

Wilson Bull., 92(1), 1980, pp. 114–116

Observations of a White-winged Crossbill invasion of southeastern Manitoba.—

Crossbills are interesting because of their irruptive tendencies and erratic breeding schedules. The movements and breeding biology of the Red Crossbill (*Loxia curvirostra*) have been studied extensively in Europe (Newton, pp. 337–357 in *Animal Populations in Relation to Their Food Resources*, A. Watson, ed., Blackwell, Oxford, England, 1970) and to a lesser extent in North America (Bailey and Niedrach, *Denver Mus. Nat. Hist.*, Mus. Pict. No. 9, 1953; Tordoff and Dawson, *Condor* 67:416–422, 1965). The White-winged Crossbill (*L. leucoptera*) has received little attention in this regard, especially in North America. Godfrey (*The Birds of Canada*, Natl. Mus. Bull., No. 203, 1966) indicates that it winters throughout much of the boreal coniferous forest in Canada, although its local occurrence within this range varies erratically from year to year (Bent, U.S. Natl. Mus. Bull. 237, 1968). In southeastern Manitoba, at Pinawa (50°09'N, 95°55'W), where Christmas bird counts have been conducted since 1967 (Audubon Field Notes, 1967–70; *Am. Birds*, 1971–1976), White-winged Crossbills have been recorded only 3 times (1968, 1971, 1975). None was seen by Sealy during extensive field work in the winters of 1974 and 1974–75, nor since 1975–76, the period of the invasion under study here.

From late October 1975 to early April 1976, we studied aspects of a White-winged Crossbill invasion in southeastern Manitoba. Only 11 Red Crossbill flocks were seen during this period. Most of our observations were made within a 160 km radius of Hadashville, Manitoba (49°40'N, 95°55'W). Collins' and Sexton's observations were ancillary to Collins' study of the Great Gray Owl (*Strix nebulosa*). Sealy made day-trips every 7–10 days into the study area.

Southeastern Manitoba is forested (see Gill, Forest Serv., Man. Dept. Mines and Resources, Rept. No. 1, 1956) with black spruce (*Picea mariana*, 37%), aspen (*Populus tremuloides*, 21%), jack pine (*Pinus banksiana*, 19%), tamarack (*Larix laricina*, 7%) and white spruce (*Picea glauca*, 3%). All other trees comprise less than 1% of the tree species composition.

Thirty-two White-winged Crossbill specimens (Univ. Man. Zool. Mus. Nos. 386–417) were obtained between 12 November 1975 and 27 March 1976; most of these were killed on roads in the area (see Meade, *Auk* 59:439, 1942; Baker, *Blue Jay* 23:79–80, 1965). None of these individuals was molting wing feathers. All birds obtained up to 5 December 1975, were actively molting on the body; by 8 January 1976, when further specimens were obtained, this

TABLE 1
BODY CONDITION OF WHITE-WINGED CROSSBILLS

Date ¹	Age/sex (N)	Body weight (±SD) ² (g)	Fat ³	Body molt	Gonad ⁴
Nov.–Dec.	ad. ♂♂ (6)	27.1 ± 2.0	1.0	+	≤1.0
Nov.–Dec.	ad. ♀♀ (7)	25.8 ± 1.2	1.4	+	≤1.0
Jan.–Mar.	ad. ♂♂ (10)	28.2 ± 3.6	3.6	–	≤1.0
Jan.–Mar.	ad. ♀♀ (8)	24.8 ± 1.9	2.8	–	≤1.0

¹ Thirteen specimens (UMZM 386–396, 398, 399) obtained between 12 November and 5 December 1975, and 18 (UMZM 400–417) between 8 January and 27 March 1976.

² Mean body weight for all males (N = 16), 27.9 ± 1.3 g; for all females (N = 15) 25.3 ± 1.7 g. The juvenile male (UMZM 397) taken on 15 November 1975, weighed 25.8 g.

³ Subcutaneous fat based on scale 0 (extremely lean) to 4 (extremely fat).

⁴ Length (mm) of left testes in males; diameter (mm) of largest follicle in females.

TABLE 2
MEANS OF MEASUREMENTS OF WHITE-WINGED CROSSBILLS FROM SOUTHEASTERN
MANITOBA, NOVEMBER 1975 TO MARCH 1976

Characters	Adult		Juvenile
	♂♂ (N = 16)	♀♀ (N = 15)	♂♂ (N = 1)
Exposed culmen	15.4 ± 0.44	15.1 ± 0.44	14.2
Bill height	8.4 ± 0.20	8.1 ± 0.25	8.2
Bill width	9.4 ± 0.30	8.6 ± 0.40	9.2
Wing chord	87.4 ± 1.42	83.9 ± 1.83	85.7
Tarsus	16.4 ± 0.41	15.7 ± 0.34	16.8
Tail	55.5 ± 2.04	54.7 ± 2.24	54.8

molt had ceased (Table 1). The males weighed slightly more (Table 1) and averaged slightly larger than females in all characters measured (Table 2). The reverse was found in Asian White-winged Crossbills (*L. l. bifasciata*) by Kokhanev and Gaev (*in* Pine Crossbills, Nethersole-Thompson, ed., Poyser, Berkhamsted, 1975).

The mean (±SD) flock size we observed was 10.4 ± 9.3 individuals; the median was 14. In 118 flocks, males (pink, red or orange in the plumage) comprised 26.3% of the flocks and females and young (dark with yellow), 73.7%. In White-winged Crossbills, the age composition of flocks which have invaded Scandinavia has varied from adults only (Newton 1970) to predominantly juveniles (G. Notini, *in* Lack, The Natural Regulation of Animal Numbers, Oxford Univ. Press, Oxford, England, 1954; Hildén, Ornis Fenn. 37:51–55, 1960). Wynne-Edwards (Animal Dispersion in Relation to Social Behaviour, Oliver and Boyd, London, England, 1962) reported that adult males migrated later than the females and young. Our small and possibly biased sample of specimens contained 16 males, 15 females and a single juvenile (UMZM 397), the latter obtained on 15 November 1975. The juvenile, a heavily streaked individual, was the only immature we identified positively. Phillips (Bird-Banding 48:110–117, 1977) pointed out that in the Red Crossbill up to 10% of females show some red in their plumage. Therefore we cannot determine with certainty from sight observations the sex and age structure of the invading population we studied.

Our observations of 117 feeding flocks of White-winged Crossbills revealed that 83% fed on tamarack, 12% on black spruce, 3% on white spruce and 1% on white cedar (*Thuja occidentalis*) and forbs. Feeding flocks, very visible in the deciduous tamaracks, were almost invisible in spruce. Therefore we considered that a bias may exist in our observations. The mean (±SD) flock size of White-winged Crossbills seen feeding in tamarack was 10.5 ± 6.5 compared to 5.6 ± 4.1 for the other conifer species. This suggests that we did not see all of the individuals in conifers with needles present. However, to determine whether tamaracks were indeed their preferred feeding trees, we watched 17 flocks fly over predominantly black spruce habitat; 16 flocks settled and foraged on tamarack, the other on black spruce. Furthermore, of 7 flocks seen leaving tamarack stands 5 flew to other tamaracks and 2 to black spruce to feed. From these 2 flocks, 2 or 3 individuals left to feed again in tamarack (which may account for the smaller flocks observed in coniferous trees other than tamarack).

The diverticula and stomachs of 24 White-winged Crossbills all contained tamarack seeds. One specimen contained more white spruce seeds than tamarack and 2 or 3 white spruce seeds were present in 2 other specimens. Arthropod remains and black spruce seeds were present in trace amounts in 3 and 2 birds, respectively.

The White-winged Crossbill consumes conifer seeds, with spruce ranking highest in North America (Gabrielson, U.S. Dept. Agric. Bull. 1249, 1924; Bent, U.S. Natl. Mus. Bull. 237, 1968) and in Europe (Pulliainen, Am. Zool. Fenn. 8:326–329, 1971, Am. Zool. Fenn. 9:28–31, 1972). Newton (1970; Finches, Taplinger, New York, 1973) and Ulfstrand (pp. 780–794 in Proc. XIII Int. Ornithol. Congr., 1963) considered it essentially a tamarack seed eater.

Coniferous tree cone production is cyclic with very high crop years occurring in different places in different years (Svärdson, Br. Birds 50:314–343, 1957). Our observations and specimens of White-winged Crossbills examined suggest that tamarack seeds were sufficiently abundant in southeastern Manitoba during the winter of 1975–76 to promote settling by dispersing birds. Also, tamarack cones and hence probably seeds were fed on by Red Crossbills (in small numbers in the area in 1975–76), Common Redpolls (*Carduelis flammea*), Black-capped Chickadees (*Parus atricapillus*), Sharp-tailed Grouse (*Pedioecetes phasianellus*) and Gray Jays (*Perisoreus canadensis*) during the invasion period. Bent (U.S. Natl. Mus. Bull. 162, 1932; U.S. Natl. Mus. Bull. 191, 1946; U.S. Natl. Mus. Bull. 237, 1968) reports that of these species only Red Crossbills are known to feed regularly on tamarack seeds and Sharp-tailed Grouse occasionally feed on these seeds.

We did not obtain evidence of breeding by White-winged Crossbills during our study. None of the specimens examined was in breeding condition (Table 1). We last saw White-winged Crossbills on 10 April 1976, despite continued work by Collins in the area until late June. A gradual increase in body fat from November through March (Table 1) suggests a build up prior to movement in spring. Newton (1970) reports a similar situation in the Red Crossbill in Europe.

We thank Ian Newton, Henri Ouellet and Harrison B. Tordoff for commenting on the manuscript. The field work in 1975–76 was funded by grants to Sealy from the Manitoba Department of Renewable Resources and Transportation Services and the Northern Studies Committee of the University of Manitoba.—SPENCER G. SEALY, DONALD A. SEXTON AND K. MICHAEL COLLINS, *Dept. Zool., Univ. Manitoba, Winnipeg, Manitoba R3T 2N2 Canada.* (Present addresses: [DAS] *Ducks Unlimited [Canada], Box 776, Dauphin, Manitoba R7N 3B3*; [KMC] *96 Noble Ave., Red Deer, Alberta T4P 2H5.*) Accepted 2 Jan. 1979.

Wilson Bull., 92(1), 1980, pp. 116–120

Winter hunting behavior of a Snowy Owl in Michigan.—The Snowy Owl (*Nyctea scandiaca*) has been frequently studied on its breeding grounds (e.g., Pitelka et al., *Ecol. Monogr.* 25:85–117, 1955a; Pitelka et al., *Condor* 57:3–18, 1955b; Sutton and Parmelee, *Condor* 58:273–282, 1956; Watson, *Ibis* 99:419–462, 1957; Parmelee, *Beaver* (summer):30–41, 1972; Taylor, *Living Bird* 12:137–154, 1973) and the literature abounds with diet analyses of this species (e.g., Keith, *Wilson Bull.* 75:276–277, 1963; Catling, *Ont. Field Biol.* 27:41–45, 1973; Allan, *Jack Pine Warbler* 55:42, 1977). Winter studies have been confined to censuses, the periodicity of invasions, food habits and territoriality (Keith, *Can. Field-Nat.* 74:106–112, 1960; *Can. Field-Nat.* 78:17–24, 1964; Quilliam, *Ont. Field Biol.* 19:1–8, 1965). I found no extensive reported examination of hunting behavior of the Snowy Owl in winter.

Study area and methods.—The study area was in slightly rolling terrain consisting of agricultural land (planted mostly to hay, with some rye and corn) with several small cherry orchards and scattered woodlots. The area included eastern Green Lake and western Blair townships in Grand Traverse County, in northwestern lower Michigan. Sunrise and sunset occurred at 07:35 and 18:01 EDST, respectively, on the first day of observations and at 06:39 and 18:44 on the last.