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Hooking the public on science

Dickinson, Janis L., and Rick Bonney, editors. 2012. **Citizen science: public participation in environmental research**. Comstock Publishing, Ithaca, New York. xiv + 279 p. \$49.95, ISBN: 978-0-8014-4911-6 (alk. paper).

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I vividly recall, as a teenager, the thrill of a breeding bird survey led by ornithologist Chan Robbins in Coopers Cover, West Virginia, during the summer of 1970. As geeky sixteen-year olds, a group of us thrilled to the discovery of goldfinch and red-eyed vireo nests with their exquisite architecture, in contrast to the rough twig contraption of a mourning dove. And later in the same year, our butts literally froze perched on the open windowsill of an old Rambler station wagon, binoculars held by mittens resting on the icy rooftop, as keen teenagers participating in a Christmas bird count through the same snow-clad hills of West Virginia. We did not want to miss one hoot of a barred owl along the roadside for our checklist. Although the term “citizen science” was not widely used forty-odd years ago, such devoted amateur activities may have unknowingly inspired our careers as scientists. Of my childhood birding team, almost all of them pursued careers in field biology. And the protocols developed for these activities by the birding community have since burgeoned into a major force for the collection of large-scale data sets aiding scientific research.

Dickinson and Bonney’s volume, *Citizen science*, represents an important foundation text to launch the burgeoning arena of citizen science. Although the chapters focus predominantly on bird case studies, ornithology is arguably a predominant hotbed of citizen science (but with other scientific fields creatively beginning to harness the enthusiasm of devoted amateurs). The book editors define citizen science as “public participation in organized research efforts,” which represents an ideal platform for a diverse array of projects to engage the public in both data collection and an understanding of how science works. This volume takes stock of the historical chronology of some of the diverse birding programs and also serves as a “how-to” volume explaining the tools and protocols developed to harness public participation in data collection. In a technical sense, the book

acknowledges that citizen science has expanded due to the merging of ecology and information technology.

The book defines the technical definitions of public participation in scientific research (PPSR, as defined by the Center for Advancement of Informal Science Education, otherwise known as CAISE): (1) Contributory (where citizen scientists collect data); (2) Collaborative (where citizen scientists get involved in analyzing data); and (3) Co-created (where citizen scientists help design the project at the outset). Dickinson and Bonney restrict their chapters to “contributory” case studies, which range from simple snapshot data collection, to adjusting protocols depending on a volunteer’s ability, to answering questions carefully structured by the researchers leading the project. The book is nicely organized into three sections: practice of citizen science, impacts on conservation research, and educational/social/behavioral aspects of citizen science. These are all important “must-reads” for any scientist aspiring to include citizen science in his/her research program.

Section I discusses project development (Chapter 1 by Bonney and Dickinson), specific case studies in Chapter 2 (great review of 22 years of Cornell’s Project Feederwatch by Bonter), creation of adequate cyber-infrastructure to insure successful outcomes (Chapter 3 by Kelling), insights about sustainability of projects, including the creation of “hooks” to cultivate long-term volunteers (Chapter 4 by Chu et al.), and the all-important Chapter 5 on evaluation (Phillips et al.). A sample matrix for program development and evaluation is provided and comprises an elegant visual summary of the process. Inclusion of Project BudBurst and Monarch Larva Monitoring Project offers researchers outside of the ornithological field a better sense of how to create programs for different aspects of field biology.

Section II provides an important review of the impacts of citizen science on conservation research. The Breeding Bird Survey alone boasts over 500 publications, testimony to the prudent use of thousands of citizen efforts to survey birds throughout the breeding season over many decades. This section moves from bird lists to landscape ecology to citizen science and links changes in bird populations to land-use changes over time. Although the book is biased toward bird case studies of citizen science, eBird and other Cornell programs undoubtedly offer some of the most long-term and robust citizen-science data sets in existence. Of growing

importance is the requirement for adequate hardware and new statistical tools to analyze both large and long-term data sets for maximum outcomes to any citizen science program (Chapter 8). This section finishes with a “so what?” discussion based on some conservation outcomes in Chapters 9 and 10, including partnership with the Nature Conservancy and the history of some British Trust for Ornithology projects that span 1.5 million person-hours of field observations since the early 1900s.

And finally, Section III provides the justification for all the efforts involved—how citizen science can inspire the next generation of scientists, including applications for K–12 teachers and providing a useful integration of virtual and real nature by getting kids outdoors.

Important questions overlooked in this volume, that remain to be addressed in a subsequent volume include: (1) how can citizen science more effectively engage underserved communities (in the case of eBird, for example, how can researchers facilitate participation by youth who do not own binoculars or bird-feeders?); (2) how can researchers better control for accuracy of their volunteers?; (3) how can citizen scientists be evaluated to effectively drive outcomes of their efforts?; and (4) perhaps most significantly, how can the success of citizen science programs in developed countries like American and England be expanded to include those 6.5 plus billion people who do not currently participate? In other words, is there a creative way to expand citizen science globally, which in turn could raise environmental awareness of limited resources, especially biodiversity? During the last decade, citizen science programs in astronomy, insects, human health, urban centers, and energy have also burgeoned. There is a critical need for a second volume to illustrate and explain some of the newer citizen science programs that go beyond ornithology. For

example, the wildlife-in-your-homes project at the Nature Research Center in North Carolina (www.yourwildlife.org) is not only collecting insect biodiversity data but also changing public perception about the value of arthropods that dwell inside their residences. One of the most creative and fast-growing citizen science projects, geared for K–12 school classrooms, is arguably the School-of-Ants program that originated in the laboratory of Rob Dunn at North Carolina State University (www.schoolofants.org) that not only educates children about the importance of ants but also is creating a national data base on ant distribution. And who can pass up a session with citizen science astronomy (www.galaxyzoo.org) that is almost addictive in garnering citizens to search for new objects in space! All of these newer programs build on the history of eBird and other successful bird projects described in this book, but deserve a subsequent volume reviewing the emerging diversity of citizen science programs. Citizen science is a growing force in data collection, and has the potential to simultaneously raise the level of science literacy among participants. This book provides the “recipes” for all scientists to undertake an aspect of citizen science as part of their research portfolio. My overall reaction is “Awesome!”

MEG LOWMAN

*North Carolina State University
NC Museum of Natural Sciences
Raleigh, North Carolina 27603 USA*

E-mail: www.canopymeg.com
