



## Ecological Society of America

1990 M St, NW, Suite 700

Washington, DC 20036

April 13, 2020

The Honorable Eddie Bernice Johnson  
Chairwoman  
House Committee on Science, Space and  
Technology  
2321 Rayburn HOB  
Washington, DC 20515

The Honorable Frank Lucas  
Ranking Member  
House Committee on Science, Space and  
Technology  
2321 Rayburn HOB  
Washington, DC 20515

Dear Chairwoman Johnson and Ranking Member Lucas,

The Ecological Society of America (ESA) is the world's largest society of professional ecologists representing over 9,000 members across the country. ESA appreciates the opportunity to respond to the Committee's request for ideas to be included in any future near-term response and longer-term economic stimulus package(s) developed by the House to address and mitigate the impacts of the current COVID-19 crisis and prevent further pandemics.

The Centers for Disease Control and Prevention has found that six out of ten infectious diseases were seen in animals before humans. Generally, coronaviruses are rather species-adapted, and transmission from one species to another is rare. Only a few described species of coronaviruses have shown a broad host species range. Still, those species include severe acute respiratory syndrome (SARS-COV) and Middle East respiratory syndrome (MERS-COV). **Notable examples of wildlife to human disease transmission include the Ebola virus and HIV.**

It is not yet clear how exactly COVID-19 emerged, but the virus closely matches with viruses detected in the intermediate horseshoe bat (*Rhinolophus affinis*) from southwest China's Yunnan Province and the Pangolin coronavirus.

ESA suggests a series of items for your consideration for one of the agencies under the Committee's jurisdiction, the National Science Foundation (NSF).

### **National Science Foundation (NSF) Opportunities for Additional R&D and Related Activities Specific to COVID-19 Response and Recovery**

While NSF received \$75 million to support COVID-related projects in the CARES Act, there is great potential for NSF to fund more COVID-related research in both RAPIDs, EAGERs, and base programs. NSF has multiple efforts related to COVID-19 response and recovery, including researching the emergence of pathogens, transmission dynamics, pandemic modeling, supply change and logistics, manufacturing, telehealth security and privacy, societal impact and behavior, testbeds for digital health technologies development, wireless technology advancement, and STEM workforce needs.

ESA urges additional research funding for social science, disease ecology, community ecology, wildlife ecology and population ecology research that is needed to understand the causes of zoonotic pathogens introduction to the human species and its spread. Two NSF directorates are poised to support additional research:

1. The NSF Biological Directorate Division of Environmental Biology (DEB) Core Track supports research and training on evolutionary and ecological processes acting at the level of populations, species, communities, and ecosystems.
2. The NSF Biological Directorate Emerging Frontiers (EF) Division is an incubator for 21st Century Biology. EF supports multidisciplinary research opportunities and networking activities that arise from advances in disciplinary research.

Specific NSF support for research areas within the directorates include these programs:

- The NSF Long Term Ecological Research Network (LTER) is the largest network of ecologists working across the Nation with over 2000 researchers at 28 sites who apply long-term observation, experiments, and modeling to understand how ecological systems function over decades. Its research areas include disease ecology, population ecology, community ecology, and wildlife ecology. These areas have a unique role in addressing the root cause and spread of viruses such as Ebola, SARS, COVID 19 and other emerging pathogens.
- Syntheses Centers that facilitate novel research across the natural and social sciences to achieve to address complex problems challenging human societies globally.
- The National Ecological Observatory Network, which is a continental-scale observation facility designed to collect long-term open access ecological data to better understand how U.S. ecosystems are changing can provide population and community ecology data.
- The multi-agency, international Ecology and Evolution of Infectious Diseases program supports research on the ecological, evolutionary, and social drivers that influence the transmission dynamics of infectious diseases.

### **Near-Term Response to COVID Impacts on the larger Research Enterprise**

Many active National Science Foundation (NSF), Environmental Protection Agency (EPA), Department of Energy (DOE) and National Oceanic and Atmospheric Administration (NOAA) grants have already been impacted by changes due to COVID-19; whether it be access to laboratories, human subjects, or field experiments, there are many situations that will require both ramp-up costs to restart research, and also supplemental funds to cover the time when personnel still needed support but could not conduct the fully proposed work.

ESA recommends that the Committee encourage NSF, EPA, DOE and NOAA to raise the acceptable ceiling for research supplements in recognition of the anticipated greater need. Significantly larger supplements will be needed for active grants impacted by the pandemic. Many ecological field sites are inaccessible due to the social isolation restrictions on federal and private property. ***Additional funding for remote field site access such as the use of drones, remote sensors, and Remotely Operated Vehicles (ROVs) could mitigate the loss of access to field research in the short run and greatly increase efficiency of ecological research in the long run.*** Many field stations and marine labs have modest programs that could be rapidly scaled with

additional funding.

We also anticipate a need for extended support for students funded separately from grants, such as graduate fellowships and traineeships including NOAA's Sea Grant National Sea Grant College Program and Knauss Fellowship Program, NSF's Graduate Research Fellowship and National Research Traineeships. One mechanism that could extend support for graduate students is the NSF Doctoral Dissertation Improvement Grant (DDIG) program for the Division of Integrative Organismal Systems (IOS) and the Division of Environmental Biology (DEB). This program was cancelled in 2017, but it could be restarted. The DDIG award fulfilled a very specific need of ecology graduate students and has a disproportionate impact on the field of ecology. Additionally, depending on the overall economic recovery and job market, the Committee should consider supporting innovative partnerships to support post-docs who will likely face a bleak job market.

In order to recognize the significant taxpayer investment already made in these students, and their importance to fields critical to national innovation, NSF should find temporary grant mechanisms and creative partnerships with scientific societies and industry to allow post-docs an extra year or two of support to get through the economic crisis.

NSF will need additional funding to support research grants, students, and scientific facilities. Many of these concerns are also captured in a recent [research relief letter](#) to Congress from several higher education associations.

### **“Shovel-Ready” Research Infrastructure**

NSF currently has ecology-related programs in place that can be scaled for “shovel-ready” research projects:

- The NSF “Improvements to Biological Field Stations and Marine Laboratories (FSML) Crosscutting Program” provides funding for place based research. Its improvement proposals focus on well-defined projects of major equipment acquisition, data management and communication systems modernization, or physical plant improvement. Its planning proposals are for strategic institutional planning for the long term research and education goals of the station.
- The National Ecological Observatory Network (NEON) is fully operational, but its scope originally included 95 sites, but 14 sites in 2015 were descope. Many of the 14 descope sites were planned in detail and are “shovel-ready” and could be built.

### **NSF Support for Long-term Economic Stimulus/Recovery**

ESA recommends these improvements to the STEM workforce development:

1. With the anticipated demographic changes in our nation and the need to engage all communities in seeking solutions for emerging environmental challenges, **we propose an expansion to the capacity and infrastructure for the mentoring and career development of diverse undergraduates, graduate students and early-career scientists underrepresented in science.**

For example, ESA's infrastructure includes a mentoring platform, a series of scaffolded programs, a 100+ strong network of campus-based ecology chapters (student organizations) and a network of professional and peer mentors activated through ESA's Presidential Award-winning Strategies for Ecology Education, Diversity and Sustainability (SEEDS) and EcologyPlus program. Both programs are currently NSF-funded.

Improved cross-site coordination for Research Experiences for Undergraduates, for Teachers, and Research Opportunity Awards (all NSF programs) would allow current participants to glean some benefit from these field-based experiences and dramatically improve learning opportunities from future experiences.

Graduate students and postdoctoral scholars from underrepresented groups may be particularly vulnerable to the obstacles presented by COVID19, as their field research is stalled and research stipends and teaching assistantships on hold. Targeted fellowships well as training and mentoring in remote collaboration, such as those offered through existing synthesis centers, could sustain progress toward full inclusion.

Activities include scholarships and awards for research, career discovery and leadership development across all sectors of the economy at local, regional and national levels.

**2. Long-term STEM workforce development should prioritize funding for the professional development and scientific engagement programs that facilitate the use of big data streaming from existing shared research infrastructure such as the National Ecological Observatory Network (NEON) and the Oceans Observatory Initiative (OOI), and the many sources of open data in public repositories, including:**

- STEM faculty development programs to effectively teach the data science skills needed in a disciplinary context
- Interdisciplinary research among early-career scientists that builds upon *in-situ* research and develops a new culture of science-based on team science and democratized data sharing. Existing synthesis centers, including the National Center for Ecological Analysis and Synthesis, are offering such training on a cost-based model, but resources to support it for graduate students and early career scientists are limited.

By working with faculty and early-career scientists, the efforts prepare the nation for multiple future generations of study and research.

**3. We recommend additional funding for professional development programs for scientists who lead research infrastructure projects.**

Research infrastructure requires informed planning to maintain long-term financial sustainability and to adapt to changing circumstances. Successful research infrastructure projects are innovative, responsive to community needs, and have clear communication channels to their user base. These projects require scientific leaders who not only have scientific credentials, but strong skills in business planning, marketing, communication, and strategic planning.

Professional development programs are emerging to help ensure that scientists who lead research infrastructure projects can gain and develop these skills throughout their careers. These programs use principles of adult learning, focused on problem-solving and skill-building, to ensure maximum retention and impact. These programs promote scientific progress by ensuring that vital infrastructure continues to support research innovation and discovery.

Additional funding for such professional development programs (e.g., the [Sustaining Biological Infrastructure Training Initiative](#)) would enable these programs to hire more instructors, train more scientists, and develop new courses in additional leadership skill areas. Investment in these programs would equip more scientific leaders with the strategic planning skills and business acumen to manage these critical resources at their utmost efficiency to advance the health, prosperity, and welfare of the United States.

Thank you for your consideration of this request. If you have further questions, please contact Alison Mize at [alison@esa.org](mailto:alison@esa.org) or by calling 202-833-8773.

Sincerely,

Ecological Society of America