

## **\*\* Comparing AI-Based Camera Monitoring to Human Bird Surveys at Freezout Lake**

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Conventional avian monitoring relies heavily on human observers, which limits temporal coverage and can introduce observer bias. Autonomous camera systems paired with artificial intelligence (AI) offer a potential complement, but few have been directly evaluated against established bird survey methods under field conditions. We evaluated an AI-driven camera monitoring system, Binoculars to Bytes (B2B), by comparing its outputs to professional biologist surveys and citizen-science observations at Freezout Lake Wildlife Management Area, Montana. Cameras operated continuously during migration seasons, generating high-frequency visual data that were processed into standardized survey outputs comparable to human observations. Across seasons, AI-derived species presence patterns broadly aligned with both professional and eBird records, with agreement improving when modest temporal mismatches between surveys were accounted for. The system consistently underestimated counts for large flocks, highlighting an important limitation shared by many camera-based survey approaches. However, continuous operation enabled the AI system to capture phenological patterns—including early arrivals and late departures—not consistently observed during periodic human surveys. Beyond presence and counts, high-frequency sampling supported additional analyses such as sex-ratio estimation, species co-occurrence, and exploratory distance-based detectability. These results demonstrate that autonomous camera systems can complement aspects of traditional avian monitoring by increasing sampling frequency and standardization while revealing ecological patterns difficult to capture with human-only surveys.