

Background

- On average, blackbirds damage 8.7% of the sunflower crop annually in North Dakota (estimated from 2009–2013) [1]
- Current damage management techniques struggle with cost efficiency and rapid blackbird habituation
- Drones are becoming common for scientific, commercial, and recreational use [2] and are used to haze blackbirds
- How drone size and speed affect hazing efficacy is unknown [3,4]
- Antipredator behavior research examines how animals perceive and respond to living and nonliving threats (e.g., drones)
- Most research on hazing blackbirds with drones has occurred during sunflower maturity (Aug.–Oct.), when birds are flocking
- Evaluating behavioral responses of blackbirds on breeding territories, allows testing of individual antipredator responses

Objectives

- Evaluate how territorial, male red-winged blackbirds (*Agelaius phoeniceus*) respond to drones of different sizes and speeds
- Study how free-ranging red-winged blackbirds respond to drones during the summer breeding season

Methods

- We approached blackbirds using 3 drone platforms (Fig. 1) from Jun.–Jul. 2023 in eastern North Dakota
- Upon locating perched red-winged blackbirds, we set up a GoPro video camera on a spotting scope in a blind ≥ 100 m away
- We a) observed bird behavior for 2 min. prior to drone approach b) flew a drone directly at the perched blackbird c) landed the drone and waited 10 min. for the bird to return d) if the bird returned, we observed behavior for 2 min.
- We determined blackbird flight initiation distance (FID; measure of perceived riskiness of approaching object) using GoPro videos and drone flight logs

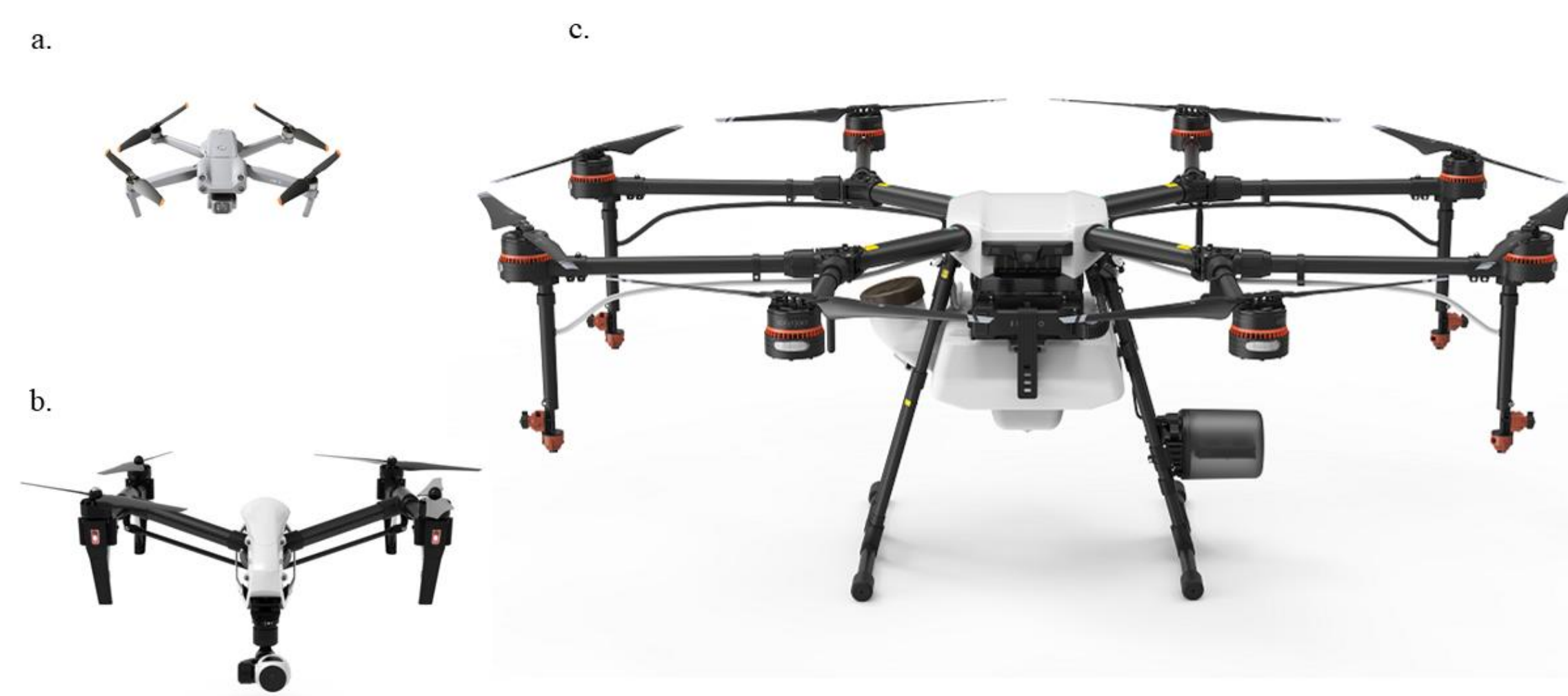


Fig. 1. DJI Mavic Air 2 (a), Inspire 1 (b), and Agras MG-1P (c)

Study Sites

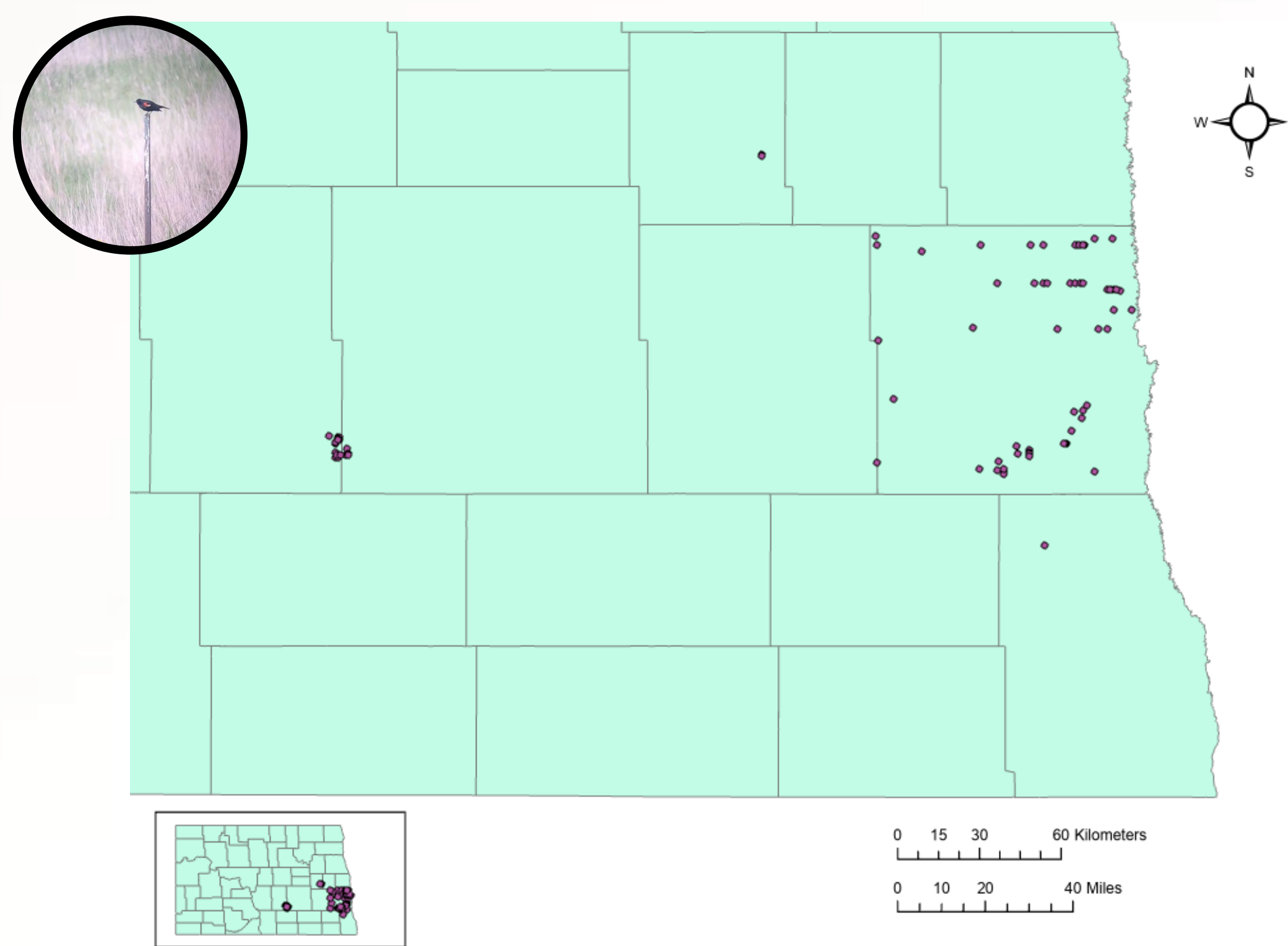


Fig. 2. Locations of trials in eastern North Dakota where we approached male, red-winged blackbirds perched on their breeding territories with 3 different drone platforms of increasing size at various speeds.

Summary

- Birds took flight sooner (larger FID) when approached by larger drones (Agras, $p = 0.001$; Inspire $p = 0.018$) compared to the smaller Mavic model.
- We did not see a significant difference in FID when comparing the Agras and Inspire ($p = 0.55$)
- Faster approach speeds were significantly correlated with smaller FID for the Agras ($p < 0.001$), but not the Mavic ($p = 0.062$) or Inspire ($p = 0.086$) models

Preliminary Conclusions

- The Inspire and Agras were perceived as equally risky to birds, but the Inspire was more difficult to pilot. The change in FID at higher speeds may have been related to speed consistency or path directness of the Inspire.
- Although the Mavic is perceived as less risky, it is quieter and more maneuverable. Thus, combinations of large and small drones may improve hazing efficacy.

Future Directions

- Evaluate effects of drone size and speed on the FID of blackbird flocks in sunflower fields (Fall 2024)
- Examine if results from individual, territorial blackbirds are similar to aggregated blackbird flocks during fall migration

Acknowledgements

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Preliminary Results

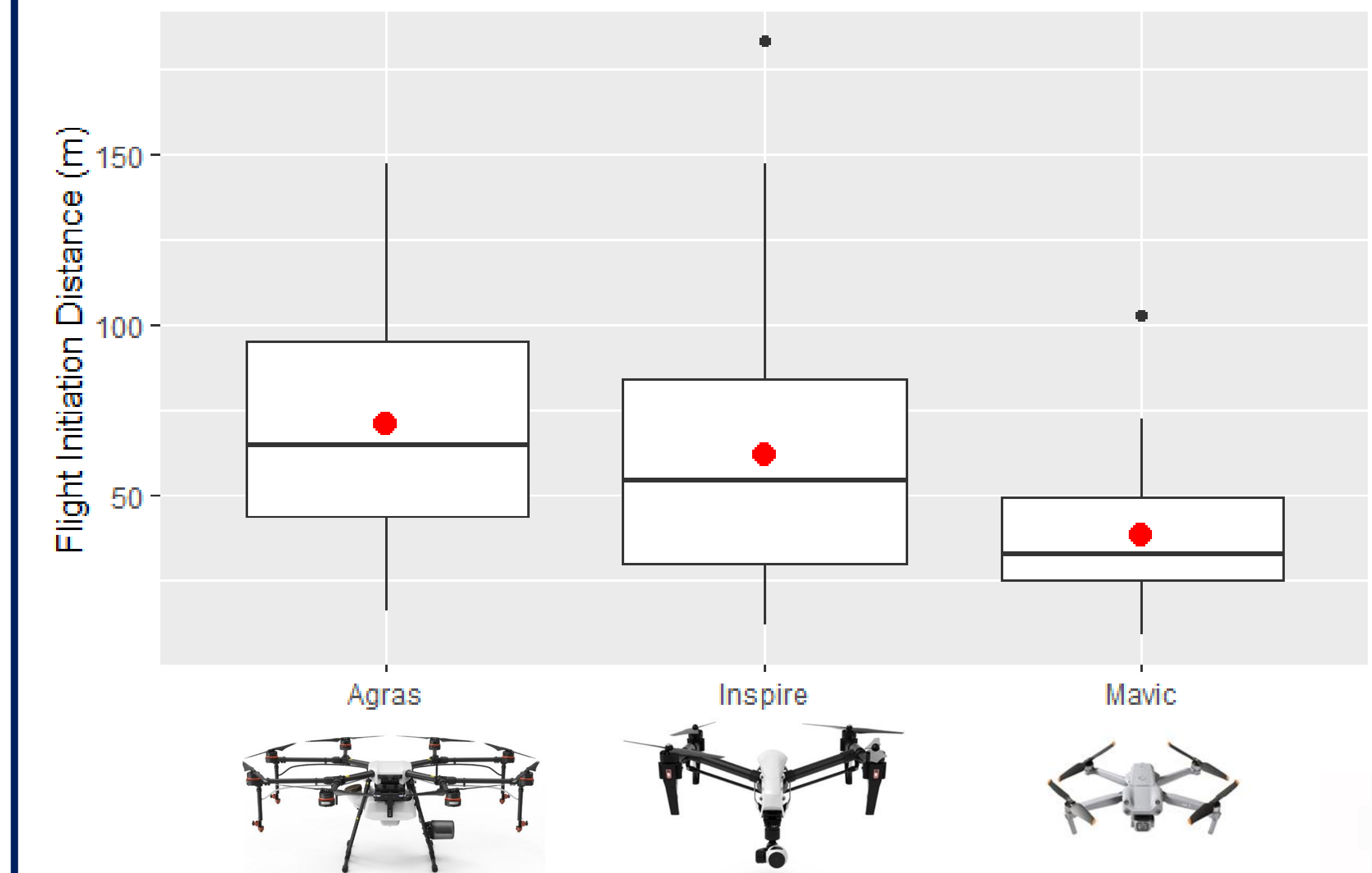


Fig. 3. Distance between an approaching drone and a perched red-winged blackbird when a bird chooses to take flight (flight initiation distance; mean = red dot) in response to 3 drone platforms of different sizes moving at variable speeds (Agras: mean = 70.93 ± 35.53 , range = 15.95–147.24; Inspire: mean = 61.87 ± 39.45 , range = 12.00–183.14; Mavic: mean = 38.25 ± 20.75 , range = 8.82–102.79).

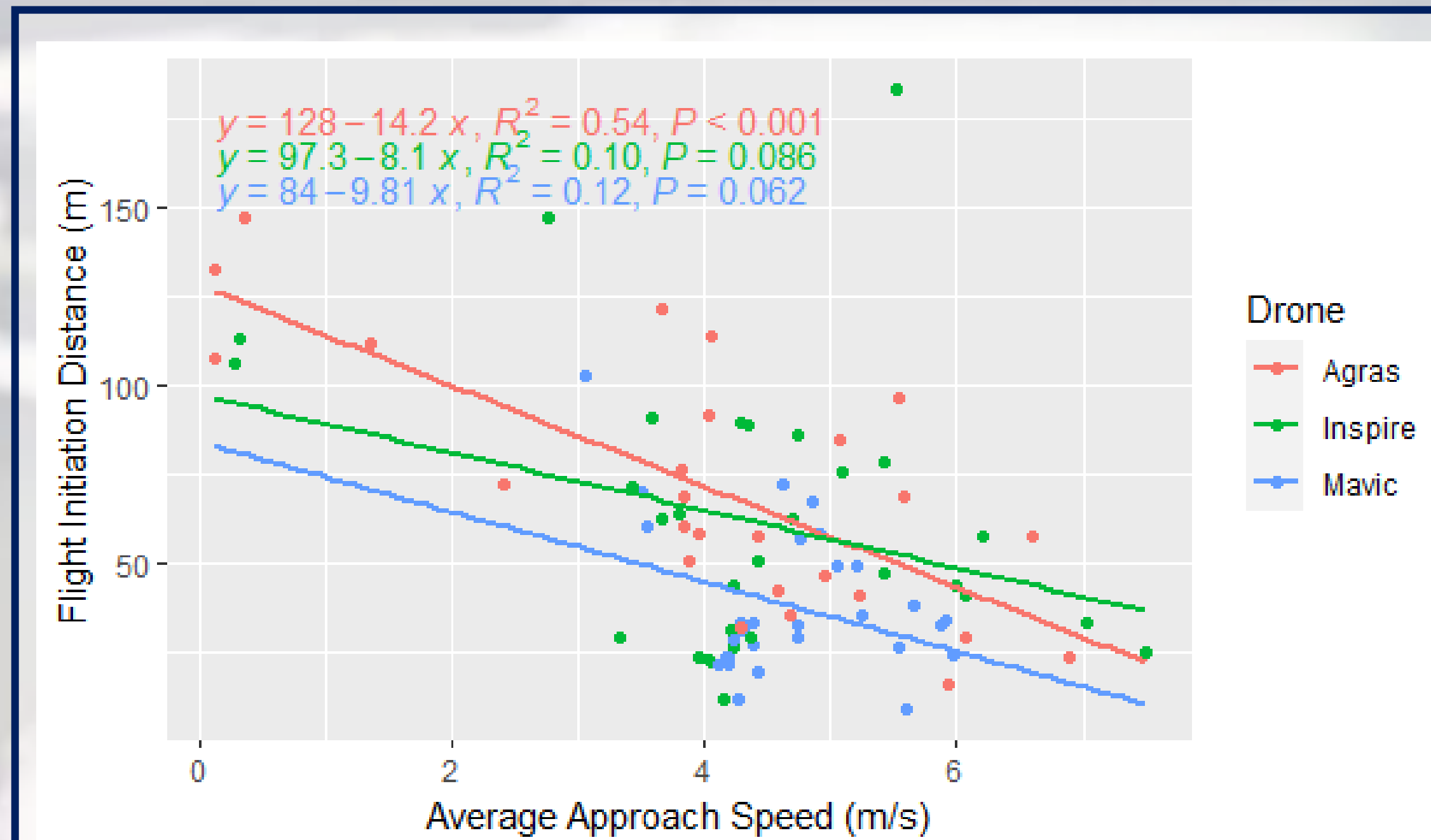


Fig. 4. The flight initiation distance of red-winged blackbirds perched on their breeding territories as a function of the speed of 3 drones of various sizes. A line of best fit is shown for each drone platform.

Literature Cited

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