

# The birder and the robot: Power and knowledge-making in ornithology

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Abstract submitted:

Using a theoretical framework of actor-network theory and animal geography, this paper investigates the relationship between official ornithological knowledge making and amateur birdwatchers. Acting as a kind of lay scientist, there has been a long history of amateur birders adding to the official body of bird knowledge through “citizen science” projects. Without any formal training, and with only an interest in birds, anyone has the opportunity to participate in these knowledge making enterprises. Thus, these citizen-science projects act to order, integrate and legitimize this knowledge into the dominant ornithological field. Through the diffused location of the actors involved in this knowledge-making, birders generate data that would normally be unavailable to the dominant practices of ornithology.

While this work has yielded important longitudinal information about the health and ecosystem status of bird populations, a tension exists within these practices. Movement is now occurring within ornithology where technological advances are threatening to replace the amateur. For example, robots are now being used remotely to attempt to record rare birds in flight and mobile phones are deployed to play bird calls and record responses. If ornithology has remained one scientific discipline where power has been flattened through the importance of amateur observation and reporting, what does the movement away from including amateur knowledge mean for the discipline, for the amateurs now involved and the structure of power between the two?

The ivory-billed woodpecker (IBW) (*Campephilus principalis*) was, or is (depending on your belief in their recent “re-discovery”) a large, omnivorous (but mostly insectivorous) and striking woodpecker whose pre-European contact range would have included most old growth bottomland forest found in the South-eastern United States<sup>1</sup>. These birds, their feathers, skins and bills found at First Nations’ sites well outside their range (Jackson, 2006), have had significance for humans long before

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<sup>1</sup> Their original range could be broadly described as being from the Carolinas in the North to the Mississippi River in the West to the coasts of the Gulf of Mexico and Atlantic Ocean in the East and South (Jackson, 2006).

they were discovered by Europeans<sup>2</sup>. Due to habitat loss and collection, the IBW disappeared from these south-eastern US old growth bottomland forest in the early 20<sup>th</sup> century, with the last confirmed record occurring in 1944 (Fitzpatrick et al., 2005). Based on a video recording taken in 2004 by M. David Luneau, Jr., members of the Cornell Laboratory of Ornithology (the pre-eminent ornithology lab in North America and arguably the world) and the amateur birders that located the IBW in 2004, published an article in *Science* reporting the re-discovery of the IBW (Fitzpatrick et al., 2005). Since the publication of the 2005 Fitzpatrick article, researchers have been searching in earnest for further evidence of the existence of the IBW in the Big Woods region of Arkansas with little reported luck.

### **Amateurs in ornithology**

We're discussing lay science and the environment today and I've started by telling a story about a seemingly professionalized knowledge making endeavor in ornithology. Why? Because in this story, as in other stories of knowledge-making in ornithology, the amateur is not located at the periphery. Rather, I would argue, that the amateur birder has taken an important role in the "discovery" of official knowledge about birds: amateurs regularly make significant contributions (Curry, 2007). In this paper, I plan to outline why and how the amateur has played such a role in ornithology, while knowledge-making endeavors in other scientific disciplines have become more and more esoteric. I will also make the argument that this engagement of birders and the more-than-human world has been beneficial to both the amateur and the professional, but for distinctly different reasons. Finally, I will describe two case studies where birders are seemingly being replaced and the implications of how this change might impact how we come to know the more-than-human world (Abram, 1996) and our relationships to it.

The emergence of birding in the United States of America in the late 19<sup>th</sup> century is said to be part of the larger "Romantic backlash against an increasingly urbanized, industrialized society to irrevocably alter the American landscape" (Barrow, 1998, p. 156). It could easily be said that the act of watching birds is still driven by this

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<sup>2</sup> And consequently, Western science.  
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declensionist narrative. Stories about threatened species and threatened landscapes permeate birding discourse and acts. This is why, in part, rare or unusual birds hold more *caché* for most birders: birds are disappearing, so you had better see them before they go. To suggest that birding is *just* about collecting disappearing birds is limiting. Rather the term birding is a smooth word that covers a ragged variety of practices. Today, birding is one of the fastest growing outdoor activities (Cordell & Herbert, 2002) with up to nearly one third of North American adults considering themselves birdwatchers (Scott, 2004). The consequence of the popularity of the activity is that there are birders spread over North America. Amateur ornithologists, birders, bird watchers or whatever you might want to call them, as a group, have had a significant impact on the kind and quality of data that ornithologists have been able to collect about these organisms collectively known as birds. These projects are visible all over the place: most, such as state or provincial breeding bird atlases (see Petersen & Meservey, 2003, for example), the Christmas Bird Count ("History & Objectives," 2007) and Project Feederwatch ("What is Project FeederWatch?," 2002) are examples of citizen science at work. With an interest in birds and the right kind of observation technology, a motivated person has the opportunity to participate in these knowledge making enterprises and these citizen-science projects have been recognized in the ornithological literature as the source of "good" scientific information (Lepage & Francis, 2002; Lepczyk, 2005) about birds and bird populations.

Historically, in the move to disciplinarity during the professionalization of the sciences, the world was seemingly split into more and more discrete chunks of knowledge (Daniels, 1967). With this splitting of the world, the knowledge and techniques behind truth-making enterprises becomes more and more esoteric. As a consequence, the non-professional has less to say (officially) about the world. In this sense, the power to make truth claims is reified in the hands of those with the expertise to use the techniques and access the knowledge. For some scientific disciplines, the movement of research from outside to inside institutional structures created a distinct barrier between the professional and the amateur. For others, including ornithology, the practice of knowledge making in the discipline has been more diffuse with amateurs continuing to supplement the work of professionals (Lankford, 1981). What appears to

separate the amateur from the professional is the location of the subject or phenomena under study: the amateur can be excluded when data collection takes place in a laboratory; when discoveries are made in the field, the amateur has had and continues to play an important role. While the dichotomy seems to be created and maintained by the physical barrier of a laboratory, the key here is the visibility of what is accepted as empirical evidence: if the amateur can find and observe the object or objects with the assistance of readily-available technology, then there is a place, though regulated, for amateurs in the process of knowledge making.

Within ornithology, this is especially true for one distinct area: the tracking, over time and space, populations of wild birds. Studying living organisms provides a challenge for those doing scientific research on bird populations and conservation: wild birds do not begin by existing within the walls of a laboratory. They need to be observed, recorded, collected—their bodily presence becoming an inscription—and then end up in the hands of ornithologists. Thus, these citizen-science projects act to order, integrate and legitimize this knowledge into the dominant ornithological field.

In describing how different kinds of knowledge enter into official accounts, recognition by the dominant worldview may not be the right word. Perhaps acceptance is better. Better, in part, because a single observation of a Yellow Warbler (*Dendroica petechia*) in a cattail marsh on the shores of Lake Erie during the month of June offers little to the science of ornithology in and of itself. Rather, it is the aggregation of all reported observations anchored in their specific places and at different times that gives this information its power. For conclusions to be made on a continental scale about the trends of bird populations, this requires the collection of thousands of inscriptions. In practice this is the limiting factor of ornithological field work: Ornithologists are corporeal beings that can only be in one place at one time. As such, there is a need for more data than they can generate on their own. They need a distributed and diffuse network of inscription devices to collect bird inscriptions. That distributed and diffuse network? Amateur birders, recruited by citizen science projects into reproducing the hegemony of science by enlisting citizens to do its work in the “right” way. Through this distributed and diffused network of actors, ornithology has access to data that would, without birders, be otherwise unavailable.

Amateur birders, however, are not just inscription devices. Rather, this is one enacted network out of many possible; a particular assemblage of birds, technology and people. It would seem, then, that birders have been interested (Callon, 1986) into a network of relations with the wild birds they observe, the landscapes they observe them in, the citizen science projects they report their observations to and the ornithologists that use this data to uncover the seeming realities of bird populations. Callon (1986) suggests that the concept of interestment is the ability of one actor to lock other actors into place within a particular network of relations. The actors in any particular network only becomes static as they become enrolled, where “a set of interrelated roles [are] defined and attributed to actors who accept them” (Callon, 1986, p. 211). These networks of knowledge, then, are a distinct power-play, where an actor or actors jostle for a distinct position of power over other actors in the network. Existing as heterogeneous mixture of relations and exchanges between the actors, power is enacted in these networks as one actor is allowed to speak for the rest of the actors in the network. Ornithologists, through their participation in this network gain access to a better truth about bird populations, and in turn, get to speak for birds in the language of changing population dynamics and for birders. In reducing birders’ engagement with the more-than-human world to that of simple note-taker, ornithology gets to speak on behalf of birders too.

If any irony exists in these citizen science projects, it is that amateurs participate for the sole purpose to improve the quality of scientific data about birds; that, in the *parlance* of actor-network-theory, that they have been interested by the vast scientific network. Amateurs have been participating in citizen science programs like the Christmas Bird Count for over 107 years (“History & Objectives,” 2007). Provocatively, let me suggest that in some instances birding is a reaction against the professionalization of the study of birds; that birders are getting something more out of the relationship than being a scribe. What then, is the amateur birder receiving? If the scientific knowledge about the world abstracts our every-day relationship to it, then an enacted set of practices that re-connects first-hand experience opens the possibility to know the world differently and acts as a counter-point to diffuse power in knowledge making endeavors. Birders engage with birds as that first-hand experience that provides

birders with a “sense of wonder” (Carson, 1956) of the world greater than them as birding is a practice that is deeply embedded in the living world around it. Birders collect more than inscriptions because they move through habitats and make observations, over days and years on an ecosystem level between the connections that matter significantly to the lives of birds. The kind of knowledge that comes through sustained observation often called natural history. I am offering the term to describe contemporary practices that create different networks of relationships between the human and the more-than-human world; practices that do more to erase the boundary between the two than reify it, as science has been criticized to do. Attentiveness to the agency and subjectivity of the world beyond ourselves is an exceedingly important skill to cultivate. If agency is an “emotive and embodied” (Law, 2004, p. 3) effect “generated by...interacting components whose activity is constituted in the networks of which they are a part” (Whatmore, 1999, p. 28), then acts of watching birds can allow for experiences that open birders to the agency and subjectivity of the world: going out with the intention of going bird watching is quite different than actually seeing birds. To be successful in this practice, it requires an understanding of the lives of the bird species that a particular birder is interested in. Simply put, a birder does not go to the woods when they want to see waterfowl; a trumpeter swans’ (*Cygnus buccinator*) preferred habitat is not land-locked. Bird watching, then, is a form of natural history knowledge where knowledge is created in specific context of time and place creating a personal space of engagement between the human and the-more-than-human. A birder’s experience with birds allows the possibility to see beyond anthropocentric frames of reference. Movement is now occurring within ornithology where technological advances are threatening to replace the amateur and in so doing, changing the way that birds are inscribed. While a simple statement, the implication of this fact is that, as a consequence, the way that birds are known will change.

## **Emerging technologies**

What this analysis has been missing to this point is birds themselves. Let me introduce the birds by telling an old joke. Q: How do you tell a male owl from a female owl? A: Call them up. If *he* answers, it’s a male. If *she* answers, it’s a female. Absurd, in

part, because you can't really call an owl, bird or, for that matter, any animal up and expect to have them answer.

### **The owl project**

But it turns out you really can call up an owl. The owl project, described as “a community space for interacting with owls in their natural habitat” (Gold, 2008) allows researchers and users to place calls to a network of cell phones located in the woods of Connecticut. Calling the remotely-deployed phones triggers a recorded owl hoot to play over speakers and listen for responses. In an article describing the project, traditional bird surveys, such as those undertaken in citizen science projects, were described as “labour intensive and inexact” (Highfield, 2007, ¶ 8) where this development is listed as an “important step towards large-scale applications where networks of cellular phones conduct real-time monitoring tasks” (Joachim & Goodale, 2007, p. 603). Thus far, researchers have recorded the Barred Owl (*Strix varia*) and Eastern Screech Owl (*Megascops asio*) calls. The implicit assumption being made by the authors is that the information gathered by this and any future deployments of these bird-calling phones will be of better quality than the information a human would collect otherwise: cellular phones offer access to a better truth about owl populations than humans do alone. Why is this? Because a network of wildlife-calling cellular phones could be deployed to create an even more distributed and diffuse network compared to amateurs alone: they will go places humans have difficulty and inscribe on command.

### **Ivory-billed woodpecker**

Since the last recorded official IBW observation in 1944 there have been hundreds of unconfirmed sightings of these birds (Jackson, 2006). Often these have been disregarded as unreliable because of *who* reported seeing the bird: at best, amateur birders who are aware of IBWs and who believe the bird they saw matched the IBW's “field marking;” at worst a truck driver that gets a fleeting glance of some big woodpecker that flies across an interstate. Prior to the professionalization of the search for the IBW in 2005, amateurs made important contributions in keeping an interest in the bird alive. Naturalists and amateur birders are cited in literature about the re-discovery as key in monitoring and reporting observations prior to the 2005

announcement (Dalton, 2005). Since the reported re-discovery, narratives along the lines of “we’ve known this bird has been here all along” have emerged from people that have intimate local knowledge of the IBW habitat. Duck hunters, in Alabama and in Florida, report having heard IBWs for the past sixty years (Mennill, 2006). They suggest that they’ve kept the information to themselves because they feared that the re-discovery of the bird would lead to some kind of control or restriction on their ability to hunt. Now the question arises if the knowledge they had was legitimate. Amateurs can be wrong in their wildlife observations and the story of the IBW is filled with miscues and misidentifications by those not considered professionals. Confusing this search is the presence of the pileated woodpecker (*Dryocopus pileatus*), another large woodpecker with an overlapping range that superficially resembles the IBW. The question that gets asked of these observations is: “Did they see a pileated or an ivory-billed woodpecker?” And likely, because the IBW is supposed to be extinct, any observation of an IBW by an amateur is disregarded and the identity of the organism is transformed into a pileated woodpecker, regardless.

The concern of ornithologist on the quality of information that amateurs collect is not a new one. When a photograph is unavailable, sight records are the gold standard for collecting data concerning the presence or absence of birds. A sight record, which is the official documentation submitted of a bird sighting has no official format. Rather, it tends to include the kind of information required to convince others that the bird existed and was observed. Typical sight records include: field marks; a comparison of size and shape to other “known” birds; how well the bird was seen; and how consistent observed characteristics “map” to the species in question (Grzybowski, 2007). Sight records are submitted to the appropriate rare bird committees for scrutinization. These committees are normally composed of amateur experts and their establishment is for the purpose of creating long-term credibility of accepted reported observations. These committees act to police the boundary between amateur observations and professional inscription: once a sight record is accepted by a committee, it can enter the established networks of official knowledge of birds. This is why the IBW can be seen by some and yet not exist: the sightings in question do not match up to gold-standard sighting; the

observers and observations lack the purity inherent in contemporary constructions of nature to be real.

### **Robots watching**

In the Big Woods of Alabama, the site of the 2005 IBW “re-discovery” reported in *Science* (Fitzpatrick et al., 2005), researchers have been searching in earnest, with millions of dollars spent and little to show for these efforts. Technological advances have played an important role in these searches, with camera equipment and even robots entering the enacted network to find the IBW. Part of the original search involved the use of RECONYX cameras—remotely deployed programmable cameras “that incorporate passive infrared (PIR) motion detection, infrared illumination, and a variety of image sensors and lenses” (Connolly, 2007, p. 283). In over 6000 hours of searching in 2006, no evidence was found to support the bird’s rediscovery (Connolly, 2007). Efforts in 2007, then, were augmented with the installation of more than a camera: researchers installed a robot, described as “a high-resolution intelligent robotic video system” (Connolly, 2007, p. 285) that collects images and examines them in real time. The software is designed to look for birds that are large enough to be an IBW and discards images “that contain nothing of interest” (Connolly, 2007, p. 285). The developer of this system is quoted as saying that “the presence of a human observer can affect the behaviour of the animals...robots can help” (Fildes, 2007, ¶ 14). This idea that the robot’s software can delete images that contain nothing of interest and, with the removal of humans, have access to a different (and better) truth about the natural world is key in understanding this technology’s impact on how birds come to be seen and how amateur knowledge could be treated in the future.

### **Excluding the amateur: implications of the *Turing* of ornithology**

In both the owl project and the deployment of robots to search for the IBW, the amateur as inscription device in ornithology is being replaced by different technologies. It is true that technological advances, including the use of Global Positioning Systems today and the historical availability of field glasses and access to automobiles in the early 20<sup>th</sup> century (Barrow, 1998), have been an important part of birding and, in turn allowed amateurs to make regular significant contributions to knowledge about bird

populations. Rather than through its use, it is the context that a technology is employed that creates moral and ethical dilemmas (Franklin, 2004). Amateurs have used and continue to use binoculars and automobiles in a context where knowledge and experience are intimately linked. New technologies of surveillance, such as cellular phones and robotic video devices disconnect experience and the creation of knowledge.

It is true that amateur birders, while distributed and diffuse, are imperfect inscription devices. They make mistakes. While amateurs themselves have attempted to police the boundary between good and bad observations with a systematized collection and reporting procedure, in the search for the IBW they are being excluded from the networks of objects, birds and landscapes enacted to uncover scientific truths about this bird population. Birders are being cast free from their interestment in these particular networks. In this act, these amateur birders' power, in the eye of the dominant discourse on the more-than-human world, is diminished in their ability to come to know nature. In turn machines, robots if you prefer, are being sought out for their "perfection." This perfection means that these new inscription devices are understood as being able to access a different kind of truth about the natural world than is normally accessible to humans. These new methods of wildlife observation act as purification devices, getting rid of unwanted video frames and unwarranted observations. The digital evidence that the high-resolution intelligent robotic video system or the cellular phone network offers becomes the gold standard for describing bird populations and the enacted relationships between birds and birders disappear. These robot "watchers," in turn, reinforce a nature that is separate from humans and that is only accessible when humans are removed from the process of inscription.

Alan Turing is a man described by many as the father of computer sciences. He, posthumously, has lent his name to a term that describes the process through which the computerization of a discipline irrevocably changes the kind and quality of information available to those in the discipline. The term, *Turinged*, is used as a verb if a discipline has gone through this process of computerization. References to this process are irrevocably positive: "Once you are Turing'd it is much easier to believe other occupations which we humans used to do uniquely, can be done by computers. You tend to be open to disruptive technology in all parts of your life" (Kelly, 2008). The

changes that I have outline here may mark the beginning of the *Turing* of ornithology. While some may be open to disruptive technology, it appears if little thought is occurring to the ramifications of this process. In this sense the birds, be they hooted at from a cellular phone or recorded and run through software, become nothing more than inscriptions, or in Charles Bergman's (2005) words "beasts with no body." They become artificial animals. Artificial animals is a term used by Ursula Heise to describe the digital proliferation of animals as solutions to current problems. She writes that this offers a convenient "means of escape from the unpleasant realities of ecological deterioration and species extinction into a digital world that is not subject to the same sets of problems" (Heise, 2003, pp. 70-71). The irony here is that the proliferation of digital animals by these inscription devices is made in the attempt to provide information to help answer questions of ecological deterioration and bird species extinction. Amateur birders, acting as inscription devices for citizen science projects, have offered the science of ornithology important longitudinal information on the bird health and population. If birders disappear from official ornithological knowledge, so too does the first-hand experience of birds. While this relationship may seem to be inconsequential to the quality of data collected, it has significant impact on how wild bird populations are known. Rather than through first-hand experience, these organisms are known as pixels on a screen or digital audio over cellular networks. This reductionistic approach to the more-than-human world does little to question or challenge underlying assumptions of what it is to be animal or what it is to study nature.

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