

Draft NOAA Citizen Science Strategy

Applying the Power of the Crowd



**National Oceanic and
Atmospheric Administration**
U.S. Department of Commerce



NOAA welcomes your input on this draft strategy. Please send your comments via email to oar.rc.execsec@noaa.gov by September 2nd. For complete instructions and information, please visit <https://nrc.noaa.gov/NOAA-Science-Technology-Focus-Areas>.

NOAA Science & Technology Focus Areas:

Unmanned Systems ■ Artificial Intelligence ■ 'Omics ■ Cloud ■ Citizen Science ■ Data

July 2020

Introduction

This strategy provides a path for the National Oceanic and Atmospheric Administration (NOAA) to fully leverage the power of public participation in support of agency mission areas. Citizen science, crowdsourcing, and challenge competitions provide opportunities for the agency to engage the American public in addressing societal needs and accelerating science, technology, and innovation. The term “citizen science” is used within this strategy to encompass all three capabilities (citizen science, crowdsourcing, challenge competitions). New and emerging technologies, a growing field of practice and a better connected and more engaged public are rapidly enhancing the power and applicability of these tools. NOAA is well positioned to leverage and contribute to this growth.

This strategy aligns with the [Crowdsourcing and Citizen Science Act](#), that highlights the unique benefits of citizen science, such as “including accelerating scientific research, increasing cost effectiveness to maximize the return on taxpayer dollars, addressing societal needs, providing hands-on learning in STEM, and connecting members of the public directly to Federal science agency missions and to each other”. It also addresses recommendations from the NOAA Science Advisory Board’s [Potential for Citizen Science in Support of Data Needs for Ecosystem-Based Science](#) 2018 report. This strategy positions NOAA as a leader in effectively maximizing and leveraging these benefits and allows the agency to fully support the Administration’s commitment to “unleash Federal resources, strengthen partnerships inside and outside of government, and encourage citizens to tackle great scientific challenges,” as articulated by Dr. Kelvin Droegemeier, Director of the Office of Science & Technology Policy, on release of the [Implementation of Federal Prize and Citizen Science Authority: Fiscal Years 2017-18](#) report.

Lastly, the NOAA Citizen Science Strategy supports the goals to [Accelerate American Leadership](#) and [Support Economic Activity](#) of the DOC Strategic Plan for 2018-2022 by advancing Innovation and providing additional data streams. The Earth Prediction Innovation Center (EPIC) will serve as a model for how community-developed contributions can benefit operational applications.

Background

Citizen science has a rich history within NOAA. Volunteer observations have helped inform our Nation’s prediction and management of weather, oceans and coasts for over a century. This experience, paired with strengthened coordination, operational capabilities, workforce proficiency, and multisector partnerships will enable NOAA to lead citizen science efforts for years to come. Our agency will maximize and contribute to new pathways for evolving how the public engages with scientific research and monitoring.

NOAA established a citizen science community of practice in 2013 and stood up an executive committee in 2020 to help inform this strategy. Our agency was also a founding member of the [Federal Crowdsourcing and Citizen Science Community of Practice](#) which now involves over 400 participants from 60 agencies. The majority of NOAA’s projects in this area are performed through partnerships. Collaboration is inherent in this type of work and the increased capacity within our agency will inform and benefit private and public institutions throughout the Nation.

Vision for NOAA Citizen Science

NOAA engages the public in supporting the agency's mission and addressing societal needs through science, technology, and innovation.

Purpose

The goals and supporting objectives in this strategy are intended to directly improve the understanding, coordination, awareness, and application of citizen science across NOAA. They are designed to ensure that NOAA-affiliated citizen science projects represent the high standards of our agency's scientific products and services. By improving coordination of citizen science, routinely integrating citizen science into agency operations, building an infrastructure to ensure appropriate data quality, strengthening partnerships, and increasing proficiency for appropriately using citizen science, NOAA will be able to more fully harness innovation and public participation in research.

What is Citizen Science?

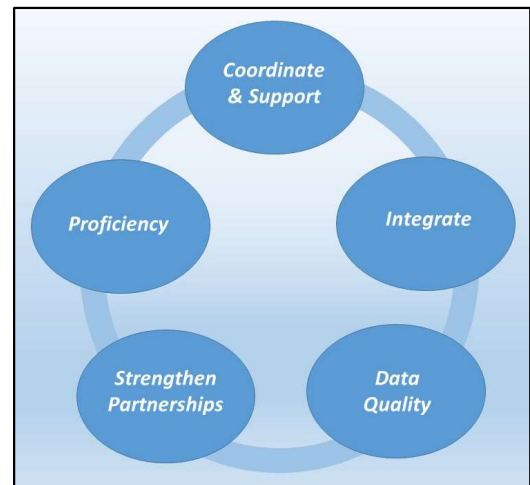
Citizen Science is defined by the Crowdsourcing and Citizen Science Act (5 U.S. Code § 3724) as a form of open collaboration in which individuals or organizations participate voluntarily in the scientific process in various ways, including: (A)enabling the formulation of research questions; (B)creating and refining project design; (C)conducting scientific experiments; (D)collecting and analyzing data; (E)interpreting the results of data; (F)developing technologies and applications; (G)making discoveries; and (H)solving problems.

This work can go by other names (e.g., Community Science, Volunteer Monitoring, and Public Participation).

For the purposes of this strategy, citizen science also includes crowdsourcing: a “method to obtain needed services, ideas, or content by soliciting voluntary contributions from a group of individuals or organizations, especially from an online community” as well as prizes and challenges. Challenges may also be referred to as "prize competitions," and allow the public to solve problems presented by federal agencies and receive awards for the best solutions (source Challenge.gov).

NOAA's Strategic Goals for Citizen Science

The strategy incorporates five goals that collectively drive change and position NOAA to fully leverage the power of public participation in support of agency mission areas.



Goal 1: Coordinate and Support Citizen Science Efforts across NOAA

In order to optimize use of public participation and innovation to help NOAA meet its mission, it is important to apply best practices, assess impacts, and have access to the latest tools and techniques. NOAA's community of practice, with its subject matter experts, provides the foundation for contemporary information exchange and keeps the agency on the frontlines of innovation. Engaging with public and private partners on the latest techniques and information will also help NOAA apply best practices and better position NOAA as a leader in this field.

Objectives:

- a. Strengthen and expand an agency community of practice
- b. Increase awareness of citizen science as a viable and increasingly capable tool to engage the public in helping NOAA meet its mission
- c. Develop flexible and diverse metrics and processes to track projects and impacts
- d. Establish a formal program and designate a Program Manager to support existing and new projects and facilitate opportunities for collaboration
- e. Prioritize citizen science in NOAA budget submissions

Goal 2: Expand Integration of Citizen Science into Agency Operations

NOAA will promote appropriate use of citizen science across the agency to address and advance mission areas and help fill data gaps. A necessary first step is increasing staff awareness of citizen science as a viable and valid tool to meet science and education needs and to highlight its unique ability to provide additional benefits like building relationships with stakeholders. Having this additional tool in the toolbox will aid the NOAA workforce in best addressing complex questions they face.

Objectives:

- a. Promote those citizen science activities that can address unfilled research and operational gaps

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- b. Ensure diversity, equity, and inclusion are considered in project design and implementation to maximize the benefits of citizen science
- c. Prioritize areas of citizen science that align with NOAA's S&T Focus Areas
- d. Require new Cooperative Institute (CI) prospectuses include citizen science, and encourage current CIs to expand their inclusion of citizen science derived data and applications

Goal 3: Promote Citizen Science Data Quality and Accessibility at NOAA

Citizen science projects vary in their core objectives. Some may focus on educating students while others primarily seek to collect data for science and management purposes. Regardless of core objective, any citizen science project which involves NOAA and its resulting data should strive to represent NOAA's high standards and uphold our agency's reputation as an objective, trusted source of information. Towards this end, projects should be designed with scientific quality and data credibility as core considerations. Data collected for legal, regulatory, and/or policy actions may have specific requirements in order to be used. Citizen science data must meet these requirements in order to be considered for such actions and will require more extensive quality assurance and documentation than data collected for increasing public understanding. Ultimately, the goal is to put agency processes and resources in place to ensure that NOAA and NOAA-affiliated citizen science projects apply appropriate data fitness for use.

Objectives:

- a. Ensure projects are designed with scientific quality and data credibility as core considerations
- b. Provide strategies and templates to aid NOAA projects in applying and documenting best practices for data quality
- c. Encourage NOAA projects to maximize accessibility of their data and provide transparency in the presentation of the methods by which data are collected
- d. Ensure appropriate data fitness for use, particularly when citizen science data is considered for use for regulatory purposes
- e. Ensure NOAA sponsored or applied citizen science data adhere to the principles and support the goals of NOAA's Data Strategy

Goal 4: Strengthen Partnerships to Advance Citizen Science

Collaborative work forms the basis for every citizen science project and is likewise essential to effectively advance innovation work on an agency-level. Partnerships with all sectors, public and private, will allow NOAA to stay current in this rapidly evolving field and maintain the ability to leverage and contribute to efforts of organizations working toward similar goals.

Objectives:

- a. Strengthen and expand intergovernmental partnerships through the Federal Community of Practice for Crowdsourcing and Citizen Science and the Federal Community of Prizes and Challenges
- b. Review existing NOAA non-governmental partnerships and modify the corresponding agreements for those which are most amenable to add citizen science components
- c. Develop new partnerships to expand use of innovative citizen science in mutually-beneficial projects with the following entities: private sector; philanthropic organizations; institutions of higher education; community-based organizations, formal and informal education institutions; state and local government agencies; and Indian tribal governments
- d. Engage the various environmental community listservs, distributions, and professional societies to promote NOAA Citizen Science application and the formation of new partnerships
- e. Include discussion of citizen science in NOAA executive level engagement and communications with key stakeholders with emphasis on the NSTC Select Committee on STEM Education

Goal 5: Increase Proficiency for Appropriately Using Citizen Science within NOAA

Success of this strategy relies on a diverse, collaborative, and well-trained NOAA staff knowing if, when, and how to use citizen science. This includes understanding how to approach liability and privacy issues related to public participation. We will provide targeted training to staff interested in citizen science to evaluate if this is an appropriate approach, and if so, how to design and apply projects according to best practices. This will be achieved through focused, current, and accessible training opportunities that convey well-established principles and best practices from the field. NOAA's existing development programs are well suited to include such trainings. In addition, collaboration with partners such as the National Park Service, National Conservation Training Center, U.S. Forest Service, and Citizen Science Association with experience in conducting similar trainings may provide options to develop skills, understanding, and expertise.

Objectives:

- a. Provide trainings, information, and tools to guide appropriate application of citizen science
- b. Leverage and contribute to a growing body of research and best practices
- c. Provide formal training materials and modules through internal and external venues
- d. Conduct outreach and education on NOAA's Citizen Science Program to new supervisors, interns, scholars, fellows, NRAP details, and Mentoring and LCDP Program cohorts across NOAA

Conclusion

This strategy will guide the application of citizen science across NOAA using best practices while ensuring data quality and integrity. It will increase the use of innovation and public participation to help accomplish NOAA's mission. It will also set the course to involve the public when appropriate in developing innovative solutions to scientific problems. As a next step, NOAA is developing a Citizen Science Implementation Plan that will define detailed action items, deadlines, metrics and responsibilities as resources permit. Together with our advances in NOAA's other science and technology focus areas— Artificial Intelligence, Cloud Computing, Data, 'Omics, and Unmanned Systems—NOAA's citizen science activities will help the U.S. continue to lead in developing innovative, cost-effective and collaborative solutions to global environmental and technology issues.

References

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Acknowledgements

The NOAA Citizen Science Strategy is led by Timothy Gallaudet, Ph.D., Rear Admiral, U.S. Navy (Ret.), Assistant Secretary of Commerce for Oceans and Atmosphere / Deputy NOAA Administrator. John McLaughlin from the NOAA Office of Education and Laura Oremland from NOAA Fisheries Office of Science and Technology are coordinating the overall process in collaboration with the NOAA Citizen Science Executive Committee, which is chaired by Rear Admiral Gallaudet with Louisa Koch from the NOAA Office of Education as Vice-Chair and whose members are listed below:

National Environmental Satellite, Data, and Information Service: Jennifer Jencks

National Marine Fisheries Service: Cisco Werner

National Ocean Service: John Armor

National Weather Service: Stephan Smith

Office of Oceanic and Atmospheric Research: Jonathan Pennock, Kevin Wood

Office of Marine and Aviation Operations: John McDonough

Middle photo on report cover, titled "Person Holding Black Smartphone", was taken by photographer Kenneth Caprina.