

This solicitation has been archived and replaced by [NSF 18-581](#).

Ecology and Evolution of Infectious Diseases (EEID)

PROGRAM SOLICITATION

NSF 16-592

REPLACES DOCUMENT(S):

NSF 14-592



National Science Foundation

Directorate for Biological Sciences

Directorate for Social, Behavioral & Economic Sciences



National Institutes of Health

John E. Fogarty International Center

National Institute of General Medical Sciences

National Institute of Allergy and Infectious Diseases



National Institute of Food and Agriculture



U.K. Biotechnology and Biological Sciences Research Council



United States-Israel Binational Science Foundation

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

November 16, 2016

Third Wednesday in November, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

For US-Israel Collaborative projects, Israeli researchers are now limited to involvement in no more than one submitted proposal.

US-UK Collaborative proposals will once again be accepted. Proposals can include both regular proposals and Research Coordination Network proposals.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) ([NSF 18-1](#)), which is effective for proposals submitted, or due, on or after January 29, 2018.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Ecology and Evolution of Infectious Diseases (EEID)

Synopsis of Program:

The Ecology and Evolution of Infectious Diseases program supports research on the ecological, evolutionary, and socio-ecological principles and processes that influence the transmission dynamics of infectious diseases. The central theme of submitted projects must be quantitative or computational understanding of pathogen transmission dynamics. The intent is discovery of principles of infectious disease transmission and testing mathematical or computational models that elucidate infectious disease systems. Projects should be broad, interdisciplinary efforts that go beyond the scope of typical studies. They should focus on the determinants and interactions of transmission among humans, non-human animals, and/or plants. This includes, for example, the spread of pathogens; the influence of environmental factors such as climate; the population dynamics and genetics of reservoir species or hosts; the cultural, social, behavioral, and economic dimensions of disease transmission. Research may be on zoonotic, environmentally-borne, vector-borne, or enteric diseases of either terrestrial or freshwater systems and organisms, including diseases of animals and plants, at any scale from specific pathogens to inclusive environmental systems. Proposals for research on disease systems of public health concern to developing countries are strongly encouraged, as are disease systems of concern in agricultural systems. Investigators are encouraged to develop the appropriate multidisciplinary team, including for example, modelers, bioinformaticians, genomics researchers, social scientists, economists, epidemiologists, entomologists, parasitologists, microbiologists, bacteriologists, virologists, pathologists or veterinarians, with the goal of integrating knowledge across disciplines to enhance our ability to predict and control infectious diseases.

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.

- Katharina Dittmar, Program Director, DEB/NSF, telephone: (703) 292-7799, email: kdittmar@nsf.gov
- Christine Jessup, Program Director, NIH/FIC, telephone: (301) 496-1653, email: christine.jessup@nih.gov
- Peter Johnson, National Program Leader, USDA/NIFA, telephone: (202) 401-1896, email: pjohnson@nifa.usda.gov
- Sadhana Sharma, Strategy and Policy Manager, UKRI - BBSRC, telephone: 44 1793-413099, email: sadhana.sharma@bbsrc.ac.uk
- Rachel (Heni) Haring, Deputy Executive Director, BSF, telephone: 972 2 5828239, email: heni@bsf.org.il
- Daniel Janes, Program Director, NIH/NIGMS, telephone: (301) 594-0943, email: daniel.janes@nih.gov
- Deborah Winslow, Program Director, SBE/NSF, telephone: (703) 292-7315, email: dwinslow@nsf.gov
- Susanna Remold, Program Director, DEB/NSF, telephone: (703) 292-7836, email: sremold@nsf.gov
- Colette St. Mary, Program Director, DEB/NSF, telephone: (703) 292-4659, email: cstmary@nsf.gov
- Samuel M. Scheiner, Program Director, DEB/NSF, telephone: (703) 292-7175, email: sscheine@nsf.gov

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

- 10.310 --- USDA-NIFA Agriculture and Food Research Initiative
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences
- 93.856 --- Microbiology and Infectious Diseases Research
- 93.859 --- National Institute of General Medical Sciences
- 93.989 --- John E. Fogarty International Center

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 9

Anticipated Funding Amount: \$13,500,000 in FY 2017, pending the availability of funds. That amount includes approximately \$5M from NSF for new standard or continuing awards, approximately \$5M from NIH for new or continuing awards, and \$3.5M from USDA for new awards. The expected funding from the UKRI-BBSRC for the UK component of the US-UK Collaborative Projects will be a maximum of £2M. The expected funding from the BSF for the Israeli component of the US-Israel Collaborative Projects will be a maximum of \$80,000/year.

Eligibility Information

Who May Submit Proposals:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the *NSF Proposal & Award Policies & Procedures Guide (PAPPG)*, Chapter I.E.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI: 2

In a given year, an individual may participate as a PI, co-PI, or sub-award lead on no more than **two** proposals

submitted in response to this solicitation. In addition, an individual from Israel may participate in no more than **one** US-BSF proposal. **This limit does not include RCN proposals.** Proposals in excess of the limit for any person will be returned without review in the reverse order received. Participating in a proposal as other senior personnel does not count in this limit. Changes in the list post-submission to meet the eligibility limits will not be allowed. **It is the responsibility of the submitters to confirm that the entire team is within the eligibility guidelines.**

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

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

B. Budgetary Information

- **Cost Sharing Requirements:**

Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:**

Not Applicable
- **Other Budgetary Limitations:**

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

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):
 - November 16, 2016
 - Third Wednesday in November, Annually Thereafter

Proposal Review Information Criteria

Merit Review Criteria:

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

Award Administration Information

Award Conditions:

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.

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I. INTRODUCTION

The past twenty years have seen a dramatic increase in our awareness of the need to understand the ecological and evolutionary drivers of disease emergence and transmission dynamics. While our knowledge has increased about specific systems and the basic principles of simple systems, understanding of complex systems and translation of those principles into ecosystem, public health, and agricultural health management tools remains challenging. System complexity includes such factors as multiple interacting species of hosts, pathogens and/or vectors; interactions among pathogenic and non-pathogenic microbes; interactions between biological, cultural and social factors; effects of spatial and temporal structure; and evolutionary dynamics.

The emergence and the re-emergence of numerous infectious diseases around the world have coincided with unprecedented rates of change in the structure and diversity of the environment and human social and economic systems. Nearly all of the world's terrestrial and aquatic ecosystems have undergone dramatic changes due to a variety of human activities such as habitat transformation, human displacement and relocation, urbanization, rapid long-distance transport and increased international trade, species invasions, deliberate introduction of infectious diseases for biological control, wildlife trafficking, chemical waste contamination, use of antimicrobial agents in agriculture and medicine, and climate change. The coincidence of broad scale environmental changes, the expansion of human social and economic networks, and the emergence of infectious diseases may point to underlying predictable ecological relationships.

We have improved our ability to define the molecular identity and dynamics of pathogens, and have greatly increased our understanding of host defense systems. We are able to apply genetic knowledge to understand the evolutionary dynamics of infectious diseases. These improvements have contributed significantly to our knowledge of the epidemiology and transmission patterns of diseases. However, the relationship of these factors to the biotic and structural complexity of ecological, agricultural, and socio-ecological systems in which transmission occurs remains poorly understood. For example, little is known about the transmission dynamics of interacting pathogens and non-pathogens within a common host. In addition, although these dynamics take place over evolutionary time for pathogens and in the context of social systems, insufficient attention has been given to integrating ecological, epidemiological, evolutionary, and socio-economic dynamics.

At present, basic and applied research in infectious disease ecology and evolution are not well integrated. The potential benefits of an interdisciplinary research program in this area include:

- development of disease transmission theory,
- improved understanding of how diseases (re)emerge,
- improved understanding of host population and ecosystem effects on disease transmission,
- increased capacity to forecast outbreaks,
- improved understanding of unintended health effects of development projects affecting terrestrial and freshwater systems,
- enhanced safety of food supplies, and
- improved strategies to control or prevent infectious diseases and enhance biosecurity.

An understudied aspect of disease transmission is the importance of socio-ecological factors and processes. Important new insights into the drivers and control of infectious diseases in humans and other species can only be achieved by integrated approaches that take into account the ways in which the natural and social environments affect the emergence and spread of infectious disease. This concept, often called "one health," links medical, veterinary, social and environmental sciences by drawing on a common pool of knowledge between the three sectors in order to exploit the potential of animal disease research to provide insights into ecosystem, agricultural, and human health.

This activity is a continuation of the previous joint National Science Foundation/National Institutes of Health/United States Department of Agriculture (NSF/NIH/USDA) Ecology of Infectious Disease competition. Information on past awards can be found at [EEID Awards](#). Additional information for NIH can be found at <http://www.fic.nih.gov/Programs/Pages/ecology-infectious-diseases.aspx> and for USDA at <https://nifa.usda.gov/funding-opportunity/ecology-and-evolution-infectious-diseases>.

II. PROGRAM DESCRIPTION

The goal of the Ecology and Evolution of Infectious Diseases (EEID) program is to support important and innovative research on the ecological, evolutionary, and socio-ecological principles that influence the transmission dynamics of infectious diseases. The program's focus is on the discovery of general principles and processes and on building and testing models that elucidate these principles.

Projects must address quantitative or computational understanding of pathogen transmission dynamics. Research in EEID is expected to be an interdisciplinary effort that goes beyond the scope of typical studies funded by the standing programs of the partner agencies. They should bring together such areas as anthropology, bioinformatics, computational science, ecology, economics, epidemiology, evolution, food science, genomics, geography, global health, mathematics, medicine, microbiology, plant science, population biology, sociology, physical environmental sciences, systems science, and veterinary medicine. Research within EEID is expected to generate rigorously characterized and tested models that are of value to the scientific community, but also may be useful in decision making. **The history of the EEID program has shown that the most competitive proposals are those that advance broad, conceptual knowledge that reaches beyond the specific system under study and that may be useful for understanding public, agricultural or ecosystem health, natural resource use and wildlife management, and/or economic development. Such proposals are typically interdisciplinary in their approach and/or the nature of the question(s) being addressed.**

Infectious disease transmission reflects complex, dynamic relationships that occur on varying spatial and temporal landscapes, are created by both ecological and evolutionary processes, and are revealed in genome architecture, physiological systems, population dynamics, and community structure, as well as behavioral and social dynamics. The interactions between disease-causing organisms, their vectors, and their host(s) are embedded within much larger networks of interacting systems, including other microorganisms that may or may not cause disease, one or more vector species, and multiple host species. Analysis of environmental influences (biological, geophysical, economic, and social) on individual and population susceptibility is fundamental to understanding these complex systems of infectious diseases. Research into the ecology (population, community, evolutionary, and social) of infectious diseases will contribute to a deeper understanding of these complex infectious disease systems, to the development of well characterized and tested models, and to the elucidation of general ecological and evolutionary principles.

Insights into the dynamics of infectious disease systems may require integration across several temporal, spatial, and functional scales including molecular, individual, population, societal, and ecosystem levels. Similarly, they may require integration across biological, socio-economic, and geophysical domains. The field of evolutionary ecology, which focuses on both the importance of ecological context in studies of evolution and the importance of evolutionary change for ecological systems, may also provide important insights into infectious disease systems. The interplay of evolution and ecology has implications for understanding how infectious agents emerge as pathogens, adapt to one or more hosts, interact with other microbial communities (e.g., microbiome), and are transmitted among hosts.

A critical goal of research supported by this program is the generation of principles and conceptual frameworks that organize and inform the research and that lead to mathematical, computational, and statistical models of infectious disease dynamics. Diverse modeling approaches are appropriate, including, but not limited to, mathematical equations, computational simulations, geospatial algorithms, and statistical models. **For the EEID program, the most competitive proposals are organized around an overarching conceptual framework that leads to such a model.** Models should aim to be explanatory beyond the specific system under study and must be well-characterized and rigorously tested. Proposals must describe how models will be developed, evaluated, and disseminated. Proposals must identify which individual(s) will oversee the quantitative approaches and provide evidence of demonstrated expertise in mathematical, computational, or statistical modeling and/or data analysis. Likewise, strategies for data collection must be well designed to contribute to and test model design. Proposals must include plans for dissemination of data, models, and tools developed by this program.

A variety of *topics, questions, systems and approaches* are appropriate. Among the areas of particular interest are: the role of social influences on the susceptibility of individuals or populations; multiway interactions between pathogenic and non-pathogenic organisms and their mutual hosts; the role of medical, agricultural or environmental practices on pathogen emergence and transmission; emergence of pathogens from non-pathogenic populations; host switching; evolutionary dynamics in an ecological context such as disease control interventions and drug resistance. These topics have significant ecological and evolutionary components that should be studied as a system, not in isolation. Depending on the hypotheses or research questions being addressed, investigations might entail some combination of laboratory experiments, field observations or manipulations, public health interventions (although clinical trials are beyond the scope of the EEID program), analysis of social and cultural processes, or ethnographic studies. Research may also focus on novel analyses of existing data and/or theoretical investigations of ecological and evolutionary dynamics. Investigations may focus on model infectious disease systems in natural (terrestrial or freshwater) or laboratory settings where those systems elucidate general principles.

Research may use a variety of study systems. The organism(s) or system(s) selected for study should be justified with respect to its suitability to study questions of ecology and/or evolutionary ecology. Research may involve a variety of infectious agents, individual diseases, or groups of diseases, and might involve one or more social systems, regions, habitats, or groups of organisms. Proposals may focus on terrestrial or freshwater systems and organisms and may include infectious diseases of humans, non-human animals, or plants. Proposals for research on diseases of public or agricultural health concern to developing countries, including potential pandemic diseases, are encouraged. **Regardless of the system or approach taken, a proposal must have a significant focus on the ecology of disease transmission to be eligible for funding.**

Because of the complexity of studies on the ecology and evolutionary ecology of infectious diseases, multidisciplinary teams of domestic and international collaborators with expertise from diverse disciplines are likely to be most effective. Investigators are encouraged to develop collaborations with public health research communities where that is appropriate. Collaborative teams could include, for example: ecologists, epidemiologists, medical scientists, veterinary scientists, social and behavioral scientists, entomologists, food scientists, microbiologists, pathologists, and parasitologists, geologists, hydrologists, geospatial analysts, and mathematicians. The research plan should indicate how multiple disciplines will be integrated and how new investigators in U.S. and collaborating foreign institutions will be prepared to further this research.

The EEID program is not intended to be the only avenue of support by the participating agencies for supporting research on infectious diseases. Specifically, proposals submitted in response to this announcement must address ecological dynamics and among-host transmission, even when evolutionary studies are a substantive part of the proposal. Investigations that are outside the scope of this EEID announcement include:

- those limited solely to genetic patterns of evolutionary change (e.g., comparative genomics),
- those that focus solely on human diseases without considering the broader ecological context,
- those that focus solely on within-host biological processes,
- those that focus solely on vector species ecology, and
- those that have not pre-identified at least one pathogenic organism that will be the focus of the study (i.e., metagenomic surveys to identify the pathogenic organism are not included in this solicitation).

Projects focusing on **marine systems are no longer accepted**, except for those dealing with aquacultural systems within the purview of the USDA-National Institute of Food and Agriculture. Projects focused on disease ecology in marine systems, *might* be appropriate for the [Biological Oceanography](#) program in the Division of Ocean Sciences. However, projects that primarily investigate the fundamental microbiology, physiology, or molecular biology (i.e., not ecology) of specific marine syndromes/diseases are not appropriate for the Biological Oceanography program. You may contact program officers in the Biological Oceanography program to clarify the suitability of your project before submission.

The EEID competition broadly welcomes projects that include international collaborators. Two specific forms of collaboration (US-UK Collaborative Projects and US-Israel Collaborative Projects) are described below. These specific activities do not preclude other international collaborations. Nor do they require that a proposal have an international collaborator.

EEID Partner Interests

Fogarty International Center

The Fogarty International Center (FIC) is dedicated to advancing the mission of the National Institutes of Health (NIH) by supporting and facilitating global health research conducted by U.S. and international investigators, building partnerships between health research institutions in the U.S. and abroad, and training the next generation of scientists to address global health needs. The FIC is interested in EEID applications that include explicit plans for capacity building in low- or middle-income countries (LMICs) and encourages applications that are focused on significant and/or emerging infectious disease threats, including zoonotic disease threats, to human health in LMICs. The FIC will consider supporting meritorious EEID research applications that address the above priorities and/or meritorious EEID Research Coordination Network (RCN) applications aimed at capacity building in LMICs.

National Institute of General Medical Sciences

The National Institute of General Medical Sciences (NIGMS) supports basic research that improves understanding of biological processes and lays the foundation for advances in disease diagnoses, prevention and treatment. NIGMS also has a strong interest in training and support of the nation's scientific workforce. NIGMS is interested in EEID applications that address the evolution of hosts, pathogens and their interactions as well as basic biology and population genetics of hosts and pathogens as they relate to disease transmission and prevention. NIGMS will consider supporting meritorious EEID research applications as single-PI or multi-PI research program grants.

USDA-NIFA

The National Institute of Food and Agriculture (NIFA) supports research, education, and extension work that addresses key problems of national, regional, and multi-state importance in sustaining all components of food and agriculture, including farm efficiency and profitability, ranching, bioenergy, forestry (both urban and agroforestry), aquaculture, rural communities and entrepreneurship, human nutrition, food safety, physical and social sciences, home economics and rural human ecology, biotechnology, and conventional breeding, and including both conventional and organic food production systems.

Applicants may submit proposals that support USDA's strategic objective (3.1) to "ensure U.S. agricultural resources contribute to enhanced global food security" (see [USDA Strategic Plan FY 2014-2018](#)). Any such activity proposed (e.g., partnerships, exchanges, training, and/or travel), must first and foremost support NIFA's domestic program goals. Applicants must clearly describe and demonstrate how international activities proposed in applications will contribute to and support advances in U.S. agriculture.

US-UK Collaborative Projects

Recognizing the potential for international collaboration to advance EEID research and education objectives, NSF has partnered for this solicitation with the Biotechnology and Biological Sciences Research Council (BBSRC) of the U.K. This partnership will facilitate coordinated funding of U.S. and U.K. research collaboration. The UK component of the US-UK Collaborative Projects will be funded under the umbrella of the Global Challenges Research Fund (GCRF) and will form part of BBSRC's individual GCRF allocation and will be part of the U.K.'s Official Development Assistance for promoting the welfare and economic development of countries on the OECD's DAC list of ODA recipients (<http://www.oecd.org/dac/stats/documentupload/DAC%20List%20of%20ODA%20Recipients%202014%20final.pdf>).

The focus of US-UK Collaborative Projects should be on understanding the transmission dynamics of pathogens of farmed animals (including aquaculture) and/or crops in LMICs. Projects can include, but are not limited to, transmission dynamics of antimicrobial and anti-parasitic resistance, and the interactions of pathogens with animal or plant-associated microbiomes. Projects can include animal pathogens that have zoonotic potential. The project **must** indicate how the project will promote economic development and welfare in the LMICs. For further information, please see <http://www.bbsrc.ac.uk/eeid>. Collaborative proposals can include both research projects and Research Coordination Networks. The UK component of the Collaborative proposal must fit within BBSRC's remit.

UK researchers applying under this heading must meet BBSRC eligibility requirements for managed mode calls and must apply through an institution eligible to receive BBSRC's funding. Please see BBSRC funding rules: <http://www.bbsrc.ac.uk/funding/apply/grants-guide.aspx>.

All UK researchers are **required** to submit a Letter of Intent by 27 September 2016 to UK-USCollab@bbsrc.ac.uk. For further information please see <http://www.bbsrc.ac.uk/eeid>. Individuals considering submitting a proposal as a US-UK Collaborative Project are **strongly encouraged** to contact the relevant Cognizant Program Officer to confirm that the UK component fits BBSRC's requirements. Applications with non-eligible UK partners will not be considered for funding as a US-UK Collaborative Projects.

US-Israel Collaborative Proposals

Recognizing the potential for international collaboration to advance EEID research and education objectives, NSF has partnered for this solicitation with the U.S.-Israel Binational Science Foundation (BSF), which is an organization owned by the two governments with the aim of facilitating scientific relations between them. The Israeli component of the US-Israel Collaborative Projects will be funded by the BSF using special funds provided by the Israeli government.

Israeli researchers applying under this heading must meet BSF eligibility requirements, and must apply through an institution eligible to receive BSF funding. Please see BSF eligibility rules: <http://www.bsf.org.il/ElectronicSubmission/GatewayFormsAndGuidelines.aspx?PageId=7&innerTextID=0>.

US-UK-Israel Collaborative proposals

Multinational Research Coordination Networks that involve researchers from the US, UK and Israel are also welcome. Any such projects must meet the requirements of each of the NSF, the BBSRC and the BSF.

Research Coordination Network Projects (RCN)

The EEID program will accept proposals to establish Research Coordination Networks that focus on issues involving infectious disease ecology, socio-ecology, and evolution. RCN projects are eligible to be submitted as US-UK Collaborative Projects. Information on the scope of RCN projects and the format of those proposals can be found at (https://www.nsf.gov/funding/pgm_summ.jsp?pins_id=11691). Such RCN proposals should be submitted under the EEID solicitation and deadline.

III. AWARD INFORMATION

Under this solicitation, the maximum total (for all years) award size is \$2.5 million, including indirect costs, and the maximum award duration is five years. US-UK Collaborative Projects can request additional funding for the UK component of the project. The minimum award size is \$1.0 million total project costs for all years, or \$750 thousand for the US component of US-UK and US-Israel Collaborative Projects. For US-Israel Collaborative Projects, the maximum award size for the Israeli portion is \$80,000/year. The maximum award size for RCN proposals is \$500,000 as per the RCN solicitation. For US-UK Collaborative RCN proposals, the maximum award size for the US component is \$500,000.

Approximately 9 new awards are anticipated in FY 2017, depending on the quality of submissions and the availability of funds; the expected funding will be \$13.5 million. That amount includes approximately \$5M from the NSF for new standard or continuing awards, approximately \$5M from the NIH for new or continuing awards, and \$3.5M from the USDA for new awards. Of those awards, 2-4 are anticipated to be US-UK Collaborative Projects, depending on the quality of submissions and the availability of funds; the expected funding from the BBSRC for this call is up to £2M. This amount reflects 80% of the full economic costs in the U.K. Of those awards, up to 1 is anticipated to be a US-Israel Collaborative Project, depending on the quality of submissions and the availability of funds; the expected funding from the BSF for the Israeli component of the US-Israel Collaborative Projects will be a maximum of \$80,000/year.

Upon conclusion of the review process, meritorious proposals may be recommended for funding by either NSF, NIH, or USDA, at the option of the agencies, not the proposing organizations. Proposals selected for funding by NIH or USDA will need to be reformatted and resubmitted to that agency. Subsequent submission and grant administration procedures will be in accordance with the individual policies of the awarding agency.

Proposals selected for funding consideration by the NIH will be invited to resubmit to the Division of Receipt and Referral (DRR) in NIH's Center for Scientific Review (CSR) (see Section VI.B). PIs submitting to the NIH must be registered in eRA Commons and the applicant's organization must be registered with SAM, Grants.gov and eRA Commons. PIs should therefore ensure that all registrations required for NIH submission are in place before the NIH receipt deadline.

USDA/NIFA Legislative Authority: The USDA authority for this RFA is contained in Section 7406 of the Food, Conservation, and Energy Act of 2008 (FCEA) (Pub. L. 110-246) which amends section 2(b) of the Competitive, Special, and Facilities Research Grant Act (7 U.S.C. 450i(b)) to authorize the Secretary of Agriculture to establish the Agriculture and Food Research Initiative (AFRI); a new competitive grant program to provide funding for fundamental and applied research, extension, and education to address food and agricultural sciences. AFRI is subject to the provision found at 7 CFR Part 3430.

For US-UK Collaborative Projects, the UK component of the collaboration will be awarded through the BBSRC in accordance with its policies. If the BBSRC selects an application for funding, the Research Councils will require that the costs for the UK element of the proposal be submitted via the RCUK's Je-S application submission system before final sign-off. UK collaborators should therefore ensure they are registered Je-S users before the proposal is submitted.

For US-Israel Collaborative Projects, the Israeli component of the collaboration will be awarded through the BSF in accordance with its policies and regulations. The collaborative proposal must be submitted to the BSF by the Israeli scientist by the BSF-established deadline.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the *NSF Proposal & Award Policies & Procedures Guide (PAPPG)*, Chapter I.E.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI: 2

In a given year, an individual may participate as a PI, co-PI, or sub-award lead on no more than **two** proposals submitted in response to this solicitation. In addition, an individual from Israel may participate in no more than **one** US-BSF proposal. **This limit does not include RCN proposals.** Proposals in excess of the limit for any person will be returned without review in the reverse order received. Participating in a proposal as other senior personnel does not count in this limit. Changes in the list post-submission to meet the eligibility limits will not be allowed. **It is the responsibility of the submitters to confirm that the entire team is within the eligibility guidelines.**

Additional Eligibility Info:

NIH Eligibility: Institutions eligible for awards by the NIH's Fogarty International Center (FIC) include foreign organizations.

USDA/NIFA Eligibility Requirements: Eligible entities for award include, (1) State agricultural experiment stations; (2) colleges and universities (including junior colleges offering associate degrees or higher); (3) university research foundations; (4) other research institutions and organizations; (5) Federal agencies, (6) national laboratories; (7) private organizations or corporations; (8) individuals who are U.S. citizens, nations, or permanent residents; and (9) any group consisting of 2 or more entities identified in (1) through (8). Eligible institutions do not include foreign and international organizations.

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 Proposal & Award Policies & Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

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

Special Information and Supplementary Documentation:

- **Proposals Involving Multiple Institutions**

In the case of proposals involving multiple organizations, a single organization must be identified as the lead, and a single proposal describing the entire project must be submitted by that organization. Funds may be distributed among partner organizations via subawards from the lead organization. A budget on the standard NSF budget form should be submitted for each subawardee. The requirement for a single organization to submit the sole proposal for a project is designed to facilitate effective coordination among participating organizations and to avoid difficulties that ensue in funded projects when individuals change organizations and/or cease to fulfill project responsibilities.

Of the two types of collaborative proposal formats described in the *Proposal & Award Policies & Procedures Guide*, this solicitation allows only a single proposal submission with subawards administered by that lead organization.

- **Research Experiences for Undergraduates.** Projects anticipating the inclusion of undergraduate research experiences may include those as part of the research proposal itself, rather than as a subsequent supplemental request. See the REU solicitation (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13542) for additional information.

- **A list of Senior Personnel.** In lieu of the instructions specified in the PAPPG, Collaborators and Other Affiliations Information should be submitted as follows: All projects must provide a single, consolidated list of senior personnel as a **Single Copy Document**. This list is used to facilitate the identification of potential conflicts of interest in review. The list must include all PIs, co-PIs, and other Senior Personnel on the proposed project, including collaborators, and optionally may include Other Personnel from the Postdoctoral and Other Professional categories. The *Proposal & Award Policies & Procedures Guide* Exhibit II-7 provides the definition of personnel categories: https://www.nsf.gov/pubs/policydocs/pappg17_1/pappg_2.jsp#2ex7.

Each individual must be listed on a separate line using the following format:

Person Name (last name, first name), Institution Name, Role in project

as in these examples:

Doe, Jane, State University of Science and Technology, PI

Smith, John, Memorial Research Institute, collaborator

"Role in project" must be from the following list: PI, co-PI, Senior Personnel, collaborator, post-doctoral scholar.

- **Letters of Collaboration.** Supplementary Documents may include letters of collaboration from individuals or organizations that are integral parts of the proposed project but are not listed as PI, co-PI, or other senior personnel on the main proposal or any subaward. Such involvement may include subsidiary involvement in some aspect of the project, cooperation on outreach efforts, or documentation of permission to access materials or data. Letters of collaboration should focus solely on affirming that the individual or organization is willing to collaborate on the project as specified in the project description. No additional text, especially elaboration of the nature of activities to be undertaken by the collaborator and endorsements of the potential value or significance of the project for the collaborator, may be included. The template that **must** be used for the preparation of letters of collaboration is provided below.

Letters of collaboration should not be provided from any individual designated as a principal investigator or senior personnel, nor are letters of collaboration required from any organization that will be a subawardee in the proposal budget.

Each letter of collaboration **must** be signed by the designated collaborator. Requests to collaborators for letters of collaboration should be made by the PI well in advance of the proposal submission deadline, because they **must** be included at the time of the proposal submission. **Letters deviating from this template will not be accepted and may be grounds for returning the proposal without review.**

Template to be used for letters of collaboration

To: NSF _____ (Program Title) _____ Program

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

By signing below (or transmitting electronically), I acknowledge that I am listed as a collaborator on this proposal, entitled "_____(proposal title)_____" with _____(PI name)_____ as the Principal Investigator. I agree to undertake the tasks assigned to me or my organization, as described in the project description of the proposal, and I commit to provide or make available the resources specified therein.

Signed: _____

Organization: _____

Date: _____

Research Coordination Network proposals

These proposals should begin the title with "RCN:" Follow the proposal preparation instructions in the RCN solicitation (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=11691).

US-UK Collaborative proposals

All UK applicants must submit a letter of Letter of Intent form in order to then submit a full proposal. For further information, please see <https://bbsrc.ukri.org/funding/filter/ecology-evolution-of-infectious-diseases-2016/>.

For full application: These proposals should begin the title with "US-UK Collab:" Collaborative RCN proposals should begin the title with "US-UK Collab: RCN:"

Information for the UK portion of US-UK Collaborative Proposals should be included as Supplementary Documents. That information should include the following, and **only** the following:

1. **Biographical sketches of UK senior personnel:** Those biographical sketches must conform to NSF format and limitations.
2. **UK budget:** Costs for the UK component of the project should be entered onto the Je-S system but the the completed form **SHOULD NOT** be submitted electronically to the BBSRC at this stage. Instead, a PDF version of the form should be saved and sent to the US lead PI for inclusion as a supplementary document in the proposal. Also, an electronic copy of this document should be sent to BBSRC Cognizant Programme Officer no later than the NSF submission deadline. Full details on what is required can be obtained at (<http://www.bbsrc.ac.uk/eeid>).

Applicants should ensure that they contact the main UK Cognizant Program Officer at BBSRC to discuss the remit of their proposal and to confirm whether they should complete a BBSRC Je-S form.

The researchers will be asked to attend a meeting to be held at either the National Science Foundation or an alternate location. Include the necessary travel costs for attendance at the meeting in the proposed budget.

3. **Letters of collaboration:** Letters of collaboration from UK scientists are required. These letters must be restricted to a statement of intent to collaborate only as described above. Additional information on the nature of the collaboration and the roles of the investigators should be included in the Project Description.
4. **Institutional endorsement:** An institutional certification of the submission must be a signed letter from an authorized U.K. institutional representative with the following text: "I confirm on behalf of [insert name of institution] that the U.S.-U.K. Collaborative proposal between [insert name of US PI and institution] and [insert name of UK PI] is endorsed and has been submitted by [name of Research Office]."
5. **Sharing of unattributed reviews:** Unattributed reviews will be shared with the BBSRC. The following text must be included in a **Single Copy Document** and signed by the lead investigator, confirming that the investigators involved in the proposal acknowledge and confirm this fact.

On behalf of the proposal investigators, I, _____ (insert Lead PI Name), consent that the proposal as well as its unattributed reviews will be shared with the EEID partner-funding agencies.

Signed: _____
Organization: _____
Date: _____

US-Israel Collaborative proposals

These proposals should begin the title with "US-Israel Collab." Information for the Israel portion of the US-Israel Collaborative Proposals should be included as Supplementary Documents. That information should include the following, and only the following:

1. **Biographical sketches of Israeli PIs:** Those biographical sketches must conform to NSF format and limitations.
2. **Israeli budget:** Costs for the Israeli component should be copied from the BSF submission of the proposal using the BSF format: <http://www.bsf.org.il/ElectronicSubmission/GatewayFormsAndGuidelines.aspx?PagelD=7&innerTextID=0>
3. **Letters of collaboration:** Letters of collaboration from Israeli scientists are required. These letters must be restricted to a statement of intent to collaborate only as described above. Additional information on the nature of the collaboration and the roles of the investigators should be included in the Project Description.
4. **Institutional endorsement:** An institutional certification of the submission must be a signed letter from an authorized Israeli institutional representative with the following text: "I confirm on behalf of [insert name of institution] that the U.S.-Israel Collaborative proposal between [insert name of US PI and institution] and [insert name of Israeli PI] is endorsed and has been submitted by [name of Research Office]."
5. **Sharing of unattributed reviews:** Unattributed reviews will be shared with the BSF. The following text must be included in a **Single Copy Document** and signed by the lead investigator, confirming that the investigators involved in the proposal acknowledge and confirm this fact.

On behalf of the proposal investigators, I, _____ (insert Lead PI Name), consent that the proposal as well as its unattributed reviews will be shared with the EEID partner-funding agencies.

Signed: _____
Organization: _____
Date: _____

Full proposals with Israeli collaboration must be also submitted to the BSF by the Israeli partner, using the BSF submission system: <http://www.bsf.org.il/ElectronicSubmission/GatewayFormsAndGuidelines.aspx?PagelD=7&innerTextID=0>.

US-UK-Israel Collaborative proposals

These proposals should begin the title with "US-UK-Israel Collab." Information for the UK and Israel portion should be included as Supplementary Documents as described above.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

EEID projects must have a minimum budget of \$1,000,000 in total project costs for all years; US-UK Collaborative must have a minimum budget of \$750,000 in total project costs for all years. Research that falls within the scope of the EEID initiative but with project aims that do not require budgets of this magnitude should be directed to either the Population and Community Ecology or Evolutionary Processes clusters in the Division of Environmental Biology.

Budget Preparation Instructions:

Subawards

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

C. Due Dates

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

November 16, 2016

Third Wednesday in November, Annually Thereafter

D. FastLane/Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

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

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

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

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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

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

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Building the Future: Investing in Discovery and Innovation - NSF Strategic Plan for Fiscal Years (FY) 2018-2022*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

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

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

A. Merit Review Principles and Criteria

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

1. Merit Review Principles

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

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

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

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

2. Merit Review Criteria

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

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

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

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

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

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

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

STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

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

Additional Solicitation Specific Review Criteria

- **Significance.** Does the project address an important problem or a critical barrier to progress in the field? If the aims of the project are achieved, how will scientific knowledge, technical capability, and/or clinical practice be improved? How will successful completion of the aims change the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field?
- **Investigator(s).** Are the PD/PIs, collaborators, and other researchers well suited to the project? If early career investigators, do they have appropriate experience and training? If established, have they demonstrated an ongoing record of accomplishments that have advanced their field(s)? If the project is collaborative or multi-PD/PI, do the investigators have complementary and integrated expertise; are their leadership approach, governance and organizational structure appropriate for the project?
- **Innovation.** Does the application challenge and seek to shift current research or clinical practice paradigms by utilizing novel theoretical concepts, approaches or methodologies, instrumentation, or interventions? Are the concepts, approaches or methodologies, instrumentation, or interventions novel to one field of research or novel in a broad sense? Is a refinement, improvement, or new application of theoretical concepts, approaches or methodologies, instrumentation, or interventions proposed?
- **Approach.** Are the overall strategy, methodology, and analyses well-reasoned and appropriate to accomplish the specific aims of the project? Are potential problems, alternative strategies, and benchmarks for success presented? If the project is in the early stages of development, will the strategy establish feasibility and will particularly risky aspects be managed?

If the project involves clinical research, are the plans for 1) protection of human subjects from research risks, and 2) inclusion of minorities and members of both sexes/genders, as well as the inclusion of children, justified in terms of the scientific goals and research strategy proposed?

- **Environment.** Will the scientific environment in which the work will be done contribute to the probability of success? Are the institutional support, equipment and other physical resources available to the investigators adequate for the project proposed? Will the project benefit from unique features of the scientific environment, subject populations, or collaborative arrangements?
- **Biohazards.** Reviewers will assess whether materials or procedures proposed are potentially hazardous to research personnel and/or the environment, and if needed, determine whether adequate protection is proposed.

Where relevant, proposals will also be reviewed with respect to the following:

- **Protections for Human Subjects.** For research that involves human subjects but does not involve one of the six categories of research that are exempt under 45 CFR Part 46, the reviewers will evaluate the justification for involvement of human subjects and the proposed protections from research risk relating to their participation according to the following five review criteria: 1) risk to subjects, 2) adequacy of protection against risks, 3) potential benefits to the subjects and others, 4) importance of the knowledge to be gained, and 5) data and safety monitoring for clinical trials. However, most clinical trials are beyond the scope of the EEID program.

For research that involves human subjects and meets the criteria for one or more of the six categories of research that are exempt under 45 CFR Part 46, the reviewers will evaluate: 1) the justification for the exemption, 2) human subjects involvement and characteristics, and 3) sources of materials.

- **Inclusion of Women, Minorities, and Children.** When the proposed project involves clinical research, the reviewers will evaluate the proposed plans for inclusion of minorities and members of both genders, as well as the inclusion of children.
- **Vertebrate Animals.** The reviewers will evaluate the involvement of live vertebrate animals as part of the scientific assessment according to the following five points: 1) proposed use of the animals, and species, strains, ages, sex, and numbers to be used; 2) justifications for the use of animals and for the appropriateness of the species and numbers proposed; 3) adequacy of veterinary care; 4) procedures for limiting discomfort, distress, pain and injury to that which is unavoidable in the conduct of scientifically sound research including the use of analgesic, anesthetic, and tranquilizing drugs and/or comfortable restraining devices; and 5) methods of euthanasia and reason for selection if not consistent with the American Veterinary Medical Association Guidelines on Euthanasia.

For all proposals involving international collaborations, reviewers will consider: mutual benefits, true intellectual collaboration with the foreign partner(s), benefits to be realized from the expertise and specialized skills, facilities, sites and/or resources of the international counterpart, and active research engagement of U.S. students and early-career researchers, where such individuals are engaged in the research.

US-UK and US- Israel Collaborative Projects will also be reviewed with respect to the extent which they demonstrate a substantial collaboration between the US and foreign partners and enhance research on infectious disease transmission. The review will take into account the foreign research context.

B. Review and Selection Process

NSF will manage the review of proposals in consultation with NIH and USDA, and in the case of US-UK and US- Israel Collaborative Projects, the BBSRC and BSF. Copies of proposals and unattributed reviews will be shared with the partner funding organizations, as appropriate.

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

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each

reviewer and/or panel. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

NSF Process: Those proposals selected for funding by NSF will be handled in accordance with standard NSF procedures. 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.

NIH Process: Proposals selected for funding consideration by NIH will be invited to submit reformatted applications to the Division of Receipt and Referral (DRR) in NIH's Center for Scientific Review (CSR). A receipt date of approximately March 15 annually is in effect for the NIH formatted applications. Following initial NSF-led peer review, recommended applications that have been resubmitted to the NIH will receive a second level of review by the appropriate national Advisory Council or Board. The following will be considered in making funding decisions:

- Scientific and technical merit of the proposed project as determined by scientific peer review.
- Availability of funds.
- Relevance of the proposed project to program priorities.

Subsequent award processing and grant administration procedures will be in accordance with NIH policies and procedures.

USDA/NIFA Process: Applicants submitting proposals selected for funding by USDA/NIFA will receive specific instructions outlining what additional information is needed in accordance with the policies of the agency. USDA/NIFA will make final funding decisions based on the results of the peer review process. Applications selected for funding by NIFA will be forwarded to the USDA/NIFA Awards Management Division for award processing in accordance with the USDA/NIFA procedures. All proposals selected for funding by USDA/NIFA, in FY 2017 will be limited to 30 percent indirect cost rate. Therefore, the recovery of indirect costs on awards made by NIFA under this program area may not exceed the lesser of the institution's official negotiated indirect cost rate or the equivalent of 30 percent of total Federal funds awarded. If the limitation of indirect costs changes, the applicant will be notified.

US-UK Collaborative Projects: The UK component of the collaboration will be awarded through the BBSRC in accordance with the policies of that agency. If the BBSRC selects an application for funding, the costs for the UK element of the proposal must be submitted via the RCUK's Je-S application submission system before final sign-off. UK collaborators should therefore ensure they are registered Je-S users before the proposal is submitted.

US-Israeli Collaborative Projects: The Israeli component of the collaboration will be awarded through the BSF in accordance with its policies and regulations. The collaborative proposal must be submitted to the BSF by both the Israeli and US scientists at the time it is submitted to the NSF.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

NSF Process: 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.)

NIH Process: If the application is under consideration for NIH funding, NIH will request "just-in-time" information from the applicant as described in the [NIH Grants Policy Statement](#).

A formal notification in the form of a Notice of Award (NoA) will be provided to the applicant organization for successful applications. The NoA signed by the grants management officer is the authorizing document and will be sent via email to the grantee's business official.

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any

announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

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

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

Special Award Conditions:

Proposals funded by NIH:

Selection of an application for award is not an authorization to begin performance. Any costs incurred before receipt of the Notice of Award are at the recipient's risk. These costs may be reimbursed only to the extent considered allowable pre-award costs.

Any application awarded by NIH in response to this solicitation will be subject to the DUNS, CCR Registration, and Transparency Act requirements as noted on the [Award Conditions and Information for NIH Grants](#) website.

All NIH grant and cooperative agreement awards include the *NIH Grants Policy Statement* as part of the NoA. For these terms of award, see the [NIH Grants Policy Statement Part II: Terms and Conditions of NIH Grant Awards, Subpart A: General](#) and [Part II: Terms and Conditions of NIH Grant Awards, Subpart B: Terms and Conditions for Specific Types of Grants, Grantees, and Activities](#). More information is provided at [Award Conditions and Information for NIH Grants](#).

Proposals funded by USDA/NIFA:

Awards issued as a result of this RFA will have designated the Automated Standard Applications for Payment System (ASAP), operated by the Department of Treasury's Bureau of the Fiscal Service, as the payment system for funds. For more information see <http://fms.treas.gov/index1.html>.

Several federal statutes and regulations apply to grant applications considered for review and to project grants awarded under this program. These may include, but are not limited to, the ones listed on the NIFA web page - <http://nifa.usda.gov/federal-regulations>.

NIFA Federal Assistance Policy Guide — a compendium of basic NIFA policies and procedures that apply to all NIFA awards, unless there are statutory, regulatory, or award-specific requirements to the contrary is available at <http://nifa.usda.gov/policy-guide>.

Other Requirements

USDA/NIFA:

1. Delegation of Fiscal Responsibility

Unless the terms and conditions of the grant state otherwise, the grantee may not, in whole or in part, delegate or transfer to another person, institution, or organization the responsibility for use or expenditure of grant funds.

2. Changes in Project Plans

The permissible changes by the grantee, PD(s), or other key project personnel in the approved project grant shall be limited to changes in methodology, techniques, or other similar aspects of the project to expedite achievement of the project's approved goals. If the grantee or the PD(s) is uncertain as to whether a change complies with this provision, the question must be referred to the Authorized Departmental Officer (ADO) for a final determination. The ADO is the signatory of the award document, not the program contact.

- Changes in approved goals or objectives shall be requested by the grantee and approved in writing by the ADO prior to effecting such changes. In no event shall requests for such changes be approved which are outside the scope of the original approved project.
- Changes in approved project leadership or the replacement or reassignment of other key project personnel shall be requested by the grantee and approved in writing by the ADO prior to effecting such changes.
- Transfers of actual performance of the substantive programmatic work in whole or in part and provisions for payment of funds, whether or not Federal funds are involved, shall be requested by the grantee and approved in writing by the ADO prior to effecting such transfers, unless prescribed otherwise in the terms and conditions of the grant.
- Changes in Project Period: The project period may be extended by USDA/NIFA without additional financial support, for such additional period(s) as the ADO determines may be necessary to complete or fulfill the purposes of an approved project, but in no case shall the total project period exceed ten years. Any extension of time shall be conditioned upon prior request by the grantee and approval in writing by the ADO, unless prescribed otherwise in the terms and conditions of a grant.
- Changes in Approved Budget: Changes in an approved budget must be requested by the grantee and approved in writing by the ADO prior to instituting such changes if the revision will involve transfers or expenditures of amounts requiring prior approval as set forth in the applicable Federal cost principles, Departmental regulations, or grant award.

US-UK Collaborative projects:

BBSRC Awardees are subject to BBSRC reporting and administration requirements as appropriate and outlined in the BBSRC Research Funding Guide at <http://www.bbsrc.ac.uk/funding/apply/grants-guide.aspx>.

US-Israel Collaborative projects:

BSF Awardees are subject to BSF reporting and administration requirements as appropriate and outlined in the BSF website:

<http://www.bsf.org.il/BSFPublic/DefaultPage1.aspx?PageId=41&innerTextID=41>. US-Israel Collaborative Projects should report on activities of the entire collaborative effort and submit that information to both NSF and BSF as part of the annual and final reports.

C. Reporting Requirements

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

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

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

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

Reporting on NIH Awards:

Awardees will be required to submit the [Research Performance Progress Report \(RPPR\)](#) annually and financial statements as required in the [NIH Grants Policy Statement](#).

A final progress report, invention statement, and the expenditure data portion of the Federal Financial Report are required for closeout of an award, as described in the *NIH Grants Policy Statement*.

The Federal Funding Accountability and Transparency Act of 2006 (Transparency Act), includes a requirement for awardees of Federal grants to report information about first-tier subawards and executive compensation under Federal assistance awards issued in FY2011 or later.; All awardees of applicable NIH grants and cooperative agreements are required to report to the Federal Subaward Reporting System (FSRS) available at [Federal Funding Accountability and Transparency Act Subaward Reporting System \(FSRS\)](#) on all subawards over \$25,000. See the [NIH Grants Policy Statement](#) for additional information on this reporting requirement.

Reporting on USDA Awards: Grantees are to submit initial project information and annual summary reports to NIFA's electronic, Web-based inventory system that facilitates both grantee submissions of project outcomes and public access to information on Federally-funded projects. The details of these reporting requirements are included in the award terms and conditions.

Any additional reporting requirements will be identified in the terms and conditions of the award (see Part VII, B. above for a link to view the NIFA award terms and conditions).

For informational purposes, the "Federal Financial Report," Form SF-425, consolidates into a single report the former Financial Status Report (SF-269 and SF-269A) and the Federal Cash Transactions Report (SF-272 and SF-272A). The [NIFA Agency-specific Terms and Conditions](#) include the requirement that Form SF-425 is due on a **annual basis no later than 90 days following the award's anniversary date (i.e., one year following the month and day of which the project period begins and each year thereafter up until a final report is required)**. A final "Federal Financial Report," Form SF-425, is due 90 days after the expiration date of this award.

US-UK Collaborative projects:

BBSRC Awardees are subject to BBSRC reporting requirements as outlined in the BBSRC Research Funding Guide at <http://www.bbsrc.ac.uk/funding/apply/grants-guide.aspx>. US-UK Collaborative Projects should report on activities of the entire collaborative effort and submit that information to both NSF and BBSRC as part of the annual and final reports.

US-Israel Collaborative projects:

BSF Awardees are subject to BSF reporting and administration requirements as appropriate and outlined in the BSF website: <http://www.bsf.org.il/BSFPublic/DefaultPage1.aspx?PageId=41&innerTextID=41>. US-Israel Collaborative Projects should report on activities of the entire collaborative effort and submit that information to both NSF and BSF as part of the annual and final reports.

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:

- Katharina Dittmar, Program Director, DEB/NSF, telephone: (703) 292-7799, email:kdittmar@nsf.gov
- Christine Jessup, Program Director, NIH/FIC, telephone: (301) 496-1653, email:christine.jessup@nih.gov

- Peter Johnson, National Program Leader, USDA/NIFA, telephone: (202) 401-1896, email: pjohnson@nifa.usda.gov
- Sadhana Sharma, Strategy and Policy Manager, UKRI - BBSRC, telephone: 44 1793-413099, email: sadhana.sharma@bbsrc.ac.uk
- Rachel (Henri) Haring, Deputy Executive Director, BSF, telephone: 972 2 5828239, email: heni@bsf.org.il
- Daniel Janes, Program Director, NIH/NIGMS, telephone: (301) 594-0943, email: daniel.janes@nih.gov
- Deborah Winslow, Program Director, SBE/NSF, telephone: (703) 292-7315, email: dwinslow@nsf.gov
- Susanna Remold, Program Director, DEB/NSF, telephone: (703) 292-7836, email: sremold@nsf.gov
- Colette St. Mary, Program Director, DEB/NSF, telephone: (703) 292-4659, email: cstmary@nsf.gov
- Samuel M. Scheiner, Program Director, DEB/NSF, telephone: (703) 292-7175, email: sscheine@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.
- Azyta Ahmadi, telephone: (703) 292-7207, email: azahmadi@nsf.gov

For questions relating to Grants.gov contact:

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

IX. OTHER INFORMATION

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

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

A notice on the Ecology and Evolution of Infectious Disease research initiative and this announcement is also posted in the NIH Guide to Grants and Contracts <http://grants.nih.gov/grants/guide/index.html> along with all NIH opportunities.

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

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

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

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.E.6 for instructions regarding preparation of these types of proposals.

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

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

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

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

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314

- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 - Send an e-mail to: nsfpubs@nsf.gov
 - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, [NSF-50](#), "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and [NSF-51](#), "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

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

Suzanne H. Plimpton
 Reports Clearance Officer
 Office of the General Counsel
 National Science Foundation
 Alexandria, VA 22314

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