

****Improving Black-Billed Cuckoo Monitoring in Montana**

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Understanding species distribution and ecology are critical first steps towards biodiversity conservation. While monitoring common, conspicuous species can be relatively straight forward, collecting sufficient data for rare and cryptic species presents unique challenges. Black-billed cuckoos (*Coccyzus erythrophthalmus*) are an example of a regionally rare, cryptic, and data deficient species in Montana. Due to their infrequent vocalizations, preference for dense vegetation, and cryptic plumage, this species is difficult to detect using the conventional method of in-person playback surveys. Especially when applied in Montana, these surveys are resource and time intensive. In this study, we compare the conventional method with non-invasive passive acoustic monitoring paired with machine learning classification. From 2021-2023, we conducted playback surveys and deployed autonomous recording units at sites with historic cuckoo records. In 2023, we created an improved machine learning model to detect multiple call types from acoustic data. We present preliminary results of the effectiveness of each method based on cost, survey effort, and detections. This research tests an application of non-invasive monitoring methods for rare species of local conservation concern. Additionally, results will improve the efficiency of monitoring as practitioners in Montana create a long-term species monitoring and conservation plan.