Presumably, chicks fledging at heavier weights are more likely to survive than lighter fledglings as they have energy reserves to see them through the critical period of early flight and independence from their foster parents. If the relationship between host size and cowbird chick growth rate is real, one would expect parasites to choose nests of larger species (or individuals) in which to deposit their eggs. There are several possible disadvantages, however, to parasitizing large species, including: (1) birds larger than the cowbird could inflict serious injury to the parasite if the latter is caught at the nest, (2) large birds normally lay larger eggs and hatchability of parasite eggs is lower in nests with large host eggs than in nests of hosts similar in size to the cowbird (Wiley 1982), and (3) competitive interactions between large host chicks and cowbird chicks (particularly where host brood sizes are normal; all the parasitized grackle nests I watched had below average brood sizes) may put the parasite nestlings at a disadvantage in obtaining food from the adult. Therefore, I would expect cowbirds to parasitize species larger than grackles only rarely.

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Autumn Sandhill Crane habitat use in southeast Oregon.—Greater Sandhill Cranes (*Grus canadensis tabida*) of the Central Valley Population (CVP) are residents of the Pacific states and southern British Columbia, nesting primarily in southcentral and eastern Oregon and northeast California (Littlefield and Thompson, Proc. Int. Crane Workshop 2:113–120, 1979). Although the population has been studied extensively since the mid-1960s, many aspects of the life history of the population have not been presented.

Considerable information has been published on roosting habitat (e.g., Lewis, Proc. Int. Crane Workshop 1:93–104, 1976; Bennett, M.S. thesis, Univ. Wisconsin, Stevens Point, Wisconsin, 1978; Lovvorn and Kirkpatrick, J. Wildl. Manage. 45:842–857, 1981) and field use (Guthery, M.S. thesis, Texas A&M Univ., College Station, Texas, 1972; Lovvorn and Kirkpatrick, J. Wildl. Manage. 46:99–108, 1982) of Sandhill Cranes in the west central and midwestern states. Most studies, however, were on wintering and traditional spring and autumn stopover areas, and little information has been published on an autumn staging area. Melvin and Temple (Proc. Int. Crane Workshop 3:73–87, 1981) defined an autumn staging area as a locality where cranes congregate during the first segment of fall migration, usually no more than a day's flight from nesting areas, whereas a traditional stopover area was described as a congregation area along the migration route. Malheur National Wildlife Refuge (NWR), Harney Co., in southeast Oregon has been the major fall staging area for the CVP at least since the late 1930s.

TABLE 1

YEAR AND PEAK NUMBER OF GREATER SANDHILL CRANES ON MALHEUR NATIONAL WILDLIFE REFUGE, OREGON

Year	N	Year	N
1938	700	1962	1350
1940	766	1963	1740
1941	700	1964	1500
1942	989	1965	1800
1943	1165	1966	2000
1944	1500	1967	2400
1945	1500	1968	2000
1946	1000	1969	2000
1947	1200	1970	2929[a]
1948	1000	1971	2711
1949	800	1972	974
1950	1000	1973	1319
1951	1000	1974	563
1952	1000	1975	2056
1953	1000	1976	1651
1954	500	1977	2855
1955	2000	1978	2614
1956	2000	1979	3408
1957	1400	1980	2157
1958	2000	1981	2179
1959	2000	1982	2502
1960	1200	1983	2295
1961	1200	1984	2720

[a] Since 1970, cranes have been counted individually.

As with other populations of Sandhill Cranes, the CVP declined after European settlement (Littlefield and Thompson 1979). From the 1930s through the 1960s, however, the subspecies increased in numbers in the Pacific states. The population reached a peak in 1970, then began declining in portions of its nesting range. Concern for the CVP was first reported in the mid-1970s as low annual recruitment became evident after 1972 (Littlefield, Proc. Int. Crane Workshop 1:86–92, 1976). In 1982, the population was placed on the U.S. Fish and Wildlife Service Sensitive Species List for Region 1, and in 1983 was classified as rare on the California State List.

In autumn, grainfields and favorable roosting sites attract cranes onto Malheur NWR before birds migrate southwest to wintering areas in the California Central Valley. Autumn Sandhill Crane numbers were estimated from 1938 through 1969; however, counts of individuals begun in 1970 have continued through 1984 (Table 1). Information on roost sites and autumn crane use collected from 1966 through 1984 is summarized in this report.

Study area.—Malheur NWR, Oregon, contains 73,219 ha, is 43 km at its widest point, and is 77 km long. The majority of habitat within the refuge consists of shallow marsh-native meadows with an interspersion of shrub-grass covered uplands. Approximately 325 ha of grainfields provide autumn feeding habitat for Sandhill Cranes. All grainfields are located within 7.6 km of roosting sites.

History of autumn crane use.—Successful grain farming occurred on Malheur NWR between 1940 and the mid-1960s. The farming program was limited from the mid-1960s until 1975. During this period, there was no grain production in some years, resulting in limited autumn crane use. Since 1975, grain crops have been present annually. During poor crop years, peak crane numbers were low, but with consistent grain production after 1975, numbers increased (Table 1). Information on autumn use before 1938 was not available.

Formerly, while cranes were moving onto Malheur NWR in late September and early October, other cranes, which had been present since July and August, began leaving for wintering areas. As grain farming stabilized after 1975, this early departure has been mostly eliminated. However, in some years, inclement weather conditions have resulted in earlier than normal departure.

Autumn staging.—Sandhill cranes usually start to move onto refuge grainfields in mid-July. However, in some years, a few cranes visit fields in late June, these birds probably being unsuccessful pairs that had nested locally. In drought years, a larger number of cranes concentrated on the refuge in July as food sources elsewhere within the summer range of the population became depleted. This condition occurred in 1973 and 1977 when 393 and 238 cranes, respectively, were recorded between 15–31 July (Table 2).

Crane numbers were relatively stable through August, with the major influx not occurring until late September and early October. Peak numbers were usually present by mid-October, but if mild fall weather persisted or an abundance of feeding areas was available off the refuge, the peak was delayed until early November.

Fall migration usually began in October. In 1969 and 1971, however, cereal grain production was minimal, and the last cranes were observed in 1969 on 24 September (30) and in 1971 on 9 September (1). Cranes were seen leaving the refuge on 23 August 1968, another year with low food availability (E. McLaury, pers. comm.). Normally, the majority of cranes migrated between 1–15 November. In 1981, no cranes were seen after 1 November although an abundance of food was available. The 1981–82 winter in southeast Oregon was one of the most severe in recent years and this probably contributed to their early departure. Occasionally, a few cranes lingered into December, but normally all had migrated by the end of November (Table 3). Latest fall departures were recorded on 10 December 1947 (2), 20 December 1951 (1), 31 December 1961 (1), 11 December 1965 (1), and 15 December 1977 (4). The mean departure date for 39 years was 16 November.

Based on color-marked birds, unsuccessful nesting pairs and subadults were usually the first to arrive on refuge grainfields, and these individuals were often the first to migrate. Pairs with young were among the last to migrate. This behavior was similar to that reported from other Sandhill Crane concentration areas (Herter, Proc. Int. Crane Workshop 3:273–280, 1981; Miller and Hatfield, J. Wildl. Manage. 38:234–242, 1973).

Roosting sites.—Several roosting sites on Malheur NWR have been used regularly since studies began in 1966. These sites included Buena Vista Pond, Diamond Pond, and Boca Lake. Mean water depth at roosting sites was 11.7 cm (range = 4.0–22.4 cm). Water depths at Malheur NWR were within the range of those reported elsewhere (Lewis 1976; Lovvorn and Kirkpatrick 1981; Perkins and Brown, Arizona Game and Fish Dept. Spec. Publ. 11, 1981). All refuge sites were in types 3, 4, and 10 wetlands as described by Shaw and Fredine (U.S. Fish and Wildl. Serv. Circ. 39, 1971). Roost sites averaged 2.2 km (range = 0.8–7.6 km) from feeding areas. Distances from roost sites to grainfields were less than those reported for Sandhill Cranes on wintering and traditional stopover areas (Lewis 1976; Crete and Toepfer, U.S. Fish and Wildl. Serv. Rept., Twin Cities, Minn., 1978; Lovvorn and Kirkpatrick 1982). Distances flown to feeding sites did not seem influenced by weather conditions as reported from other regions (Guthery 1972; Lovvorn and Kirkpatrick 1982; Perkins and Brown 1981; Walkinshaw, The Sandhill Cranes, Cranbrook Inst. Sci. Bull. 29, Bloomfield

TABLE 2

NUMBER OF GREATER SANDHILL CRANES ON THE MALHEUR NWR STAGING AREA

Period	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
15 Jul.–31 Jul.	393	160	—	148	238	61	—	—	—	25	—	133
1 Aug.–15 Aug.	452	309	276	188	317	176	251	248	335	324	120	242
16 Aug.–29 Aug.	545	421	328	215	453	205	359	348	398	338	206	257
30 Aug.–12 Sept.	664	580	448	441	698	284	402	425	524	377	413	418
13 Sept.–26 Sept.	795	580	860	617	1160	795	709	1028	771	583	1049	943
27 Sept.–10 Oct.	201	111	957	1637	2623	2016	2663	1631	1525	2340	2295	1921
11 Oct.–24 Oct.	45	—	1565	1145	2855	2614	2016	2157	2179	2346	537	2720
25 Oct.–14 Nov.	—	—	2279	395	2067	849	3408	647	422	2502	4	82
15 Nov.–28 Nov.	—	—	597	—	1039	—	6	404	—	179	—	5
29 Nov.–15 Dec.	—	—	—	—	57	—	2	—	—	1	—	—

TABLE 3
LATEST FALL OBSERVATIONS OF GREATER SANDHILL CRANES AT MALHEUR NWR, OREGON

Year	Date	N	Year	Date	N
1944	19 Nov.	(150)	1966	17 Nov.	(2)
1945	17 Nov.	(76)	1967	6 Dec.	(13)
1946	13 Nov.	(3)	1968	23 Nov.	(23)
1947	10 Dec.	(2)	1969	24 Sept.	(30)
1948	8 Nov.	(2)	1970	1 Dec.	(6)
1949	4 Nov.	(3)	1971	9 Sept.	(1)
1950	11 Nov.	(5)	1972	7 Nov.	(65)
1951	20 Dec.	(1)	1973	18 Nov.	(1)
1952	20 Nov.	(10)	1974	23 Oct.	(?)
1955	2 Nov.	(12)	1975	23 Nov.	(13)
1956	3 Nov.	(300)	1976	11 Nov.	(75)
1957	22 Nov.	(1)	1977	15 Dec.	(4)
1958	20 Oct.	(10)	1978	3 Nov.	(49)
1959	15 Oct.	(50)	1979	5 Dec.	(2)
1960	14 Oct.	(130)	1980	31 Dec.	(2)[a]
1961	31 Dec.	(1)	1981	31 Oct.	(368)
1962	14 Nov.	(13)	1982	31 Dec.	(1)[a]
1963	30 Nov.	(10))	1983	7 Nov.	(4)
1964	17 Nov.	(100)	1984	16 Nov.	(5)
1965	11 Dec.	(1)			

[a] Wintered.

Hills, Michigan, 1949). The close proximity of Malheur NWR grainfields to roost sites probably accounted for this difference.

Sandhill Crane intolerance to human disturbance seemed less important on Malheur NWR than reported elsewhere (Lewis 1976, Perkins and Brown 1981). The Diamond Pond Roost was within 100 m of a well-traveled highway and was bordered on one side by a dike and three sides by low growth saltgrass (*Distichlis stricta*). Saltgrass separated the site from the highway. Buena Vista Roost was within 0.8 km of a human residence, but visibility was restricted by dense hardstem bulrush (*Scirpus acutus*). Other roost sites on the refuge, however, were isolated from human activity.

Roost sites on Malheur NWR have ranged from ca 0.5 to 120 ha. As with other reported roost sites, water was clear with little turbidity. Lewis (1976) reported winter roost sites had little submergent vegetation, whereas Bennett (1978) and Lovvorn and Kirkpatrick (1981) found cranes used sites with heavy submergent growth in Wisconsin and Indiana, respectively. Roost sites had no substantial growths of submergent vegetation on Malheur NWR.

Loafing sites.—The nearest water from feeding areas was often used for loafing, but some cranes regularly flew to the roost site used the previous night. Loafing sites included shallow ponds, sloughs, lakes, and canals. Loafing areas other than roosting sites were usually small bodies of water with short vegetation. Visibility was sometimes restricted along canals, but usually a few cranes stood on adjoining uplands while other birds loafed in the canal. Dry areas near loafing sites were often used for sitting and sleeping. Dominant vegetation on loafing sites included giant burreed (*Sparganium eurycarpum*), foxtail barley (*Hordeum jubatum*), creeping wildrye (*Elymus triticoides*), and saltgrass. Mowed, flooded meadows were used extensively when available.

Feeding sites.—Most autumn feeding sites on Malheur NWR were in barley fields; however, in some years oat, rye, and wheat fields also were used. Refuge crop plantings have been entirely of barley in recent years. Cranes showed no special preference among oats, rye, and barley, but did prefer wheat when it was available. Wheat has also been reported as a preferred autumn food from other areas within the species' range (Bennett 1978, Hoffman, Proc. Int. Crane Workshop 1:35–43, 1976; Munro, J. Wildl. Manage. 14:276–284, 1950; Stephen, Can. Wildl. Serv. Rept. 2, 1967).

Fields used for feeding ranged from 10 to 138 ha. Cranes periodically shifted feeding sites and preferred harvested areas. Shortly after passage of harvesting equipment, cranes moved onto the stubble. Three factors were believed responsible for this behavior: (1) An abundance of loose grain: before harvest, cranes pluck an entire seed head and pick each kernel from the head individually. This behavior was not necessary after harvest, as seeds were readily available on the ground. (2) Increased visibility: coyotes (*Canis latrans*) commonly hunt in grainfields in the fall; no cranes have been observed being attacked by coyotes in unharvested fields, but some losses may occur. Coyotes were observed attacking and killing adult cranes on four occasions in 1979. These attacks were in harvested areas, but dense vegetation adjacent to irrigation ditches provided the necessary concealment for surprise attacks. Unharvested grain probably provides additional concealment habitat for mammalian predators. (3) Increased escape capabilities: Sandhill Cranes usually escape by running until take-off speed is attained. In tall vegetation, cranes have been seen returning to the ground after their initial leap because of insufficient speed for flight. Golden Eagles (*Aquila chrysaetos*) regularly hunted over crane feeding areas. Cranes left fields rapidly when eagles approached, and take-off capabilities were improved with the shorter vegetation in harvested fields.

Discussion.—Malheur NWR has a long history of use in autumn by Sandhill Cranes. Cereal grain crops have been available during most years since the 1930s. These crops provide a valuable food source for premigratory cranes in the Pacific Flyway. Compared to other Sandhill Crane populations (Drewien, Ph.D. diss., Univ. Idaho, Moscow, Idaho, 1973; Crete and Toepfer 1978; Melvin and Temple 1981), the CVP has a relatively short distance (ca 465 km) to migrate before reaching its wintering areas. Unlike other populations, however, the CVP has to migrate against prevailing southwest winds. Few days in autumn have favorable migratory conditions in southeast Oregon. Favorable conditions normally last 3–4 days; therefore, it is perhaps important for cranes to have sufficient energy reserves to make the flight. Although some CVP members do stop between Malheur NWR and the California Central Valley, others have been known to fly nonstop.

The importance of protected and abundant autumn food sources may have been underestimated. If Malheur NWR grainfields were eliminated, the majority of the CVP possibly could be detrimentally affected (ca 80–85% congregate on Malheur NWR in autumn). This would be so particularly if alternate feeding areas were not available within the population's summer and fall range. In addition, with continual degradation of California wintering habitat, it may become essential to attract and maintain cranes in southeast Oregon for longer periods.

In the Great Lakes states, Crete and Toepfer (1978), Melvin and Temple (1981), and Walkinshaw and Hoffman (Jack-Pine Warbler 52:102–114, 1974) reported the rapid departure of Sandhill Cranes on the opening day of waterfowl hunting. I have seen similar behavior in southeast Oregon. Protected feeding and roosting sites (nonhunted) on Malheur NWR have provided ideal autumn habitat for the CVP for the past 40 years. Presently, the refuge is probably the most important autumn use area for Greater Sandhill Cranes in the Pacific states.

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Diets of House Sparrows in urban and rural habitats.—The House Sparrow (*Passer domesticus*) is a familiar and important member of the urban avifauna. A close association with man has been a major factor in its success (Summers-Smith, The House Sparrow, Collins, London, England, 1967; Robbins, pp. 3–9 *in* A Symposium on the House Sparrow [*Passer domesticus*] and European Tree Sparrow [*P. montanus*] in North America, S. C. Kendeigh, ed., Ornithol. Monogr. 14, 1973). Despite its abundance and widespread distribution, relatively little is known of the ecology and behavior of the House Sparrow in urban habitats. Previous studies of food habits (Kalmbach, U.S. Dept. Agric. Tech. Bull. 711, 1940; Southern, Annals Appl. Biol. 32:57–67, 1945; Hammer, Danish Rev. Game Biol. 1: 3–59, 1948) generally have focused on agricultural populations. More recently, Seel (Ibis 111:36–47, 1969) reported diets of nestlings from suburban areas and agricultural villages in England.

The objectives of this study were to determine the food habits of urban House Sparrows during the breeding season, and to compare their diet with that of nearby rural sparrows. We also tested the reliability of tartar emetic (antimony potassium tartrate) as a technique for collecting food samples from sparrows.

Study area and methods.—The study area comprised separate urban and rural areas in Centre County, Pennsylvania. A 1.3-km^2 portion of the Borough of State College constituted the urban site, and included the business district plus neighboring residential areas. The urban area was arbitrarily divided into 15 blocks of approximately equal area, each containing one sparrow trap site. The rural area consisted of nine farms 8–16 km from State College. All were small family farms, 60–80 ha in size, raising dairy or beef cattle and crops primarily of corn and hay.

House Sparrows were captured in mist nets or unbaited Potter traps from 26 April through 28 July 1981 and were classified by age and sex. A trapping schedule of 2 days in the urban area to 1 day in the rural area was established to maintain fairly equal numbers of captures in each habitat throughout the study period. Also, a rotation of farms and urban trap sites was followed to ensure equal trapping pressure over the study areas. All trapping was done between 06:00 and 15:00 EDT.

Two methods were employed to obtain food samples from captured House Sparrows: (1) tartar emetic (antimony potassium tartrate), a local stomach irritant, was administered to all birds to stimulate regurgitation; and (2) a sample of sparrows was sacrificed and their stomachs removed. Each bird received an oral 0.4-cc dose of 0.5% solution of tartar emetic, and was placed in a darkened box lined with a plastic tray for 15 min. Regurgitated food was rinsed from the tray into storage vials containing 10% formalin solution. After treatment with the emetic, 322 birds were sacrificed. Stomachs and crops were removed and preserved in 10% formalin.

In the laboratory, food samples were rinsed on a nylon net sieve of 28 meshes/cm, and volumes of regurgitated and combined stomach and crop samples (hereafter called stomach samples) were measured by water displacement. Food items were identified with the aid of