Effects of Grazing Management on Nest Survival of Sharp-tailed Grouse

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Introduction

- Grazing occurs across 70% of the western US
- Rest-rotation is implemented on conservation easements in MT and could create patch-level heterogeneity
- Sharp-tailed grouse (*Tympanuchus phasianellus*) are an ideal species to evaluate the effects of livestock management on prairie habitats
- Nest survival is one of the most important vital rates influencing grouse populations

Objectives

- Assess factors influencing nest survival for sharp-tailed grouse in eastern Montana and evaluate rest-rotation as a management strategy for improving nest survival

Methods

- Monitored radio-marked females 3 times/week in 2016 and 2017 to determine nest fate
- Classified fate as hatched or failed

- Measured vegetation at the nest using Daubenmire frame and Robel pole (Fig 1)
- Measured home range habitat using GIS

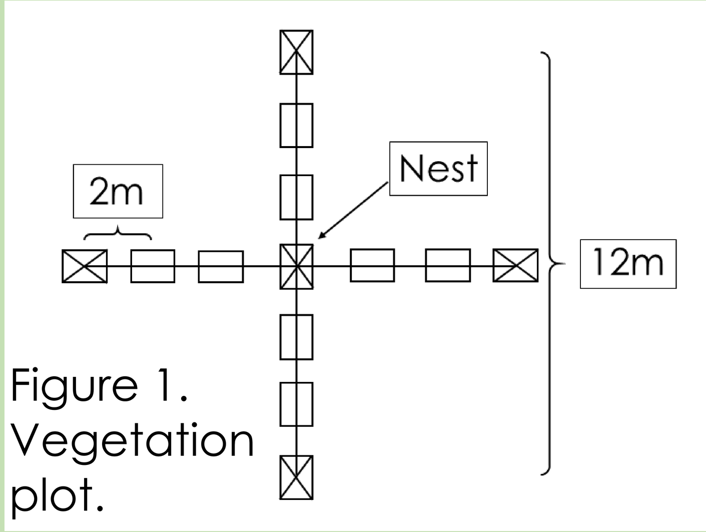

Figure 1. Vegetation plot.

Habitat Covariates

- % new grass, residual grass, forbs, shrubs, bare ground
- Visual obstruction
- Habitat edge and shape complexity
- Prop. grassland and dist. to grassland edge

- Nest survival models using Program MARK
- Hierarchical model selection using AIC_c

Results

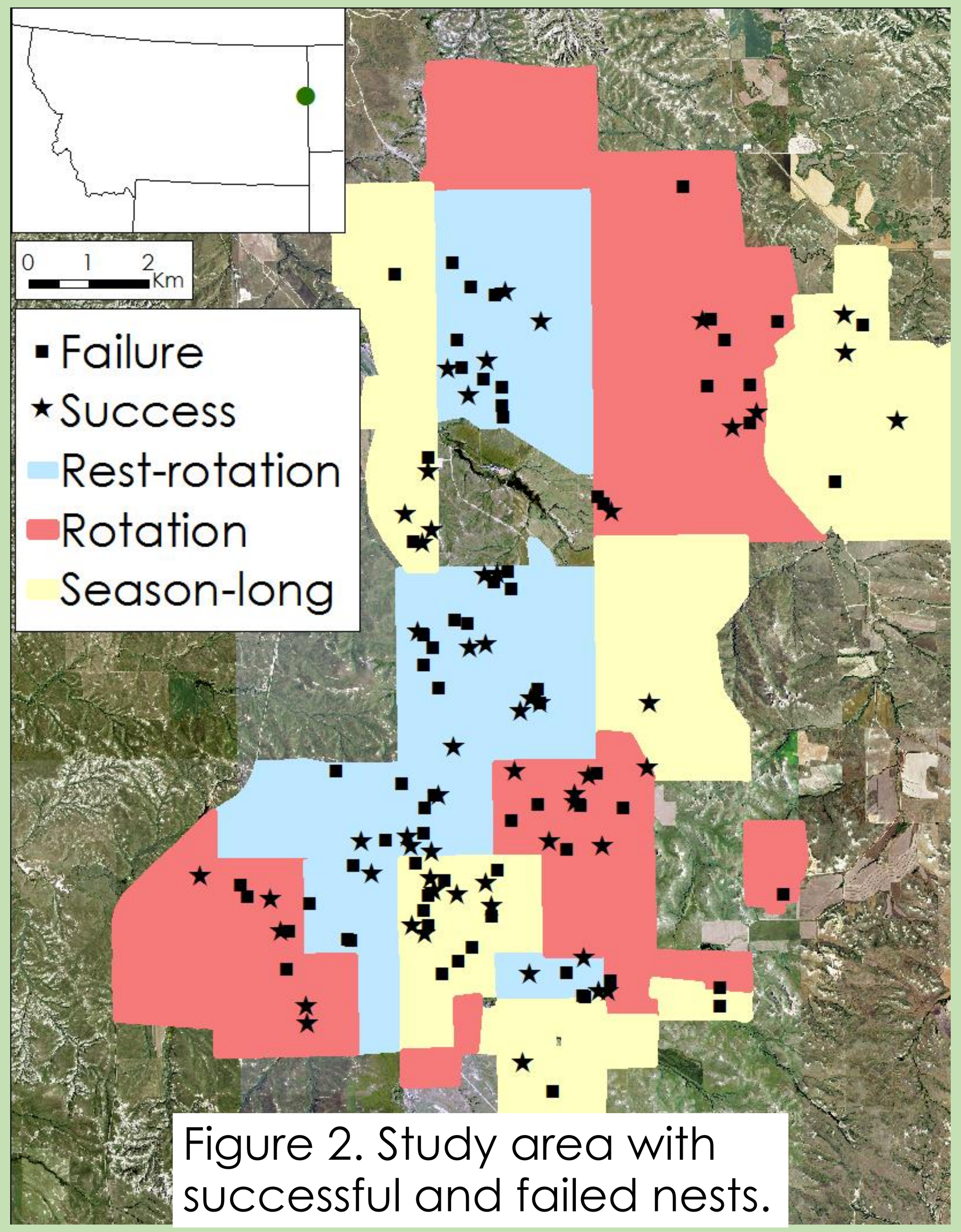

Figure 2. Study area with successful and failed nests.

- 127 nests from 85 hens
- Nesting frequency = 1
- Renesting frequency = 0.64 ± 0.04
- Overall nest survival = 0.22 ± 0.06

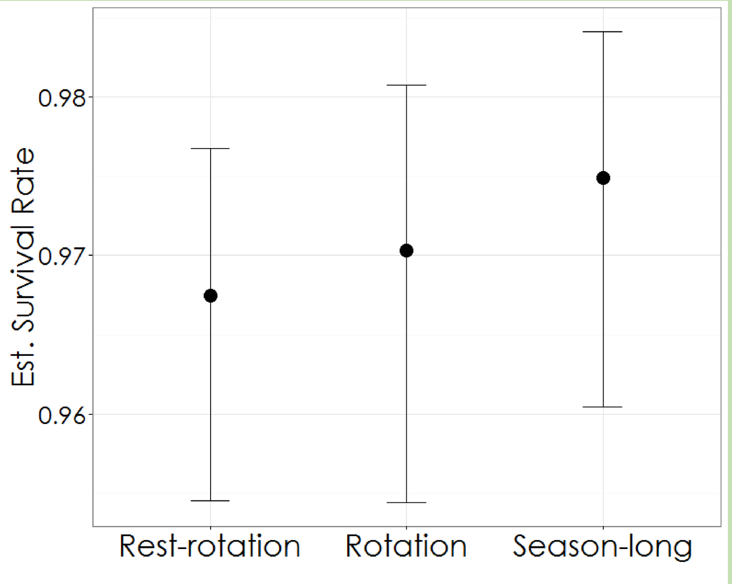

Figure 3. Daily nest survival (± 85% confidence intervals) in each grazing treatment.

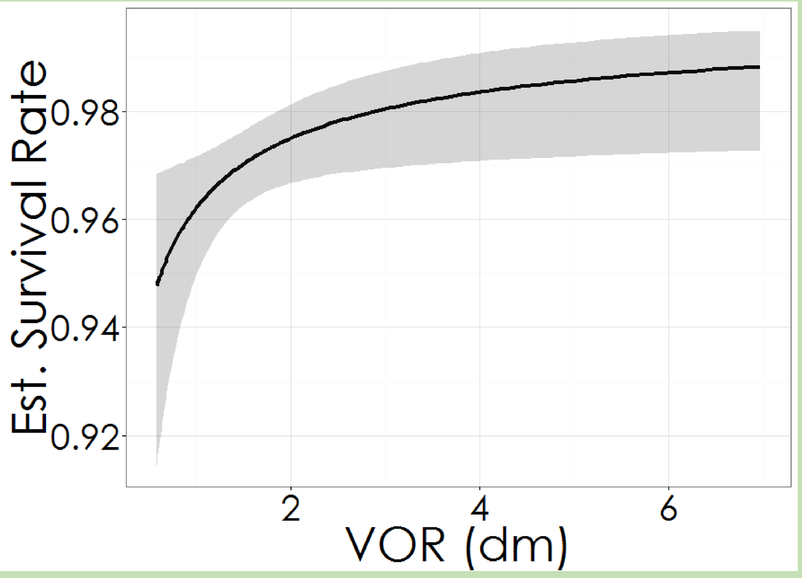

Figure 4. Pseudo-threshold relationship between VOR and daily survival rate.

Figure 5. A female sitting on a well-concealed nest.

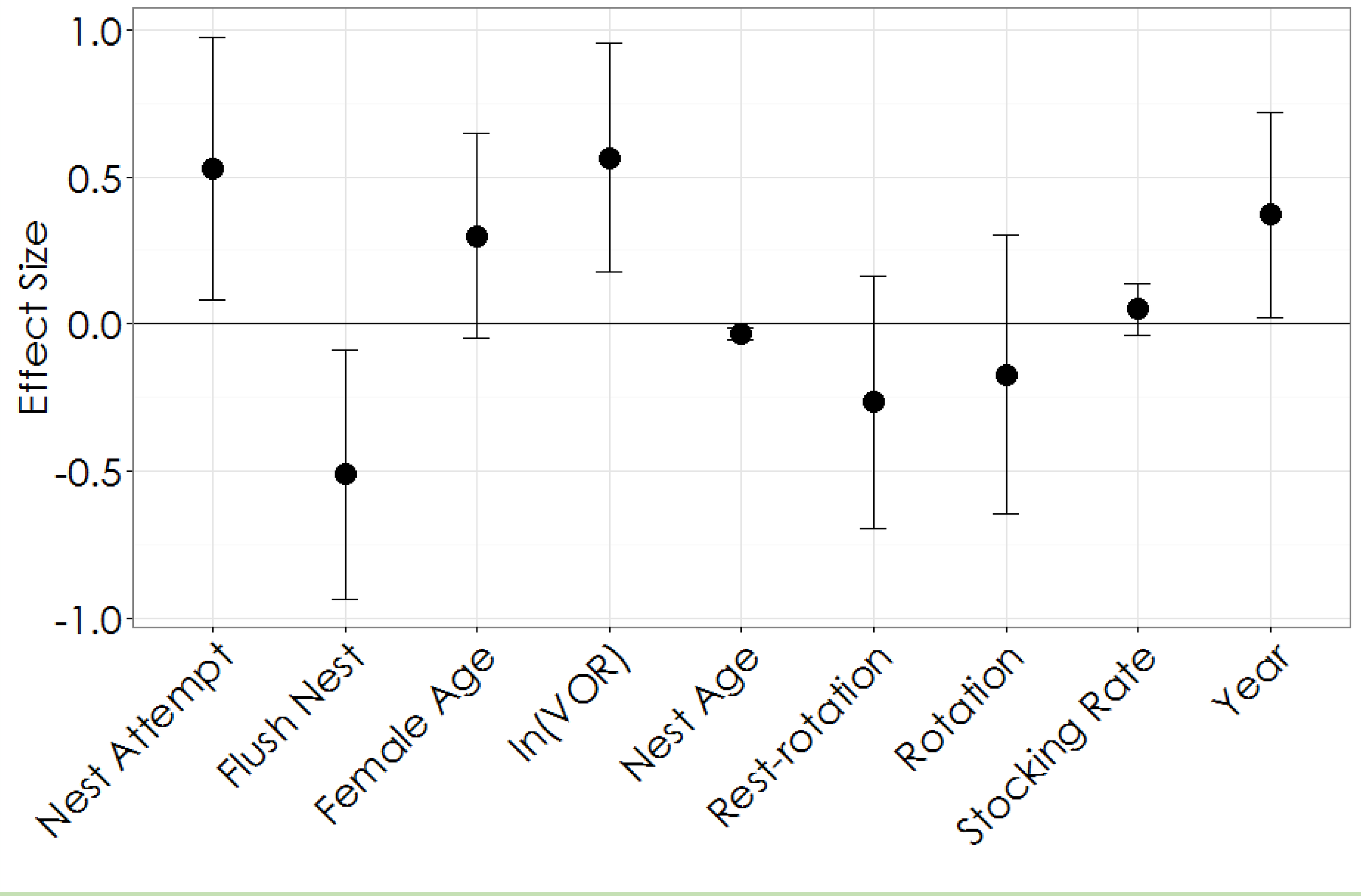

Figure 5. Effect size (β ± 85% confidence intervals) for each variable in the nest survival analysis. Rotation and rest-rotation systems measured in relation to season-long grazing.

Table 1. Support for candidate models predicting nest survival during the breeding season. The null model represents constant daily survival.

Model	K	AIC_c	ΔAIC_c	$AIC_c\ w_i$	Deviance
Nest Age + ln(VOR)	3	545.79	0.00	0.49	539.78
Nest Attempt + ln(VOR)	3	548.76	2.97	0.11	542.75
Flush Nest + ln(VOR)	3	549.03	3.24	0.10	543.02
Female Age + Nest Attempt + ln(VOR)	4	549.75	3.96	0.07	541.74
ln(VOR)	2	549.82	4.02	0.07	545.81
Nest Age	2	550.59	4.80	0.04	546.59
Year + ln(VOR)	3	550.64	4.84	0.04	544.63
Flush Nest	2	552.11	6.31	0.02	548.10
Nest Attempt	2	552.21	6.41	0.02	548.20
Female Age + Nest Attempt	3	552.69	6.89	0.02	546.67
Year	2	553.04	7.25	0.01	549.03
Null	1	553.40	7.61	0.01	551.40
Stocking Rate	2	554.69	8.90	0.01	550.69
Grazing System	3	556.65	10.86	0.00	550.64

VOR represents visual obstruction as measured with a Robel pole

- Interaction of visual obstruction with nest age was best predictor of nest survival
- Nest survival increased with greater cover
- Nest survival decreased with nest age

Conclusions

- No evidence for an effect of grazing system or stocking rates on nest survival
- Grazing may influence other factors such as brood survival rather than nest survival
- Nest survival increased with available cover but only to a certain threshold
- Nests are more vulnerable later in season
- Strong effect of nest age may be result of drought with little new vegetation growth later in the season to provide nesting cover

Questions?

Feel free to ask!

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Acknowledgments

- PR Grant #W-162-R-0
- IACUC Protocol #2016-01
- All the ranchers whose cooperation have made this study possible
- Kyla Bas, Adam Bradley, Adrian Cain, Drew Howing, John Landsiedel, Joshua Luft, Chris Smith and Skyler Vold

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