Monitoring daily and seasonal rhythms of roosting blackbirds using acoustic recording systems



08:20:00

Background



- Economic cost of bird damage to sunflower in ND from 2009-2013: **\$18.7 million**¹
- Acoustic recording systems (ARS) record animal vocalizations to:
- Survey biodiversity²
- Estimate populations during the breeding season³

Using ARS to monitor blackbird flock behavior informs timing of tool deployment

Fig. 1: A) an acoustic recording system (ARS) deployed in cattails, B) a red-winged blackbird (Agelaius phoeniceus), and C) map of blackbird day (DR01-DR03, CD02) and night roosts (SG01, BB01). Photo credits: USDA-Wildlife Services

How does daily phenology of blackbirds change over the fall season?

Methods

- 1. With landowner permission, we placed ARS units (recording sunrise to sunset) in cattail marshes used as day or night roosts by blackbird flocks (Sept-Nov)
- 2. We viewed recordings as spectrograms using Kaleidoscope Pro to identify timing of daily and seasonal activity (i.e., roost abandonment)



Most blackbirds had left the night roosts, presumably on migration, by November (SG01 = Nov. 03; BB01 = Oct. 29).

Spectrogram Images



Fig. 2: Spectrograms of a red-winged blackbird (Agelaius phoeniceus) song at a night roost on A) Oct. 10, B) Oct. 18, and C) Oct. 19, 2023. Time scale is in one-second increments. Image differences are due to noise caused by wind and bird proximity to ARS unit.

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Fig. 4: A) Morning arrivals and B) evening departures of mixed-blackbird flocks at day roosts within sunflower fields. Stars indicate harvest dates of the fields. The ARS unit at DR03 was placed in roost after harvest (10 Oct).



Fig. 3: Spectrogram (green to red indicates increasing amplitude) of blackbird flock chatter at a night roost on Oct. 21, 2023, with A) an increasing number of birds calling as birds wake up, B) a period of peak chatter, and C) a decreasing number of birds calling as they leave the roost. Time scale is in twenty-second increments.





Summary

At day roosts, flocks arrive at sunflower fields later as the season progresses but leave about the same time regardless of day of season.

At night roosts, birds wake up and leave the roost later in the morning and in the evening return (BB01 only) and settle down earlier as the season progresses.

Blackbird flocks abandoned the roosts between 29 Oct. and 3 Nov. (after harvest) as they continue to feed on dropped seeds at day roosts prior to migrating and abandoning night roosts.





Figure 6: Blackbird flocks in sunflower fields with cattail day roosts in the background. Photo credits: USDA-Wildlife Services, Jacob, Ward, Mitchell Singer

Future Directions

Evaluate if activity is due to day length or how weather contributes.

Estimate flock density using ARS by comparing infield bird counts to recorded amplitude while controlling for environmental covariates.

Evaluate progression of birds migrating from night roosts by tracking decline in peak amplitude over time.

Investigate foraging and loafing behavior during the day at sunflower fields with day roosts.

Acknowledgments and References

We thank sunflower producers in North Dakota for allowing us access to their property.

- ¹ Ernst et al. (2019). Pest Management Science.