Title

An Investigation of Human-Error Rates in Wildlife Photographic Identification; Implications for the Use of Citizen Scientists

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Abstract

Rapid technological advancements in digital cameras and widespread public access to the internet have inspired many researchers to consider alternative methods for collecting, analyzing, and distributing scientific data. Two emerging fields of study that have capitalized on these developments are “citizen science” and photo-id in wildlife capture-mark-recapture (CMR) studies. Both approaches offer unprecedented flexibility and potential for acquiring previously inconceivable datasets, yet both remain dependent on data collection by human observers. The absence of rigorous assessment of observer error rates causes many scientists to resist citizen science altogether or to fail to incorporate citizen-collected data into ecological analyses. This same need for consistent measurement and documentation of the type and frequency of errors resulting from different observers is mirrored in numerous ecological studies employing photographic identification. The driving question of interest behind this thesis rests at the intersection of these two fields: can citizen scientists provide an effective alternative to commonly utilized computer-assisted programs used with large photo-id databases from wildlife studies?

To address this question we reviewed the history of wildlife photo-id in order to gain a better understanding of knowledge gaps caused by a failure to consistently report human error rates (Chapter 1). We then piloted a crowdsourcing approach to distributed photographic analysis by soliciting responses to image comparisons from a large number of untrained observers (Chapter 2).

We found that observers correctly assessed 99.6% of all comparisons, but that the predictor variables for the two types of error (false positive and false negative) differed. Building upon a deeper understanding of the history, limitations, key issues, and recommendations for researchers considering using photo-id, we recommend the expanded use of citizen science methods as an effective alternative to computer-assisted approaches with large image libraries. Error rate improvements should allow scientists to more readily accept data collected by untrained observers as valid, and will also contribute to improved accuracy of ecological estimates of population size, vital rates, and overall conservation management of threatened or endangered species. Additionally, the general public will benefit from expanded opportunities to engage with and learn about the scientific process.

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