SUMMER FOODS OF SANDHILL CRANES IN IDAHO[1]

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ABSTRACT.—The digestive tracts of 20 greater sandhill cranes collected at Grays Lake, Idaho in 1972 and 1973 were analyzed for food habits. Their diet contained 8 plant, 8 insect, and 1 annelid species. Plants made up 73% of the total by volume, insects and earthworms 27%. Important foods include timothy corms, short-horned grasshoppers, and fly larvae. Comparison of food items consumed and food available supports the conclusion that cranes are opportunistic and omnivorous feeders.—*Idaho Cooperative Wildlife Research Unit, U.S. Fish and Wildlife Service, University of Idaho, Moscow, Idaho 83843.* Accepted 14 June 1976.

LITTLE is known about summer foods of Greater Sandhill Cranes (*Grus canadensis tabida*). According to Walkinshaw (1949: 3), Sandhill Cranes eat mainly insects, grubs, spiders, rootlets, tender herbage, grain, berries, and occasionally mice. Barrows (1912: 150) said they feed on roots, grains, bulbs, berries, insects, frogs, lizards, snakes, and mice. Hamerstrom (1938) mentioned cranes in Wisconsin feeding on huckleberries (*Gaylussacia baccata*), blueberries (*Vaccinium* sp.), grasshoppers (*Melanoplus femur-rubrum*), and beetles. Others (Munro 1950, Boeker et al. 1961, Madsen 1967, Guthery 1972) worked primarily with fall and winter populations, where cranes fed primarily in grain fields and pastures.

METHODS

This paper reports on summer foods of cranes at Grays Lake in Bonneville and Caribou Counties in southeastern Idaho. This region supports the largest known breeding concentration of Greater Sandhill Cranes (Drewien and Bizeau 1974). A high altitude marsh (1,946 m above sea level) forms the core of Grays Lake basin. About 80% of the marsh proper is covered with emergent vegetation, mainly hardstem bulrush (*Scirpus acutus*) with lesser amounts of cattail (*Typha latifolia*). The marsh is bordered by sedges (*Carex* spp.), rushes (*Juncus* spp.), and a multitude of grasses and forbs. About 200 breeding territories of cranes almost completely encircle the edge of the 8,900-ha marsh.

At Grays Lake cranes begin arriving in late March and April and feed in marshland, upland meadow, and foothill habitats until early August. The birds then utilize grain fields extensively until they leave in September.

Data for this study are based on the upper digestive tracts of 20 adult sandhill cranes collected primarily for analysis of pesticide and heavy metal residues. Nine specimens were pair-bonded individuals collected on breeding territories along the marsh edge; the remaining 11 were taken on upland feeding sites.

Eight cranes were collected in 1972, four in late June and four in late July. Twelve were collected in 1973 from mid-June to early July. Most were collected during morning and evening feeding hours. Esophagus, proventriculus, and gizzard contents were removed and stored in 20% formalin. As the esophagus and proventriculus contained only small amounts of food, the contents of all three organs were combined.

Contents were washed, separated, identified, and measured volumetrically by water displacement. In gizzards that contained only one food item, unidentified material was assumed to be identical to the identifiable material. Contents were appraised by the aggregate volume method (Martin et al. 1946).

To establish the availability of vegetational foods at the feeding sites at time of collection, we used a canopy-coverage method similar to that described by Daubenmire (1959). Ten 20- × 50-cm plots were placed along a 100-m transect at 10-m intervals. All plants within or overhanging the plot frame were recorded for frequency of occurrence and percentage canopy coverage by species. Plant identification follows Hitchcock (1950), Davis (1952), and Hitchcock and Cronquist (1973). Seed identification is after Martin and Barkley (1961), and insect identification follows Borror and DeLong (1971).

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TABLE 1
SUMMER FOOD ITEMS FOUND IN 20 GREATER SANDHILL CRANES AT GRAYS LAKE, IDAHO, 1972–73

Food item	Percent total volume of entire sample	Frequency of occurrence (No. cranes/20)
Vegetation		
Timothy corms (*Phleum pratense*)	68	11
Grass rachises (Gramineae)	2	2
Lupine seeds (*Lupinus* sp.)	1	2
Horsetail (*Equisetum* sp.)	1	2
Barley (*Hordeum vulgare*)	<1	1
Burreed seeds (*Sparganium eurycarpum*)	<1	1
Unidentified seeds	<1	1
Unidentified rootlets	<1	1
Unidentified plant	1	10
Animal		
Short-horned grasshopper (*Melanoplus sanguinipes*)	11	7
Fly larvae (Sarcophagidae)	6	3
Cutworm (*Agrotis vetusta*)	3	8
Narrow-winged damselfly (Coenagrionidae)	1	6
Carrion beetle (*Silpha ramosa*)	1	8
Click beetle (*Ctenicera carbo*)	<1	3
Click beetle larvae	<1	1
Robber fly (*Cyrtopogon* sp.)	<1	1
Ichneumon wasp (*Compsocryptus* sp.)	<1	1
Earthworm (Oligochaeta)	<1	2
Unidentified insect	4	9

RESULTS

The diet contained 8 plant species, 8 insect species, and 1 annelid (Table 1). Plants made up 73%, and insects and earthworms made up 27% of the total diet.

Plant foods.—Timothy grass (*Phleum pratense*) corms were the most prevalent food, making up 68% of total volume and occurring in 11 cranes. Although timothy was the most common plant in the sampling plots (Table 2), it made up only 19% of total plant composition. Other plant foods taken in small amounts included grass rachises, horsetail (*Equisetum* sp.) vegetative parts, seeds of barley and lupine (*Lupinus* sp.), and broad-fruited burreed (*Sparganium eurycarpum*).

Animal foods.—The short-horned grasshopper (*Melanoplus sanguinipes*) was the most common insect consumed; it made up 11% of the total diet and occurred in seven cranes. Fly larvae (Sarcophagidae), found in 3 cranes, made up 6% of total contents. Less important animal foods included cutworms (*Agrotis vetusta*), narrow-winged damselflies (Coenagrionidae), carrion beetles (*Silpha ramosa*), click beetles and larvae (*Ctenicera carbo*), earthworms (Oligochaeta), robber flies (*Cyrtopogon* sp.), and ichneumon wasps (*Compsocryptus* sp.). Carrion beetles were found in small quantities in eight cranes. Cranes were often seen turning over and feeding under piles of cow manure, a likely source of this beetle.

DISCUSSION AND CONCLUSIONS

Timothy grass corms were the principal food of the 20 cranes collected. Table 3 shows the relationship between the amount of timothy in the diet and in vegetational canopy at feeding sites where the cranes were collected. All sampling plots but one indicated a preference for timothy corms.

Grass rachises made up 2% of total contents. These were found only in two birds that had been feeding heavily on grasshoppers, and were probably ingested inciden-

TABLE 2

PERCENT CANOPY COVERAGE OF VEGETATION OCCURRING IN SAMPLE PLOTS AT GREATER SANDHILL CRANE FEEDING SITES, GRAYS LAKE, IDAHO

Species	Percent canopy coverage	Species	Percent canopy coverage
Grasses and grasslike plants		Forbs (cont.)	
Timothy (*Phleum pratense*)	19	Little sunflower (*Helianthella uniflora*)	1
Kentucky bluegrass (*Poa pratensis*)	15	Lupine (*Lupinus* sp.)	1
Smooth brome (*Bromus inermis*)	10	Red clover (*Trifolium pratense*)	1
Needlegrass (*Stipa lemmonii*)	4	Sorrel (*Rumex crispus*)	1
Redtop (*Agrostis alba*)	1	Scarlet gilia (*Gilia aggregata*)	<1
Foxtail (*Hordeum jabatum*)	<1	Arrowleaf balsamroot (*Balsamorhiza sagittata*)	<1
Giant wildrye (*Elymus cinereus*)	<1	Purple milk-vetch (*Astragalus agrestis*)	<1
Sedges (*Carex* spp.)	5	Horse-mint (*Agastache urticifolia*)	<1
Rushes (*Juncus* spp.)	<1	Mulesear (*Wyethia amplexicaulis*)	<1
Forbs		Dandelion (*Taraxacum officinale*)	<1
Wild geranium (*Geranium viscosissiumum*)	17	Owl clover (*Orthocarpus luteus*)	<1
Yarrow (*Achillea lanulosa*)	7	Elk thistle (*Cirsium scariosum*)	<1
Aster (*Aster* sp.)	5	Horsetail (*Equisetum* sp.)	<1
Buttercup (*Ranunculus* sp.)	1	Shrubs	
Buckwheat (*Eriogonum*)	1	Green rabbitbrush (*Chrysothamnus viscidiflorus*)	5
Flax (*Linum kingii*)	1	Three-tipped sagebrush (*Artemisia tripartita*)	2
		Big sagebrush (*Artemisia tridentata*)	1

tally with the grasshoppers. Lupine seeds constituted 19% of total food in one pair of cranes, and lupine made up 18% of the vegetation in the sample plots at this site.

Grasshoppers made up only 1% of the contents of cranes collected in late June 1972 and less than 1% in all 12 cranes collected in 1973, but they constituted more than half (56% by volume) of the contents of a group of four cranes collected in June 1972 during a major grasshopper irruption that summer in southern Idaho (U.S. Dept. Agr. 1972).

Other insects in the diet also seem to reflect availability. For example, cutworms (*Agrotis vutusta*) made up 39% of the contents of three cranes collected 18–21 June, but they constituted only about 5% of the contents of five birds collected 3–7 July 1973. Visual sampling indicated a corresponding downward trend in cutworm populations during this period.

Observations of others provide further evidence that cranes are omnivorous and opportunistic feeders. Nelson (1887) reported Lesser Sandhill Cranes (*G. c. canadensis*) feeding on the previous year's crowberries (*Empetrum nigrum*), heathberries, and an occasional lemming or mouse. Harvey et al. (1968) reported Lesser Sandhill Cranes feeding readily on Blue Goose (*Chen caerulescens*) eggs and Willow Ptarmigan (*Lagopus lagopus*) chicks when available. C. D. Littlefield (pers. comm.) has seen

TABLE 3

COMPARISONS OF TIMOTHY (*PHLEUM PRATENSE*) OCCURRENCE IN PLANT TRANSECTS AND IN CRANE DIET

Transect number	Percent canopy coverage for timothy	Percent volume of timothy in diet of collected cranes (sample size)
1	2	86 (1)
2	29	82 (3)
3	37	98 (3)
4	2	0 (2)
5	14	70 (4)

Greater Sandhill Cranes swallow young Gadwalls (*Anas strepera*) and Mallards (*Anas platyrhynchos*), Red-winged Blackbird (*Agelaius phoeniceus*) eggs, mice, frogs, and earthworms in eastern Oregon. R. Drewien (pers. comm.) watched a pet crane eat several newly hatched Barn Swallows (*Hirundo rustica*).

The small sample size of only 20 cranes precludes any major conclusions concerning summer food habits of Greater Sandhill Cranes at Grays Lake. Except for a strong preference for timothy corms, the cranes apparently fed on whatever was available, as reflected in comparisons of diet with plant composition on the feeding sites and their consumption of large amounts of certain insects when in abundance.

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LITERATURE CITED

BARROWS, W. B. 1912. Michigan bird life. East Lansing, Michigan Agr. College.

BOEKER, E. L., J. W. ALDRICH, AND W. S. HUEY. 1961. Study of experimental Sandhill Crane hunting season in New Mexico during January 1961. U.S. Dept. Interior, Fish Wildl. Serv., Spec. Sci. Rept. Wildl. No. 63.

BORROR, D. J., AND D. M. DELONG. 1971. An introduction to the study of insects. New York, Holt, Rinehart, and Winston.

DAUBENMIRE, R. 1959. A canopy-coverage method of vegetational analysis. Northwest Sci. 33: 43–64.

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

DREWIEN, R., AND E. G. BIZEAU. 1974. Status and distribution of Greater Sandhill Cranes in the Rocky Mountains. J. Wildl. Mgmt. 38: 720–742.

GUTHERY, F. S. 1972. Food habits, habitat, distribution, numbers, and subspecies of Sandhill Cranes wintering in southern Texas. Unpublished M.S. thesis, College Station, Texas A&M Univ.

HAMERSTROM, F. N., JR. 1938. Central Wisconsin crane study. Wilson Bull. 50: 175–184.

HARVEY, J. M., B. C. LIEFF, C. D. MACINNES, AND J. P. PREVETT. 1968. Observation on behavior of Sandhill Cranes. Wilson Bull. 80: 421–425.

HITCHCOCK, A. S. 1950. Manual of the grasses of the United States. U.S. Dept. Agr. Misc. Publ. 200.

HITCHCOCK, C. L., AND A. CRONQUIST. 1973. Flora of the Pacific Northwest. Seattle, Univ. Washington Press.

MADSEN, C. R. 1967. Food and habitat selection by fall migrant Sandhill Cranes in Kidder County, North Dakota. Unpublished M.S. Thesis, East Lansing, Michigan State Univ.

MARTIN, A. C., AND W. D. BARKLEY. 1961. Seed identification manual. Berkeley, Univ. California Press.

———, R. H. GENSCH, AND C. P. BROWN. 1946. Alternate methods in upland game bird food analysis. J. Wildl. Mgmt. 10: 8–12.

MUNRO, D. A. 1950. A study of the economic status of Sandhill Cranes in Saskatchewan. J. Wildl. Mgmt. 14: 276–284.

NELSON, E. W. 1887. Natural history collection made in Alaska, 1877–1881, U.S. Army Signal Service, Arctic Series. No. 3: 19–230.

U.S. DEPT. AGR. ANIMAL AND PLANT INSPECTION SERVICE. 1972. Federal and state plant protection programs. Coop. Econ. Insect Rept. 22: 485–486.

WALKINSHAW, L. H. 1949. The Sandhill Crane. Cranbrook Inst. Sci. Bull. 29.