Primary Molt Patterns of Northern Saw-whet Owls *(Aegolius acadicus)* Captured During Spring Migration

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INTRODUCTION

Determining the age of North American owls can be done by examining primary and secondary feathers to detect evidence of different molts. In adult birds, primaries and secondaries can show feathers of two distinct ages, thus indicating that the individual has undergone at least one molt (Anon. 1980).

It has been suggested that this pattern results from an interrupted molt (Weir et al. 1980), a partial postbreeding remex molt (Buckholtz et al. 1984), or an annual incomplete molt (Evans and Rosenfield 1987). Such feather patterns are used to age Northern Saw-whet Owls (Mueller and Berger 1967, Evans 1975, Weir et al. 1980, Anon. 1980, Evans and Rosenfield 1987, Slack et al. 1987), which can be classified as hatching year (HY) or after hatching year (AHY) in fall, or as AHY, after second year (ASY), or second year (SY) in spring.

The Bird Banding Manual (Anon. 1980) describes these feather differences as follows:

3A All primaries* and secondaries appearing uniform in color (for example, P1 through P5 are the same color tone as P6 through P10) .....**HY/AHY** (see 4)
*Note: Some primaries are gray-brown, others are brown.

3B Primaries and secondaries not uniformly colored (for example, P1 through P5 are paler and more faded than P6 through P10) .....**AHY/ASY**

4A Fault bars, if present, extending regularly across all primaries and/or secondaries .....**HY/SY**

4B Fault bars, if present, irregularly but symmetrically located on some or all primaries and/or secondaries..**AHY**

By examining remex color patterns on fall captured Northern Saw-whet Owls, Evans and Rosenfield (1987) estimated that they retained approximately 35% of their remiges for two years. By examining the right wing of each bird, they classified Northern Saw-whet Owl molt into five generalized patterns:

Group A - "solid block of old inner primaries...",
Group B - "solid block of old feathers in the mid primaries...",
Group C - "characterized by 2, and sometimes 3, discrete blocks of old feathers" in the primaries,
Group D - "birds with virtually all old or all new feathers...",
Group E - adults that "had completed their molt and had only one generation of remiges."

This paper illustrates primary molt patterns observed in 150 Northern Saw-whet Owls during their spring migration at Nine Mile Point, New York, and compares these observations with those of Evans and Rosenfield (1987) at the Hawk Ridge Nature Preserve, Duluth, Minnesota.

METHODS

Northern Saw-whet Owls were captured during spring migration (1981 through 1988) at the Richard A. Noyes Sanctuary at Nine Mile Point, Town of New Haven, Oswego County, New York, along the southeastern shore of Lake Ontario. The methods of capture and the study area have been described previously (Slack et al. 1987). Notes on the primary feather patterns of 150 Northern Saw-whet Owls were recorded.

RESULTS

Fifteen distinct patterns of molt were observed in the primary feathers of 150 Northern Saw-whet Owls (Fig. 1a-o). All observed patterns were symmetrical in both wings. When P1 through P10 were uniform in color and no fault bars were present (Fig. 1a and 1b), birds were classified as AHY. However, these birds consisted of two types: all primaries dark and unfaded (Fig. 1a) (n=86) or all primaries dull, light, and faded (Fig. 1b) (n=16). Those birds with all dark and unfaded primaries undoubtedly molted in the previous summer and, therefore, contrary to the Banding Manual Key (Anon. 1980), could have been aged as ASY birds. Birds with all primaries old, faded, and worn were, in all likelihood, SY birds. The presence of fault bars allowed for two birds to be classified as ASY (Fig. 1c) and three birds to be classified as SY (Fig. 1d). Although the sample size is small (combined n=5), whenever fault bars were present (Fig. 1c and 1d), they confirmed that birds with 10 dark unfaded primaries were ASY, while birds with faded and worn primaries were SY birds. A larger sample size would, however, be necessary to suggest that Northern Saw-whet Owls with uniform primaries can be aged accurately. Thus, these birds were classified as AHY (Fig. 1a and 1b), ASY (Fig. 1c and 1e through 1o), and SY (Fig. 1d).

Figures 1e through 1j illustrate birds which had an inner block of primary feathers faded and worn. These birds are aged as ASY. This group of birds corresponds to the Group A birds of Evans and Rosenfield (1987). In their sample, 827 of 1,463 (56.5%) adult Northern Saw-whet Owls had the Group A pattern. In the Nine Mile Point birds, only 37 (24.7%) of the 150 total birds had this pattern. They represent 82.2% of the 45 birds classified as ASY and 28% of the 131 birds that had all or some dark primaries.

Figure 1k illustrates a single bird with one new, darker primary. Since the new primary is number 3, this bird conforms to the Group D pattern described by Evans and Rosenfield (1987), i.e., "virtually all old or new feathers." Such birds comprised 1.8% of their AHY sample and 2.2% of the Nine Mile Point ASY sample.

Figures 1l through 1o illustrate birds that had two discrete blocks of newer, darker feathers. The bird illustrated in Figure 1o conforms with Evans and Rosenfield's (1987) Group B, i.e., birds with a solid block of old feathers in the mid primaries. In the Hawk Ridge sample, such birds comprised only 13.8% of the adult birds. In the Nine Mile Point sample, the single bird with this pattern represents 2.2% of the 45 ASY birds.

The remainder of these birds (Fig. 1l-1n), conform to the Group C birds of Evans and Rosenfield (1987) by having two discrete blocks of old, faded feathers. In the Nine Mile Point sample, these four birds represent only 2.6% of the total birds or 8.9% of the 45 ASY birds. Group C birds comprised 27.3% of the Hawk Ridge sample.

Evans and Rosenfield (1987) classified 0.5% of their sample as Group E birds; i.e., adults that had completed their molt and had only one generation of feathers. At Nine Mile Point, two birds were considered as Group E. These birds were classified as ASY due to the presence of fault bars located irregularly across the primaries (Fig. 1c). These birds were 4.4% of the Nine Mile Point ASY sample of 45 birds.

Evans and Rosenfield (1987) also reported 63 (4.3%) birds in their Hawk Ridge sample with three generations of feathers. All such birds occurred in their Group B and Group C patterns. Only one (2.2%) of the Nine Mile Point birds had three generations of feathers. This bird had P1 through P5 faded and worn while P6 through P10 dark. P5

was, however, extremely worn and had broken tips on both wings, therefore, indicating it was from an older generation of feathers than P1 through P4. Evans and Rosenfield noted that the very old feathers in birds with three generations of feathers were always found at the inner primaries in Group B and Group C birds. The Nine Mile Point bird does not conform with this observation since the very old feather was a mid-primary.

DISCUSSION

Evans and Rosenfield (1987) concluded that virtually all adult Northern Saw-whets have an incomplete annual molt. If Weir et al. (1980) were suggesting, by using the term "interrupted molt," that Northern Saw-whets continued their molt immediately following migration, the data from this study do not support that conclusion. Since the patterns observed in this study conform to those shown by Evans and Rosenfield, indicating that molt is not occurring during winter or spring, these data support their conclusion that the molt of Northern Saw-whets is incomplete.

While the percentages of birds within each group pattern in this study (comparing Hawk Ridge's AHY birds with Nine Mile Point's ASY birds) are very different (Table 1), the difference is not significant ($t = 1.96, P > 0.05$). Such differences may be partly due to the large number of birds (102) that had P1-P10 uniform in color and could not be aged in spring. These birds could be either ASY or SY individuals. During fall, HY birds (the SY birds in spring at Nine Mile Point) can be identified readily, as can the AHY birds; although Buckholtz et al. (1984) noted that due to a complete postbreeding molt observed in one bird at Prince Edward Point, Ontario, the assignment of HY/AHY in fall is not error-free. It is still apparent, however, that the Nine Mile Point sample, in effect, loses some of the ASY birds within the larger number that can only be aged only as AHY in spring. These birds would, however, only result in greater differences since those that are ASY would have to be assigned to Group E (i.e., only one generation of remiges). The frequency of Group E birds in the Nine Mile Point sample is already larger than that of Evans and Rosenfield at Hawk Ridge.

Table 1. Frequency of birds within each feather pattern group.

	Evans and Rosenfield (1987)	Nine Mile Point
Group A	0.565	0.822
Group B	0.138	0.022
Group C	0.273	0.089
Group D	0.018	0.022
Group E	0.005	0.044

Group A birds occurred with greater frequency in both samples. However, the Nine Mile Point sample had a much higher frequency (82.2%) than the Hawk Ridge sample (56.5%). This difference is probably due to the low sample size at Nine Mile Point, although it may be possible that the two banding operations simply sampled different populations with different proportions of Group A birds. In fact, it could be argued that all the differences in frequencies are a result of sampling populations with different genetically driven molt patterns.

SUMMARY

Regardless of these differences in the frequency of occurrence of the various molt patterns, the Nine Mile Point data conform to the general patterns found at Hawk Ridge. Therefore, these data support the conclusion that the majority of Northern Saw-whets have an incomplete remex molt (prebasic) which occurs annually beginning during the summer of their second year.

Suggested Improvement to the Methods

Contrary to the methods used by Evans and Rosenfield (1987) and in this study, future studies should examine all primaries and secondaries. Review of the Northern Saw-whet Owl specimens in the Carnegie Museum of Natural History (Parkes, pers. comm.) revealed one specimen (#13088, collection date unknown) that apparently had secondaries of three age classes with only two age class primaries. A second specimen (#11576) collected in February had P1-P10 and S1-S10 old and uniform while the tertials (S11-S12) appeared newer. Examining only the primaries, as was done in this study, would not have allowed for the correct aging of these birds. A third specimen collected during July had asymmetrical molt evident in the

primaries. Such a bird could have been incorrectly aged by examining only one wing as was done by Evans and Rosenfield. Thus, both wings should be fully examined and symmetry in molt patterns recorded when aging Northern Saw-whet Owls.

Proposed Changes to the Existing Key

The data presented here, as well as that of Evans and Rosenfield (1987), indicate that birds captured in fall or spring with three generations of feathers can be aged as ASY (fall) or ATY (spring). In addition, birds with fault bars extending regularly across all primaries and/or secondaries can be aged as SY birds in spring, while those with fault bars irregularly by symmetrically on some or all primaries and/or secondaries can be aged as ASY. [Note: Fault bars are often more distinct in rectrices than in remiges. Logically, birds with fault bars extending regularly across all rectrices could also be aged SY in spring, while those with fault bars irregularly but symmetrically across the rectrices could be aged ASY. However, since rectrices can often be damaged in the nest, aging owls by fault bars in the rectrices is not recommended (Klimkiewicz, pers. comm.).

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Figure 1. Molt patterns of 150 Northern Saw-whet Owls.