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BEHAVIOR AND HABITAT PREFERENCES OF RING-NECKED PHEASANTS DURING LATE WINTER IN CENTRAL UTAH

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ABSTRACT.— Ring-necked pheasant behavior and habitat preferences were studied during late February along benches of the Wasatch Mountains in central Utah. Seven behavioral categories were used to classify pheasant activities during three time periods of the day. Eating, alert, and movement behavior were the most frequent activities during all periods of the day. Significant differences ($p<.01$) were found between morning and midday behavior and between midday and evening behavior. Pheasants fed in open areas during morning hours then retreated into heavy cover during midday periods. The birds remained in heavy cover until late afternoon. Pheasants then moved away from heavy cover into semiopen areas to feed as evening approached.

The ring-necked pheasant (*Phasianus colchicus*) is a native of eastern Asia. Its first successful importation into the United States was in Oregon in 1881 (Allen 1956). Later, in 1888, the birds were also successfully transplanted into the eastern part of the United States (Rue 1980). Pheasants were introduced into the state of Utah about 1890 (Rawley and Bailey 1972). Distribution of pheasants in Utah has increased so that nearly all suitable habitat is occupied. This habitat is primarily within the irrigated farmlands of the state, which comprises about 2 to 4 percent of the total land area (Olsen 1977). The pheasant population of Utah reached a peak in the 1950s and has steadily decreased. This downward trend has been a result of habitat deterioration (Nish 1973).

Pheasant distribution is primarily affected by the habitat, soil, and climate of an area. Christensen (1951) found that together soils and climate determined whether or not pheasants occurred in an area of Missouri. Dale (1956) has suggested that a combination of high temperature and high humidity have probably inhibited the spread of pheasants into the southeastern United States. Soils and climate restrict pheasant distribution because climate controls soil development and food quality. Climate is especially important during the nesting season because hens leave their eggs for a period of time after laying, thus exposing them to climatic conditions (Graham and Hesterberg 1948). Pheasant eggs generally show reduced hatchability as temperatures increase (Yeatter 1950). Wood and Brotherson (1982) found that nesting sites were specifically dependent upon total living ground cover and high amounts of cover surrounding the nesting cavity.

Soils seem to influence pheasant distribution through their effects on vegetation. In the United States much of the fertile soil is cultivated with corn and other grains, which have been shown to be preferred pheasant food (Leedy and Hicks 1945). Christensen (1951) reported that the distribution of pheasants in Missouri coordinated with highly fertile soils used for agriculture. Edminster (1954) agreed that pheasants preferred agricultural land that produced grain. Pheasants showed similar distribution patterns in Wisconsin (Hine 1964), Ohio (Leedy and Hicks 1945), and Illinois (Kimball et al. 1956). In Montana and Utah, conversion of grain-producing acreage to hayfields has resulted in a decline of pheasant densities (Weigand 1973, Nish 1973). Winter cover and nesting habitat are the two major deficiencies in pheasant habitat in the Great Lake States (MacMullan 1961, McCabe et al. 1956), the Dakotas (Kimball et al. 1956), the northwest (Lauckhart and McKean 1956), New York (Perry 1946), and California (Hart et al. 1956). In areas of Utah where adequate cover is lacking, winter kill of pheasants has been shown to be high (Yeager et al. 1956). Wood and Brotherson (1981) found that in most areas of Utah over-

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winter pheasant mortality was not due to winter weather.

Pheasants are omnivorous; eating waste grains, weed seeds, green vegetation, and numerous insects (Rue 1980, Olsen 1977, Rawley and Bailey 1972). Different proportions of these foods are eaten depending on area, location (Cottam 1929, Swenk 1930, Gigstead 1937, Fried 1940, Trautman 1952, Korschgen 1964), and the age of the bird (Rue 1980, Edminster 1954). In Utah, adult pheasant diets are comprised mostly of grain (36.7 percent) and vegetation (20.4 percent) (Cottam 1929). In the midwest, 70 to 85 percent of the total diet of adult pheasants is cultivated grains (Dalke 1937, Trautman 1952, Korschgen 1964, Fried 1940, Gigstead 1937, Swenk 1930). Juvenile birds, for the first three weeks, eat insects (Rue 1980, Edminster 1954, Dalke 1937, Loughrey and Stinson 1955) then switch to vegetation after that. Few studies have been done on actual daily behavioral patterns of the ring-necked pheasant. Burger (1966) studied aggressive territorial behavior of male ring-necked pheasants during the mating season. Kuck et al. (1970) reported on the renesting behavior of hen pheasants in South Dakota. This paper is concerned with habitat preferences and daily behavior patterns of pheasants in central Utah during late February.

Study Area

The study area (40 ha) is located on a bench of the Wasatch Mountains near Provo, Utah. Thirty percent of the area is a shrub study plot used by the Intermountain Forest and Range Experiment Station, 20 percent is a mature apricot orchard (used for pasture) and 50 percent is native rangeland. The area has a western aspect with loamy cumulic calcixeroll soils. Slopes are generally 3 to 10 percent and elevation is approximately 1400 m (4600 ft). A housing tract is located on the lower edge of the study area, and one paved and heavily used road runs through the center of the area.

Methods

Five days of 4 to 8 hours each were spent observing pheasants during 20–24 February 1982. Days during which the study took place were generally clear and sunny with some scattered clouds. Approximately 15 to 25 cm (6–10 in) of snow was on the ground when the study was initiated but melted before completion. Temperatures on these days ranged from 35 F in the morning hours to 60 F during afternoons. Observations were made with the aid of binoculars and a 20 power spotting scope. One individual was chosen (a male normally) and observed closely. At one-minute intervals, the individual was classified as to his behavior at that moment. The behavior classes considered were: eating, resting, grooming, aggressive, alert, movement, and comfort behavior (Table 1). In between the minute evaluations, interaction between the selected individual and others, as well as other activities that influenced the group, were recorded. Habitat utilized by the birds was also noted and later classified into habitat types.

Results and Discussion

Pheasant behavior was variable during the day but was very similar during morning and

Table 1. Activities associated with each behavior category.

Category	Behavior
Eating	Head is down, pecking material on the ground.
Resting	Eyes closed and relaxed.
Grooming	Fluffing feathers.
Aggressive	Cause another bird to move or pecking other birds.
Alert	Watching, alert, and ready to fly. Looking at something moving or making noises close by.
Movement	Walking, running, or flying.
Comfort	Looking without being alert and not at anything in particular. Scratching.

Table 2. Behavioral classes and percent of time spent in each class during three time periods.

Behavioral class	Morning 6:00–10:00 (percent)	Midday 10:00–4:00 (percent)	Evening 4:00–8:00 (percent)
Eating	47.5	7.0	51.5
Resting	0.0	1.0	0.0
Grooming	3.5	4.0	0.5
Aggressive	2.5	2.0	0.5
Alert	31.5	50.0	22.0
Movement	14.5	32.0	20.5
Comfort	0.5	4.0	6.5

evening hours (Table 2). Approximately 50 percent of the time spent during these periods was in eating, and another 40 to 45 percent of the time was divided between alert (25 percent) and/or movement (20 percent) behavior (Table 2). Grooming, aggressive, and comfort behavior contributed the balance of the time spent (6–7 percent). However, during midday periods, most of the time was spent in being alert (50 percent) and/or moving (32 percent) (Table 2). Eating behavior during this period was reduced to 7 percent. Evening behavior of pheasants, though similar to morning periods, seemed to be less affected by noises made by man. There was a highly significant difference ($p<.01$) in the amount of time spent in each behavior category across a day. Chi-square tests showed no significant difference in behavior patterns between morning and evening periods of the day. However, significant differences ($p<.01$) were observed between morning and midday behavior and between midday and evening behavior ($p<.01$). Eating, alert, and movement behavior were the most frequent activities during all times of the day. Spearman's rank correlation (Snedecor and Cochran 1968) showed no significant differences between rankings of observed behavior during morning, midday, and evening.

Habitats utilized by the pheasants were classified into 5 types. Table 3 shows these habitat types and their major associated plant species. Habitat preference varied between periods of the day (Table 4). During morning hours, pheasants were observed to be in areas that offered little cover and where pasture grasses were available (Tables 3, 4). Numerous insects were observed in the grass pasture. The birds may have been eating the insects rather than the vegetation. They moved to areas of heavier cover (ditch banks and fence rows) as activities of man increased and as disturbances from other animals increased. During midday periods, all pheasants observed were found in fence rows or ditch

TABLE 3. Species list in each habitat type.

Species	Orchard grass apricot pasture	Orchard grass apricot pasture fence row	Wooded fence row	Ditch banks	Forest Service plots
Agoseris glauca	x	x	x		
Agropyron repens	x			x	
Agropyron spicatum	x	x	x	x	x
Ambrosia psilostachya	x	x	x	x	x
Artemisia tridentata					x
Bromus tectorum	x	x	x	x	x
Ailanthus altissima			x		
Chrysothamnus nauseosus					x
Cirsium arvense	x	x			
Cirsium vulgare	x	x			
Descurainia sophia	x	x		x	x
Dactylis glomerata	x	x	x	x	
Erodium cicutarium			x	x	x
Grindelia squarrosa				x	x
Kochia prostrata					x
Kochia scoparia	x	x		x	x
Linaria vulgaris					x
Penstemon spp.					x
Petradoria pumila				x	x
Poa secunda	x	x	x	x	x
Prunus armenica	x	x			
Populus angustifolia			x		
Populus fremontii			x	x	
Rosa woodsii		x	x		
Robinia pseudoacacia			x		
Salix fragilis			x		
Salsola kali				x	
Syringa vulgaris			x		
Ulmus pumila		x			
Xanthium spp.	x	x			

TABLE 4. Habitat and cover preferences and percent of time spent in each habitat.

Habitat type	Morning (percent)	Midday (percent)	Evening (percent)
Orchard grass apricot pasture	29	17	0
Orchard grass apricot pasture fence row	62	0	0
Wooded fence rows	0	21	0
Ditch banks	9	62	54
Forest Service plots	0	0	46

banks (Table 4). Evening hours were spent along ditch banks and shrub plots that offered some cover but which were generally more open than the areas frequented at midday.

Movement from open areas in the morning to areas of heavier cover (i.e., ditch banks and fence rows) depended on the amount and kind of disturbances in the immediate area. Cars starting and children walking to and from school generally caused the pheasants to move slowly into heavier cover. Pheasants ran and flew as crows passed overhead. Middays were spent in heavy cover and the birds did not move unless flushed. Evenings were generally spent feeding and moving away from heavy cover while being very cautious and aware of the activities around them.

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