CITIZEN SCIENCE INFORMING MARINE PROTECTED AREA MANAGEMENT

MARINE PROTECTED AREAS FEDERAL ADVISORY COMMITTEE RECOMMENDATIONS
SEPTEMBER 2017

EXECUTIVE SUMMARY

Involving members of coastal communities in studying, monitoring and understanding their marine protected areas (MPAs) is an effective, efficient, and powerful way to inform the long-term stewardship and adaptive management of these valued ocean places. In 2017, the Departments of Commerce and Interior charged the Marine Protected Areas Federal Advisory Committee (MPA FAC) to identify ways to enhance Citizen Science programs in US MPAs.

DOC and DOI Charge on Citizen Science

Citizen science engages volunteers in collecting data and information, and often serves the dual purposes of both informing MPA management and fostering knowledge and stewardship. During the process, volunteers across a wide range of ages and backgrounds, some with little to no prior scientific training, gain scientific knowledge and first-hand experience making observations and investigations of MPAs. Apps and other new technologies are making field observations more accessible to citizens, managers, and scientists. The FAC would evaluate citizen science as a means to increase stewardship and knowledge of MPA resources, and evaluate the opportunities and limitations in collecting and analyzing data, interpreting results, making new discoveries, and solving complex problems.

The MPA FAC's initial response to that charge follows:

Summary of MPA Federal Advisory Committee Recommendations

The MPA FAC urges the Departments of Interior and Commerce to continue their respective agency's commitment to citizen science volunteer programs and expand their implementation to assist in the monitoring, assessment, restoration, and general management of MPAs throughout the United States and its territories.[1] In particular, programs involving veterans, underserved communities, and at-risk youth should be emphasized. MPA FAC also recommends that further study be conducted by the Committee to evaluate citizen science as a means to increase understanding and stewardship of America's MPAs. [2,3]

BENEFITS OF CITIZEN SCIENCE PROGRAMS

Citizen science is on the rise and often presents a true win-win situation for participants and ocean agencies alike.[4] Aided by the internet, the popularity and scope of citizen science appears almost limitless. For citizens, the motivation is to experience and contribute to "real" science, exploration, public information, and/or conservation. For scientists, citizen science offers affordable means of collecting, managing and disseminating information, expanding the geographic range of a study, and increasing an appreciation by targeted interest groups (e.g., local communities and stakeholders) for the value of their research. For example, the i-Naturalist program, administered by the California Academy of Sciences[5], is an excellent model of adapting mobile apps to enable citizens to make, upload, share, and learn from natural history observations using web-based technology. The program is now successfully being implemented internationally.

Though not exhaustive, the following is a list of benefits along with examples (via end-noted citations) of how marine resource management can be improved through a strong commitment to creative citizen science programming. Specifically, citizen science in MPAs can:

1. Help reduce management labor costs by supplementing the work of paid staff.[6]
2. Improve the efficacy of an MPA's public outreach efforts by achieving a better return-on-investment.[7]
3. Educate the public about relevant issues regarding aspects of natural and social science affecting marine ecosystems, as well as improving understanding of scientific methods and the role science plays in understanding natural and human impacts.[8]
4. Train citizens to collect data of a quality that is sufficiently high to allow its use for informing MPA performance and adaptive management strategies.[9]
5. Strengthen the familiarity with, and commitment to, the goals and needs of MPAs in a more effective manner than traditional interpretive programs.[10]
6. Enhance the relevance of science conducted in the MPA by involving volunteers with broader perspectives and skills in all phases of the scientific endeavor from it design, analysis, dissemination and management application.
7. Provide a novel and engaging supplement to K-12 education curricula by enabling science classes to "come alive;" and by motivating students to think about data critically and analytically, and not to just recite facts. [11]

CREATE CAPACITY AND SUPPORT FOR CITIZEN SCIENCE IN MPAs

The MPA FAC strongly supports citizen science in MPAs as a tool to engage coastal communities in the stewardship of their oceans. To realize the full potential and benefits of citizen science, MPA programs must create and sustain the capacity to: guide and support the programs; ensure that they produce scientifically valid data; share those findings with interested stakeholders; and, incorporate those results into the MPA's decision-making wherever appropriate. To that end, the MPA FAC recommends that Federal MPA agencies and their state, territorial, tribal, and local partners take immediate steps to advance these key components of effective citizen science:

Support It – actively promote, support, and sustain citizen science programs within MPA programs and sites, encouraging innovative approaches to address a set of common objectives, topics, and methods.

Do It – conduct and expand citizen science programs in MPAs, with a particular emphasis on activities that can inform the monitoring, evaluation, and adaptive management of MPAs.

Apply It – actively incorporate data from rigorous citizen science programs into the routine and adaptive management MPAs. This may require specific measures to ensure that current and new citizen science programs consistently and reliably produce objective, defensible, and useable data, and that the site's decision-making processes effectively incorporate that information in its long-term management.

Innovate – encourage development and adoption of new technologies and apps, including crowdsourcing, that facilitate novel ways to collect, share, and analyze data from the MPA.

Diversify – identify, reach out to, and engage diverse, non-traditional communities in citizen science programs and activities, both in collecting data and in exploring their meaning about MPAs and the surrounding environment.

CONCLUSIONS

Citizen science accelerates the pace of discovery and understanding of MPAs by engaging volunteers to increase the rate and volume of information gathering and analysis. By inviting communities nationwide to become personally involved in the objective assessment and stewardship of these vital ocean places, citizen science programs maximize the return on our national investment in our MPAs while simultaneously enhancing the public's appreciation and enthusiasm for science and its critical role in informing management and policy. [12]

APPENDIX 1. LIST OF SUBCOMMITTEE MEMBERS AND STAFF

MPA FAC Members

Alex F. Brylske, PhD, Chair
Florida Keys Community College
Summerland, FL

Katy Croff Bell, PhD
MIT Media Lab and National Geographic Society
Saunderstown, RI

Martha Honey, PhD
Center for Responsible Travel
Washington, DC

Peter Stauffer
Surfrider Foundation
San Clemente, CA

Trisha Kehaulani Watson, PhD, JD
Honua Consulting
Honolulu, HI

Federal Agency Participants

Josh Keaton
NOAA, MPA Center Liaison (DOC)
Anchorage, AK

Cliff McCreedy
National Park Service (DOI)
Washington, DC

Charles M. Wahle, PhD
NOAA, MPA Center (DOC)
Monterey, CA

APPENDIX 2. ENDNOTES

1. Citizen Science and Crowdsourcing. NOAA Office of Education. http://www.noaa.gov/office-education/citizen-science-crowdsourcing. Accessed 13 September 2017.

2. Force Blue Team. https://forceblueteam.org/. Accessed 13 September 2017.

3. Diving with a Purpose. http://www.divingwithapurpose.org/ Accessed 13 September 2017.

4. Citizen Science Organization. http://www.citizenscience.org. Accessed 13 September 2017.

5. California Academy of Sciences Acquires iNaturalist. California Academy of Sciences. www.calacademy.org/press/releases/california-academy-of-sciences-acquires-inaturalist Accessed 13 September 2017.

6. Combat Wounded Heroes Help Rebuild a Florida Keys Reef. Eco Magazine. www.ecomagazine.com/currents/combat-wounded-heroes-help-rebuild-a-florida-keys-reef Accessed 13 September 2017.

7. What is Crowdsourcing? And how does it apply to outreach? IDEA. www.idea.org/blog/2013/02/19/what-is-crowdsourcing-and-how-does-it-apply-to-outreach/ Accessed 13 September 2017.

8. Reef Check. www.reefcheck.org. Accessed 13 September 2017.

9. Freiwald, J., Wisniewski, C. and Abbott, D. (2016), Northward range extension of the crowned sea urchin (*Centrostephanus coronatus*) to Monterey Bay, California. California Fish and Game 102(2):37-40.

10. How the Federal Government Engages the Public via Crowdsourcing. General Services Administration. www.digitalgov.gov/2016/08/23/what-is-citizen-science-a-recent-webinar-explores-how-the-federal-government-engages-the-public-via-crowdsourcing/ Accessed 13 September 2017.

11. K-12 Education. Citizen Science Organization. www.citizenscience.gov/tag/k-12-education/ Accessed 13 September 2017.

12. Citizen Science: Working Side by Side. National Park Service. www.nps.gov/subjects/citizenscience/index.htm. Accessed 13 September 2017.