

Identification of Bumblebee Species from Photographs Taken in the Field: Quantifying Effectiveness and Best Practices

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With many bumblebee (*Bombus*) species in decline across North America, there is an urgent need to collect data on the status of bumblebees in Montana; however, bumblebee identification requires specialized expertise and can be difficult in the field. Traditionally, bumblebee specimens have been collected and pinned for experts to view and identify. However, storing and managing specimens presents logistical challenges. In addition, three bumblebee species in Montana are under consideration for listing which may lead to restrictions on lethal sampling. Taking photographs of bumblebees in the field offers a non-lethal alternative that may be more cost-effective, appropriate for species of concern, or suitable for engaging community scientists. We seek to evaluate the effectiveness of identifying bumblebee species in Montana from photographs. In collaboration with BLM Montana/Dakotas, we took photographs and collected specimens of >565 bumblebees between 2018 and 2021. The species of each bumblebee was determined separately from specimens by Montana bumblebee expert Amy Dolan and from photographs by bumblebee expert Rich Hatfield. We will use these data to answer: (1) How frequently were species identified from photographs of bumblebees, and how frequently did these identifications agree with specimen identifications? (2) What methods and practices contribute to successful bumblebee identification from photographs? (3) Are there specific species or castes that cannot be reliably identified to species level from photos? Our goal is to inform viable and efficient methods for sampling and identifying bumblebee species, including species of concern, across Montana and beyond.