Importance of livestock facilities for wintering ring-necked pheasant

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The study objectives were to evaluate ring-necked pheasant winter habitat selection and provide managers and landowners with knowledge to aid in the management of the species on private and public lands. Our findings demonstrate the importance of farmsteads that contain livestock to pheasants during the winter months in southwestern North Dakota.

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Summary

Determining habitat use and preference of ring-necked pheasants *(Phasianus colchicus)* allows land managers to improve their understanding of the species and alter the landscape habitats to improve the vitality of the population. Winter habitat is a common limiting factor to pheasant populations throughout North Dakota.

Understanding pheasant needs and preferences allows managers and landowners to create ideal wintering habitats to potentially increase winter survival and the overall number of pheasant on the landscape. During this study, pheasants were captured and equipped with radio collars (n = 192) to be followed, and their habitat use was recorded until their demise or the end of the study. Pheasants were tracked and their locations recorded from Jan. 1 to April 1 for the cold, wet winter of 2011 and the mild, dryer winter of 2012. Although climatologically quite different, pheasants showed a high level of habitat use and preference toward farmsteads with livestock, irrelevant of climatic conditions.

Introduction

Introduced to North America in 1881, ring-necked pheasant are a highly sought after game bird with much research conducted regarding their ecology (Trautman, 1982; Johnson and Knue, 1989). Due to high winter mortality, many pheasant habitat studies have focused on winter survival and its relationship to cover and food plot habitat types (Dumke and Pils, 1973; Gabbert et al., 1999).

The objective of this study was to assess winter pheasant habitat use and movements in southwestern North Dakota. The usage of a resource is defined as the quantity of the resource that is utilized (Manly et al., 2002). The assumption is that species will select resources that are best able to satisfy their life requirements, therefore increasing the populations' viability (Manly et al., 2002). This research was conducted to examine winter habitat use of radio-collared pheasants to provide insight to managers attempting to alter lands to increase pheasant numbers for recreational opportunities.

Procedures

The study was conducted on approximately 58,000 acres of public and privately owned lands near Hettinger, N.D., in Adams County. The study area receives approximately 16 inches of precipitation annually, with the average winter temperature (January through March) of approximately 16 F and average summer temperature (June through August) of approximately 66 F (NDAWN 2012).

For the duration of our study, we monitored male and female pheasants equipped with 12-gram necklace-type radio transmitters. We used trapping and handling techniques that were approved by the North Dakota State University Institutional Animal Care and Use Committee (Protocol #A11034). We monitored pheasant movements two to three times per week using telemetry equipment. Pheasant locations were recorded using handheld global positioning system (GPS) devices.

Habitat preference is defined as the disproportionate use of some resources versus others (Gabbert et al., 1999). Habitat selection is the act of the animal choosing a particular resource. Habitat use is the quantity of a habitat resource being utilized (Johnson, 1980). We estimated habitat selection and preference using logistic regression and resource selection function analyses. The selection ratios (Table 1) were converted into odds of selection among the habitat types considered by using resource selection function techniques (Table 2) (McDonald et al., 2005).

Habitat type was broken into seven categories: Conservation Reserve Program (CRP) cover, range cover, shelterbelts, wetlands,

Table 1. Logistic regression output for second-order selection for a population of pheasants equipped with radio collars during the winters of 2011 and 2012 in southwestern North Dakota, Jan, 1 to April 1.

Parameter	Coefficient	Standard Error	Chi-Squared	Prob. > X^2
		Winter 2011[a]		
β_0- Intercept	0.86	0.319	7.23	0.0072
CRP	-0.79	0.325	5.92	0.0150
Crop	-1.47	0.332	19.54	<0.0001
Farmstead	2.91	0.441	43.35	<0.0001
Range	-3.84	0.352	119.05	<0.0001
Wetland	0.09	0.383	0.06	0.8129
Shelterbelt	2.41	0.395	37.10	<0.0001
		Winter 2012[b]		
β_0- Intercept	-2.05	0.475	18.70	<0.0001
CRP	2.45	0.481	26.05	<0.0001
Crop	1.22	0.483	6.41	0.0114
Farmstead	3.58	0.554	41.78	<0.0001
Range	0.65	0.551	1.40	0.2364
Wetland	3.49	0.520	45.21	<0.0001
Shelterbelt	3.12	0.600	27.01	<0.0001

[a]Winter 2011- Observed (n=1,863); Random (n=1,863).
[b]Winter 2012- Observed (n=882); Random (n=882).

croplands, farmsteads and other (primarily urban areas). We designated the population's available habitat and general study area by using 2010 NAIP imagery to designate cover types and delineated each cover type. The observed data points (used habitat) then were overlain and intersected with the digitized map to quantify observed habitat use for each bird in the population.

Winter resource selection was estimated using 2,745 observed pheasant locations during the two winters of our study. We collected and analyzed data on pheasants during the winters of 2011 and 2012 from Jan. 1 to April 1.

Table 2. Estimated values for the resource selection function presenting estimated relative probability of selection among each habitat type used (*P*- value < 0.05) from a population of pheasants equipped with radio collars in southwestern North Dakota (ns- refers to "not significant" at 95% confidence level).

Habitat Type	$w(x_i)^c$	$w(x_i)/\sum w(x_i)^c$	$w(x_i)^c$	$w(x_i)/\sum w(x_i)^c$
	Winter 2011[a]		Winter 2012[b]	
Other	1.00	0.032	1.00	0.009
CRP	0.45	0.015	11.59	0.108
Crop	0.23	0.007	3.39	0.032
Farmstead	18.36	0.588	35.87	0.334
Range	0.02	0.001	ns	ns
Wetland	ns	ns	32.79	0.306
Shelterbelt	11.13	0.357	22.65	0.211
Totals	31.20	1.000	107.28	1.000

[a]Winter 2011- Observed (n=1,863); Random (n=1,863); (Jan. 1 – March 31).
[b]Winter 2012- Observed (n=882); Random (n=882); (Jan. 1 – March 31).
[c]Resource Selection Function: $w(x_i)$= values from selection ratios; $w(x_i)/\sum w(x_i)$= probability (odds) of habitat use

Results and Discussion

During the comparatively harsh winter of 2011, pheasants showed strong selection for farmsteads and shelterbelts and avoidance toward CRP, crop and range cover types, compared with the "other" habitat category (Table 1; as indicated by a positive coefficient).

The mild winter of 2012 revealed pheasant selection toward CRP, crop farmsteads, wetlands and shelterbelts when compared with the "other" category (Table 1). Table 2 presents the relative probability of selection for each of the seven habitat types for each winter, based on observed pheasant locations in our study (the higher the $w(x_i)$ indicates an increased probability of selection).

Selection differences between the harsh winter of 2011 and the mild winter of 2012 were evident. Our research suggests that during harsher winters, pheasants spend up to 59 percent of their time on farmsteads. Although the odds of observing an individual pheasant on a farmstead decreased to 33 percent in 2012, in both winters, farmsteads with livestock were the most preferred winter habitat type in our study.

Our results support previous findings that pheasants show plasticity in their selection of habitats that varies with weather and season (Homan et al., 2000). Habitat selection of North American ring-necked pheasants tends to follow a sequence that progresses from CRP-type grasslands to cattail wetlands and finally to dense shelterbelts in proximity to farmsteads with livestock (Gabbert et al., 1999; Homan et al., 2000) with increasing weather severity.

For areas of pheasant habitat in southwestern North Dakota, dense shelterbelts in proximity to livestock or another food source may be the limiting winter habitat on the landscape. Managers interested in increasing pheasant populations should consider increasing available CRP-type cover, large wetlands and dense shelterbelts in proximity to farmsteads with livestock. This combination of habitat types will allow for on-site pheasant use and inhabitance during the full-range of North Dakota's climatic conditions.

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Literature Cited

Dumke, R.T., and C.M. Pils. 1973. Mortality of radio-tagged pheasants on the Waterloo Wildlife Area. Wisconsin Department of Natural Resources Technical Bulletin No. 72. Madison, Wis.

Gabbert, A.E., A.P. Leif and L.D. Flake. 1999. Survival and habitat use of ring-necked pheasants during two disparate winters in South Dakota. J. Wildl. Manage. 63:711–722.

Homan, H.J., G.M. Linz and W.J. Bleier. 2000. Winter habitat use and survival of ring-necked pheasants *(Phasianus colchicus)* in southeastern North Dakota. American Midland Naturalist 143:463–480.

Johnson, D.H. 1980. The comparison of usage and availability measurements of evaluating resource preference. Ecology 61:65-71.

Johnson, M.D., and J. Knue. 1989. Feathers from the Prairie: A short story of upland gamebirds. North Dakota Game and Fish Department, Bismarck, N.D.

Manly, B.F.J., L.L. McDonald, D.L. Thomas, T.L. McDonald and W.P. Erickson. 2002. Introduction to Resource Selection Studies in Resource Selection by Animals. Second Edition. Kluwer Academic, Boston, Mass.

McDonald, L.L., J.R. Alldredge, M.S. Boyce and W.P. Erickson. 2005. Measuring availability and vertebrate use of terrestrial habitats and foods. Pages 465-488 in C.E. Braun, editor. Techniques for wildlife investigations and management. Sixth edition. The Wildlife Society, Bethesda, Md.

NDAWN. 2012. North Dakota Agricultural Weather Network, North Dakota State University. Accessed on Feb. 23, 2012, www.ndawn.ndsu.nodak.edu.

Trautman, C.G. 1982. History, ecology and management of ring-necked pheasant in South Dakota. South Dakota Department of Game, Fish and Parks, Pierre, S.D. South Dakota Pittman-Robertson Federal Aid Project W-75-R, Wildlife Research Bulletin No. 7.