OBSERVATIONS ON MIGRATING SAW-WHET OWLS

By Helmut C. Mueller and Daniel D. Berger

Saw-whet Owls are rarely observed during migration because of their nocturnal habits and the secluded habitat in which they spend the day. As early as 1911 Taverner and Swales presented evidence which indicated that the Saw-whet Owl (*Aegolius acadica*) migrates in great numbers through southern Ontario. However, the Saw-whet Owl is generally regarded as a permanent resident in Minnesota (Roberts, 1936), Michigan (Wood, 1951), and Wisconsin (Gromme, 1963). Bent (1938) states that the owl is usually considered a permanent resident and that the movements of this owl are too irregular to be considered true migration. This paper offers evidence which indicates that the Saw-whet Owl is a fairly common fall migrant on the western shore of Lake Michigan. In addition, data on weights, measurements, age ratios, and annual variations in the magnitude of migration are presented.

The data for this paper were obtained in a study of bird migration conducted at the Cedar Grove Ornithological Station. The station is located on the west shore of Lake Michigan about 64 km north of Milwaukee, Wisconsin. A detailed description of the area can be found in Mueller and Berger (1966). A portion of the study involved the use of mist-nets to gain an index of the numbers of migrants in the area. For some years mist-nets have been left up overnight at Cedar Grove to avoid the work of setting and removing the nets each day. We caught our first Saw-whet Owl in 1956, and by the end of the autumn of 1961 we had trapped 45 individuals, all of them in the months of September and October.

In the autumn of 1962 we expanded our netting program, setting up a number of larger-mesh nets primarily for taking hawks. This almost doubled the net area of previous years. In addition, the netting period was extended well into November in 1962, 1963, and 1964. The dimensions, mesh size, and placement of some of the nets were varied somewhat in the years 1962, 1963, and 1964 (Table 1), but these manipulations did not appear to markedly affect the catch of owls. The locations, mesh size, and dimensions for 374 m^2 of the nets remained unchanged throughout the three years. The nets were placed in lanes cut through dense brush or along the edges of a clearing. Nets of 36, 61, and 106 mm mesh were employed. The bottoms of nets ranged from 15 cm to 1 m off the ground, and the tops from 3.1 to 5.5 m high.

At least 313 m^2 of the nets were up by 31 August in 1962, 1963, and 1964. All nets were up by 1 October at the latest in all three years. The nets remained in place until 17 November in 1962, 3 December in 1963, and 20 November in 1964. The nets were furled because of severe weather on only nine nights during the three autumns. Nets were visited until well after dark and at least once again later in the evening. The last net visit was usually made

TABLE 1. ANNUAL VARIATIONS IN NETTING AND IN CATCH OF SAW-WHET OWLS

Year	No. owls	Net nights*	Net area**	Index***
1962	30	49	542	1.14
1963	65	57	519	2.79
1964	73	52	583	2.54

*Number of nights in the period 29 Sept.-24 Nov. on which at least 40 per cent of the net area was operational.

**Maximum area in m^2.

***Number of owls per 1000 m^2 of net per night.

between 2100 and 2300 hours. The first visit to the nets in the morning was usually made when it was still quite dark.

A total of 213 Saw-whet Owls was trapped, 168 of them in the years 1962, 1963, and 1964. In the latter three years 13 Long-eared Owls (*Asio otus*), 10 Screech Owls (*Otus asio*), 1 Barred Owl (*Strix varia*), and 1 Boreal Owl (*Aegolius funereus*) were also taken. In spite of intensive field work at Cedar Grove in the past 15 years, we have never seen an unbanded Saw-whet Owl during the day. It is occasionally possible to watch an owl perch after being released, mark the locality carefully, and find the bird some hours later, but most of the owls released during the day cannot be found a short time after they are released. We once observed what was probably a Saw-whet Owl flying in our area at night; all other Saw-whet Owls that we have seen have been in our nets. We have never heard the call of this species at Cedar Grove.

OCCURRENCE

More than twice as many Saw-whet Owls, both in terms of absolute numbers and in terms of owls per unit net area per night, were taken in 1963 and 1964 as compared with 1962 (Table 1). This suggests that the migrations of Saw-whet Owls might have an erratic or "invasional" character. Further evidence for this possibility can be found in Forbush (1927:212-213) and Bent (1938:241). However, the year-to-year variations in our data may be the result of subtle differences in weather conditions encountered by the owls while en route. A gross analysis of weather data shows fairly good correlations between the migration of Saw-whet Owls and: (1) westerly winds, and (2) passage of a cold front. Attempts to characterize in greater detail the weather pattern associated with the appearance of the owls were unsuccessful, as were attempts to correlate weather with the total number of owls caught in a year.

At Cedar Grove the peak in autumn migration of the Saw-whet Owl appears to be about 23 October, with about one-third of the owls occuring during the week centered on this date and two-thirds in the two-week period about 23 October (Table 2). No consistent difference was noted between the temporal distributions of adults and immatures (Table 2).

TABLE 2. OCCURRENCE OF SAW-WHET OWLS

Year	Age	Early date	Late date	Median date	Total caught	Percent of total in median ± 3 days	Percent of total in median ± 6 days
1962	Immature	9 Oct	12 Nov.	19 Oct.	21	52	67
	Adult	16 Oct.	3 Nov.	19 Oct.	9	89	89
1963	Immature	29 Sep.	23 Nov.	25 Oct.	41	59	61
	Adult	29 Sep.	28 Oct.	23 Oct.	24	50	63
1964	Immature	7 Oct.	17 Nov.	22 Oct.	38	55	68
	Adult	9 Oct.	17 Nov.	24 Oct.	35	31	69
Total	Immature	29 Sep.	23 Nov.	23 Oct.	100	35	67
	Adult	29 Sep.	17 Nov.	23 Oct.	68	37	60
	Total	29 Sep.	23 Nov.	23 Oct.	168	36	64

The age of the 201 owls captured since 1960 was determined by examination of the primaries and secondaries. The presence of remiges of both lighter and darker color on the same individual was taken as evidence of non-simultaneous molt and, hence, adult status. Similarly, birds with remiges of uniform color presumably grew these simultaneously when they acquired the juvenile plumage. In autumns 1960-1964 the percentage of adults in the sample of trapped birds has varied from none in 1961 to 48 in 1964. The age ratios for both of these years differ significantly (chi-square) from each other and from the 33, 30, and 37 per cent adults trapped in 1960, 1962, and 1963, respectively.

MEASUREMENTS

Wing chord, tail length, and weight were measured on 213 Saw-whet Owls. The wing chord was measured by placing the carpal joint of the closed wing on a rule placed on a table edge and pivoting the wing downward until the tip of the longest primary touched the rule. Tail length was measured by inserting a thin metal rule between the central pair of rectrices and sighting across the tips of the longest rectrices. The owls were weighed to the nearest gram in upright cylinders, 40 x 115 mm, made of sheet aluminum, on a triple-beam balance calibrated to 0.1 g.

TABLE 3. MEASUREMENTS OF SAW-WHET OWLS

Measurement			Mean	Std. dev.	Range
Wing	(mm)	Immature	136.5	±5.5	121–149
		Adult	138.5	±4.6	129–146
Tail	(mm)	Immature	69.0	±3.4	60–79
		Adult	70.1	±3.3	62-78
Weight	(g)	Immature	88.5	±9.5	69–113
		Adult	91.2	±8.2	72–112

Adult Saw-whet Owls are, on the average, slightly larger than immatures (Table 3). The differences in the means for wing chord, tail length and weight are all significant at the five per cent level (t test). The distributions of all three measurements, segregated as to age, does not differ significantly from unimodal normal distributions, suggesting that there is little, if any, size difference between the sexes.

The mean weight of Saw-whet Owls taken in 1964 was significantly higher (5.5g) than that in 1963. We believe that this difference can be attributed to the following: (1) The average weight of Saw-whet Owls taken in the evening was 2.5 g heavier that that of those taken in the morning. In 1964, 42 per cent of the owls were taken in the evening whereas in 1963 only 14 per cent were caught in the evening. (2) More (48 per cent) adults were taken in 1964 than 1963 (37 per cent).

Thirty-four Saw-whet Owls were recaptured; five of them twice and one individual four times. Most of the recaptured owls were trapped within a day or two of the time of banding; only three were taken more than three days after original capture. Most recaptured Saw-whet Owls weighed less than at the time of banding (Table 4). This weight loss may be an effect of handling (cf. Mueller and Berger, 1966). The greatest net gain (13 g) was shown by a bird recaptured 14 days after banding; the greatest net loss (6 g) was shown by a bird recaptured two days after banding. One owl gained 5 g overnight and then lost 7 g by evening. Our observations of the weights of Saw-whet Owls suggest that the weight of free-living owls may not be as labile as that of the captives observed by Collins (1963).

TABLE 4. WEIGHT CHANGE (g) FROM TIME OF BANDING*

Time elapsed	n	Mean change	Std. dev.	Range
PM-AM	9	−1.8	±2.6	−4 to +5
AM-PM	15	−1.5	±2.8	−5 to +7
1-14 days	18	−0.3	±5.1	−6 to +13
Total	42	−1.0	±4.0	−6 to +13

*includes multiple recaptures

Graber (1962) believed that the Saw-whet Owl casts one pellet per day. Chitty (1938) found that the Short-eared Owl (*Asio flammeus*) casts one pellet per forage. Graber (1962) thus inferred that Saw-whet Owls feed only once per day. Collins (1963) offers some evidence that might indicate that Saw-whet Owls feed twice each night. Graber (1962) found that captive Saw-whets cast pellets about 7 to 8 hours after a meal. The owls would thus have time for two meals if the evening meal were consumed early. On 4 November 1963 we released a Saw-whet Owl weighing 76 g. in the morning. At 1700 hours it was recaptured and weighed 80 g.

Sunset was at 1633 hours, and it was still quite light at 1700 hours. This owl must have fed during daylight. Kumlien and Hollister (1903) and Roberts (1936) report other Saw-whet Owls which fed during the day. Another of our recaptured owls showed a gain of 1 g. over its morning weight at 1900 hours, about 1 hour after dark on that date. This evidence suggests that Saw-whet Owls can feed twice daily.

SUMMARY

A nocturnal mist-netting program was conducted at the Cedar Grove Ornithological Station, on the western shore of Lake Michigan, about 64 km north of Milwaukee, Wisconsin. A total of 213 Saw-whet Owls was trapped, with as many as 73 individuals netted in 52 nights of a single autumn. The peak of the migration occurred on 23 October; two-thirds of the individuals were taken within a two week period centered on this date. The numbers of individuals taken per unit net area per night and the age ratio of individuals taken varied considerably from year to year. Adults are slightly, but significantly, larger than immatures. Weight records of recaptured birds indicate that weight fluctuates but little and that some individuals feed during daylight hours.

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MORTALITY OF BLED BIRDS AS INDICATED BY RECAPTURE RATE

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The potential of wild bird populations to harbor such serious diseases as the encephalitides was discovered in 1938 (Stamm, 1963); public health personnel have subsequently sought methods of monitoring these wild populations for signs of the diseases (e.g., Sussman, *et al.*, 1966). Because the encephalitides do not produce easily visible symptoms in birds, their diagnosis in birds involves laboratory analysis of blood samples.

Detection of encephalitis in wild populations may begin at any of three points: (i) arthropod vectors may be collected and tested for the virus; (ii) caged domestic fowl may be placed in the open where mosquitoes can transmit any extant infection from wild birds to the fowl, blood samples then being taken from the fowl; or (iii) wild birds may be captured, identified with a band, and released after a blood sample is removed. The sampling by the last method has caused some concern among scientists involved with bird-banding records. If the taking of blood samples from wild birds increased their mortality rate, a bias would be introduced into return and recovery records, particularly if the bird had been previously reported as not bled (Baysinger, 1966).