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Birding, Citizen Science, and Wildlife Conservation in Sociological Perspective

Elizabeth Cherry

Department of Sociology & Anthropology, Manhattanville College,
Purchase, NY

Elizabeth.Cherry@mville.edu

Abstract

Sociological research on wildlife typically looks at how nonhuman animals in the wild are hunted, poached, or captured for entertainment, or how they play a symbolic role in people's lives. Within sociology, little research exists on how people appreciate nonhuman animals in the wild, and how people contribute to wildlife conservation. I explore birding-related citizen science projects in the US. Citizen science refers to scientific projects carried out by amateurs. Literature on citizen science focuses on the perspective of professional scientists, with the assumption that only professional scientists are concerned with the quality of data from citizen science projects. The research showed birders share this skepticism, but they still find satisfaction in participating in citizen science projects. This paper contributes to sociological understandings of wildlife conservation by showing how birders' participation in citizen science projects helps professional scientists study environmental problems such as climate change and its effects on wildlife.

Keywords

wildlife – citizen science – environment – conservation – scientific credibility

Introduction

Birding originated as “amateur ornithology,” and its links to professional science have endured. In the 19th century, there was little differentiation between amateur ornithologists and professional scientists. In the late 20th century, the

neologism “citizen science” came to define science conducted by amateurs. Now, lines are more clearly drawn between amateurs and professionals, while at the same time, the number of citizen science projects in which birders can participate has proliferated. Birding has implications for wildlife and environmental conservation. Birders see, through birds, what many other people refuse to see or acknowledge in our environment. Birds are an indicator species, meaning they indicate environmental distress through their migration, nesting, and mating patterns, and their extinction or endangerment attests to these environmental issues. Thus, birders note how climate change keeps pushing birds’ ranges farther north, and they provide evidence of these changes through their citizen science data.

I explore the history of citizen science in birding and the close relationships between amateur and professional ornithologists in the United States. I show the evolution of the social construction of ornithology from a practice anyone could engage in to something reserved for professionally trained ornithologists. How do professional scientists view citizen science? As this paper argues, much of the literature on citizen science focuses on skepticism of citizen science only from the perspective of professional scientists, with the underlying assumption that only professional scientists are concerned with the quality of data from citizen science projects. However, professional scientists’ perceptions about data quality often do not come from their own experiences using citizen science data, and studies investigating data from citizen science projects show the data to be valid and reliable.

How do birders, or “amateur ornithologists,” view their participation in citizen science projects? I found that birders without a background in the natural sciences are skeptical of the utility of their citizen science work, but birders with a scientific background better understand how professional scientists used their data. All birders find satisfaction in participating in citizen science projects, because of the symbolic and real benefits of contributing to conservation efforts for birds. The lack of clarity on citizen scientists’ own contributions has real implications for the nonhuman animals under study. Therefore, it is important for professional scientists to clarify to citizen scientists how they use their data.

Wildlife and Wildlife Conservation in Sociology

Most sociological research on wildlife studies the exploitation of wildlife in hunting, poaching, and keeping wild nonhuman animals in captivity for entertainment. In their research on photographs of hunters and dead nonhuman

animals in hunting magazines, Kalof and Fitzgerald (2003) found that hunters objectified and marginalized animal bodies and did not display respect or admiration for the animals or for nature. Perhaps these hunters were “tourist hunters,” who are more likely to engage in trophy hunting than local, or “resident” hunters, who typically hunt for food (Eliason, 2008). In his research on keeping wild animals in zoos, Bayma (2012) found that zoos argued for the necessity of captive breeding in order to give a social legitimacy to their practices and their identity. Zoos were attempting to move from providing entertainment to serving education and conservation goals. Zoos engage in “nature making,” or impression management, to create “naturalistic” zoo exhibits that are appropriate for the animals but that also fulfill the expectations of human visitors (Grazian, 2012).

Sociological studies also show how people socially construct nature through their views on wildlife. The sociozoologic scale (Arluke & Sanders, 1996) shows whether and how people socially construct which animals are “good” or “bad.” Good animals “willingly accept their subordinate place in society” (p. 169), whereas bad animals threaten the social order through their unwillingness to remain silent or distant. Colomy and Granfield (2010) demonstrated this valuation in their study of the poaching of a well-known bull elk named Samson in Estes Park, Colorado. Both residents and tourists knew Samson, and his death at the hands of poachers created such a shock that the state of Colorado passed Samson’s Law against trophy poaching. In creating this law, Colorado helped to define the symbolic boundaries between trophy- and normal-sized animals, between poachers and legitimate hunters, and between bad and good animals (i.e., predators and non-predators). When tourists on Tanzanian safaris purchased lion-tooth necklaces as souvenirs, they socially constructed nature and wild animals to be racialized others (Hays, 2015). These souvenirs evoked the mythos of the Maasai lion hunt and colonial tourists bringing home trophies after a kill.

Sociologists also study the relationships between humans and wildlife in urban and suburban spaces. City dwellers view pigeons as pests and as a nuisance, calling them “rats with wings” (Jerolmack, 2008). In suburbia, in the aftermath of construction workers bulldozing a cattle egret nesting colony while building a road for a new subdivision, local residents reacted to the birds in different ways (Čapek, 2006). Some saw the birds as pollution, whereas others socially constructed the birds as innocent, wild, and beautiful. Still others changed their view of the birds from negative to positive through their participation in the effort to rescue the surviving cattle egrets. This social construction of animals as in need of our assistance is part of what Moore and Kosut (2013) found in their research on urban beekeepers. Rather than

leaving bees alone, with the risk of dying from colony collapse disorder, urban beekeepers encouraged an “ethical entanglement” with bees, calling for increased attention to the plight of bees, and called for more city dwellers to start their own hives.

These sociological studies of the exploitation and social construction of wildlife highlight some strengths of a sociological approach to studying wildlife and wildlife conservation: sociologists use a wide variety of research methods, and sociologists’ research findings can be applied to wildlife conservation, or at least helping wildlife. We need more research on wildlife and wildlife conservation, with policy implications. Moore’s (2017) research on horseshoe crabs illuminates these approaches, as she studies how global warming affects horseshoe crabs, and how professional scientists and citizen scientists work to save the horseshoe crab from extinction. I attempt to use my research on birding to contribute to these areas as well. Birders directly contribute to wildlife conservation by providing data to conservation biologists through citizen science projects.

Throughout this paper, I use the terms “wildlife” and “wild animals” to describe birds as nonhuman animals who freely roam through and beyond humans’ built civilizations. I view wildness as “outside or exceeding the boundaries of human culture(s)” (Armbruster, 2010, p. 766) but avoid conflating wild places and wild animals, as is common in discussions of wilderness (e.g., Cronon, 1996). As wild animals, birds have agency and physical mobility, which is why birds are so important to citizen science. I (Cherry, 2016) discuss wildness in more detail elsewhere, but for this paper, the most important element is my underlying assumption that nature and wildness are socially constructed, as Enright (2010), succinctly explains: “Scientists study animals’ behavior, not their wildness; if their behavior is seen as wild, that is cultural, not biological” (pp. 122-123).

Methods and Case Study

The data for this paper come from 30 in-depth interviews with birders, whose demographics align with national surveys of U.S. birders (U.S. Fish & Wildlife Service, 2013). Interviewees’ ages ranged from 18 to 79, with most in their 50s and 60s. I did not inquire about race, but all but one of my interviewees presented as white. I likewise did not inquire about gender identity, but 22 presented as women and eight as men. The group was highly educated, with 10 holding Masters degrees and five with Doctorates. Half of my interviewees held a degree in the natural sciences, and six worked in or retired from a natural science field.

My research also includes over two years of fieldwork with three different birding organizations in the New York City area. In April 2015, I began attending free, public birding walks with three different birding organizations. These walks all feature a guide affiliated with a local branch of the Audubon Society, and they all take place in local parks. As a full participant, I joined each of the local chapters of the Audubon Society and attended their wildlife programs, meetings, potlucks, and weekly birdwatching walks held in local parks. I also attended several regional and national meetings, conventions, and competitions, including the national Audubon Convention, the annual Audubon New York Convention, and the World Series of Birding. I used MaxQDA to analyze my fieldnotes and interview transcripts. Using grounded theory (Charmaz, 2006; Strauss & Corbin, 1998), I coded my data for emergent themes.

A Brief History of Citizen Science and Birding

“Science” used to be socially constructed as a practice anyone could do, especially ornithological science. When birding first began as a hobby in the late 19th century, the lines between amateur and professional ornithologists were unclear. Birding emerged as a serious pastime in the end of the 19th century because of four main factors: increasing threats to birds, the emergence of ornithology as a science, the newfound appreciation for leisure time and hobbies, and writing about and drawing birds as part of natural history writing and scientific illustration (Schaffner, 2011). Because of these factors, birding became a legitimate leisure pursuit. It combined an interest in the outdoors with an interest in science, and it was now acceptable to enjoy pastimes not directly related to work. The social construction of leisure time had begun (at least for predominantly affluent white men).

During this time, birding was seen as a form of amateur science and became linked with ornithology. In birding, bird watchers keep a list of the species of birds that they see. This is no different than a census taken by professional scientists, save for the profession of the person conducting the census. I use the term “citizen science” to describe science projects conducted by amateurs, although the term was coined in the 1990s. The fields of astronomy and ornithology produced the first citizen science projects. In 1749, amateur ornithologists began collecting data on bird migration in Finland (Greenwood, 2007), and in 1874, the British Transit of Venus project employed amateur astronomers across the globe to measure the Earth’s distance to the Sun (Ratcliff, 2008). The modern iteration of citizen science began in 1900, with the Christmas Bird Count.

One of the most popular citizen science projects for birders is the annual Christmas Bird Count (CBC), sponsored by the National Audubon Society. Frank Chapman, an amateur ornithologist, originally proposed this annual bird count in his journal *Bird-Lore* as an alternative to traditional Christmas day hunts (Barrow, 1998). Traditionally, “sportsmen’s journals” encouraged hunters to kill the largest number of birds possible on Christmas day, with the results published in the journals. Chapman proposed in *Bird-Lore* that birders count the number of birds of different species that they could find in a single day, hoping to capitalize upon this same competitive spirit. He said, “it was to the hunters’ instinct and spirit of competition to which we appealed and, if we are not mistaken, it is these elemental traits, rather than interest in the science of ornithology, that still animates the census-taker” (Dunlap, 2011, p. 83). Now in its 117th consecutive year, the CBC is the nation’s longest-running citizen science project.

Rise of Citizen Science and Professional Ornithology

In the late 19th and early 20th centuries, ornithology came to be socially constructed as a practice only for professional scientists. Three main factors helped to distinguish professionals from amateurs, according to Lewis (2012). First, post-Darwinian classification schemas helped professional scientists study relationships between groups of birds and to identify subspecies of birds. Second, the idea of scientists having the authority to give order to the natural world, and scientists being accountable to a particular institution, exacerbated these divisions. Finally, biologists, and especially ornithologists, began to change their language. Professional scientists began, post-Darwin, to use technical terms, and these specialized vocabularies helped separate professionals from amateurs.

Around the same time, professional organizations such as the American Ornithologists’ Union (AOU) began to emerge. Since only a few of the AOU’s members made a living as ornithologists, they accepted many “amateur” members (Barrow, 1998). The professional ornithologists in the AOU realized that they relied heavily upon the amateur members for their specimens and other data, so they were welcomed into the union.

The rise of graduate degrees in ornithology also created more professional ornithologists and more opportunities for amateurs to participate in citizen science. The Cornell Lab of Ornithology started as a graduate program in ornithology at Cornell University, and became a self-supporting research institution after World War II (Dunlap, 2011, p. 198). In 1962, it began its own

magazine, *Living Bird*, and in the 1980s, it started its own citizen science projects.

The Cornell Lab sponsors several citizen science projects, including Project FeederWatch, Yard Map, NestWatch, and the Great Backyard Bird Count. Its House Finch Disease Survey was the first citizen science project designed to track the spread of infectious diseases in a wildlife population (House Finch Disease Survey, 2017). In a joint project between the Cornell Lab and the National Audubon Society, they launched eBird in 2002 as a way of using the internet to gather more data. eBird is a website and smart-phone app where birders upload their species lists from specific bird walks. In this way, everyday walks that birders take contribute to citizen science projects. Now, the Cornell Lab hosts over 600 citizen science projects related to a variety of environmental conservation projects (Dickinson et al., 2010).

While this paper centers on the history and present day of birding and citizen science in the United States, it is important to note that citizen science projects have equally proliferated throughout the world since the early 20th century. British birders participate yearly in the Big Garden Birdwatch, birders throughout Europe contribute to the European Bird Census, birders in eight countries created the Southern African Bird Atlas Project, and the decade-long China Coastal Waterbird Census counts waterbirds in China. Citizen science projects help conserve a variety of wildlife.

Pollinators such as birds, bees, bats, and butterflies constitute a significant portion of citizen science projects on wildlife. Bat Detective collects data on bat sightings throughout the entire world, and a transnational partnership among citizen scientists in Canada, the United States, and Mexico monitors Monarch Butterflies through the Monarch Larva Monitoring Project. Bumble Bee Watch connects with partners throughout North America and the United Kingdom, and while amateur beekeepers do not necessarily share their data with professional entomologists, they use the work of entomologists to inform their hobby: “scientific beekeepers” seek to conserve bees through empirical observation, intervention, and technology (Moore & Kosut, 2013, pp. 57-58).

Skepticism from Professional Scientists

I described how the social construction of ornithological science changed from something anyone could do in the 19th century, to something exclusive to trained, professional scientists in the 20th century. Now, birding contributes more to citizen science than any other hobby or sector of society, and has done

so for years. Despite this long history of birders contributing to citizen science, contemporary scientists are skeptical of the use of citizen science data—from birding or elsewhere—in their projects. I explore this skepticism through the literature on professional scientists.

Sometimes professional scientists ignore lay knowledge because of arrogance, as when scientists ignored Cumbrian sheep farmers' knowledge of their own lands when studying the effects of Chernobyl on the soil (Wynne, 1992). Other times, lay experts successfully embed themselves into scientific groups. For example, in his study of lay expertise in AIDS research, Epstein (1995) called this phenomenon “scientific credibility,” or “the capacity of claims makers to enroll supporters behind their claims, to legitimate their arguments as authoritative knowledge, and to present themselves as the sort of people who can give voice to science” (p. 411). But citizen science projects differ from these examples in that they are commissioned by professional scientists, with an explicit goal of crowdsourcing information from non-professional scientists. Citizen science projects related to birding typically have both “conservation” and “investigation” goals (Wiggins & Crowston, 2011), with an eye towards promoting stewardship and wildlife conservation. Even when professional scientists commission citizen science projects, scientists worry about the reliability, validity, or quality of the data collected by amateurs.

The CBC and eBird are two of the largest and most extensive citizen science projects that “crowdsource” data for professional scientists through large numbers of amateur participants (Law et al., 2017). While the number of crowdsourcing tools for data collection by citizen science proliferates, researchers hesitate to use these sources. Riesch and Potter (2014) interviewed professional scientists about their experiences with citizen science. They found that professional scientists worried about data quality, and their negative perceptions about such citizen science were driven in part by the need to persuade scientific peers, including peer reviewers, about the effectiveness of such data. Similarly, Law et al. (2017) interviewed scholars from a variety of fields and found that their concerns about crowdsourcing data stemmed from a concern about the quality of the data, and the need for further verification of any data that came from crowdsourcing or citizen science. Perceptions about data quality did not come from actual experiences with citizen science—the Law et al. (2017) study only asked about whether and how researchers might *potentially* use crowdsourced data.

Among scientists who already used citizen science data, Shirk (2014) found that scientists had to negotiate the perceptions of their research among their peers—they had to prove to their peers that they were doing “real science” and

not just public service projects. Shirk's (2014) findings demonstrate Aronson's (1984) argument that the primary claims-making activity of science occurs between scientists. Scientists must primarily prove themselves to other scientists, which requires passing peer-review, getting published, and then being cited by other scientists. Ironically, popularizing science is such a low-status activity that only high-status scientists can afford to engage in the practice (Aronson, 1984).

Burgess et al. (2016) found that biodiversity scientists held a bias towards data collected by professional scientists, and they were concerned about inconsistency in the quality of the data from citizen science projects. But at the same time, they found that scientists who worked with birds were more likely to use citizen science data than other researchers, because birds are "particularly well known subjects of citizen science" (Burgess et al., 2016, p. 6). Researchers who had never used citizen science data were most likely to be skeptical of data collected by citizen scientists.

Scientists working on the IUCN (International Union for the Conservation of Nature) Red List of threatened species use data from citizen science projects such as eBird, BirdTrack, and xeno-canto to map species distributions. But when it comes to defining extinction risk, they say, "it is also fundamental to respect the rigorous system for assessing extinction risk for the Red List" (Hilton-Taylor, 2017). Census projects do not fulfill the same criteria the IUCN requires to accurately assess the area of suitable habitat or the extent of occurrence, they argue, and thus the IUCN needs to maintain consistency in its measurements. Other IUCN researchers argue that Participatory Monitoring and Management Partnerships (PMMP) might be a better approach than citizen science, since they allow for more community-based knowledge creation and conservation management of local lands (Kennett, 2015).

Most citizen science projects employ a variety of techniques to ensure reliability and validity (Wiggins et al., 2011). Mulder et al. (2010) studied two specific case studies of citizen science projects involving the reporting of tagged animals, and they found that reporting error was minimized by careful tag design and clear instructions to participants. Moreover, in assessing the quality of the data from these two citizen science projects, they found that the data collected from such reports were voluminous, unique, and generally reliable. This combination of skepticism and a lack of experience using citizen science data demonstrates how professions preserve professional autonomy by drawing boundaries towards outsiders (Freidson, 1988; Abbott, 1988). It shows that scientists may be more concerned with maintaining divisions between professionals and amateurs than they are with scientific rigor.

To be clear, professional scientists extensively use data provided by citizen scientists. Data from the CBC has been used to inform the National Audubon Society's *Common Birds in Decline Report* and their *Climate Change Report*, by showing how birds' populations and ranges have changed throughout this time. The Environmental Protection Agency, the North American Bird Conservation Initiative, and the U.S. Fish & Wildlife Service have all also used Audubon's CBC data in their reports on climate change and other bird-related reports. Scientists at the Cornell Lab of Ornithology feature citations for hundreds of peer-reviewed publications that use data gathered by citizen scientists on the websites for the CBC and other citizen science projects (e.g., eBird, 2017; Christmas Bird Count, 2017).

Skepticism from Birders

In the aforementioned studies, only professional scientists were interviewed, and studies on amateurs' participation in citizen science projects only explore how to encourage people to participate or the ethics of participation. They do not ask participants what they think about the data they themselves collect. These studies explore "scientific credibility" (Epstein, 1995) from the point of view of professional scientists, but not from the point of view of those providing data for these citizen science projects.

Most of the birders I interviewed participated in citizen science projects, and many of them said they were skeptical of the utility of the data from citizen science projects because they—the birders—were not "real" scientists. This skepticism is somewhat surprising, since birders have developed a culture of honesty in accurately reporting their species lists. This culture of honesty is demonstrated on birding walks, when leaders double check their species lists as they go. For example, on one walk, the leader said that she had counted 60 Yellow-Rumped Warblers thus far on our trip. She then asked the group, "Is that a suspicious number?" As Miranda (MS in Biological Systems Engineering, director of a local Audubon chapter) said:

You always have to worry about your data when you're doing research. But at the same rate, I tend to think that birders are honest people. They're kind of a self-regulating group. Like if someone calls a bird that it clearly isn't, someone is always like, "Wait, why do you think it's that?" So it's, things like eBird, where if you have an unusual bird, they'll come back to you for more information. So I think that there's a lot of checks built into the community itself, but also how the data is collected to prevent

things like that. And like I said, I think the community itself is very self-policing. Like the World Series of Birding. There are no judges that go out with each team. I don't think that the teams are lying about what they're seeing.

Ottinger (2009) argued that boundaries between scientists and non-scientists came from the use of scientific instruments, but here I found that the boundary came from birders without a natural science background contrasting themselves with “experts,” including professional scientists. In an interview with Helen, who held a bachelor's degree in business and did not work in a natural science field, she said that she has banded birds as well as helped with bird surveys: “I assist with bird surveys, I assist the biologists, I scribe for them. I also do bird surveys for them.” Helen asked me if I knew what a bird survey was, and she explained, “It's like when you're going in an inlet and recording which species you see and how many of each species. That's what a bird survey is.” I asked if that was like what people do when they report their species lists on eBird, and Helen said, “Perhaps. But eBird is just, eBird is not science—eBird is not, I don't think eBird is used by biologists. But in a way it's similar, because you're recording numbers and species.” I asked her about the bird surveys she conducts, and whether she does them for biologists. She said:

Yeah, for the coastal biologists. Maintain postings, coordinate volunteers. I do a nest census, which is where you actually go into a nesting colony and you count every nest, if you have any questions about that. You actually go with two other biologists—I'm not a biologist, I'm a HR-sociology-business blend—but you actually carry it like a dowel rod, and you're making a scrape in the sand, and the person next to you is making a scrape in the sand, and is counting the nests between her scrape and my scrape, and at the end we tally, you count every nest. And just for your information, at the south end of [our] beach, this nesting season, we have 232 Least Tern nests, and 175 Black Skimmer Nests. And we've counted them. And 4 Oystercatchers, 12 Common Terns. Those are big numbers. It's really a successful nesting colony.

Helen socially constructed science as data collected under the supervision of, and used by, professional scientists. She also noted that she was not a biologist, but she quickly and easily described exactly how to do a nest census, as well as exactly how many nests they had on the beach. Helen was skeptical of eBird data but not of the nest census carried out under the supervision of

professional biologists. Helen's valuing of scientific authority, and devaluing her own expertise, mirrors scientists' own professional boundaries (Freidson, 1988; Abbott, 1988).

Other birders without a natural science background deferred to scientists' expertise, even if they did not fully share Helen's skepticism. Dawn (PhD candidate in environmental studies, director of education for a local Audubon chapter) noted that the monitoring at her local Audubon's Important Bird Areas was conducted by biologists, rather than amateurs: "monitoring, through citizen science, we do a lot. We also have biologists that do a lot of bird monitoring at our important bird areas and things like that as well." Tom (high school degree, some college, retired carpenter) saw data collection and analysis as two separate jobs:

I'm not too big on science, or, I'm out in the field, and I'm more than happy to share my observations with the, whatever people that collect data. There's certain people that go out and get the data, and there's people that analyze data. And I'm not part of that group that analyzes it. I just see it for myself. And I'm more than happy to report to these people what I see. But I don't want their job.

The birders I interviewed who had a natural science background compared citizen science projects such as the CBC to "real" science surveys, which are conducted under the supervision of professional scientists and which adhere to more stringent scientific protocols. Despite these differences, though, Joy (MS in Horticultural Science, retired board member) still argued that the CBC data have been useful for understanding bird ranges:

A lot of people want to think that, or want to say, well, the Christmas Bird Count doesn't mean anything, because there's no control, there's no true scientific database, but if you go to the same area, year after year after year, even if it's a different person, but you're in the same area, you can certainly see trend lines of where birds are moving. And a good example of that is cardinals, because I think cardinals have moved further north than they've ever been, and that's been picked up on Christmas Bird Counts, just from people going out and observing them. While it wouldn't pass the test of, you know, maybe a drug study, it certainly passed the test of observation and recognition of what you're seeing.

Joy was playing a bit of the devil's advocate and likely knows from participating in multiple CBCs that the CBC has stringent participation protocols

that they outline on their site, thus ensuring reliability and validity (Wiggins et al., 2011). She also trusted that the CBC provides real results for understanding birds' ranges. Trish (PhD in Microbiology, retired microbiology professor) contrasted the data collection by citizen science with data collected by professional scientists:

Well, considering the fact that scientists do use citizen science data, and I think they realize that it's not the same as professionals going out and doing in-depth surveys, but birding by the general population has provided a lot of data that scientists are now being able to use for looking at trends, what birds are in trouble, what birds are not in trouble, where birds are moving, that sort of thing. So that's all good scientific data.

Andy (BS in natural resources management, program manager) also believes in the utility of citizen science data: "I tell people, they really do look at that information when you send it in, and they really do analyze it, and it really does set conservation goals and things like that." While Trish acknowledged that citizen science data is different than "in-depth surveys" conducted by professional scientists, she and other birders with a background in natural science noted that scientists use citizen science data.

The skepticism from birders does not come from lay people doubting the veracity of science, as Collins (2014) posits, nor does it come from lay people not understanding science, as Wynne (1992) critiques. Here, the divide rests upon birders without a natural science background holding immense respect for scientists as "experts," which has implications for the role of professional scientists.

Birders Value Citizen Science

The most common citizen science projects conducted by these birders included the CBC, Project FeederWatch, and the Great Backyard Bird Count, organized by the National Audubon Society and the Cornell Lab of Ornithology. Some birders said they participated in up to five different CBCs in any one year. Several birders participated in other projects, such as local bird counts for local organizations. These birders valued these projects, and they saw their participation in them as valuable, useful, and helpful. Even those who expressed some skepticism about the data collected through citizen science projects valued such projects.

The CBC and Project Feeder Watch mimic the species lists that birders keep on any other walk—how many birds, of which species, they saw, on a specific

day, and in a specific location. Some citizen science projects in which these birders participated differed from a regular bird walk, though. For example, Joy (MS in Horticultural Science, retired board member) participated in a project monitoring banded birds:

I just this spring started participating in a project through the Smithsonian. It's a project to look at, the birds were banded in my backyard, and over the next three to four years, look at what you're seeing, if you're seeing them come back, so that they can determine how long some birds return or stay in the same location.

Joy signed up for a multi-year citizen science project to monitor banded birds in her yard, showing that she values citizen science to such a great extent that she is willing to donate years of her time to this one project. These citizen science projects mirror the lists birders keep on their regular walks, but they also mirror the practice of natural history (Dunlap, 2011), the precursor to biological and earth sciences. Listing birds by species was the original way that natural historians explored and catalogued the world in the 18th and early 19th centuries (Dunlap, 2011). Now, amateur birders are practicing the same thing as professional naturalists of the past had done.

These birders echoed Boxall and McFarlane's (1993) findings that while data collection is the primary objective of the CBC, personal satisfaction was also important to participants. While some birders harbored some skepticism about the reliability or validity of the data collected from citizen science projects, all of the birders I interviewed still found personal satisfaction in participating in citizen science projects, and they still found them important for helping birds. As Vivian (MS in management, research operations manager in trademark research) noted:

I like the challenge of the citizen science stuff, but I also, I feel good about sort of contributing. I feel like birding gives me so much, it's a way to give a little bit back, and hopefully make a little bit of a difference. It's unfortunate that a lot of times your news is kind of sad. Things are in decline, or land is less available, all this stuff about climate change. It's not all good news, so that's a little tough. But you've got to figure, even if it ends up being bad news, that information is important to hopefully try to reverse some of that later.

Ultimately, these birders understood that their contributions were valuable to professional scientists, and to the birds. But the underlying skepticism of many birders has implications for professional scientists, as I explain.

Conclusion

Birding as “amateur ornithology” has many links to professional science and ornithology. As ornithology began to professionalize, it maintained links to the amateurs that provided much of their data. In the 20th and 21st centuries, ornithology and wildlife conservation science thus moved from being socially constructed as open to anyone, to being constructed as the domain of professionalized and credentialed experts.

The literature explores citizen science only from the perspective of professional scientists, who worry about the validity and reliability of data collected by non-scientists. My research shows that birders without a natural science background also share this skepticism of data collected by non-scientists. Birders wanted citizen science data to be useful for scientists, which meant it must be valid and reliable. But studies show that the data collected by citizen scientists are valid and reliable. This disconnect between lay and expert understandings of the uses of citizen science data has implications for wildlife conservation. For citizen science to be more useful—and believed to be more useful—for wildlife conservation, professional scientists who use citizen science data need to be more vocal about the utility, validity, and reliability of such data. This will help assuage the fears of both professional scientists and the citizen scientists gathering and using such data.

Sociology has a strong tradition of conducting applied research with policy implications. Citizen science projects that seek to understand the patterns of wildlife breeding, habitat, populations, and disease, have similar goals. In this paper, I add to the sociological literature on wildlife conservation by studying the conservationists, both amateur and professional, attempting to help wildlife. Similarly, while human-animal studies has a strong tradition of understanding how nonhuman animals help humans through practices such as Applied Animal Therapy, I would similarly argue that human-animal studies scholars focus more of their attention on the methods and the people who seek to help wildlife.

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