



Citizen Science in the National Park Service

NPS Citizen Science Steering Committee - October 2018

Citizen science is the involvement of the general public in scientific studies. It provides opportunities both to create new knowledge and to increase people's understanding of science. In the case of public lands, citizen science also provides opportunities for people to experience and enjoy protected areas, and their natural and cultural resources, in new ways. The National Park Service (NPS) values citizen science as an effective tool for carrying out its mission to "[preserve] unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations" and to "[cooperate] with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation...." Accordingly, the NPS both conducts citizen science in parks and encourages its partners to do likewise.

This document provides a rationale for citizen science in parks and programs based on its value to both resource stewardship and public enjoyment. It places NPS-related citizen science in the context of recent federal law and Executive Branch initiatives regarding citizen science. It offers a vision and set of objectives for citizen science across the National Park System, and lists some principles that can drive the pursuit of that vision. This document does not constitute policy guidance, however.

Context: Congressional and Executive Branch Actions

The Crowdsourcing and Citizen Science Act of 2017 (15 U.S. Code § 3724) authorizes federal agencies to invest in and use citizen science to advance agency missions and stimulate and facilitate broader public participation in science. The Act lists some of the benefits of citizen science. They include: "accelerating scientific research, increasing cost effectiveness to maximize the return on taxpayer dollars, addressing societal needs, providing hands-on learning in STEM [science, technology, engineering, and mathematics], and connecting members of the public directly to Federal science agency missions and to each other." The NPS does not require the authority of this Act in order to conduct or support citizen science; such authority already is provided by the NPS Organic Act and other laws. However, the Crowdsourcing and Citizen Science Act does affirm the value, importance, and mission-relevance of citizen science that NPS has been conducting for many years and will conduct in the future.

In 2015 the Office of Science and Technology Policy (OSTP) issued a memo encouraging all federal agencies in the Executive Branch to support citizen science aligned with their missions and directing agencies to coordinate citizen science activities. The agencies continue to coordinate and collaborate with each other, including in the maintenance of a public catalog of projects and associated toolkit, communication initiatives, and a biennial report to Congress. The NPS participates in this interagency community through a Service-wide citizen science coordinator, who is based in the Natural Resource Stewardship and Science directorate in Washington, D.C.

Federal Definition of Citizen Science as Applied to NPS

The Crowdsourcing and Citizen Science Act defines citizen science as: “A form of open collaboration in which individuals or organizations participate voluntarily in the scientific process in various ways.” According to the Act, those ways may include:

- Enabling the formulation of research questions
- Creating and refining project design
- Conducting scientific experiments
- Collecting and analyzing data
- Interpreting the results of data
- Developing technologies and applications
- Making discoveries
- Solving problems

For over a century, the NPS has successfully pursued its two-part mission of resource conservation and public enjoyment in a variety of ways. It has used and applied science for resource management and public enjoyment and has developed modes of public engagement that encompass the concept of citizen science defined in the Act. Furthermore, it has conducted citizen science for many years. The Act provides value to the NPS through its call for collaboration with other agencies, and its encouragement of investment and support for activities that the public increasingly finds interesting. Given the NPS's history with citizen science and related activities, there are some important considerations in how NPS may adopt and apply the definition used by Congress.

First, although Congress exclusively uses the term “citizen science” in the Act, professionals and the public sometimes employ related terms like community science, participatory action research, service learning, co-creation of knowledge, and public archeology. This white paper interprets Congress’s definition to include those terms. The essential concept behind all of these terms is the creation of empirical knowledge through voluntary participation of the public.

Second, the NPS invites the public to identify topics of importance to them and participate in the preservation and conservation of places they care about. Accordingly, the NPS is not the sole originator of questions, ideas, or hypotheses worthy of study. This inclusiveness reflects the fact that parks are public places and are part of larger landscapes and communities.

Third, the NPS recognizes a unique and valuable role for Native Americans and indigenous and traditionally associated people as partners whose contributions of traditional knowledge can inform about park resources and complement citizen science practice. Citizen science in the National Park System continues a scientific tradition of learning about our world together.

Fourth, citizen science projects in parks must have genuine scientific outcomes related to resources and/or public enjoyment. For example they may answer research questions or inform management decisions, actions, or policies. To that end, data must be collected, stored, managed, and made available for such outcomes through the consistent use of quality-assurance and quality-management tools.

Finally, citizen science does not include activities that lack voluntary contributions to genuine scientific and scholarly outcomes. Examples that are not citizen science include: activities for which participants are paid; projects in which specimens or data are not collected, processed, stored, or used for scientific investigation; communication projects or interpretive programs that convey general scientific information but do not address a particular question or management concern; and volunteer stewardship activities (e.g. trail cleanup or maintenance) that do not

yield new information. These activities help achieve the NPS mission, and they may evolve into citizen science, but they are not in and of themselves citizen science.

A Strategic Approach to Citizen Science in the NPS

As citizen science becomes increasingly popular among NPS staff, partners, and park communities, we recommend that its use in the National Park System be guided by a Service-wide strategy that includes a vision, objectives, and principles. The following section proposes such elements.

A Vision for Citizen Science in the NPS

Citizen science is widely used by the NPS and its partners as an important tool for pursuing the agency's mission and accomplishing its science, stewardship, and education goals.

Objectives for Citizen Science in the NPS

Citizen science in the NPS will:

- Provide appropriately rigorous science to inform resource-management decisions
- Promote a shared stewardship ethic and practices
- Enhance visitor enjoyment, education, and inspiration

Principles for Citizen Science in the NPS

Because citizen science is relevant to the mission of the NPS and because parks have much to offer the field of citizen science, there are many principles that could guide the use of citizen science in parks. Some of these are general and reflect the overall attributes of national parks. Others are specific to the objectives listed above. Keeping these principles in mind will help practitioners ensure that citizen science projects bring the intended value to the NPS and align with its mission.

General considerations

- As public spaces where science is conducted and applied, and where significant issues are discussed and explored with visitors, parks have unique opportunities and responsibilities for increasing public understanding of and engagement in science.
- People have strong emotional connections to national parks and other resources protected by the National Park System. These emotional connections enhance the ability of citizen science in the NPS to facilitate learning and a shared stewardship ethic.
- Scientific exploration is a core part of the history and culture of the United States. NPS helps to maintain this tradition by encouraging people to participate directly in science.
- NPS uses citizen science to aid with the protection of some of the nation's unique, nationally-significant, and most admired resources, especially those that inform the complexity of the American story.
- As the lead federal agency for historic preservation, the NPS develops citizen science methods for historic preservation and cultural resource management with applications across cultural resource disciplines.

- Citizen science in the National Park System enhances the coupling of preservation with enjoyment, learning, and inspiration and provides examples for other organizations and individuals who wish to do likewise.
- NPS follows best practices, law, and policy, including those related to volunteers, consent, privacy, intellectual property, data availability, data management, acknowledgement, service, consultation, and safety.
- NPS provides training to NPS staff and partners to support the development of citizen science projects that follow law, policy, and best practices.
- The NPS engages traditionally associated peoples through appropriate forms of consultation for citizen science undertakings. When possible, traditional knowledge held by Native Americans, Hawaiians, Alaskans, and other traditional cultures will inform and complement our practices and knowledge gained through citizen science.

Provide appropriately rigorous science to inform resource-management decisions

- Information gained through citizen science helps NPS achieve its mission to preserve unimpaired the natural and cultural resources and values of the National Park System.
- Citizen science builds NPS's capacity to understand and manage resources, especially those that are rarely studied by professionals, those that extend across spatial scales that exceed the capacity of professionals, and those that are changing faster than professionals alone can study.
- NPS facilitates and promotes the collaboration of the general public, professional scientists, and NPS staff to accomplish scientific study and learning. It uses practices appropriate for park-based research and scholarship and recognizes that different disciplines approach research and scholarship in different ways.
- NPS treats data and conclusions from citizen science in the same way it treats expert-led scientific studies: by applying rigorous standards of data quality, openness, and scientific integrity consistent with policy and the level of complexity of each given citizen science project.
- To ensure scientific value, all citizen science projects in parks are conducted under appropriate permits, including Scientific Research and Collecting Permits. They also meet requirements for minimally consumptive or non-invasive practices and collections, in accordance with NPS Management Policies.
- Because communication is a hallmark of good science, NPS communicates the results and processes of citizen science projects through its websites, databases, government publications, scientific journals, and presentations following appropriate levels of administrative and peer review.

Promote a shared stewardship ethic and practices

- NPS is a leader in resource stewardship, outdoor recreation, volunteerism, and informal education. Because our public audiences and partners look to us for guidance, enhancing NPS expertise in citizen science can enhance conservation and outdoor recreation throughout the country and the world.
- Citizen science can enhance the public's stewardship of natural and cultural resources, the environment of which they are a part, and their communities.
- Citizen science can enhance NPS partnerships. NPS is a role model for partners who wish to conduct citizen science as part of grant-funded projects or other activities coordinated through assistance programs.

- Because parks are public places, citizen science in parks can support civic engagement and democracy.
- Citizen science projects can act as “force multipliers” and can harness the energy of grassroots volunteer efforts to advance scientific study in the National Park System, potentially increasing the cost effectiveness and impact of science funded through taxpayer dollars or public-private partnerships.
- NPS coordinates citizen science efforts with other federal agencies through the Federal Community of Practice for Crowdsourcing and Citizen Science, and also partners with nonprofit, academic, and other government organizations.
- The NPS preserves many places of cultural significance to indigenous peoples and can offer opportunities for collaborative learning through engagement of the holders of traditional knowledge with practitioners of citizen science.

Enhance visitor enjoyment, education, and inspiration

- Information gained through citizen science helps NPS achieve its mission to provide for public enjoyment of and education about the parks and the resources they contain.
- The National Park System is the largest informal education institution in the country. People come to national parks in part to learn, and NPS is a trusted source of information. NPS uses citizen science as a way to enhance learning, to maintain and enhance trust in the NPS, to make science a part of everyone’s life, and to expand public engagement in STEM more broadly.
- Citizen science provides hands-on learning experiences in STEM fields related to natural and cultural resources. These experiences can be fun and inspiring, and are consistent with the types of experiences the public seeks in national parks.
- Citizen science frequently utilizes new technologies and innovative approaches to science and problem solving. Citizen science can enhance NPS access to technology and expertise essential for achieving the NPS mission.