Wildlife Biology

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Appendix 1

Supplementary methods

Hunter space use

Our theoretical model for hunting pressure at Beaver River WMA was based on data published in Richardson et al. (2008), which was collected from northern bobwhite *Colinus virginianus* hunting parties at Packsaddle WMA, Ellis County, Oklahoma from 2004–2006. During this study, volunteer hunting parties carried Foretrex 201 GPS units that recorded hunter locations every seven seconds. Data points were censored when hunters were at their vehicles either before or after hunting events. Locations in which the GPS unit lost a satellite signal were also censored. Data points were imported into ArcView 3.3 and analyzed for vegetation cover selection patterns.

Richardson et al. (2008) defined proportional use (o_h) of vegetation cover types by each hunting party (h) as a ratio of hunting-path length within a vegetation cover type to the total path length during the hunt, rather than using point data or time spent in a vegetation cover type. This approach helped to reduce the effect of variable velocities across hunting parties. Vegetation cover types used in their analysis were based on descriptions provided by Hoagland (2000). Each hunt had a hunter selection index (w_h), where $w_h = o_h/\pi_h$ (π_h = proportional availability of a vegetation cover type) and the mean and variance of w_h over the population of hunters was computed and pooled over years. Richardson et al. (2008) determined three relationships between hunter selection and vegetation cover types: avoidance by hunters if the upper 95% CL was <1, neutral use by hunters if 95% CLs bracketed 1 (the lower CL is <1 and the upper CL is >1), and selection if the lower 95% CL was >1.

References

Hoagland, B. 2000. The vegetation of Oklahoma. A classification for landscape mapping and conservation planning. – Southwest. Nat. 45: 385–420.

Richardson, J. L. et al. 2008. Cover selection by northern bobwhites and hunter on a public-hunting area. – Proc. Annu. Conf. Southeastern Ass. Fish Wildl. Agencies 62: 46–50.

Tanner, E. P. et al. 2016. Does the presence of oil and gas infrastructure potentially increase risk of harvest in northern bobwhite? – Wildl. Biol. doi: 10.2981/wlb.00254.

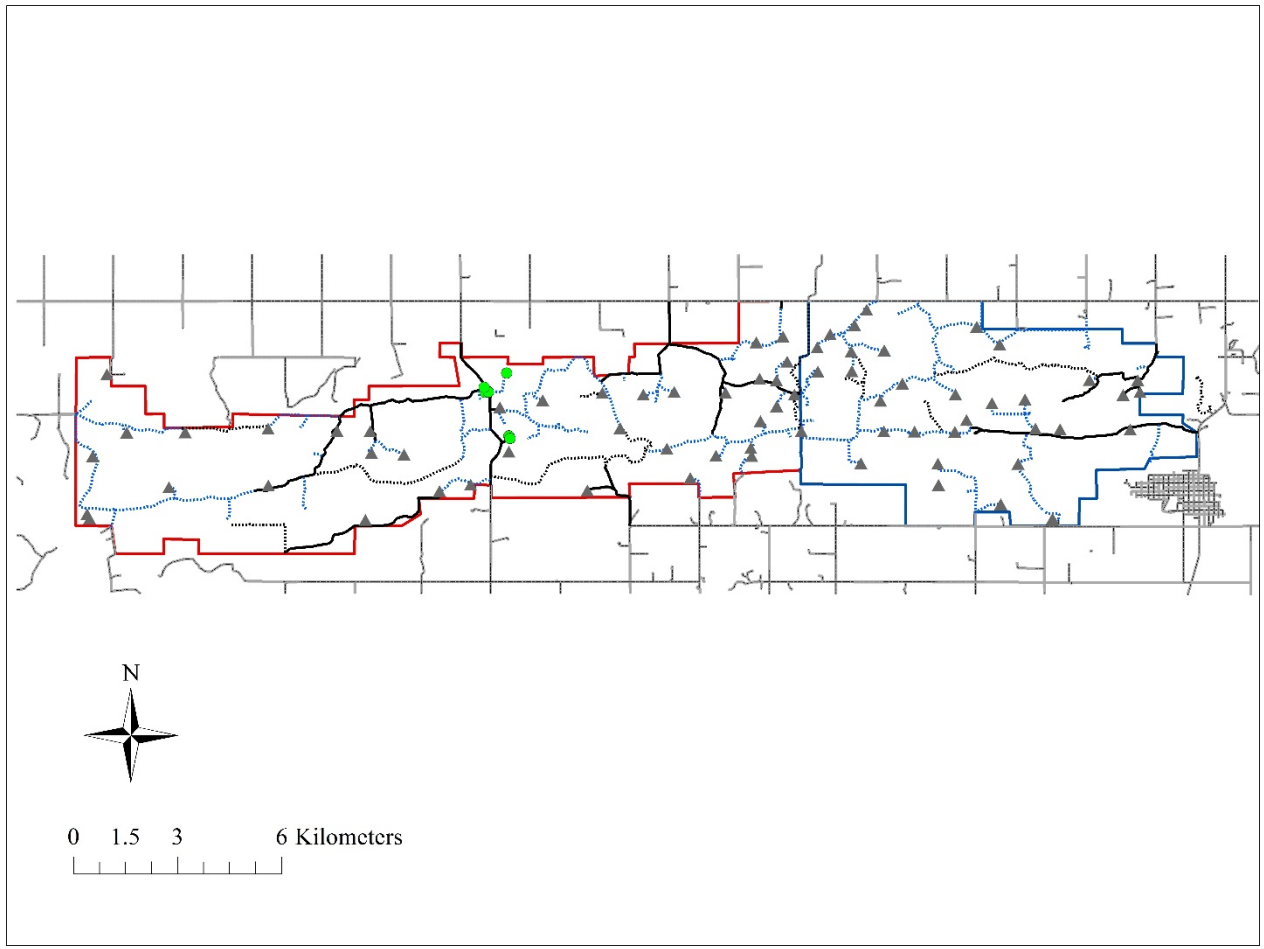
Table A1. Mean northern bobwhite *Colinus virginianus* hunter (w_h) selection indices for vegetation cover types on the Packsaddle Wildlife Management Area, Ellis County, Oklahoma. Hunters provided data during the 2004–2005 and 2005–2006 hunting seasons. This table was adapted from Richardson et al. (2008) and reprinted with permission from the Southeastern Association of Fish and Wildlife Agencies.

Slope (%), distance (m) to road, Hoagland classification	Hunters		
	w_h[1]	SE	Use[2]
≤3, <500			
Agriculture and oil field	1.5	0.44	O
Little bluestem and switchgrass	1	0.32	O
Shinnery oak and little bluestem	1.1	0.23	O
Sand sagebrush and little bluestem	2	0.36	+
Rare vegetation	0.7	0.19	O
≤3, 500-<1,500			
Agriculture and oil field	0.2	0.09	-
Little bluestem and switchgrass	0.4	0.21	-
Sideoats grama prairie	1.4	0.29	O
Shinnery oak and little bluestem	0.8	0.24	O
Sand sagebrush and little bluestem	1.5	0.23	+
Wetland	0.3	0.23	-
Rare vegetation	1.5	0.71	O
≤3, 1,500-<2,500			
Sideoats grama prairie	1	0.35	O
Shinnery oak and little bluestem	<0.1	0.04	-
Wetland	0.2	0.11	-
Rare vegetation	1.2	0.45	O
≤3, ≥2,500			
Wetland	0.2	0.16	-
Rare vegetation	0.4	0.33	-
>3, <500			
Little bluestem and switchgrass	1.7	0.86	O
Sideoats grama prairie	1.6	0.42	O
Shinnery oak and little bluestem	1	0.25	O
Sand sagebrush and little bluestem	1.8	0.34	+
Rare vegetation	0.5	0.18	-
>3, 500-<1,500			
Sideoats grama prairie	1.2	0.23	O
Shinnery oak and little bluestem	0.5	0.15	-
Sand sagebrush and little bluestem	1.5	0.25	+
Rare vegetation	0.8	0.24	O
>3, 1,500-<2,500			
Sideoats grama prairie	0.9	0.22	O
Shinnery oak and little bluestem	<0.1	0.03	-
Rare vegetation	1.5	0.41	O
>3, ≥2,500			
Sideoats grama prairie	<0.1	0.02	-
Rare vegetation	0.2	0.14	-

[1] $w_h = o_h/\pi_h$ (o_h = proportional use of cover types by an individual hunting party (h) as the ratio of hunting-path length within a cover type to total path length during a hunt and π_h = proportional availability of cover type i).

[2] - implies avoidance, O implies neutral use, and + implies selection based on CI of selection indices for northern bobwhite hunters.

Figure A1. Map of unit boundaries[1], roads[2], buildings (green circles), and oil/gas structuress (grey triangles) on Beaver River Wildlife Management Area, Beaver County, Oklahoma.



[1] The hunted unit is indicated by a red boundary line while the non-hunted unit is indicated by a blue boundary line.
[2] County roads are represented by grey solid lines, primary wildlife management area roads are represented by black solid lines, restricted (truck/ATV) wildlife management roads are represented by blue dotted lines, and restricted (ATV only) wildlife management roads are represented by black dotted lines.

Figure A2. Theoretical hunting pressure[1] on the Beaver River Unit at Beaver River WMA, Beaver County, Oklahoma. This model was calculated from hunter cover selection indices based on vegetation cover types, distance from roads, and percent slope as determined by Richardson et al. (2008).

[1] Blue indicates no hunting pressure, grey indicates low theoretical hunting pressure, pink indicates medium theoretical hunting pressure, and red indicates high theoretical hunting pressure. Two safety areas excluded hunting on the hunted (west) study unit.