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Creating advocates for mammal conservation through citizen science

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ABSTRACT

Citizen science initiatives have shown promise to provide informal education about nature and conservation and simultaneously gather scientific data at large scales. eMammal is a platform for citizen science projects that recruits volunteers to place camera traps that collect data in the form of wildlife photographs. Our project offered informal education on wildlife ecology and conservation to volunteers through training materials, feedback during the project, and a natural history blog. We tested whether our education efforts and volunteer activities affected their project specific skills, wildlife knowledge, conservation attitudes, and what kind of information they shared with their social network. Volunteers accurately (>90%) identified 15 of 20 wildlife species captured in the photos and reduced the rejection rate of camera placements over time. Our surveys showed that volunteer's attitudes toward conservation were high before joining the project and did not change after participating. However, volunteer knowledge of wildlife was higher after working with eMammal. Volunteers also became advocates for mammal conservation by sharing their new knowledge. Roughly half of our volunteers reported actively discussing some type of information related to wildlife both before (50%) and after (54%) the project. However, after volunteering they were 84% more likely to discuss local mammals or local mammal conservation. The likelihood of discussing local mammals was positively influenced by the number of predator photos captured by volunteers, showing that the type of experience can influence how information is spread through a volunteer's social network. Citizen science can connect people to the natural world while simultaneously providing reliable data for conservation.

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1. Introduction

Solving conservation problems requires both scientific data and public support for conservation actions, and generating this support often requires broad engagement with the public (Opdam & Wascher, 2004; Cooper et al., 2007; Pressey et al., 2007). Informal education is an important avenue for engaging the public with both science and nature, and often takes place in natural history museums, zoos or aquariums, which a majority of American adults report visiting (Falk and Dierking, 2010). Informal learning is an important avenue for science education among adults (Falk and Dierking, 2010) and is also a strategy for maintaining support for conservation (Ballard et al., In Press-b; Ballantyne et al., 2007).

Citizen science, engaging non-professional volunteers in scientific research (Bonney et al., 2009; Tulloch et al., 2013), has been advanced as a method to collect ecological data at large-scales (Miller-Rushing et al., 2012) as well as an effective form of informal education about the natural world (Cooper et al., 2007; Dickinson et al., 2012). There is still some question whether citizen science projects can achieve simultaneous goals of data collection and education (Jordan et al., 2011), although several projects have combined data collection with informal education (Ballard et al., In press; Jordan et al., 2011). Understanding volunteer motivations and establishing explicit education goals can improve informal education outcomes (Domroese & Johnson, In press), but there is evidence that even without explicit learning goals, volunteers can learn about ecology and science simply through the experience of rigorous data collection (Ballard et al., In Press-a; Jordan et al., 2009). Projects that are collecting data for scientific research offer experience with "authentic science" that provides unique informal education

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opportunities (Jordan et al., 2012b) that can be easily supplemented with additional educational activities.

Citizen science is unique in that in can provide a vehicle to directly experience the natural world as well as offering informal education. Direct experience with nature may be a useful tool to encourage support for conservation. As the world has become increasingly urbanized (Alig et al., 2004; Cohen, 2006) the public in industrialized countries has spent less time engaged in nature-based recreation (Pergams & Zaradic, 2006, 2008). Children, and particularly urban children, are spending much less time outdoors than previous generations (Louv, 2008). This trend of reduced interaction with the natural world may negatively impact current and future support for conservation (Miller, 2005), and there is already evidence that the decline in some types of outdoor recreation is impacting support for non-governmental organizations that are focused on conservation (Zaradic et al., 2009). Citizen science offers one strategy to combat this trend and provide meaningful interactions with the natural world as well give volunteers experience with science, and often science that is focused on conservation.

To evaluate the possible effects of citizen science on support for conservation, we investigated the effects of volunteering for a large wildlife ecology project. We evaluated volunteer experience, learning outcomes, and possible changes to conservation attitudes before and after a wildlife study on the effects of recreation on mammals using eMammal. eMammal is a platform for gathering, storing, and sharing survey data of mammals collected with camera traps (McShea et al., 2016). Camera traps are motion-triggered cameras that photograph any animal larger than ~100 g that moves through the sensor field. The goals of eMammal are to provide tools for large-scale camera trapping for researchers and citizen scientists and to maintain a data repository of mammal survey data that can be easily and quickly accessed for conservation and management. We assessed the quality of volunteer data and how quickly volunteers learned to place cameras and identify wildlife pictures through expert review of all photos identified by volunteers. The effectiveness of project activities in changing volunteer attitudes, knowledge and behavior were assessed with pre and post-season surveys of volunteers and control groups. We predicted that volunteers would: 1) improve their ability to setup cameras and identify species over time; 2) increase their knowledge about the natural history of mammals; 3) improve attitudes toward conservation; 4) share information learned during or from the project with more people in their networks, and 5) be more likely to share information if they detected rare or charismatic wildlife, such as predators, on their camera traps.

2. Materials and methods

2.1. eMammal project description

eMammal was developed by the Smithsonian Institution and the North Carolina Museum of Natural Sciences (McShea et al., 2016). Program features include online tools for managing volunteers, custom applications for identifying wildlife photographs, uploading data, and reviewing volunteer identifications, and storage of data in the Smithsonian Data Repository. The data reported here are from a study to evaluate the effect of recreation on wildlife across 32 public lands and six states in the mid-Atlantic region of the USA (Fig. 1). Volunteers were recruited to deploy cameras at pre-assigned locations determined

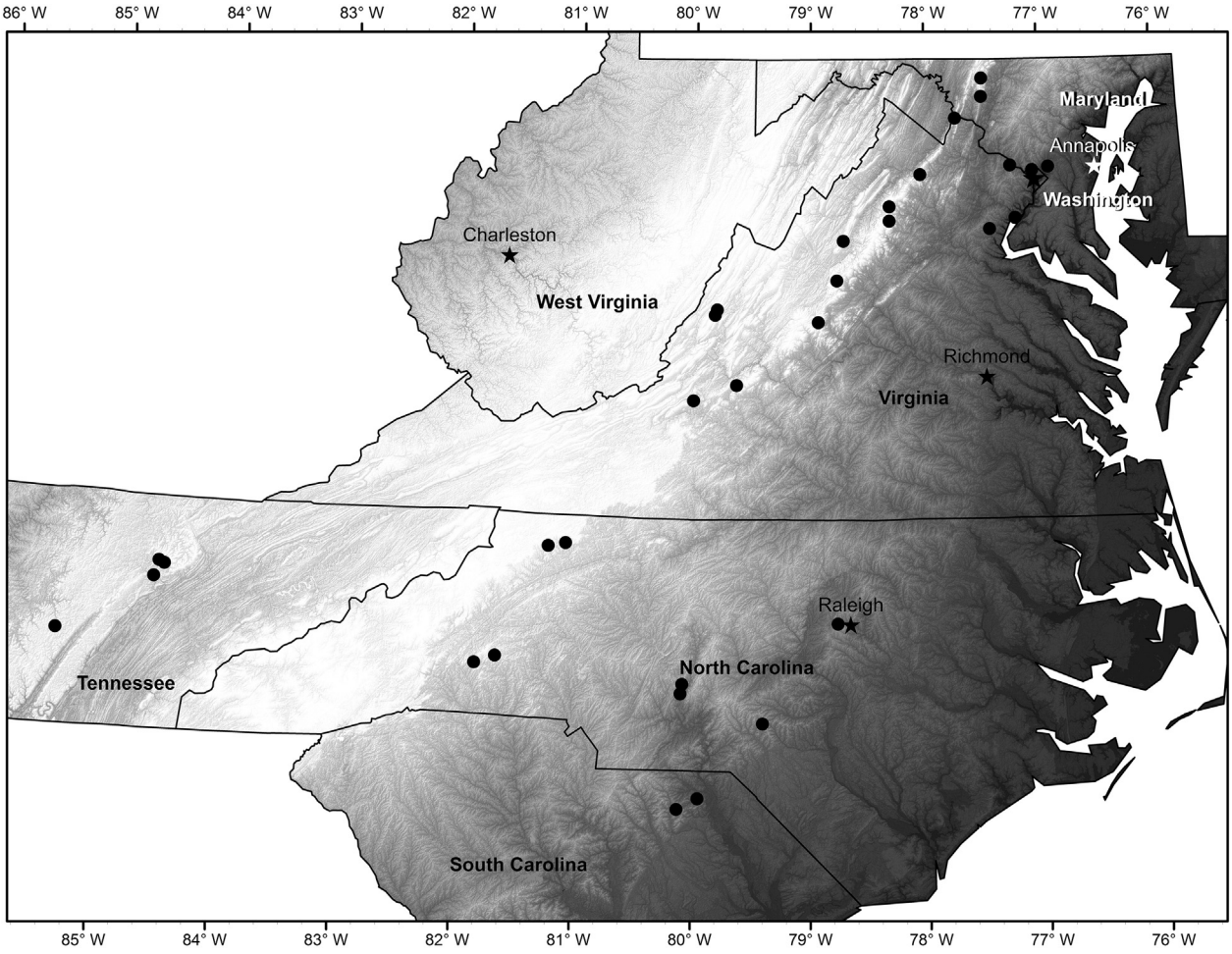

Fig. 1. The study area of the eMammal project in the mid-Atlantic region of the USA. Each park is represented by a point, cities are indicated with a star, and elevation is represented by shading with lighter areas indicating higher elevation.

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