SPRING, SUMMER, AND FALL FOODS OF THE COLUMBIAN SHARP-TAILED GROUSE IN EASTERN WASHINGTON

ROBERT E. JONES

The western race of Sharp-tailed Grouse (*Pedioecetes phasianellus columbianus*) has declined from abundance to a scattered low-density status in the state of Washington (Yocom, 1952; Buss and Dziedzic, 1955). These grouse were extremely common until 1910–1915 when they disappeared over much of their original range. Buss and Dziedzic (1955) have related the disappearance of the birds to the destruction of essential habitat by agricultural practices. A thorough understanding of the habitat used by these birds is a necessary precedent to wise grouse management and preservation. Food, an important part of the habitat, is discussed in this report.

This study was conducted primarily on a 10,000-acre area in Lincoln County located 6 miles south of Creston, Washington. The study area falls within the *Artemisia-Agropyron* vegetation zone as described by Daubenmire (1942). Sharp-tailed Grouse are restricted at present to the so-called channeled scablands of this area. Fall collections are from an area north of the study area in Okanogan County, also within the *Artemisia-Agropyron* vegetation zone.

MATERIALS AND METHODS

Procuring samples of food materials of species at low population levels or at times other than the hunting season usually is difficult. In the case of an endangered species, such as this grouse, collecting digestive tracts for analysis was not feasible; consequently analysis of fresh droppings was used. Swanson (1940) found that "Practically anything eaten by these birds will have recognizable remnants in the feces." Spring booming-ground counts indicated that at the most there were 50 birds using the study area. During the spring and summer of 1964 a total of 169 fresh droppings was gathered by carefully searching areas from which birds were flushed. In addition a series of 14 crops, collected in 1954, were analyzed and included to give a more complete food-use picture.

Availability of food plants at each flush point was evaluated by a series of ten 0.1 m^2 plots set at 1-meter intervals across the flush area. Plot frames of heavy steel wire 0.2 × 0.5 m were used. From each line of plots, plant species were recorded as being either present or absent. Presence by plot was translated as per cent occurrence for food-availability figures for each flush point.

Dropping analysis was essentially that of Korschgen (1962) with the following modifications. Samples were soaked briefly until soft and gently teased apart. Different food materials were then separated while still wet. These were then identified, and their fractional volume was estimated visually and recorded as a percentage of the total. Estimations of less than 1.0 per cent were reported as a trace.

Crops were analyzed by the dry method, in which crop contents were removed from the specimen and allowed to dry. The items were then separated, measured, and recorded. Volumes were recorded to the nearest 0.1 cm^2; if there was less than 0.1 cm^2, the item was recorded as a trace. Crop analysis should better represent the volume of food consumed by the birds when compared with dropping analysis. At the same time the dropping analysis should better represent the variety and frequency of use of certain foods due to the larger sample and longer collection period. Be-

TABLE 1

SHARP-TAILED GROUSE FOODS IN 169 DROPPINGS, COMPARED WITH FOOD AVAILABILITY DETERMINED BY MEASURING 350 0.1 M^2 PLOTS

Food item[a]	Spring (120 collections)			Summer (49 collections)			Ident. foods ranked by food index
	Per cent total vol.	Frequency of occurrence in per cent	Availability per cent occur.	Per cent total vol.	Frequency of occurrence in per cent	Availability per cent occur.	
Plant foods							
Taraxacum officinale (fl, l, & s)	1.1	18	3	2.4	41	13	1
Ranunculus glaberrimus (fl & s)	2.2	33	16	0	0	–	2
Other flowers	1.1	11	–	0	0	–	–
Poa pratensis (l)	0.6	14	6	0.5	14	15	3
Poa secunda (l)	4.2	40	65	0	0	19	4
Bromus tectorum (l & s)	1.0	35	74	0.5	16	75	5
Hordeum jubatum (l)	0.1	3	–	0.9	6	–	–
Festuca idahoensis (l)	0.3	8	18	0	0	–	–
Agropyron spicatum (l)	0.4	10	16	trace	2	13	–
Other grasses	5.1	45	–	6.5	55	–	–
Total plant materials	96.4	100		96.2	100		
Animal foods							
Coleoptera							
Curculionidae	trace	3	–	0.4	10	–	–
Carabidae	0.6	1	–	0.2	2	–	–
Unidentified	2.7	41	–	1.4	49	–	–
Hymenoptera							
Formicidae	0.1	7	–	0.1	6	–	–
Unidentified insects	0.7	25	–	0.8	27	–	–

[a] (fl) = flowers, (l) = leaves, and (s) = seeds.

cause of the time interval, geographic difference, and seasonal difference the two samples reported here are complementary rather than directly comparable. Unknown materials were compared with herbarium specimens collected at the same time and with known seed samples. Plant nomenclature follows that of Davis (1952).

From availability of food plants and frequency occurrence of food items in the droppings a food index calculation was made following Hungerford's (1957) equation:

$$\text{Food index} = \frac{\text{Per cent use} \times (100 \text{ per cent available})}{100},$$

where per cent use is the per cent occurrence of the food item in Sharp-tailed Grouse droppings, and per cent available is the per cent occurrence of the food plant in the 0.1 m^2 plot samples.

It is assumed that there is a relationship between food availability and the number of times the food plant occurs in the sample. The food index values have then been ranked with the lowest numbers representing the plants having the greatest value to the grouse in terms of preference when related to availability.

TABLE 2
FALL FOODS OF THE COLUMBIAN SHARP-TAILED GROUSE AS REPRESENTED BY 14 CROPS FROM TUNK CREEK, OKANOGAN COUNTY, WASHINGTON, OCTOBER 1954

Food item	Per cent total volume	Frequency of occurrence in per cent
Plant foods		
Taraxacum officinale, seeds	36.8	64
Grass leaves	23.2	93
Composite leaves	6.7	64
Epilobium sp.	0.6	28
Animal foods		
Grasshoppers	32.3	57

RESULTS

Green plant materials represented the major portion of the diet of the Columbian Sharp-tailed Grouse during the spring and summer months. The green materials most important volumetrically were grass blades, which comprised one-half of the total food materials in the spring and three-fourths during the summer (table 1). Sandberg bluegrass (*Poa secunda*), the most important of these green materials during the spring, was found in 40 per cent of the droppings.

Parts of flowers formed one-quarter of the identified food materials in the spring and summer months. Particularly important were flower parts of early buttercup (*Ranunculus glaberrimus*) in March, April, and May, and dandelion (*Taraxacum officinale*) in May, June, and August.

Fall foods (table 2) consisted primarily of plant materials with dandelion seeds and grass leaves again the leading foods. Swenk and Selko (1938) have reported dandelion as being the most important food of a fall sample of crops of the Sharp-tailed Grouse in Nebraska.

Animal foods, primarily insects, formed a minor component of the spring and summer diet of the Sharp-tailed Grouse. Of the three species of prairie grouse, including in addition to Sharp-tailed Grouse, the Greater and the Lesser Prairie Chicken (*Tympanuchus cupido* and *T. pallidicinctus*, respectively), that I have studied the Sharp-tails have consumed the least amount of animal food (Jones, 1963). Various beetles made up the greatest part of the animal foods during spring and summer, while grasshoppers made up a third of the fall foods.

Of the 51 different food items recorded, 38 were plant foods. Those items greater than 0.1 per cent of the total volume are listed in tables 1 and 2. Those found in quantities less than 0.1 per cent are as follows.

Plant foods: *Lomatium piperi, Lithophragma bulbiferum, Elymus condensatus, Tragopogon dubius, Delphinium nelsoni, Artemisia tridentata, Lithospermum ruderale, Galium watsonii, Cryptantha simulans, Lupinus sericeus, Achillea lanulosa, Poa bulbosa, Plantago purshii, Veronica persica, Agoseris laciniata, Sisymbrium longipedicellatum, Orthocarpus tenuifolius, Lactuca* sp., *Lepidium perfoliatum, Rumex crispus, Melilotus alba, Phlox douglasii, Hordeum* sp., *Avena fatua, Madia* sp., *Polygonum* sp., *Pseudotsuga menziesii, Picea* sp., *Triticum vulgare*, and unidentified moss.

Animal foods: Hemiptera (Pentatomidae, Nabidae, and others), Orthoptera, Coleoptera (Scarabaeidae, Elateridae, Coccinellidae) and larvae of various insect orders.

DISCUSSION

An animal's choice of food is governed by the availability of a particular food and the preference of the animal for a given food item. *Poa secunda* was an abundant potential food material (available in 65 per cent of the plots) and was found in a relatively large number of food samples (40 per cent frequency of occurrence) in the spring. *Bromus tectorum*, on the other hand, available in abundance in spring and summer (available in 74 and 75 per cent of the plots) formed a much lower part of the food resource used (35 and 16 per cent frequency of occurrence). *Taraxacum officinale*, on the other hand, was not readily available (3 and 13 per cent occurrence) yet was evidently sought out by the birds (18 and 41 per cent frequency of occurrence) as a food item.

Before modern man appeared in eastern Washington, the habitat of the Columbian Sharp-tailed Grouse did not contain two of the most important foods of these birds today, *Taraxacum officinale* and *Bromus tectorum*. Other foods such as *Poa secunda*, *Poa pratensis*, *Festuca idahoensis*, and *Agropyron spicatum* have decreased considerably because of man's impact upon the environment. In areas where habitat destruction has not been complete, the Sharp-tails have apparently been able to adapt to the "new" food resources and thus maintain themselves in relatively low numbers. This has included adoption of the non-native species as a relatively large portion of their diet.

SUMMARY

One-hundred-sixty-nine fresh droppings and 14 crops of the Columbian Sharp-tailed Grouse were analyzed to determine the more important spring, summer, and fall foods. Foods consumed were correlated with availability of the food materials within known grouse habitat. Green leaves, particularly grass blades, were the predominant food of these birds during the spring and summer. The two most important identified food plants proved to be the native *Poa secunda* in the spring, and the exotic *Taraxacum officinale* in the summer and fall.

ACKNOWLEDGMENTS

This study was supported by funds from a Grant-in-Aid of research by the Society of the Sigma Xi. Equipment and logistic support was furnished by Washington State University. The writer acknowledges the field assistance of Washington State Game Biologist J. C. Adkins. Fall food samples were analyzed by Del Konschu, Department of Zoology, Washington State University. Unknown seeds were verified by comparison to seed collections at Washington State University and Patuxent Wildlife Refuge.

LITERATURE CITED

Buss, I. O., and E. S. Dziedzic. 1955. Relation of cultivation to the disappearance of the Columbian Sharp-tailed Grouse from southeastern Washington. Condor, 57:185–187.

Daubenmire, R. F. 1942. An ecological study of the vegetation of southeastern Washington and adjacent Idaho. Ecol. Monogr., 12:53–79.

Davis, R. J. 1952. Flora of Idaho. William C. Brown Co., Dubuque, Iowa.

Hungerford, K. E. 1957. Evaluating Ruffed Grouse foods for habitat improvement. Trans. 22nd N. Amer. Wildl. Conf. p. 380–395.

Jones, R. E. 1963. Identification and analysis of Lesser and Greater Prairie Chicken habitat. J. Wildl. Mgmt., 27:757–778.

KORSCHGEN, L. J. 1962. Food habits of Greater Prairie Chickens in Missouri. Amer. Midl. Nat., 68:307–318.

SWANSON, G. 1940. Food habits of the Sharp-tailed Grouse by analysis of droppings. J. Wildl. Mgmt., 4:432–436.

SWENK, M. H., and L. F. SELKO. 1938. Late autumn food of the Sharp-tailed Grouse in Western Nebraska. J. Wildl. Mgmt., 2:184–189.

YOCOM, C. F. 1952. Columbian Sharp-tailed Grouse (*Pedioecetes phasianellus columbianus*) in the state of Washington. Amer. Midl. Nat., 48:185–192.

Department of Zoology, Washington State University, Pullman. (Present address: Department of Entomology and Applied Ecology, University of Delaware, Newark, Delaware.) *4 November 1965.*