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Temporal differences in size of Northern Saw-whet Owls during spring migration.—Northern Saw-whet Owls (*Aegolius acadicus*) exhibit reversed sexual size dimorphism, males being smaller than females (Earhart and Johnson 1970, Mueller 1986, McGillivray 1987). Various sexing criteria using wing chord have been published (Anonymous 1980, Weir et al. 1980, Buckholtz et al. 1984), but their accuracy has been questioned (Mueller 1982, 1990; Slack 1992). Using such criteria, Weir et al. (1980) concluded that females preceded males during fall migration. Mueller (1990) questioned the utility of these sexing criteria to show differential timing of migration by sex; he noted that all but the largest and smallest individuals in the sample are excluded by such criteria. To avoid this problem, Duffy and Kerlinger (1992) used regression analysis of wing chord on date to test for sex differences in the timing of fall migration at Cape May Point, New Jersey; they detected no differences. Differential timing by sex has not been examined for spring migration. We used regression analysis to examine sex differences in the timing of spring migration of Northern Saw-whet Owls at Whitefish Point, Michigan. Because of sexual size dimorphism, if differential timing by sex occurs, the regression should detect a relationship between time of migration and size.

Owls were captured in mist nets (121 mm stretched mesh) placed in the jack-pine (*Pinus banksiana*) woods at the tip of Whitefish Point, Chippewa County, Michigan. We banded owls for 2–6 weeks every spring from 12 April–5 June, 1985–1988. Several individuals banded owls during these years (see Carpenter 1987); here we only included owls banded by us to minimize error from individual variation in measurement technique. Most owls included were measured by the senior author, so measurement error should be minimal. We recorded wing chord and tail length to the nearest mm. Owls were also weighed to the nearest g with a 300 g Pesola scale. Owls with two generations of remiges were aged ASY (after-second year), and owls with a single generation of remiges were aged SY (Evans and Rosenfield 1987). Data from all years were pooled, as too few owls were banded within a single year to permit statistical analysis.

Northern Saw-whet Owls begin arriving at Whitefish Point during early April; migration peaks in mid to late April; a smaller, secondary peak occurs in late May, with a few individuals captured in early June (Carpenter 1987, 1989; Grigg 1991). We numbered the days of the migration period, starting with 1 April = 1. Then we regressed wing chord, tail length, and mass on date. Northern Saw-whet Owls exhibit sexual size dimorphism for all three measurements (Earhart and Johnson 1970), so if sex differences in the timing of migration exist, the regressions should reveal them. We also did a principal component analysis (PCA) to obtain an estimate of size that incorporated all three measures. To make mass more compatible with the two linear measures, we used the cube root of mass in the PCA. The scores on the first principal component (PC 1) were then regressed on date. Two regressions were done for each measure of size: one for ASY and one for SY owls. Analysis of variance was used to determine if regression coefficients (b) were significantly different from zero (Zar 1984); differences were considered significant if $P < 0.05$. All calculations were done using Statistical Analysis System (SAS Institute 1985).

ASY owls were slightly larger than SY (Table 1), as has been shown for fall migration (Mueller and Berger 1967, Buckholtz et al. 1984). All three measures loaded highly (0.80, 0.83, and 0.85 for tail length, weight, and wing chord, respectively) on PC 1, which accounted for 69% of the variance. The only regression that was significant for ASY owls was wing chord. Tail length was the only regression that was not significant for SY owls. Wing chord exhibited the best relationship with date, followed by weight; tail length showed no relationship. For SY, but not ASY owls, the scores on PC 1 showed a better relationship with date than did the univariate measures (Table 1). The proportion of the variance explained by the regressions that were significant was small (≤ 0.20, r^2, Table 1). The proportion of small versus large owls varied over the course of the migration period, but the overall size range remained similar throughout the migration period; this was probably the reason that so little of the variance was explained by the regressions. Small owls constituted a high proportion of the owls early in the migration period. In contrast, toward the end of the migration period, large owls predominated. For example, the mean wing chords of SY owls banded in April versus May–June were 134.10 and 137.03 mm, respectively; these differences were significant ($t = 2.636$, df = 58, $P = 0.0108$, 2-sample t-test). Since males are smaller than females, these size differences are most likely due to males preceding females

TABLE 1

DESCRIPTIVE STATISTICS AND REGRESSIONS FOR THREE MEASURES OF SIZE FOR NORTHERN SAW-WHET OWLS BANDED DURING SPRING MIGRATION, WHITEFISH POINT, MICHIGAN[a]

	N	Mean ± SD	Range	r^2	b	F	P
ASY birds							
Wing	26	136.73 ± 4.15	127–142	0.20	0.10	6.132	0.0203
Tail	28	71.71 ± 3.21	61–78	0.04	0.04	1.081	0.3081
Mass	26	93.65 ± 11.32	65–113	0.13	0.23	3.635	0.0686
PC 1	24			0.13	0.02	3.527	0.0737
SY birds							
Wing	60	135.57 ± 4.45	127–148	0.09	0.07	5.671	0.0206
Tail	62	69.90 ± 3.69	58–78	0.04	0.03	2.230	0.1406
Mass	60	89.45 ± 9.02	74–112	0.09	0.14	5.386	0.0238
PC1	59			0.10	0.02	6.361	0.0145

[a] Each measure of size was regressed on date. PC 1 = the scores on the first principal component from a principal component analysis done using all three measures; r^2 = the coefficient of determination; b = the regression coefficient.

during spring migration. Laparotomies on migrant owls will be necessary to confirm sex differences in the timing of migration.

This study pooled owls banded during different 2–6 week periods each spring, so we could not examine annual differences in temporal variation in size within the migration period. Weather conditions influence the initiation of spring migration (Slack et al. 1987), so there probably was some annual variation. However, pooling would tend to obscure rather than enhance temporal differences in size, so the differences we reported should not be due to pooling. Still, future research should examine annual variation so its effect can be assessed.

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Reverse mounting in the Black-throated Blue Warbler.—Reverse mountings (female mounting male) have been reported in 29 bird species (Nuechterlein and Storer 1989, Bowen et al. 1991), the majority (76%) of which are non-passerines. Only seven species (24%) of passerines have been observed reverse mounting. These include Zebra Finch (*Poephila guttata,* Morris 1954), European Starling (*Sturnus vulgaris,* Glick 1954), Rook (*Corvus frugilegus,* Coombs 1978), Painted Bunting (*Passerina ciris,* Thompson and Lanyon 1979), Northwestern Crow (*Corvus caurinus,* James 1983), American Redstart (*Setophaga ruticilla,* Ficken 1963), and Prairie Warbler (*Dendroica discolor,* Nolan 1978). Here, I report an observation of reverse mounting in another species (and the third wood-warbler), the Black-throated Blue Warbler (*D. caerulescens*).

On 20 May 1991, James Tucker and I observed a male and a female Black-throated Blue Warbler on and near to the ground beneath a hobblebush (*Viburnum alnifolium*) shrub. These birds had been defending this territory for over one week. The female was on top of a rotting log, and the male was approximately 10 cm below her on the ground. With his