



NATURAL SCIENCE COLLECTIONS ALLIANCE

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To National Science and Technology Council:

The Natural Science Collections Alliance (NSC Alliance) commends the National Science and Technology Council (NSTC) for its development of a strong Framework for a Federal Strategic Plan for Soil Science. Increased federal coordination and collaboration with the research community is required if we are to fully understand and effectively manage our nation's soils, and particularly the biological diversity of our soils. We do offer several comments below that address questions 1 and 6 in the NSTC's Request for Information.

The NSC Alliance is a national organization 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 member institutions are part of an international community of museums, botanical gardens, herbariums, universities and other institutions that house natural science collections and use them in research, exhibitions, academic and informal science education, and outreach activities.

Whether it is providing the basis for the development of a new antibiotic or facilitating nutrient uptake in our food crops, the organisms inhabiting our soil are critically important to humanity. Yet, we do not adequately understand the biological diversity in our soils, or how these organisms interact in positive and negative ways with other parts of our environment. There is a real and pressing need for new national investments in biodiversity surveys of our soils. This work should build on, and not replace, existing research programs, many of which are developing the tools that will be needed to achieve the goals of the Strategic Plan for Soil Science.

We must properly identify the organisms in our soils, and place them appropriately in the Tree of Life. This will allow us to ask key questions and understand the evolution of biological and ecological pathways and processes that are important to society. Our nation's natural history museums, botanic gardens, and living stock collections can make significant contributions to these endeavors. Indeed, just this month a group of leading collection institutions and researchers interested in the research potential of collections met in Washington, DC, as part of a

workshop organized by the Biodiversity Collections Network – a National Science Foundation funded Research Coordination Network project. A significant focus of this meeting was articulating a national strategic vision for how the samples and specimens held in natural science collections can be used in conjunction with other data and samples to drive research that will contribute solutions to problems facing agriculture, public health, and environmental stewardship.

Importantly, there are few soil collections. This has limited our ability to understand the soil biome and how it is being altered in response to changing environmental conditions. It has also hindered our ability to understand how soil biodiversity interacts with other biological diversity. These collections have been limited, in part, because of a lack of federal support to conduct these surveys and curate these collections. New investments are required.

Natural science collection institutions have centuries of experience with curating biological diversity for the benefit of science and education. Moreover, our institutions are now engaged in international campaigns to mobilize images of biological specimens and their associated data for research, education and informed decision making. In addition to unlocking vast amounts of historical data, we are working to link these data to genetic resources, environmental data, isotopic data, among many other types, in efforts to ask and answer questions from basic evolution to how organisms influence or are influenced by their environment. Bringing these data together is vitally important to efforts to develop models that can reliably forecast impacts of climate change on the living world, for example.

A frequent set of challenges facing modern science relate to the proliferation of databases, datasets, data standards, and strategic linking of large data sources. The natural history collections community has been at the forefront of resolving these kinds of issues. The lessons our community learned could prove valuable as agencies endeavor to find the most cost-effective and efficient ways to gather and mobilize data. The involvement of TDWG Biodiversity Information Standards and/or the Research Data Alliance may be valuable to efforts to develop data standards that will be used by the research community.

We encourage the NSTC to ensure that efforts to move soil biodiversity research forward, including the development of any new data tools or standards, be done in conjunction with agencies such as the National Science Foundation and the Smithsonian Institution. These federal agencies have established national leadership on these issues that could prove valuable to other federal agencies with emerging programs focused on soil biodiversity. Strategic new investments in existing programs could save time and resources.

Again, we commend the NSTC for its efforts to draw attention to the importance of soil biodiversity and the need for a coordinated national framework to advance research and the development of research tools. The natural science collections community stands ready and eager to join with your efforts.

Sincerely,

A handwritten signature in black ink, appearing to read "Joseph A. Cook".

Joseph A. Cook, PhD

President, Natural Science Collections Alliance

Director, Museum of Southwestern Biology, University of New Mexico