Factors influencing the population of blackbirds available to depredate crops: an evaluation of migration and breeding ecology on the fecundity of red-winged blackbirds

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Introduction

- Young of year blackbirds contribute 45-92% of the local late season population responsible for damaging sunflower crops[1].
- Earliest breeding females tend to produce the most offspring.
- Birds that travel from the shortest distance back to the breeding ground may breed earliest.
- Daily rhythms, regulated by endogenous 'clocks', may affect a harem's interactions with predators and, consequently, their nestling success.

Blackbird flock on a sunflower field. Photograph by Conor Egan.

Migration Study

- *We hypothesize that females with the shortest migration distance will be the first to breed.*
- To determine overwintering location of female red-winged blackbirds (*Agelaius phoeniceus*) we will deploy GPS logger tags (Figure 1) and perform stable isotope analysis on claw samples (Figure 2).
- Upon arrival, reproductive hormones (testosterone and estradiol) will be sampled to assess readiness to breed (Figure 3).
- Females will be monitored throughout the breeding season to count how many offspring they produce.

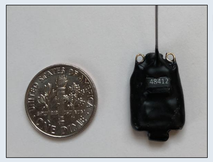

Figure 1. PinPoint10 tags will provide migration locations that can be accessed when the bird is recaptured.

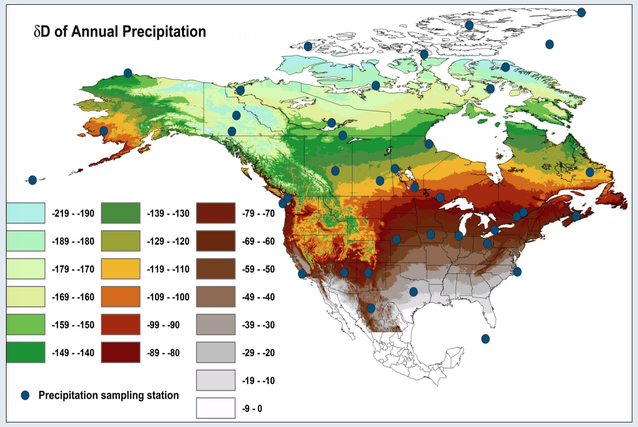

Figure 2. Map of stable-hydrogen isotope ratios at different latitudes in North America[2]. Claw samples will provide a ratio that indicates a general latitude where the bird overwintered (i.e., grew recent claw tissue).

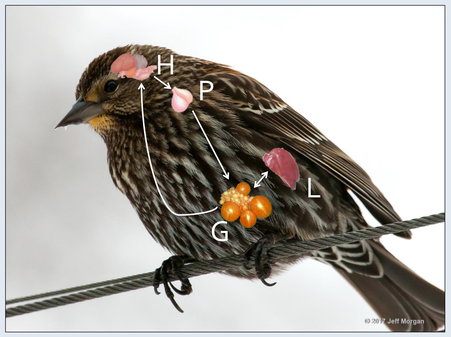

Figure 3. An injection of GnRH will show the amount of testosterone and estradiol that a female can produce. Those with low levels may not be prepared to breed. GnRH is released from the hypothalamus (H). In response, the anterior pituitary gland (P) releases luteinizing hormone. The ovaries (G) then produce testosterone and estradiol. The liver (L) produces proteins necessary for egg development.

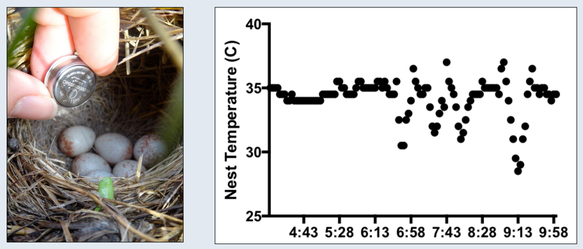

Figure 4. iButton sensors can be hidden in nests to wirelessly monitor incubation behavior of female blackbirds by recording the time and temperature of a nest every 3 minutes. This data is from a dark-eyed junco (*Junco hyemalis*) nest[3].

Anti-predator Study

- *We hypothesize that harems that consist of females with the greatest variation in daily activity will fledge the most offspring because they will be awake and aware of predators for the greatest amount of time.*
- *Alternatively, harems with less variation in activity may be less conspicuous to predators and therefore have a higher fledgling success rate.*
- Testosterone is an important regulator of daily activity. If individuals within a harem have a variety of testosterone levels, they may also have a variety of activity times.
- iButton temperature sensors will record nest temperature throughout the day (Figure 4); first morning drop in temperature will determine daily activity onset and last drop in evening will determine activity offset.
- The active time for each female will be compared to the active time of other females in the harem to get a total activity time for each group.

Significance

- Hatch-year birds multiply local breeding populations by up to 192%[4] and hold the potential to inflict considerable crop damage.
- Understanding how migration and breeding physiology impacts reproductive fitness of female blackbirds could inform management strategies aimed at reducing fecundity.

Acknowledgements and Literature Cited

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