

**Important Proposal Preparation Information:** FastLane will check for required sections of the proposal, in accordance with *Grant Proposal Guide* (GPG) instructions described in Chapter II.C.2. The GPG requires submission of: Project Summary; Project Description; References Cited; Biographical Sketch(es); Budget; Budget Justification; Current and Pending Support; Facilities, Equipment & Other Resources; Data Management Plan; and Postdoctoral Mentoring Plan, if applicable. If a required section is missing, **FastLane will not accept the proposal.**

Please note that the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions. If the solicitation instructions do not require a GPG-required section to be included in the proposal, insert text or upload a document in that section of the proposal that states, "Not Applicable for this Program Solicitation." Doing so will enable FastLane to accept your proposal.

**Proposals may be returned without review for failing to comply with the Grant Proposal Guide (GPG)or NSF Grants.gov Application Guide, this solicitation and the instructions that supplement the GPG and NSF Grants.gov Application Guide.**

**Principles for the Conduct of Research in the Arctic**

Researchers should conform to the *Principles for the Conduct of Research in the Arctic*, approved by the U.S. Interagency Arctic Research Policy Committee (IARPC) in 1990 (http://www.nsf.gov/geo/plr/arctic/conduct.jsp ). Proposers may also find the "Guidelines for Improved Cooperation between Northern Communities and Arctic Researchers" helpful (http://www.arcus.org/guidelines).

**Proposals Involving Human Subjects**

The NSF Grant Proposal Guide (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg) provides procedural information for projects with human subjects in the section Projects Involving Human Subjects. Investigators must ensure that human subjects are protected from research risks in conformance with the relevant federal policy known as the Common Rule (*Federal Policy for the Protection of Human Subjects*, 45 CFR 690). Additional information is available at http://www.nsf.gov/bfa/dias/policy/guidance.jsp. Letters of permission or approval, such as those from Alaska Native organizations or communities in which the work will take place, should be included in the Supplementary Documents section of the proposal.

**Proposals Involving Arctic Field Work**

The Arctic Research Support and Logistics (RSL) program was created to enhance safe access to the Arctic, and improve interactions with Arctic communities. RSL has an annual budget to operate, maintain and upgrade facilities and infrastructure, purchase services from third-party support providers and contribute to proposal funding for research support and logistics activities.

Proposals involving field work in the Arctic must describe the field work in the body of the proposal and include a schedule of proposed work. Investigators may include logistics costs directly in the proposal budget, if they will be making arrangements themselves. Alternatively, investigators may utilize third-party logistics providers for services. If using a third-party provider, the proposal must include a letter from the organization in the Supplementary Documents section of the proposal. The letter should be 1-2 pages long and include a description of the scope of work and a cost estimate. Prior to award, **all proposals will be evaluated for total logistics costs and feasibility** whether the logistics are in the proposal budget or provided by a third party.

Third-party support providers include NSF's Arctic logistics contractor, CH2M HILL Polar Services (CPS), UNAVCO, Ice Drilling Design and Operations (IDDO) and others. A more detailed list is on the RSL website (http://www.nsf.gov/geo/plr/arctic/res_log_sup.jsp ). CPS services to the Arctic research community include preparing logistics estimates for all submissions to NSF. Please allow 4-6 weeks for the preparation of these estimates prior to the deadline. Other support providers may require similar lead-time to meet proposal deadlines. Proposals requesting support for field work should be submitted with adequate time for proposal review and decision-making, up to six months, and an additional six months for logistics planning and budgeting. Thus, proposals submitted to this announcement should plan to go to the field no sooner than one year after the deadline.

**In early 2014, the new R/V *Sikuliaq (formerly the Alaska Region Research Vessel)*, will be available for research missions in the Arctic, including community participatory research at sea.** Specifications for the vessel can be found at http://www.sfos.uaf.edu/arrv/. Additional information about the timing and availability of the *Sikuliaq* can be found in the OCE newsletter “Making Waves” (http://www.nsf.gov/pubs/2011/nsf11067/nsf11067.pdf). Proposals requesting ship time should include a UNOLS Ship Time Request (STR) which can be obtained at http://www.unols.org. Proposers who include time on board should coordinate with RSL to ensure that the timing of the intended field work can be accommodated.

Projects that will work close to Arctic communities, particularly indigenous communities, are required to discuss the proposed work with those communities while the project is being developed and to bring results back to the community following each field season or the end of the project. Investigators should include travel funds for this in their proposal budget. The RSL program may also support requests to visit communities on an ad hoc basis. These visits are anticipated to be limited to a few days and do not include additional funds for salaries or stipends. Please contact the RSL program managers for information about these opportunities.

Investigators are responsible for acquiring any permits necessary for their work. For work in Greenland, the Government of Greenland has instituted a new process (http://uk.nanoq.gl/Emner/Government/Departments/ministry_of_domestic_affairs_nature_and_environment/expeditions.aspx). NSF has committed to covering Search and Rescue related insurance in Greenland for NSF-sponsored investigators through a direct agreement with the Government of Greenland. NSF is not responsible for medical costs or evacuation of injured parties back to the U.S. however, so investigators should include costs of evacuation insurance in the proposal budget if not covered by their institution. This is an allowable cost.

PIs are responsible for obtaining any required visas for foreign travel and for providing documentation through the U.S. research institution in support of U.S. visas for foreign counterpart investigators. PIs are also responsible for obtaining research permits and import/export documents where necessary. PIs should review NSF's web page "Information for U.S. Travelers", http://www.nsf.gov/geo/plr/arctic/res_log_sup.jsp ). For support from CH2M Hill Polar Services in preparing the supplementary documents, please contact Diana Garcia-Lavigne at diana@polarfield.com and/or see the CPS website (http://www.polar.ch2m.com/).

**Environmental Policy Considerations of Field Work**

Federal agencies must comply with the National Environmental Policy Act (NEPA). Most NSF awards support individual scientific research projects and are not considered 'major Federal actions significantly affecting the quality of the human environment'. Projects involving construction, drilling or major disturbance to the local environment may require an assessment of environmental impacts. All federal agencies are regulated under acts such as the Endangered Species Act, the Marine Mammal Protection Act, and the National Historic Preservation Act. Researchers proposing work that may affect cultural or historic properties, or whose work involves tribal lands must cooperate with NSF in complying with the consultation requirements of section 106 of the National Historic Preservation Act. For additional information on cultural or historic preservation issues, see the Advisory Council on Historic Preservation's web site at http://www.achp.gov/work106.html. Contact the Environmental Officer of the Division of Polar Programs, Dr. Polly Penhale (ppenhale@nsf.gov) for guidance on environmental consultations, permitting, and NSF's obligations under existing environmental laws.

**Data Management**

Proposals must include a data and information management plan that describes how access to quality-controlled and fully-documented data and information by all researchers, and others, will be achieved at no more than incremental cost and within a reasonable time during the course of the award, e.g., via a project web site and/or a recognized data repository. Proposers should be aware that posting graphs on a web site is not sufficient. The plan must include transfer of all data to a recognized data repository by the conclusion of the award. Please note that data gathered of a particularly sensitive nature, such as the locations of archaeological sites or nest locations of endangered species, may incur different guidelines. Discipline standards, indigenous community cultural rules, and state and federal regulations and laws should be followed for these types of data.

**Identify this Solicitation Number on the Proposal Cover Sheet.**

## B. Budgetary Information

**Cost Sharing:** Inclusion of voluntary committed cost sharing is prohibited

## C. Due Dates

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

  September 14, 2012

## 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**

1. How well do the proposed research and educational activities integrate across NSF-supported disciplines, such as creating new interdisciplinary networks and/or collaborations?

2. How well do the proposed activities advance the foundations of sustainability by including a strong conceptual framework that addresses the social, economic, and environmental components?

3. How will the proposed activities advance the development of a workforce skilled in the interdisciplinary scholarship needed to understand and address the complex issues of sustainability?

4. How well does the proposed research advance understanding of the role of the Arctic in global sustainability science?

## B. Review and Selection Process

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

Reviewers will be asked to 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.

NSF will coordinate and manage the review of proposals jointly with participating domestic and foreign funding organizations. In some instances, additional information is required by the U.S. and/or foreign funding organizations. Relevant information about proposals and reviews of proposals will be shared between the participating organizations as appropriate.

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.

**Special Award Conditions**

**Principles for the Conduct of Research in the Arctic:** Principal Investigators are expected to follow the *Principles for the Conduct of Research in the Arctic*, prepared by the Social Science Task Force of the U.S. Interagency Arctic Research Policy Committee (IARPC) and approved by IARPC in 1990. These principles are listed at http://www.nsf.gov/geo/plr/arctic/conduct.jsp . Investigators may find useful the Guidelines for Improved Cooperation between Arctic Researchers and Northern Communities (http://www.arcus.org/guidelines).

**Policy for Sharing Scientific Data**

The Arctic Sciences Section (ARC) of the Division of Polar Programs (OPP) at the National Science Foundation (NSF) and its FY13 partners in this ArcSEES competition have adopted a policy for data sharing that will be applied to all ArcSEES grantees. This policy establishes the criteria for the timely archiving of data in long-lived archives and sets out special conditions applicable to ArcSEES grants. The purpose of this policy is to facilitate full and open access to data and materials for polar research from projects supported by ArcSEES.

The Division of Polar Programs, in conformance with NSF policy (see Grant Proposal Guide, http://www.nsf.gov/pubsys/ods/getpub.cfm?gpg), expects investigators to share with other researchers, at no more than incremental cost and within a reasonable time, the data, derived data products, samples, physical collections and other supported materials gathered or created in the course of the research project. Data sets from ArcSEES-supported scientific research should be deposited in archives appropriate for the specific type of data collected.

Data archives of ArcSEES-supported projects should include easily accessible information about the data holdings (metadata), including quality assessments, supporting ancillary information, and guidance for locating and obtaining the data. National and international data and metadata standards should be used for the collection, processing and communication of ArcSEES-sponsored data sets. The use of graphics to present data or results does not qualify as sharing of scientific data or submission to an archive.

NSF realizes that on occasion there are data gathered of a particularly sensitive nature, such as the locations of archaeological sites or nest locations of endangered species. It is not the intention of this policy to reveal such information publicly. Discipline standards, indigenous community cultural rules, and state and federal regulations and laws should be followed for these types of data.

**General Data Sharing Policy**

For all ArcSEES supported projects:

- Complete metadata must be submitted to a national or approved data center within two years of collection or before the end of the award, whichever comes first.
- All data and derived data products that are appropriate for submission to a national data center or approved data repository must be submitted within two years of collection or before the end of the award, whichever comes first.

**Special Note for ArcSEES Social Science Data**

ArcSEES research projects may include the collection of data pertinent to the range of social science disciplines and adheres to the ArcSEES Data Management statement that "Proposals must include a data and information management plan that describes how free and rapid access to quality-controlled and fully-documented data and information by all researchers, and others, will be achieved during the course of the award, e.g., via a project web site and/or a recognized data repository." However, the program recognizes that the nature of social science data, the way they are collected, analyzed, and stored, and the pace at which this occurs, vary widely. Different storage facilities and access requirements exist for different types of social science data, e.g., archaeological data, specimens from physical anthropology, large-scale survey data, oral histories, taped interviews, and other narrative materials elicited from individuals or groups, and field records. Therefore, "rapid access" is defined for the purposes of this solicitation as 3-5 years and "recognized data repository" can be discipline-specific. However, increasing efforts are being made by the social science community to provide disciplinary relevant guidelines (in the form of best practices), set data and ethical standards, create open source software for social science data, and create new data repositories. In recognition of these efforts, all proposals to the ArcSEES program must include a data and information management plan. Providing access to data collected in projects supported by the ArcSEES Program necessarily engages a broad range of potential complexities. Investigators should identify those that can be anticipated and explain fully when and why a modified application of the ArcSEES Data Management policies might be appropriate.

**Responsibilities of Principal Investigators of Awards Funded by the Arctic Sciences Section**

Coordinated programs (multi-investigator and/or multi-agency programs) may (in consultation with the ArcSEES cognizant program managers and other funding agencies involved) establish data submission procedures that are more rigorous than those for typical single-investigator projects, as necessary to meet the coordinated mission objectives. Principal Investigators with ArcSEES-funded awards should comply with data policies established for these coordinated programs and submit their data as required to the appropriate repository stipulated by the coordinated program office.

Compliance with the data guidelines will be considered in the program managers' overall evaluation of a Principal Investigator's prior support record. Annual and final reports may not be approved if program managers determine that data sharing requirements have not been met. This can hold up future funding increments and awards.

Any questions concerning this policy should be directed to the cognizant program officers for ArcSEES.

## 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.

Please see the instructions, Section VII. B. Award Conditions in this program solicitation for information about award conditions for data.

For awards funded by NSF, PIs will be required to include descriptions of their project milestones in their annual reports. Data reporting should conform to current NSF data policy guidelines; PIs should consult with the managing program officer.

Reporting requirements for awards funded by BOEM, EPA, USGS, US FWS, or a partner agency in the French consortium will conform to those specified by the agency funding the proposal.

For collaborative projects that are funded by NSF and one or more of the partnering agencies, the annual report of the lead project in the collaborative that is resident at NSF must include a description of the activities and milestones of the parts of the project that are funded by the other agencies.

# 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:

- Anna M. Kerttula de Echave, Division of Polar Programs (OPP), telephone: (703) 292-7432, email: akerttul@nsf.gov
- Erica Key, Division of Polar Programs (OPP), telephone: (703) 292-8029, email: ekey@nsf.gov
- Nancy B. Grimm, Directorate for Biological Sciences (BIO), telephone: (703) 292-5377, email: ngrimm@nsf.gov
- Krishna Kant, Directorate for Computer and Information Science and Engineering (CISE), telephone: (703) 292-8950, email: kkant@nsf.gov
- Bruce M. Kramer, Directorate for Engineering (ENG), telephone: (703) 292-5348, email: bkramer@nsf.gov
- Paul E. Filmer, telephone: (703) 292-8551, email: pfilmer@nsf.gov
- Thomas F. Russell, Directorate for Mathematical and Physical Sciences (MPS), telephone: (703) 292-4863, email: trussell@nsf.gov
- David McGinnis, Directorate for Social, Behavioral, and Economic Sciences (SBE), telephone: (703) 292-7307, email: dmcginni@nsf.gov
- Guillermo Auad, Bureau of Ocean Energy Management (BOEM), Environmental Studies Program, telephone: (703) 787-1759, email: Guillermo.Auad@boem.gov
- Jackie Kramer, US Environmental Protection Agency (EPA), telephone: (907) 271-3541, email: Kramer.Jackie@epamail.epa.gov
- Leslie Holland-Bartels, US Geological Survey (USGS), telephone: (907) 786-7055, email: lholland-bartels@usgs.gov
- Carl Markon, US Geological Survey (USGS), telephone: 907-786-7023, email: markon@usgs.gov
- Krishna Roy, US Fish and Wildlife Service (US FWS), telephone: (703)358-2645, email: Krishna_Roy@fws.gov
- Denis-Didier Rousseau, Centre National de la Recherche Scientifique, Institut National des Sciences de l'Univers (CNRS-INSU), telephone: +33 (0) 1 44 96 4387, email: Denis.Rousseau@lmd.ens.fr

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

- Linda Izzard, telephone: (703) 292-7430, fax: (703)292-9082, email: lizzard@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.

***Questions regarding the ArcSEES solicitation should also be emailed to arcsees@nsf.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 Bureau of Ocean Energy Management (BOEM)***

The mission of the U.S. Department of the Interior's Bureau of Ocean Energy Management is to protect the environment while ensuring the safe development of the nation's offshore energy and marine mineral resources. BOEM conducts and oversees world-class research and environmental reviews to support decision-making regarding offshore conventional and renewable energy development.

BOEM's interests in the Alaskan Arctic OCS encompass several disciplines including marine ecology, physical oceanography, atmospheric sciences, marine archaeology, chemical oceanography, marine geology and the socio-cultural and economic sciences. BOEM needs information in these areas in order to inform the offshore energy resource management and regulatory processes for which it is responsible.

***For ArcSEES,*** BOEM welcomes studies in these disciplines and especially those taking an interdisciplinary approach. Studies which combine the use of models and observations are also encouraged. Examples include but are not limited to studies addressing: physical-biological interactions, shelf and slope biogeochemical processes as well as sediment transport estimations, ecology of benthic communities and pelagic species, migratory species and their geographical routes, multi-system feedbacks, and impact of environmental variability on local subsistence activities. Proposals which address any or some of these areas in the context of sustainability of Arctic communities are also encouraged.

BOEM Web Site:

http://boem.gov

Phone: 1-703-787-1759

Mailing and Street Address:

Bureau of Ocean Energy Management

U.S. Department of the Interior

381 Elden Street

Herndon, VA 20170

***About the US Environmental Protection Agency (EPA)***

The US Environmental Protection Agency was established on December 2, 1970 with a mission to protect human health and the environment. Seven thematic priorities have been identified within this mission scope: climate change, air quality, chemical safety, environmental risk and clean-up, watershed protection, environmental justice, and tribal partnerships. These national priorities are echoed in the program and activities of the regional and state operational and field offices.

EPA's interests in the Arctic are focused on Alaska, which is part of the Region 10 office that includes the Pacific Northwest. The Alaska EPA program emphasizes research on climate change impacts in the north and the development of tangible solutions for communities imperiled by climate change. This includes innovation of sustainable, energy-efficient and climate resilient infrastructure, planning climate change induced responses, and/or clean air and water quality. Research and response efforts are developed in partnership with the affected communities, state and regional government, federal agencies, commercial industry, non-governmental organizations, and native corporations. These practical solutions are developed with the potential for widespread application to the circumpolar Arctic.

**In the FY13 ArcSEES competition**, the US EPA Region 10 Office is interested in projects which propose integrated, solutions-oriented scenarios that augment and inform existing EPA Alaska climate change programs. Proposals may address any of the 4 themes of ArcSEES but should be interdisciplinary and would benefit from engagement with local communities.

US EPA Region 10 Web Site:

http://www.epa.gov/aboutepa/region10.html

Phone: 1-907-271-5083

Mailing and Street Address:

EPA Alaska Operations Office

222 W. 7th Ave. #19

Anchorage, AK 99513-7588

***About the US Fish and Wildlife Service (US FWS)***

The US Fish and Wildlife Service was established as a bureau in 1939. It is charged by law with responsibility for migratory birds, endangered species, certain marine mammals, inland sport fisheries, and specific fishery and wildlife research functions. The International Affairs office of US FWS takes a global view on conservation of migratory species and engages with other nations to enforce to the extent practicable the intent of US laws, treaties, agreements and cooperative programs, such as the Endangered Species Act of 1973.

The US FWS is engaged in Arctic science through activities such as capacity building and training for wildlife conservation.

**In the FY2013 ArcSEES solicitation**, US FWS is interested in efforts that protect endangered species, migratory animals, and contribute to training and capacity building related to conservation.

US FWS Web Site:

http://www.fws.gov

Phone: 1-703-358-2645

Mailing and Street Address:

U.S. Fish and Wildlife Service

International Affairs

4401 N. Fairfax Drive

Arlington, VA 22203

***About the US Geological Survey (USGS)***

The US Geological Survey was established on March 3, 1879. Its mission as a science organization is to provide impartial information on the health of our ecosystems and environment, the natural hazards that threaten us, the natural resources we rely on, the impacts of climate and land-use change, and the core science systems that help us provide timely, relevant, and useable information.

USGS is actively engaged in the Arctic through its various Bureau Science Centers that perform work in the Arctic. Much of the Arctic research involves long-term inventory and monitoring, studies of wildlife-habitat interactions, and the effects of climate change on Arctic and associated boreal ecosystems . USGS is also actively engaged in activities that are related to Alaskan Natives including Alaska Native Science Engineering Program (ANSEP) at the University of Alaska, and science activities involving climate and human health.

**USGS's interests in the FY13 ArcSEES** competition are targeted towards science activities that are interdisciplinary in nature and that combine the use of models and observations that help define and predict the consequences of changes to Arctic ecosystems as they relate to mammal, bird, and fish species, and the habitats that they depend on. Examples include but are not limited to studies addressing research looking at the confounding effects of changes in permafrost, changes to hydrologic regimes, water quality, and potential natural and anthropogenic pollutants. Proposals which address any or some of these areas in the context of sustainability of Arctic communities are encouraged.

USGS Web Site:

http://www.usgs.gov

Phone: 1-907-786-7023

Mailing and Street Address:

U.S. Geological Survey

4210 University Drive

Anchorage, AK 99508

***About the Centre National de la Recherche Scientifique***

(National Center for Scientific Research)

The Centre National de la Recherche Scientifique (CNRS) is a government-funded research institution, under the administrative authority of France Ministry of High Education and Research. It was founded in 1939 by governmental decree with the mission to evaluate and carry out all research capable of advancing knowledge and bringing social, cultural, and economic benefits for society; to contribute to the application and promotion of research results; to develop scientific information; to support research training; and to participate in the analysis of the national and international scientific climate and its potential for evolution in order to develop a national policy. CNRS consists of ten institutes, which span the range of environmental, physical, social, and engineering sciences.

CNRS has advanced understanding of the Arctic through individual research grants spanning the environmental, social, and physical disciplines, participation in and leadership of EU Framework Programmes, as well as

collaboration with foreign universities. Currently, CNRS researchers are involved in the 7th Framework Programme Arctic Climate Change, Economy and Society (ACCESS, http://www.access-eu.org). CNRS has also been mandated by the French Ministry of High Education and Research to establish an interdisciplinary Observatory of the Arctic.

For the FY13 ArcSEES competition, CNRS interests are being coordinated by the National Institute of Earth Sciences and Astronomy (INSU: Institut National des Sciences de l'Univers); however, all relevant CNRS institutes (INSU, INSHS, INEE) are cognizant of this competition and will participate in the review process. CNRS welcomes proposals from researchers and postdoctoral scholars in France related to all four ArcSEES themes: living systems, built environment, natural resource development, and governance. The new French Arctic program, which is being developed by CNRS, recognizes all four of these themes as priorities for Arctic research. French scientists are encouraged to collaborate with American colleagues to engage in interdisciplinary science focusing on sustainability of human, environmental, and engineered systems in the Arctic.

CNRS Web Site:

http://www.cnrs.fr

Phone: +33 (0) 1 44964387

Mailing and Street Address:

CNRS /INSU

3, rue Michel-Ange

Paris, FRANCE 75016

## 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
Division of Administrative Services
National Science Foundation
Arlington, VA 22230

## X. APPENDIX

***ArcSEES Frequently Asked Questions***

1. Do all proposals need to include community participation?

Proposals are not required to have community-based participation, but proposers are encouraged to develop research questions and approaches in cooperation with stakeholders, residents, and/or relevant organizations. For projects that do include community-based participatory research, ArcSEES requires a pre-planning document. Please email arcsees@nsf.gov before proposal submission to discuss this planning document and your project.

2. Community participation is encouraged, but how does ArcSEES define "community" for this solicitation?

"Community" is not defined in ArcSEES to allow for the various interpretations of the word, including but not limited to cultural, ethnic, regional, economic, ecosystem, user group, governmental, and data communities. The proposing team should make it clear in their proposal which "communities" they are targeting with their research. If applied science and management communities are intended, proposers are encouraged to contact the appropriate agency partners. If indigenous or resident communities will be included in the research, a pre-planning document is needed.

3. How is sustainability defined for ArcSEES?

All NSF SEES solicitations refer to the Proceedings of the National Academies definition of sustainability, which calls for research "to meet the needs of present and future generations while substantially reducing poverty and conserving the planet's life support systems". Proposers to ArcSEES are required to show how their research project advances sustainability within this broad context.

4. What is the timeframe that ArcSEES is trying to address with this call? Will proposals that look at past climatic shifts or project centennial change be considered?

ArcSEES seeks to provide the fundamental scientific underpinning and integrated solutions for current and near-term (2013-2063) sustainability concerns in the Arctic. It is acknowledged that large-scale environmental change events have occurred throughout time, at other latitudes, and may have consequences that extend beyond a 50-year window. Research that draws on past, future, or global sustainability scenarios must show relevance to the current and near-term Arctic state and demonstrate how this understanding advances Arctic sustainability science.

5. Will decadal and regional modeling efforts be eligible for consideration under ArcSEES?

While decadal and regional modeling proposals can be submitted to ArcSEES, please refer to the second EaSM solicitation on Decadal and Regional Climate Prediction using

Earth System Models and contact arcsees@nsf.gov to discuss your proposal. Please note that the current EaSM solicitation has a proposal deadline of May 11, 2012.

6. Will large field campaigns be supported by ArcSEES?

It is acknowledged that current observations may not provide information most relevant to the sustainability of a system. Observations that demonstrate how they will advance understanding of Arctic sustainability will be considered. Researchers should contact arcsees@nsf.gov to discuss potential field deployments. An estimate of field costs must be provided for every proposal which includes field work.

7. How are proposals with interagency or international partners submitted to ArcSEES?

All proposals must be submitted in English to the NSF Fastlane system to be eligible for the FY13 ArcSEES competition. Only proposers from the partnering agencies, French scientists, and eligible organizations listed in the solicitation may submit proposals to

ArcSEES. Projects involving scientists from our interagency partners or France will only be considered for NSF funding if they are collaborative efforts that include non-federally funded US institutions.

8. How do French researchers provide a budget for consideration by ArcSEES?

French scientists submitting to ArcSEES should include a budget as a supplementary document in the NSF Fastlane system. Meritorious proposals which include research by scientists in France will be withdrawn from the NSF system and submitted to CNRS for funding. The budget must be present as a supplementary document to be considered for funding.

9. Is there guidance for proposers wishing to collaborate with international partners other than France?

Partnering with investigators in countries other than France is welcomed; however, foreign investigators, other than as specified for French partners, may not submit directly to the solicitation. NSF funds typically support U.S. participants on a collaborative project, while international partners are to be supported directly by their own funding sources. The partnering international investigators should provide a substantive letter of collaboration that would be uploaded as a supplementary document to the proposal. If you have specific questions about a collaborative project involving international partners, please contact arcsees@nsf.gov for more information.

10. Will ArcSEES entertain proposals which have elements of applied science?

In the FY13 ArcSEES competition, NSF has partnered with several agencies which have expertise in applied science. Proposals which include applied efforts would be considered large, integrated projects and should address the research interests of one or more of the management/regulatory agency partners (BOEM, EPA, US FWS, or USGS). Please refer to section IX in the solicitation for agency interests or email arcsees@nsf.gov for more information.

11. Is this the only ArcSEES competition, or will there be future announcements of opportunity?

ArcSEES is envisioned as a 5-year effort to build capacity in sustainability science targeted towards Arctic priorities that have global relevance. Research themes and agency and international partners may evolve in future ArcSEES competitions. If proposers are interested in ArcSEES but need additional time to form interdisciplinary research teams and develop ideas relevant to ArcSEES, please consult the Research Coordination Network-SEES call (http://www.nsf.gov/pubs/2011/nsf11531/nsf11531.htm), which has a deadline for proposals on February 4, 2013.