Outside Witness Testimony in Support of FY 2027 Funding for the National Science Foundation

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Submitted by:
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House Committee on Appropriations
Subcommittee on Commerce, Justice, Science and Related Agencies

The Natural Science Collections Alliance appreciates the opportunity to provide testimony in support of fiscal year (FY) 2027 appropriations for the National Science Foundation (NSF). We strongly encourage Congress to reject the proposed cuts to NSF in the President's budget request and instead allocate **at least $9.9 billion** for the agency in FY 2027.

The Natural Science Collections Alliance is a non-profit association that supports natural science collections, their human resources, the institutions that house them, and their research activities for the benefit of science and society. Our membership consists of institutions that are part of an international network of museums, botanical gardens, herbaria, universities, and other institutions that contain natural science collections and use them in research, exhibitions, academic and informal science education, and outreach activities.

NSF is a key supporter of natural science collections, their staff, and the emerging professionals who will form their future workforce. Scientific collections and the professionals and researchers who build, maintain, and study them are a vital part of the nation's research infrastructure. These collections and the expertise surrounding them play a crucial role in growing our bioeconomy. Whether housed in museums, government laboratories or archives, or university departments, these scientific resources represent a highly coordinated network of specimens, samples, and data—including genetic, tissue, organismal, and environmental information—that form an irreplaceable foundation for understanding life on Earth, past and present.

Natural science collections drive cutting-edge NSF-funded scientific research and education that help address pressing societal challenges. They contribute to efforts to improve public health, strengthen agricultural productivity, manage natural resources, conserve biodiversity, and advance American innovation and economic growth. Research based on these collections is also driving advances in cyberinfrastructure, data visualization, and data management practices, while providing critical scientific information that informs policymaking across the federal government. Examples of how scientific collections have saved lives, strengthened food production, and advanced scientific discovery include:

- Scientists used museum specimens in U.S. collections to gather data on the distribution of the mosquito *Culex quadrofaciatus*, which is known to carry West Nile Virus and other pathogens. They then modeled the distribution under different scenarios of changing climates to predict regions where the species may expand in the future. Predicting the spread of disease vectors such as these mosquitoes helps the health care community prepare for disease outbreaks and where they will happen.
- Researchers from Boston University documented Tau proteins in the brains of fluid preserved museum specimens of Downy Woodpecker. These proteins are also found in traumatic brain injuries in humans. Because of the life history traits of woodpeckers, the researchers argue these birds may have evolved a level of resistance to traumatic head injuries that could have implications for treatments for humans.
- Citrus bacterial canker disease wreaks havoc on fruit crops in Florida. Using plant specimens collected a century ago, scientists have analyzed the bacterium and traced its source. Knowledge of how the bacteria spreads allows scientists to develop effective control methods and to protect the U.S. citrus industry.
- When the 2001 anthrax attacks happened in the United States, specimens collected decades earlier allowed researchers from the Centers for Disease Control and Prevention to quickly identify the strain involved.

Scientific collections help tell the story of life on Earth. More than 1,600 biological collections across the United States preserve over one billion specimens gathered through more than 200 years of scientific investigation, discovery, and inventory of living and fossil species. With continued NSF support, many of these specimens have been digitized and made accessible through online databases that underpin a wide range of research. The institutions that maintain these collections serve as critical research infrastructure, enabling biological, geological, anthropological, and environmental research and helping scientists integrate findings across disciplines. Their professional staff also train future generations of researchers and provide the specialized expertise necessary to sustain and advance this invaluable scientific infrastructure.

According to the U.S. Interagency Working Group on Scientific Collections (IWGSC), "scientific collections are essential to supporting agency missions and are thus vital to supporting the global research enterprise." A 2020 report by the IWGSC highlights the long-term benefits of scientific collections and presents a framework for estimating and documenting these benefits, both monetary and non-monetary, generated by federal institutional collections. A 2023 report from the IWGSC enumerates their diverse contributions to public health, climate science, food security, and national resilience.

Additional reports emphasize the value of mobilizing biodiversity specimens and data to drive discovery, economic growth, public health, and national security. In 2019, the Biodiversity Collections Network called for an Extended Specimen Network, outlining a national agenda to unlock new uses of digitized collections data. The report emphasizes that advances in data and analysis have transformed specimens from isolated objects into interconnected, evolving resources—the "extended specimen," encompassing both physical materials and expanding digital data. This endeavor requires robust investments in our nation's scientific collections.

A 2020 report by the National Academies, *"*Biological Collections: Ensuring Critical Research and Education for the 21st Century," argued that collections are a critical part of our nation's science and innovation infrastructure and a fundamental resource for understanding the natural world. The report's recommendations for establishing an action center for biological collections and requiring specimen management plans for research proposals generating new specimens underscore the importance of biodiversity specimen collections and have been supported by the CHIPS and Science Act of 2022. A subsequent white paper published in 2024, "Envisioning a Natural History Collections Action Center," summarized the features and functions of an action center and underscored the essential role that collections play in human health, food security, pathogen-borne disease, biosecurity, and a strong bioeconomy. Such a center will provide leadership, support, and coordination for federal, non-federal, and private collections and enable transformative research to address grand societal challenges.

All these reports articulate a common vision for the future of biological collections and emphasize the need to broaden and deepen these collections and associated data to realize their potential to inform 21st century science. Because NSF is the only agency that supports research in all fields of science, it is ideally suited to lead a national effort to establish the action center and build the Extended Specimen Network, which will require the engagement of computer and information scientists, geoscientists, life and environmental scientists, and anthropologists.

Collections are a critical resource for advancing the knowledge needed to address current global challenges such as climate change, biodiversity loss, and pandemics. The COVID-19 crisis has illustrated how inextricably linked humans are to nature. Biological collections, their extended data, and the experts who build and study them are globally important for understanding where viruses exist and when they cross from their current hosts to humans. The United Nations Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services has warned that about one million species of plants and animals worldwide face extinction within the next few decades. This would not only be an unprecedented loss of global biodiversity but also a loss of valuable genetic diversity that has implications for human health and well-being. Robust investments must be made to support efforts to grow and digitize natural history collections and conduct critical collections-based science that can help prevent this loss.

NSF plays a unique role in protecting, enhancing, and expanding access to the nation's scientific collections. The agency supports both research that relies on existing collections and field-based studies that generate new natural history specimens. Through its Directorates for Biological Sciences, Geosciences, and Social, Behavioral and Economic Sciences, NSF also supports student training and workforce development opportunities tied to natural history collections. In addition, NSF invests in scientific collections as critical research infrastructure, alongside living stock collections and field stations. These investments extend beyond the research enterprise, as efforts to enhance these resources benefit US-based companies that manufacture the world's best and most innovative scientific and museum equipment, creating skilled jobs and supporting local economies nationwide.

NSF has played a leading role in supporting specimen digitization for more than 15 years, making irreplaceable biological specimens and their associated data accessible online to researchers, educators, and the public. Through relatively modest federal investments, more than

150 million specimens have been digitized, with millions more awaiting digitization. Many specimen records now include high-quality images that enable detailed scientific analysis. These projects bring together biologists, computer scientists, and engineers to develop innovative imaging, robotics, and data management technologies that not only accelerate digitization, but also generate tools and services with broader commercial and scientific applications. Scientific collections also provide valuable resources for teaching core concepts in science, supporting the training of undergraduates, graduate students, postdoctoral researchers, and early-career professionals in cutting-edge scientific and technical skills.

A powerful example is the multi-institutional openVertebrate (oVert) project, which generates high-resolution 3D anatomical data for museum specimens of amphibians, reptiles, fishes, mammals, and birds across the nation. Through its NSF-supported partner MorphoSource, an open-access online repository, these data have been downloaded more than 100,000 times and viewed over 1 million times by researchers, veterinarians, exhibit designers, K12 teachers, and artists, fueling more than 200 scientific publications and innumerable educational and other projects. Additionally, more than 2,000 undergraduate students have engaged with oVert data and visualizations in fields ranging from zoology and veterinary science to art and design.

In addition to supporting research, NSF's programs enhance the ability of museums, botanic gardens, zoos, and other research institutions to provide science learning opportunities and outreach programs for students of all ages. NSF's support for research in education and learning sciences strengthens our understanding of learning in formal and informal contexts, providing a critical foundation for the development of America's scientific workforce.

Conclusion

Investments in NSF have long served the national interest. Scientific collections supported by NSF contribute to improved public well-being and national economic security. These collections—irreplaceable records of our nation's natural heritage—contain specimens collected decades or even centuries ago. Today, they are essential for developing and validating models that track the global spread of species, including viruses, parasites, and pathogens, and help us understand their potential to impact human health now and in the future. NSF is the primary funding agency that provides support to institutions that preserve at-risk scientific collections, ensuring their continued accessibility for research and innovation.

Despite this essential role, NSF received an 8% budget cut in FY 2024 and a 3.4% cut in FY 2026—a trajectory that contradicts the bipartisan vision of the CHIPS and Science Act. That landmark legislation recognized the importance of biological collections, called for a national collections action center, and authorized NSF funding to grow to $18.9 billion in FY 2027. Yet, current funding remains well below this target. Furthermore, the President's FY 2027 budget proposes a 55% cut to NSF, a move that would severely undermine our nation's ability to lead in science, technology, and innovation.

Please reject the President's proposed cut and instead provide at least $9.9 billion for NSF in FY 2027—bringing the agency back to its FY 2023 funding level and reaffirming America's commitment to scientific excellence. Thank you for your thoughtful consideration of this request.