For permission to operate on Ontario Hydro property I thank H. A. Blomme, Plant Superintendent. I wish to thank Eugene Eisenmann for reading the manuscript and making helpful suggestions, and Dean Amadon for the loan of the gull specimen and permission to examine material in the American Museum collections.—ROBERT F. ANDRLE, *Buffalo Museum of Science, Humboldt Park, Buffalo, New York 14211.* Accepted 9 Aug. 71.

Ruffed Grouse primary molt chronology.[1]—The ecology and survivorship of male Ruffed Grouse (*Bonasa umbellus*) have been investigated at the Cloquet Forest Research Center, Cloquet, Minnesota since 1956. One of the most difficult aspects of working with Ruffed Grouse has been determining the time of death accurately. Gullion and Marshall (1968: 126) note the possibility of obtaining survival information from droppings and feathers left on or near the drumming log, but admit that the accuracy in determining the time at which any individual bird was lost from the population could be as vague as "during the summer." Male Ruffed Grouse manifest so high a degree of faithfulness in attendance to certain drumming logs (Gullion, 1967) that determining the molting sequence and the dates of primary loss would help in estimating the time of an individual's last visit to the site. Little is known about the loss sequence of adult Ruffed Grouse flight feathers, although the young have been studied in this respect (Bump et al., 1947; Davis, 1968).

The objective of this study was to determine the chronology of primary loss for free-living male Ruffed Grouse on the Cloquet study area. The study was initiated in July 1967 and terminated in September 1969. We wish to thank F. J. Svoboda, who contributed feather records, and W. H. Marshall, who critically read the manuscript. The cooperation of B. A. Brown and other personnel of the Cloquet Forest Research Center, School of Forestry, University of Minnesota, is greatly appreciated. The senior author was supported by a Minnesota Academy of Science Grant-in-Aid during the 1969 field season.

During the summers of 1967, 1968, and 1969, we made 819 weekly visits to active drumming logs and collected a total of 500 primaries, of which 276 were used in determining the shedding periods. We rejected those feathers impossible to identify because of rapid deterioration or rodent or other damage, and those picked up after a lapse of 5 or more days since the last visit to the log.

Most primaries could be identified by comparison with known primaries from male Ruffed Grouse. An identification key was developed, and the primaries were numbered from the innermost (P1) to the outermost (P10). The earliest recovered feather was a P1 found 8 June and the latest a P10 recovered 3 September. Numbers and dates of recovered primaries used were as follows: P1, 55, 8 June–30 June; P2, 62, 13 June–10 July; P3, 56, 16 June–11 July; P4, 41, 16 June–13 July; P5, 31, 19 June–17 July; P6, 8, 7 July–22 July; P7, 10, 17 July–7 August; P8, 2, 6 August–23 August; P9, 6, 6 August–2 September; P10, 5, 18 August–3 September.

These data confirm the findings of other workers for gallinaceous birds, that flight feather molt is not random but proceeds in a regular sequence (Taber, 1969), but Ruffed Grouse at Cloquet apparently lost P1 through P5 during the same time period (early June to mid-July). P1 was shed about 6 days earlier and P5 about 4 days later than P2, P3 and P4. It was common to find some combination of these five primaries at a drumming log during mid-June.

Recoveries of P1–P5 comprise about 89 percent of the feathers used for this analysis.

[1] Paper No. 7291, Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul, Minnesota 55101.

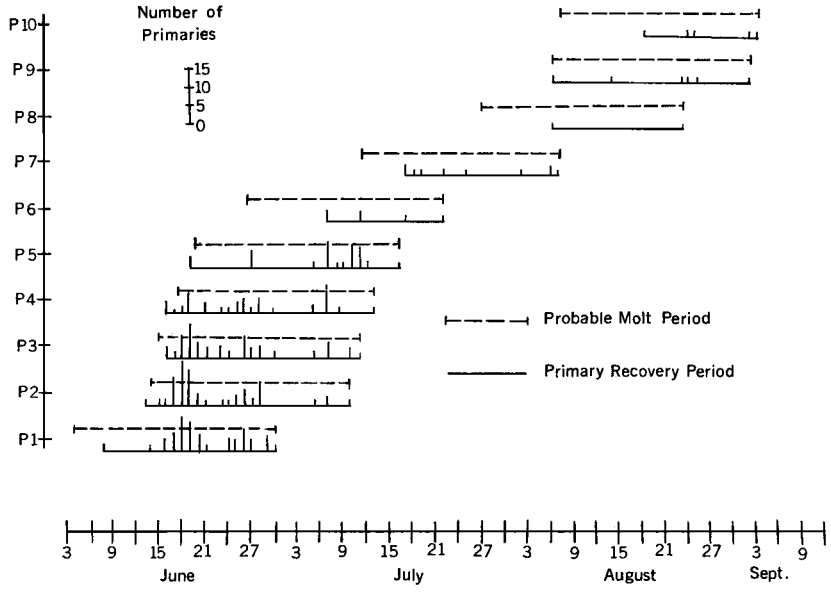

Figure 1. Dates and numbers of primaries recovered from drumming logs and periods of probable primary loss for male Ruffed Grouse at Cloquet.

Averaging the number of days in the period over which each of these five primaries was recovered gives an average shedding period of 26 days. The probable molt period (Figure 1) is determined by working backward from the date of last recovery for each of the 10 primaries. For example, 26 days prior to 30 June (the date of last recovery of a P1) gives a date for commencement of the molting period as 4 June.

Applying the "26-day rule" to P6–P10 suggests a more orderly loss schedule than do the collection records. These data also suggest that the chance of any one grouse being without three or four of the outer primaries is less than the chance of the same bird being without three or four of P1–P5. In no case were more than three of the P6–P10 primaries recovered from the same drumming log during any one visit, and three were found only twice. This conforms to the general principle of land birds maintaining flight capability through an orderly molt pattern from the inner to the outer primaries (Pettingill, 1970: 191).

Fewer of the P6–P10 are shed in the vicinity of the drumming log. This suggests that the birds spend decreasing amounts of time in attendance at their drumming sites as the summer progresses. This may be due to a decrease in the males' territorial behavior, or the birds may become more secretive when they lose their most important flight feathers.

The stimuli for molting are not well-known. Such factors as sex hormone levels, photoperiod, ambient temperatures, breeding status of individual birds, and cyclic activity of the pituitary gland may influence the molt pattern (Welty, 1962: 42). Consequently geographical and subspecific variation in molt chronology among populations of Ruffed Grouse probably exist, and care must be exercised in applying these data to grouse in other areas. Nevertheless this technique is useful for maintaining contact with male grouse from early spring through early fall.

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WILLIAM P. WENSTROM, PHILLIP V. VANDERSCHAEGEN, and GORDON W. GULLION, *Department of Entomology, Fisheries and Wildlife, University of Minnesota, St. Paul, Minnesota 55101.* Accepted 30 Jul. 71.

Discovery of the nest of the Kauai Creeper.—The Creeper (*Loxops maculata*), family Drepanididae, has a distinct subspecies on each of Hawaii's main islands. The Kauai Creeper (*L. m. bairdi*) is relatively common in the Alakai Swamp of Kauai, less common in Kokee State Park of Kauai.

The breeding biology of none of the Creeper subspecies is well-known. Perkins (Fauna Hawaiiensis, or the zoology of the Sandwich (Hawaiian) Islands. *In* Aves, part 4, No. 1 (David Sharp, Ed.), Cambridge, Cambridge Univ. Press, 1903, pp. 415–416) reports finding a nest with a single young but never with eggs, presumably of the Hawaii Creeper (*L. m. mana*). The eggs and nestlings of the Molokai Creeper (*L. m. flammea*) have never been described; Bryan (Occ. Pap., B. P. Bishop Mus., 4: 133–176, 1908) found one nest under construction. Bryan (Occ. Pap., B. P. Bishop Mus., 1: 228–241, 1905) collected the first nest (empty) of the Oahu Creeper (*L. m. maculata*) and described two eggs in a nest secured by Seale on Oahu. I have found no other references to Creeper nests.

On 19 April 1969 in Kokee State Park, Kauai, I saw a Creeper fly down to a low tree stump, pull some moss loose from the base of the stump, and fly away with it. I searched the area and again saw the Creeper, this time adding nesting material to a nearly completed nest in the terminal crown of a nonblooming Ohia tree. While I watched the male joined the female in nest construction. The nest was 26 feet 6 inches above the ground.

The nest, composed largely of moss, had the following measurements (in inches): Rim thickness, ¼–1¼; outside diameter, 3¼–4¼; outside height, 2¾; inside diameter, 1½–2¼; cup depth, 1¾.

The first egg was laid prior to 11:40 on 3 May 1969. The female did not leave the nest until my hand was less than 1 foot from the nest. She then jumped from the nest cup onto the nest rim, looked at me, ruffled her feathers, and then flew to a neighboring tree where she gave a very soft alarm call. The single egg had a white background with few irregularly shaped brown speckles scattered over the entire surface of the egg, but most concentrated at the large end of the egg. It measured 18.3 × 23.3 mm. On 4 May, the last day I saw the female on or near the nest, she behaved exactly the