THE SAW-WHET OWL POPULATION OF NORTH CAROLINA'S SOUTHERN GREAT BALSAM MOUNTAINS

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Pearson, Brimley, and Brimley (1942) regarded the Saw-whet Owl *(Aegolius acadicus)* as a "casual winter visitor" to North Carolina, with no evidence that the bird might be present in the state during the breeding season. Furthermore, the American Ornithologists' Union (1957) gave the breeding range of the species as "south ... to central Ohio, West Virginia, and Maryland." Nevertheless, Stupka's (1946) spring and summer records of the owl in the Great Smoky Mountains marked the beginning of a growing body of evidence, reviewed by Simpson (1968), which documents the occurrence of the Saw-whet Owl as a spring and summer resident in regions of suitable habitat throughout the major mountain ranges of western North Carolina and adjacent eastern Tennessee. Within this high mountain country, the bird has been associated with Canadian zone forests of red spruce *(Picea rubens)* and Fraser fir *(Abies fraseri);* and summer records of the owl have been confined, therefore, to the Great Smoky, Plott Balsam, Great Balsam, Roan, and Black Mountains. In spite of a fairly large number of individual records, there has been no effort to study the population structure of the Saw-whet Owl in any of these ranges; and data pertaining to absolute numbers and density are, therefore, unavailable. In light of this situation, a summary of extensive field work from the Great Balsam Mountains and Pisgah Ridge will provide valuable information concerning the status of the Saw-whet Owl in the southern Appalachians.

STUDY AREA

The southern portion of the Great Balsam Mountains and adjacent Pisgah Ridge provide an excellent location for studies of the Saw-whet Owl. These two transverse ranges lie along the southern edge of Haywood County, N.C., with the Great Balsams forming the boundary between Haywood and Jackson Counties and Pisgah Ridge forming the border between Haywood and Transylvania Counties. Canadian zone forests begin on Lone Bald, just east of Locust Gap in the Great Balsams, and extend for 13 miles southeastward, past Tanasee Bald and into the Pisgah Ridge area to their terminus at Fork River Bald (see map, Figure 1). In spite of heavy logging operations and repeated fires, these spruce-fir forests are fairly dense along the main ridge, although no precise data concerning total acreage are available. The Blue Ridge Parkway provides convenient access to the entire range; and the route follows close to the crest of the mountains, thereby giving panoramic views of practically all regions of Canadian zone forest within the area. By careful utilization of the Parkway and adjoining trails, it is possible in a 3-hour period to census approximately 90% of the high altitude coniferous forests in these two ranges.

METHODS OF OBSERVATION

The majority of my field work in this region spans the period from spring of 1968 through spring of 1971, during which time I conducted 29 censuses totaling 145 hours of field work. Initially, the censuses were conducted between the hours of 8:30 PM and 5:30 AM by stopping every 0.2 mile along the Parkway, whistling an imitation of the owl's calls, and listening for 3 to 5 minutes at each site. Once the locations of calling stations became apparent, stops were usually made at these sites and in regions with extensive spruce-fir forests. Of these 29 censuses, 4 were conducted in March, 4 in April,

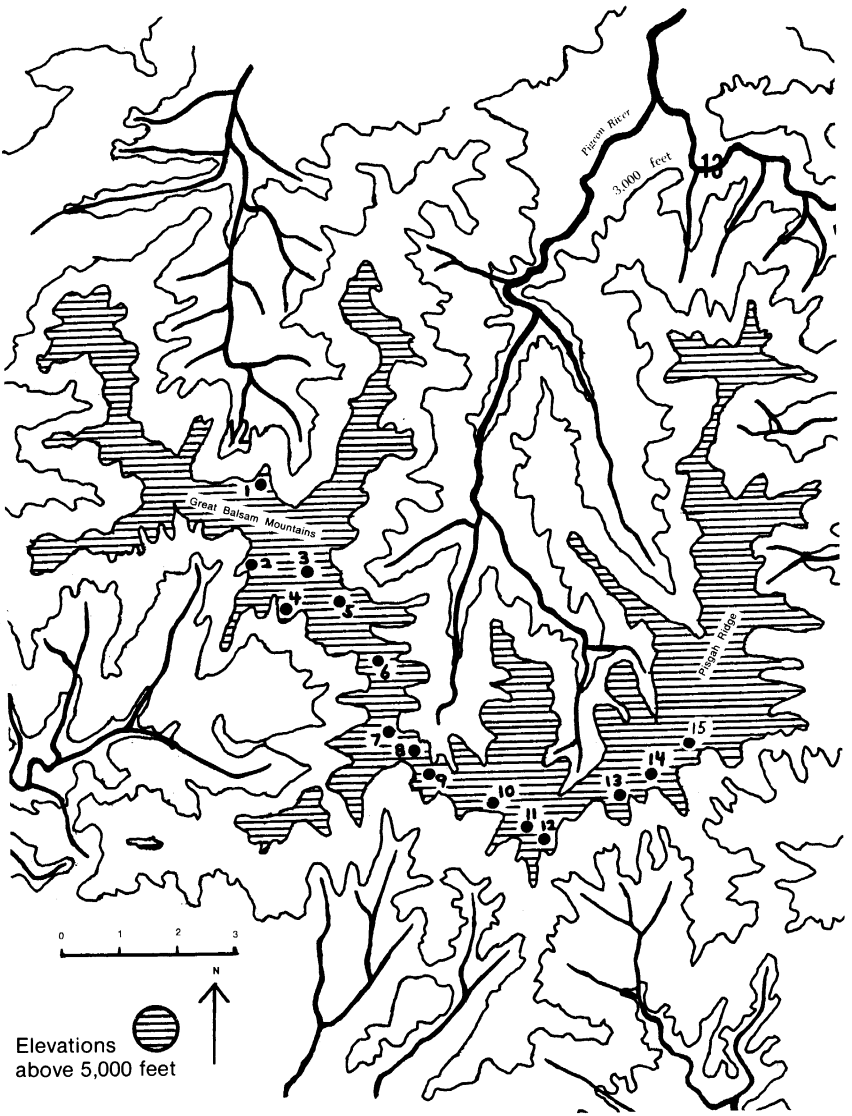

Figure 1. Saw-whet Owls have been found at 15 localities in the Great Balsam Mountains and Pisgah Ridge. Canadian zone spruce-fir forests begin on Lone Bald (near Site 1) and extend for 13 miles southeastward past Tanasee Bald (Site 12) into Pisgah Ridge, terminating at Fork River Bald (Site 15).

6 in May, 7 in June, 3 in July, none in August, 2 in September, 2 in October, and 1 in November. In addition to the censuses, I have spent some 100 nights listening for Saw-whet Owls in this area during the period from 1960 to 1971, so that a total of approximately 400 hours of field work is represented in this study. Additional records of the owl have been reported from the study region by Richard H. Peake (1965 and pers. com.), Charles F. Hutchinson (pers. com.), and Don R. McLeod (pers. com.).

With the exception of a few sight records, all observations are based on the call notes of the Saw-whet Owl. The most common "song" consists of a series of resonant, bell-like "cooing" notes repeated at the rate of 1 or 2 per second and often lasting for several hours without a break. Unfortunately, it is difficult and frequently impossible to hear the calling of the species if there is any wind movement; and many nights of field work subsequently produce no records. On the other hand, ideal weather conditions may produce excellent results, as on the night of 31 May 1969, when seven Saw-whet Owls were calling in the census area. On nights when the wind is calm, rapid, repeated surveys of the range provide a very accurate figure for the total number of owls actively calling in the area.

OBSERVATIONS

SITE 1 - SPRUCE RIDGE - Haywood County - 5,600 feet

The calling area is along the NW slope of the ridge just E of Lone Bald Overlook. Saw-whet Owls called from this site at 9:50 PM on 7 June 1969 and at 9:40 PM on 23 May 1970.

SITE 2 - RICHLAND BALSAM - Jackson County - 5,120 feet

The calling area is on an unnamed ridge running SSW from Richland Balsam and approximately 0.4 mile E of Lone Bald Overlook. Saw-whet Owls were heard here at 8:45 PM on 12 April 1968 (Simpson, 1968) and at 10 PM on 7 June 1969.

SITE 3 - RICHLAND BALSAM - Jackson and Haywood Counties - 6,200 feet

The calling area is on the S slope of Richland Balsam along the Nature Trail from the Jackson-Haywood Overlook to the peak. Saw-whet Owls were reported here by Peake (1965) on 3 May 1965, and on 10 July 1965 he observed a juvenile Saw-whet at this spot. Peake (pers. com.) also found the species on 16 August 1965, 22 April 1966, and 20-21 July 1968. I heard the species calling here at 8 PM on 12 April 1968 (Simpson, 1968) and at 9:55 PM on 23 May 1970. On the night of 31 May 1969 a single bird was calling along the trail about 250 yards from the parking lot, and I was able to watch it at close range for 10 minutes in a spotlight.

SITE 4 - CHESTNUT RIDGE - Jackson County - 5,320 feet

This calling area is located in a small stand of spruce on the S slope of Richland Balsam below the Cowee Mountain Overlook. I heard Saw-whet Owls calling here at 11 PM on 11 April 1968 (Simpson, 1968), 11 PM on 31 May 1969, 8 PM on 13 June 1969, 11:30 PM on 14 May 1970, and at 10:10 PM on 23 May 1970.

SITE 5 - BIG BEARTRAIL RIDGE - Haywood County - 5,800 feet

This site is on the NE slope of Reinhart Knob about 100 feet NE of the Parkway road cut through the ridge. I heard Saw-whet Owls here at 11 PM on 10 May 1968 (Simpson, 1968), 10:20 PM on 7 June 1969, at 10 PM on 13 June 1969, and at 1:30 AM on 11 April 1971.

SITE 6 - BEARTRAP GAP - Jackson and Haywood Counties - 5,680 feet

The calling area is on an unnamed peak NW of the Beartrap Gap Overlook. My only record of the owl from this site is of a single bird calling at 10:35 PM on 31 May 1969.

SITE 7 - ROUGH BUTT BALD - Haywood County - 5,400 feet

The calling area is on the N slope, below the Parkway, and approximately 0.3 mile NE of the peak. My only record is of a single bird calling at 10:10 PM on 31 May 1969.

SITE 8 - HAYWOOD GAP - Haywood County - 5,080 feet

The calling area is near Sweetwater Spring on the N slope of Parker Knob just below the Parkway cut at Haywood Gap. I have heard Saw-whet Owls calling here at 10:20 PM on 11 April 1968 (Simpson, 1968), at 10:05 PM on 31 May 1969, at 10:35 PM on 14 May 1970, at 10:40 PM on 23 May 1970, and at 4:50 AM on 6 June 1970.

SITE 9 - PARKER KNOB - Haywood County - 5,400 feet

This site is on the E slope of the knob just above the Parkway. I noted a single bird calling here on 11 April 1968 (Simpson, 1968).

SITE 10 - MT. HARDY - Jackson County - 5,200 feet

This site is below the Parkway on the SSW slope of Mt. Hardy. I noted a single owl calling here at 11:05 PM on 7 June 1969.

SITE 11 - HERRIN KNOB - Jackson and Haywood Counties - 5,440 feet

This site is along the Parkway in the gap between Herrin Knob and Tanasee Bald adjacent to the headwaters of Bubbling Spring Branch. At 9:30 PM on 11 April 1968, I recorded on tape the calls of a single owl at this site (Simpson, 1968).

SITE 12 - TANASEE BALD - Transylvania County - 5,480 feet

This site is on the NE slope of the peak and approximately 100 yards SW of the Tanasee Bald Overlook. I heard single owls calling here at 9:15 PM on 11 April 1968 (Simpson, 1968), at 9:45 PM on 31 May 1969, and at 1:10 AM on 11 April 1971. In addition, Don R. McLeod (pers. com.) heard Saw-whet Owls calling here on several occasions in June 1959 and June 1963.

SITE 13 - DEVIL'S COURTHOUSE - Transylvania County - 5,650 feet

This site is along the ridge on the N slope of the peak adjacent to the trail from the Parkway. Don R. McLeod (pers. com.) noted Saw-whet Owls calling here in June 1959, and Charles F. Hutchinson (pers. com.) heard the species here on two occasions in June 1965. I noted single birds calling at 10:15 PM on 12 April 1968 (Simpson, 1968), at 9:30 PM on 31 May 1969, at 10 PM on 14 May 1970, and at 4:35 AM on 6 June 1970. On 28 May 1971 several members of the Carolina Bird Club and Georgia Ornithological Society heard two Saw-whet Owls calling simultaneously during the mid-afternoon; and at 11:30 PM on the same night, I heard a single owl calling here just N of the Parkway.

SITE 14 - SILVERMINE BALD - Transylvania County - 5,800 feet

This site is 0.2 mile W of Shuck Ridge just above the Parkway on the S slope of the bald. I heard the owls here at 8:45 PM on 11 April 1968 (Simpson, 1968) and at 9:50 PM on 7 June 1970.

SITE 15 - FORK RIVER BALD - Transylvania County - 5,480 feet

This site is below the Parkway on the SW slope of the bald. My single record here is an owl calling at 9:30 PM on 14 May 1970.

CALLING STATIONS AND POPULATION DENSITY

An examination of the above data from the Great Balsam-Pisgah Ridge area reveals a total of 49 records of the Saw-whet Owl at elevations ranging from 5,050 feet (Site 8) to 6,200 feet (Site 3) and averaging 5,597 feet. These records span the period from 11 April

(1968) to 16 August (1965); but 46 of the 49 records are based on the owls' calling, which encompasses the period from 11 April through 13 June (1969). Of these 46 calling records, 12 are from April (26%), 20 from May (44%), and 14 from June (30%). Since field time was not evenly distributed among the 9 months involved in the study, it is impossible to draw statistically valid conclusions about the calling season of the owl. However, the data do suggest rather strongly that the period of regular, active calling extends from around the first week of April through the middle of June, with vocal activity outside this period being erratic and unpredictable. The maximum number of owls noted on a given night was seven on 31 May 1969, while six were calling on 11 April 1968, and four were heard on the nights of 7 June 1969 and 14 and 23 May 1970.

Savage (1965) was apparently the first to use the term "calling station" to designate localities at which Saw-whet Owls were heard repeatedly. As defined in this paper, a "calling station" is a specific locale where the species has been reported calling on two or more different nights. On this basis, there are a total of nine calling stations in the Great Balsam-Pisgah Ridge area along a 13-mile transect, thus representing a density of one station per 1.44 miles. The validity of these designated stations is apparent in a careful scrutiny of the records, which indicate at least one occasion for each station when owls were simultaneously present in immediately adjacent calling areas on the same night. Interestingly, all nine of the calling stations have been occupied for at least 2 years, a fact suggesting that the owls return to the same site during consecutive breeding seasons. The stations at Spruce Ridge (Site 1), Richland Balsam (Site 2), and Silvermine Bald (Site 14) have been active for 2 years. The calling stations at Chestnut Ridge (Site 4), Big Beartrail Ridge (Site 5), Haywood Gap (Site 8), and Tanasee Bald (Site 12) have been active for 3 years; Richland Balsam (Site 3) has been active for 5 years; and Devil's Courthouse (Site 13) has been active for 6 years. Examining the data from the 4-year period of censuses reveals that eight of the nine stations were active in both 1968 and 1969, while five stations were active in 1970 and three were active in 1971. Since the majority of censuses were conducted in the first two years, this apparent decline in station activity during the 4-year period reflects the amount of time spent in the field during each season and is not indicative of a decrease in the owl population in the region.

Analysis of the above data reveals some interesting conclusions concerning the population density of the Saw-whet Owl in the area. The maximum number of owls noted on a given census (31 May 1969) was seven, for a value of one bird per 1.86 miles. The maximum number of calling stations active in a given year (1968 and 1969) was eight, for a value of one station per 1.63 miles. The total number of calling stations in the range is nine, for a value of one station per 1.44 miles. A careful scrutiny of the records from a comparable region in the Great Smoky Mountains reveals a remarkably similar figure for station density. Based on the observations of Stupka (1946, 1963), Savage (1965 and pers. com.), Simpson (1968), and James Campbell (pers. com.), there are five calling stations along the main crest of the Smokies on the 7-mile transect along the road from Newfound Gap to Clingman's Dome, for a station density of one per 1.40 miles. Although no values are available from the Smokies for owls per night or active calling stations per year, the value for station density is quite similar to that of one per 1.44 miles in the Great Balsams. This suggests that densities of the species may be relatively uniform in areas of comparable habitat in the southern Appalachians, although it is not known whether these stations are indicative of the locations of breeding pairs or individual owls.

The Saw-whet Owl is clearly the most abundant owl species in the spruce-fir zone of the southern Great Balsam Mountains. In the course of my field work I have never seen or heard any other owls in this area, although Barred Owls *(Strix varia)* may be heard calling from hardwoods about 1,000 feet lower in elevation. Stupka (1963) regards both the Barred and the Great Horned Owl *(Bubo virginianus)* as uncommon permanent residents of the Great Smoky Mountains, and he considers the fairly common Screech Owl *(Otus asio)* to be very rare or absent in the spruce-fir forests. Although the Barn Owl

(Tyto alba) is found occasionally in the vicinity of the Great Smokies and Great Balsams, I am not aware of any records from the Canadian zone.

In the past, the Saw-whet Owl has been regarded as a rare to uncommon species in the spruce-fir forests of the mountain regions. This impression has apparently been due to the random nature of observations, the lack of systematic census work, and the necessity for totally calm wind conditions during periods of field work. The present data, especially the census of 31 May 1969, indicate that the owl is actually fairly common in regions of suitable habitat, in fact the most abundant owl in the Canadian zone forests of the southern Great Balsam Mountains. It seems likely that systematic, repeated censuses in other ranges might yield a similar index of abundance in suitable habitat outside the Great Balsams.

HABITAT PREFERENCE

The aerial photograph (Figure 2) of Tanasee Bald and Devil's Courthouse is typical of the habitat found at each of the nine calling stations in the Great Balsam Mountains and Pisgah Ridge. It is apparent from this photograph that the spruce-fir forests are fairly limited in extent and generally confined to scattered groves along the crest of the ridge. In the southern Great Balsam Mountains, there are two main sites where the Canadian zone community occurs in a vast, relatively unbroken canopy: Reinhart Knob and the SW slope of Richland Balsam. Saw-whet Owls have never been reported from either of these locations, in spite of intensive and repeated searches. Although the 49 records contained in the present study are from areas where spruce-fir forests are present, a careful examination of aerial photographs of the Great Balsam Mountains indicates that this biome often constitutes only a portion of the habitat where the owl occurs. Seventeen of the 49 records are from areas where hardwoods comprise over 90% of the forest canopy, with conifers occurring only as scattered, solitary trees. Furthermore, eight of the nine calling stations and all of the other single records are from localities where the spruce-fir forests are either limited in extent, disrupted by fires or logging, or extensively infiltrated with species typical of the heath or northern hardwood communities. Nevertheless, virtually every article dealing with the Saw-whet Owl in the southern Appalachians has left the impression that the species is strictly confined during the breeding season to the Canadian zone biome.

Although no data are available from the southern Appalachians concerning the home range of the owl, Thomas H. Nicholls (pers. com.) has utilized biotelemetric tracking techniques to measure the movements of the species at the University of Minnesota's Cedar Creek Automatic Radio-tracking Station. Nicholls informs me that three Saw-whet Owls were followed for 20 days each with this technique, and their average home range was approximately 350 acres. If one assumes that the Saw-whet Owl occupies a home range of comparable size in the Great Balsam area, then it seems apparent that the bird must utilize a considerable acreage of hardwood forests, even though spruce-fir associations must be present in the immediate vicinity. Accurate documentation of habitat selection would require the use of biotelemetry in the study area, but inspection of the aerial photographs substantiates the general impression that one gets in the field, namely that the bird occurs predominantly in the transition zone between the spruce-fir community and hardwood forests.

Although there appears to be no information in the literature concerning the relationship between the calling area and the foraging area of the owl, it seems possible that the occurrence of the species in this transitional zone, or edge community, is related to the relative abundance of food in the area. Peter Weigel (pers. com.) has conducted extensive studies of the mammal populations of the spruce-fir, northern hardwood, and transitional zone communities of the Roan Mountain area, and his studies indicate a statistically significant difference in the density of species and individuals among the three communities. The greatest variety of species and the maximum number of individuals occur in the edge between the spruce-fir and northern hardwood communities. Thus the rodents and other small mammals that comprise one of the major

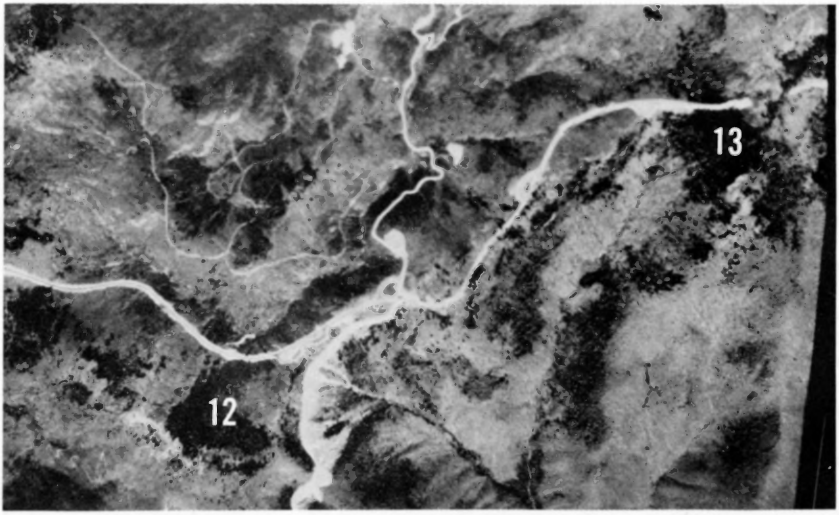

Figure 2. Aerial photograph shows Saw-whet Owl calling stations at Tanasee Bald (Site 12) and Devil's Courthouse (Site 13). The east-west highway is the Blue Ridge Parkway, and the one running north-south is NC 215. Note how the dark patches of spruce-fir forest contrast with the surrounding hardwoods. This is typical habitat for all nine calling stations.

sources of food for the Saw-whet Owl attain their maximum density in the areas where the two communities merge. It may be hypothesized, therefore, that the presence of the owl in these mixed communities is in part a reflection of the relative abundance of food in the locality.

Several authors, including Hall (1966), have suggested that the recent increase in records of the Saw-whet Owl in the southern Appalachians indicates range expansion by the species. In a previous paper (Simpson, 1968), I suggested that these records are not sufficient evidence to establish range expansion but rather reflect three trends in the area: the increased accessibility of the high country due to the creation of new roads, the growing popular interest in birds, and intentional searching for the species by ornithologists. However, if the species does prefer edge or transitional communities, then there may have been an increase in the numbers of the bird due to the disruption of the forests by fires, logging, highways, and insect pests. In this regard, it is interesting that in the Black Mountains the owl was not reported until 1949, in spite of extensive studies of the range by Brewster (1886), Cairns (1887, 1889, 1891, 1894), and Burleigh (1941). Nevertheless, the owl may have been overlooked in this area until modern times; and any evidence offered either to support or refute the concept of range expansion remains highly circumstantial.

From a geographical standpoint, the calling station at Tanasee Bald (Site 12) is of considerable significance. Although small scattered groves of red spruce occur farther south into the mountains of northern Georgia, Ramseur (1960), Stupka (1964), and Simpson (1968) have pointed out that the true Canadian zone spruce-fir biome reaches its southern limit in the eastern United States at Tanasee Bald. If the Saw-whet Owl requires the presence of this plant community during the breeding season, then Tanasee Bald represents the southernmost point in the eastern United States where this species should occur during the spring and summer months. As pointed out in my previous paper (Simpson, 1968), however, additional field work is required to determine whether the owl is strictly limited to these spruce-fir communities.

EVIDENCE OF BREEDING

One of the major controversies over the status of the Saw-whet Owl in the southern Appalachians centers around the question of whether the extensive summer records indicate a breeding population. In spite of repeated, systematic searches in the Great Smokies, Great Balsams, and Black Mountains, no nests or eggs have ever been reported. However, there are two records of juvenile owls from North Carolina which provide strong evidence that the species does nest in the state. A review of these two reports is in order.

On 10 July 1965 Peake (1965) reported his sighting of a single Saw-whet Owl in juvenile plumage at Richland Balsam in the Great Balsam Mountains and suggested that this was the first record to substantiate the breeding of the species south of West Virginia. Subsequently, on 2 September 1965, a juvenile Saw-whet Owl was captured in the mist nets at Mt. Mitchell State Park in the Black Mountains. This bird was banded with USF&WS No. 544-05701 by Brad Hawkins and photographed by Connely Moffett. Hawkins (pers. com.) felt that the record was strong evidence of breeding in the Mt. Mitchell area. However, a number of ornithologists have contended that these two records may represent early migrants; and the validity of using the records as breeding evidence has been questioned on this basis.

An examination of the available data on migration patterns of the Saw-whet Owl indicates that it is extremely unlikely that the juvenile owls found by Peake and Hawkins were migrants. Davis (1966) reported on the extensive southward invasion of the species into the eastern United States during the fall of 1965, and his summary indicated that the overwhelming bulk of the population arrived between 3 October and 10 November with the peak of movement occurring between 14 and 18 October. Furthermore, the earliest record was from Monomoy, Massachusetts, on 8 September, and only a few scattered individuals were noted elsewhere from that date until the last week of September. Mueller and Berger (1967) reported on a study of Saw-whet Owl migration at Cedar Grove Ornithological Station in Wisconsin from 1956 through 1964. They noted that the bulk of the records centered around 23 October, with 65% of the sightings occurring in a 2-week period centered on that date. Furthermore, Mueller (pers. com.) informs me that the species was never recorded in the area prior to the last week in September and that only one of the 213 captured owls had even a minute trace of the distinctive juvenile plumage. In North Carolina, the occurrence in spruce-fir forests of these two juvenile owls on 10 July and 2 September strongly suggests, therefore, that the species does breed in the mountain regions of western North Carolina. Ultimate proof, however, must rest upon the eventual discovery of a nest containing eggs or flightless young.

WINTER STATUS AT HIGH ELEVATIONS UNKNOWN

Savage (1965) and Peake (1965) have suggested that the Saw-whet Owl undergoes a "vertical migration" in the southern Appalachians, with the birds wintering in the valleys and moving up the slopes to the higher elevations in late March or early April for breeding. I have no records to substantiate or refute this concept, aside from the fact that the bird has not been recorded in the study area except during the period of April through August. Although Savage (1965), Peake (1965), and Simpson (1968) have summarized the evidence to support vertical migration, the extent to which this occurs and the extent of overwintering in the high elevations remain unknown.

SUMMARY

An 8-year study of the Saw-whet Owl in the southern Great Balsam Mountains reveals a total of 49 records of the species, with the calling season occurring during the period of early April through mid-June. A total of nine calling stations are present in the range

along a 13-mile transect, and comparison with a comparable area in the Great Smoky Mountains indicates that densities of the species may be quite uniform throughout regions of suitable habitat in the southern Appalachians. The data indicate that the bird is actually fairly common in the proper habitat, and it is clearly the most abundant owl in the spruce-fir community. The owl shows a preference for mixed communities of conifer and hardwood and occurs most regularly in the transition zone or edge between the spruce-fir and hardwood forests, where the increased availability of small mammals may account for its presence. The questions of range expansion and vertical migration remain unsettled; but two documented occurrences of juvenile Saw-whet Owls in the southern Appalachians, both records coming at least a month prior to the earliest known migratory movement of the species, give strong evidence in support of a breeding population.

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