Report for Missouri Birding Society Graduate Research Scholarship. Breeding Success of Eastern Meadowlark (Sturnella magna) and interactions with bison grazing (Bison bison) in restored pastures of Midewin National Tallgrass Prairie. February 2024.

Midewin National Tallgrass Prairie has a growing history of commitment to tallgrass prairie management and restoration. The globally imperiled conditions of grasslands and tallgrass prairies (Henwood, 2010; Lark et al., 2015) and the dramatic decline of grasslands birds (Rosenberg et al., 2019) require science-based solutions and research on prairie restoration and bird ecology. Currently, an experimental project on restoration of tallgrass prairie is being conducted assessing the effect of disturbances (i.e., fire, mowing, herbicide, and bison grazing) on grassland birds. The response of grassland bird breeding success, habitat selection and territory sizes to different management practices is important because the role of tallgrass prairie restoration and bison reintroduction in the mitigation of grassland birds' declines is still unknown.

Nest Searching and Monitoring.

Thanks to the Missouri Birding Society Scholarship, I was able to purchase equipment necessary to perform my field work. In the Spring of 2023, I assembled a team of 5 technicians. Two of them used handheld GPSs purchased thanks to the scholarship. The team used the purchase to mark waypoints of nests found and navigate to them for monitoring. We found 40 nests of Eastern Meadowlarks (*Sturnella magna*) and 330 additional nests of other species of grassland birds including Dickcissel (*Spiza americana*) and Grasshopper Sparrow (*Ammodramus savannarum*) (Figure 1).

Eastern Meadowlark GPS tagging

We purchased three GPS tags for Eastern Meadowlarks that helped us increase our sample size. Data collected by GPS tags will tell us about the management treatments preferred by Eastern Meadowlarks. We caught 21 birds and GPS tag 19 of them. We collected 19,479 locations and average of 32 locations a day per bird (Figure 2).

Bison behavior and locations

Six bison where GPS-collared and their movements were monitored (Figure 3). A video camera was purchased and used to film behavior of collared bison. The videos were used to label behavior into three categories (grazing, resting, walking). Then these labeled behaviors were used to create a model to predict bison behavior given accelerometer data collected by the collars (Figure 4). This information will expand our understanding of bison space use, as we will be able to link behavior and bison GPS locations and discover which areas were actually used for grazing. Ultimately, this data will be used in a model of grassland Eastern Meadowlark's nesting success as a covariable.

Acknowledgments

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Figure 1. Nests of grassland birds. From left to right and top to bottom: Eastern meadowlark nestlings, Dickcissel nest parasitized by Brown-headed Cowbird (egg stage), Grasshopper Sparrow nest (egg stage).

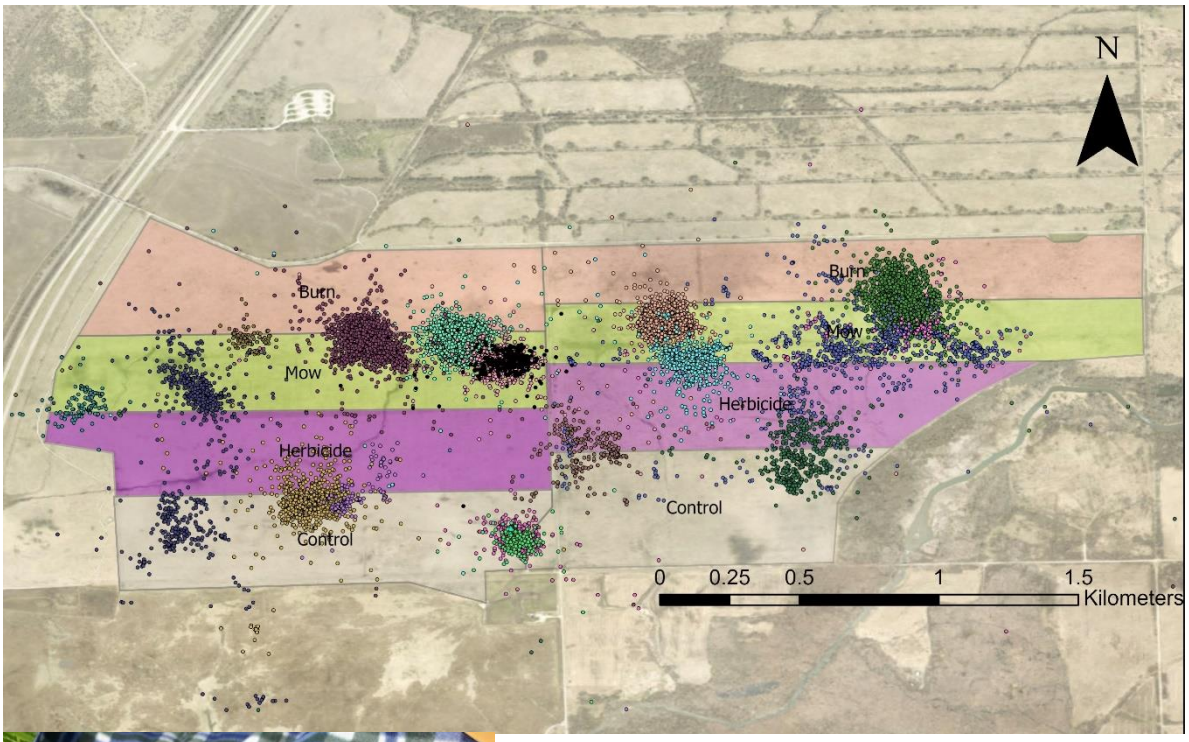

Figure 2. Above: Map of Eastern meadowlark locations on study site. The site was managed with four different treatments: burning, mowing, herbicide, and bison grazing. Bison grazing occurred on the west pasture, whereas the east pasture remained ungrazed. Distinct colors represent different bird individuals. Left: An Eastern Meadowlark with a GPS tag handled with the appropriate permits.

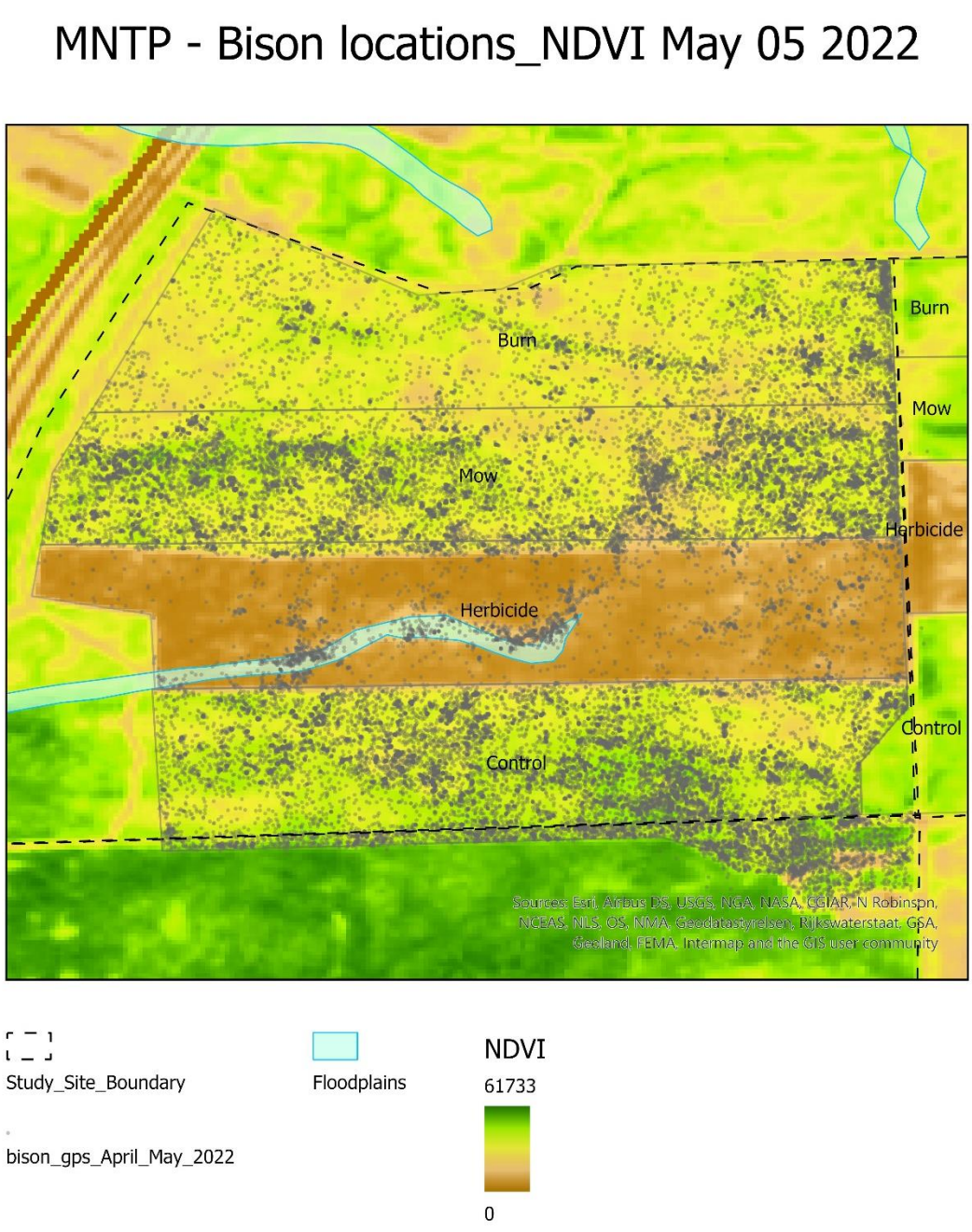

Figure 3. Locations of bison and NDVI (a measure of vegetation greenness or productivity).

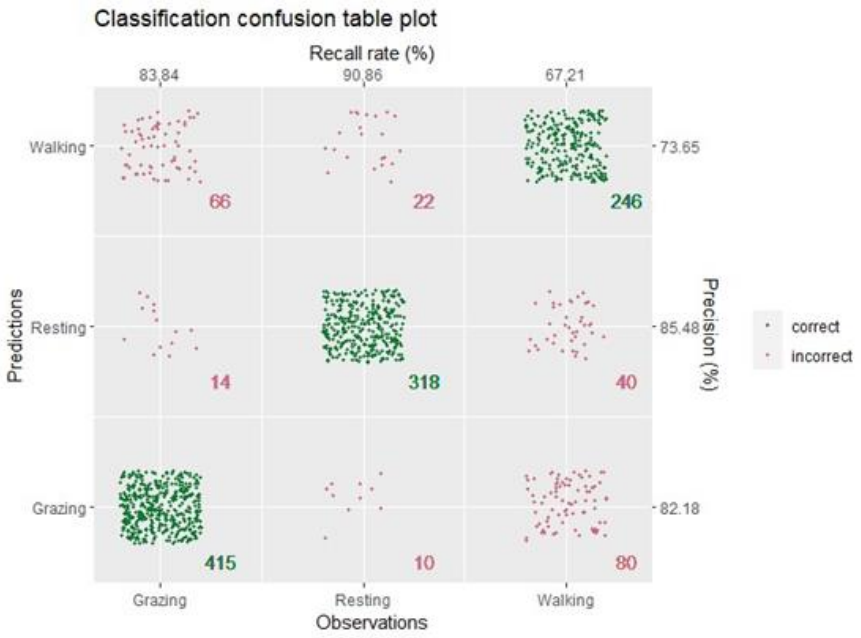

Figure 4. Cross-validation of behavior model using accelerometer data on collared bison. Grazing behavior was predicted with 82% precision.