The State of NOAA Citizen Science

NOAA Citizen Science Co-Coordinators:

JOHN MCLAUGHLIN OFFICE OF EDUCATION

LAURA OREMLAND NOAA FISHERIES OFFICE OF SCIENCE AND TECHNOLOGY

Presentation for Ocean Exploration Advisory Board April 8, 2020



Provide an update on NOAA citizen science and discuss the agency's response to recommendations from the NOAA Science Advisory Board report on citizen science



3

- Definition
- Citizen Science at NOAA and beyond
- NOAA SAB recommendations and NOAA's responses
- Current actions
- Discussion

Definition: Citizen Science

A form of open collaboration in which individuals or organizations participate voluntarily in the scientific process, including:

- **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; and
- Solving problems.

Source: Crowdsourcing and Citizen Science Act of 2017 (15 USC 3724)

Significant Reports and Actions

- 2019: OSTP report to Congress
 launched at Innovation Summit
- 2018:
 - NOAA SAB Report
 - NAS Report
 - Sea Grant CS Vision Report
- 2017: Crowdsourcing and Citizen Science Act signed into law (15 USC 3724)
- 2017: Federal CoP finalist for Harvard Ash Innovation award
- 2016: CitizenScience.gov site



OSTP Leadership and Citizen Science

"By encouraging everyday Americans to engage in scientific research, our citizen science authorities benefit communities and the country as a whole, as well as advance our science and technology enterprise. This report highlights the Trump Administration's commitment to unleash Federal resources, strengthen partnerships inside and outside of government, and encourage citizens to tackle great scientific challenges."



Dr. Kelvin Droegemeier, Director, OSTP

Cooperative Observer Program (COOP)

- Since 1890
- NRC: "this little known, low-cost network is a vital element of the nation's infrastructure"
- USDA risk management models get 80% of their data from COOP

Richard G. Hendrickson, NY farmer, logged > 150,000 daily observations over 85 years





> **117 million** points of depth data, used by hydrographers, cartographers to improve nautical chart products and knowledge of seafloor.



A Growing Practice

10

David Hanych, an NSF Program Officer who managed the majority of their citizen science portfolio, described the growth in this field as a "coming tsunami"



Results for a search of the Web of Science for the keyword "citizen science" *McKinley et al (2015) Issues in Ecology 19.*



Plot courtesy of UC Davis Center of Community Science and Citizen Science

Multiple, Complementary Impacts

Citizen Science can:

- Enhance scientific research and monitoring
- Provide hands-on learning and increase STEM literacy
- Help address societal needs
- 2018 report from National Academies of Science suggest the impacts can complement each other



The National Academies of SCIENCES • ENGINEERING • MEDICINE

CONSENSUS STUDY REPORT

LEARNING THROUGH CITIZEN SCIENCE

Enhancing Opportunities by Design

Citizen Science Communities 12 **Citizen Science Association** Federal Community of Practice for **Crowdsourcing and Citizen Science** 🕉 citizenscience.gov **NOAA Citizen Science Community of Practice** (>210 members) Sanctuaries

Data Fitness for Use

"Each citizen science dataset should be judged individually, according to project design and application, rather than assumed to be substandard simply because volunteers generated it."

Source: Kosmala et al. 2016. Assessing data quality in citizen science. Frontiers in Ecology and the Environment (<u>https://doi.org/10.1002/fee.1436</u>)



19 strategies to ensure appropriate data credibility *EPA, 2019*

Rec. 1: Citizen Science is likely an underutilized tool for environmental data collection and monitoring in coastal systems, and well-designed programs have potential to contribute cost-effective information that can be used in scientific investigation.

NOAA Response:

- Data call to identify research projects, programs where citizen science may be integrated
- NOAA directive on R&D revised to bolster inclusion of citizen science
- NOAA "All-Hands" email

Rec. 2: Further **review of existing programs that already have valuable data for ecosystem monitoring is warranted**, and additional support, standardization of data storage and sharing, and enhancement of data collection protocols or trainings in those programs may improve their utility.

NOAA Response:

- Host NOAA citizen science workshop that will address: 1) Best practices; 2) Data management; and 3) Citizen science resources
- Facilitate and ongoing exchange of best practices between NOAA programs

Rec. 3: Citizen science doesn't just happen – it **requires intention**, consideration of community and participant needs, interests and abilities, and **careful planning to ensure data quality and control**. For programs to contribute meaningful data for NOAA ecosystem science and management, they need to be built over time and receive ongoing support for multientity collaborations.

NOAA Response:

- Stand up an Advisory Committee with representation from across the agency
- Adopt or adapt EPA Handbook for Citizen Science Quality Assurance and Documentation

Rec. 4: Commitment of resources and expertise from NOAA Regional and Science Centers can improve the quality and integration of data generated by citizen science and contribute to participatory research that enhances public awareness of science and its value to coastal communities.

NOAA Response:

• Data call to identify funding opportunities that either currently do, or potentially could, call out citizen science as a tool for proposed projects to consider using.

Recent Updates

18

- NOAA Citizen Science Strategy in progress
- Executive Committee formed
- 1st NOAA Citizen Science Workshop 4/22 4/24
- 2021 OSTP Citizen Science report development



Students make observations in the intertidal zone through through the LiMPETS network. *Photo: Jessie Altstatt/NOAA*



NOAA Contributions to OSTP CCS Report

Summary: 11 programs and projects across NOAA **Contributions:**

- **#Participants** (8/11): ~ 50K
- #Submissions (4/11): ~670K (e.g., hydrographic data points, # images classified)
- **# Volunteer hours** (6/11): ~300K
- # Staff Required: < 9 full time staff needed to support 9 programs in FY17 and FY18
- **Scope:** 3/11 apply worldwide