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PRELIMINARY SURVEY OF AUTUMN HAWK MIGRATION IN THE INNER PIEDMONT OF VIRGINIA

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Abstract

A hawkwatch was conducted in September 1997-1999 in the Inner Piedmont of Virginia near Lynchburg, to assess the magnitude and species composition of the flight relative to the Blue Ridge. The flight density in the Piedmont averaged one-third to one-half that of two nearby Blue Ridge lookouts, but among years ranged from one-fifth to two-thirds that of those two ridge lookouts. The species composition of the Inner Piedmont flight was similar to that on the Blue Ridge, with Broad-winged Hawks (*Buteo platypterus*) making up over 95% of the September flight. A close-site study in 1998 suggested that the Broad-winged Hawk flight is greater over Lynchburg than to the immediate southeast. Hawk migration studies in this area certainly warrant further attention.

Hawkwatching in the Americas (Bildstein and Klem, Eds.) 2001. Pages 59-66.

Introduction

Hawkwatching in Virginia traditionally has focused on the Ridge-and-Valley Province in the west and on the Coastal Plain in the east. Relatively little attention has been given to the intervening Piedmont region. Anecdotal observations suggest that a significant autumn flight might occur near Lynchburg in central Virginia. A hawkwatch was instituted there beginning in 1997 with the threefold goals of (1) assessing the magnitude of the flight, especially relative to the nearby flight on the Blue Ridge, (2) determining its species composition and comparing it with the Blue Ridge flight, and (3) evaluating the flight path that hawks use through this locale.

Methods

The city of Lynchburg is at the juncture of Amherst, Bedford, and Campbell counties, in a region sometimes referred to as the Inner Piedmont, where scattered ridges and mountains make up foothills paralleling the Blue Ridge Mountains (Woodward and Hoffman 1991). The city, which is 32 km southwest of the Blue Ridge, is 72 km south of Rockfish Gap and 51 km east of Harvey's Knob, two autumn hawk lookouts on the Blue Ridge.

In 1997 pilot observations were conducted from three locations within Lynchburg, including Candler Mountain. In 1998 and 1999 the summit of Candler Mountain was used as the primary count site. Candler Mountain, on the southeast edge of Lynchburg, is a small northeast-southwest oriented ridge, one of the last remnants of the Blue Ridge foothills. Its nearly bare crest stands at 405 m, 160 m above the nearby surrounding

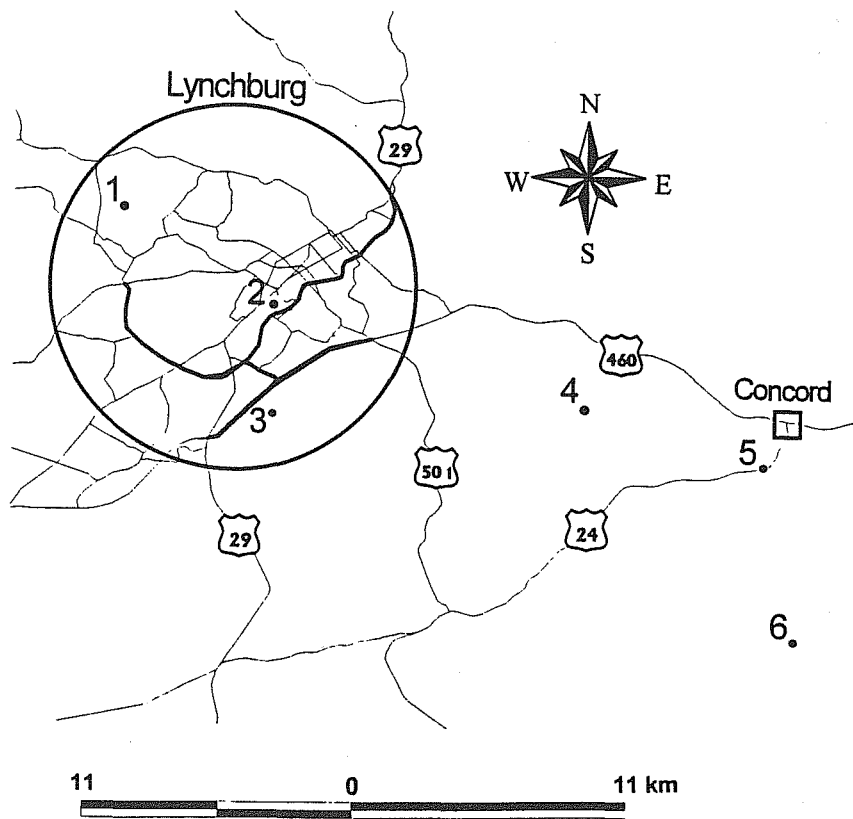


Figure 1. Location of primary lookout on Candler Mountain (Site 3) and five additional auxiliary sites (Sites 1, 2, 4, 5, and 6) relative to Lynchburg, Virginia.

Piedmont, and offers an unrestricted view in all directions except downridge to the southwest.

In 1998 observations were made from several auxiliary sites in and near Lynchburg concurrently with the count taken at Candler Mountain, in order to study local flight paths of Broad-winged Hawks (*Buteo platypterus*). Auxiliary sites (Figure 1) were along a transect perpendicular to the hawks' flight path, which is oriented northeast to southwest.

All observations were conducted between the 12th and 30th of September during the peak of the Broad-winged Hawk migration. A visual count of migrating hawks was made using 7-10x binoculars, and data on both hawks and weather were recorded in hourly increments according to Hawk Migration Association of North America (HMANA) protocols. One or two of a total of three experienced hawkwatchers counted at Candler Mountain at any time. One or two students who had received some training in spotting and identifying migrating Broad-winged Hawks collected most of the data at auxiliary sites in 1998.

Only raptors deemed to be migrating were recorded. This excluded some Red-tailed Hawks (*B. jamaicensis*) that hunted within view of the lookout. Resident and

potentially migrant Turkey Vultures (*Cathartes aura*) and Black Vultures (*Coragyps atratus*) also were numerous, but because of the difficulty of distinguishing residents from migrants, we excluded vultures from our count.

Results

In the three years (1997-1999), 9147 raptors of 11 species were counted during 190.7 hours of observation (Table 1).

Of the 190.7 hours of observations, 127 were when counts also were conducted at both Harvey's Knob and Rockfish Gap. These observations are the basis for assessing the magnitude and species composition of the Lynchburg flight relative to the Blue Ridge flight (Table 2).

Lynchburg's average flight density of 44 hawks per hour over the three years was a little more than one-third to one-half that of Rockfish Gap and Harvey's Knob respectively (Table 3). Flight densities at the two Blue Ridge lookouts varied between 1998 and 1999, and considering these two years individually, Lynchburg's average flight density ranged from one-fifth to two-thirds of the two ridge lookouts (Table 3).

Broad-winged Hawks made up over 95% of the September flight at all three lookouts (Table 4). When all species other than Broad-winged Hawks are considered, the species composition of the flight was also relatively similar for the three lookouts, with only minor differences notable, such as a lower proportion of Red-tailed Hawks seen at Lynchburg (Figure 2).

In 1998 flight densities were greatest over Lynchburg and decreased to the southeast with increased distance from Lynchburg (Table 5). Because more than 60% of the hawks passed during one day (September 20th), flight densities are heavily skewed by the data from this day. However, even when data for this day are excluded, the trend noted still exists, though not as strongly (Table 5).

Discussion

A preliminary survey of the September hawk flight in Virginia's Inner Piedmont through the Lynchburg area verified that a substantial flight does occur in the region. The magnitude of this flight relative to the Blue Ridge flight varied appreciably over the three years of this survey. This is not surprising given that the survey covered only September, when numbers of Broad-winged Hawks make up better than 95% of the total flight. Flight densities for Lynchburg were compared to Harvey's Knob and Rockfish Gap separately for Broad-winged Hawks and for all other raptors during both 1998 and 1999, the two years making up the bulk of the data. For Broad-winged Hawks, Lynchburg's flight density ranged from 17-68%, and all other raptors ranged from 18-52% of that of the Blue Ridge lookouts.

One point to be noted in making such comparisons between Piedmont and ridge sites is that it is assumed that detectabilities of hawks by counters at different locations are the same. It is known, however, that factors such as flight density and flight visibility can affect what proportion of the passing hawk flight is detected during such visual surveys (Sattler and Bart 1985). Although weather and airport surveillance radar observations of bird migration allow for the unbiased detection of migrants, they are not able to quantify the number of migrants passing (Gauthreaux et al. 2001).

Table 1. Yearly totals of raptors seen in Lynchburg, Virginia, in September 1997-1999.

Species	1997	1998	1999	Total
Osprey (<i>Pandion haliaetus</i>)	12	30	21	63
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	3	6	1	10
Northern Harrier (<i>Circus cyaneus</i>)	0	6	2	8
Sharp-shinned Hawk (<i>Accipiter striatus</i>)	16	69	20	105
Cooper's Hawk (<i>A. cooperii</i>)	1	6	3	10
Northern Goshawk (<i>A. gentilis</i>)	0	0	0	0
Red-shouldered Hawk (<i>Buteo lineatus</i>)	1	0	0	1
Broad-winged Hawk (<i>B. platypterus</i>)	3345	3256	2282	8883
Red-tailed Hawk (<i>B. jamaicensis</i>)	0	2	0	2
Golden Eagle (<i>Aquila chrysaetos</i>)	0	0	0	0
American Kestrel (<i>Falco sparverius</i>)	11	25	12	48
Merlin (<i>F. columbarius</i>)	0	2	0	2
Peregrine Falcon (<i>F. peregrinus</i>)	0	3	0	3
Unidentified raptor	1	9	2	12
Total	3390	3414	2343	9147
Hours of observation	29.0	100.3	61.4	190.7

Table 2. Raptor totals for Lynchburg, Virginia, and two Blue Ridge lookouts in Virginia for September 1997-1999, during 127 hours of concurrent coverage.

Species	Lynchburg	Harvey's Knob	Rockfish Gap
Osprey	40	87	119
Bald Eagle	8	22	25
Northern Harrier	8	29	34
Sharp-shinned Hawk	74	155	215
Cooper's Hawk	9	24	59
Northern Goshawk	0	0	3
Red-shouldered Hawk	0	9	15
Broad-winged Hawk	5405	9329	14786
Red-tailed Hawk	2	33	26
Golden Eagle	0	0	1
American Kestrel	32	58	42
Merlin	1	7	5
Peregrine Falcon	3	5	10
Unidentified raptor	10	11	28
Total	5592	9769	15368

Table 3. Total hawks per hour for Lynchburg, Virginia, and two Blue Ridge lookouts in Virginia.

Year	Lynchburg	Harvey's Knob	Rockfish Gap	Hours of Observation
1997	225.7	6.3	21.7	3
1998	41.1	61.1	72.8	80
1999	36.9	110.5	215.3	44
Total	44.0	76.9	121.0	127

Table 4. Percentage of the September 1997-1999 hawk flight made up of Broad-winged Hawks and all other species at three watchsites in Virginia.

	Broad-winged Hawks	All other species
Lynchburg	96.7	3.3
Harvey's Knob	95.5	4.5
Rockfish Gap	96.2	3.8

It is conceivable that in the Inner Piedmont hawks rely more on thermal lift than those migrating along the Blue Ridge, because bare thermal-generating surfaces such as pavement and fields are generally more common there. If this is true, hawks might fly higher on average relative to the observer through the Inner Piedmont than along the Blue Ridge, and counts could be lower in the former area because of this.

Species composition in the Inner Piedmont and along the Blue Ridge was found to be comparable. This is not unexpected, given the proximity of all three sites. Some hawkwatchers have speculated that human development in the Piedmont might enhance thermal development there, resulting in an increasingly greater proportion of the flight of certain thermal-dependent species such as Broad-winged Hawks favoring this flight path. Our data do not support this hypothesis, in that Broad-winged Hawks made up similar proportions of the September flight at these three lookouts. It seems reasonable to view the Inner Piedmont flight as a portion of a broad-frontal movement of Broad-winged Hawks and other species occurring across the continent, as opposed to the spill-off of a flight concentrated along a leading line. Such broad-frontal movement has been suggested in the literature for some time (Kellogg 1983, McKenzie and Feerick 1989), and empirical evidence to this effect has become increasingly evident as a result of close-site studies in this region (Blauer 1995, Irvine 1996).

Finally, a small-scale close-site study in 1998 suggested that the Broad-winged Hawk flight is greater over Lynchburg than to the immediate southeast. This may be because hawks are at high densities close to the Blue Ridge, which as a leading line concentrates them. Numbers would then decline with increased distance from this source. For the reasons cited above we question this explanation.

Another possible explanation is that the pattern is a spurious result of a one-year study. Results from another year might reveal an entirely different flight path.

A third explanation would invoke some geographical characteristic of the region, which acts to concentrate hawks preferentially over Lynchburg. Candler Mountain itself, and/or other ridges to the north, might act as features that draw migrating hawks, perhaps with ridge lift. Or Lynchburg might serve as an attractant if thermal production there is greater than the surrounding, more vegetated landscape.

PERCENTAGE OF THE NON-BROAD-WINGED HAWK FLIGHT

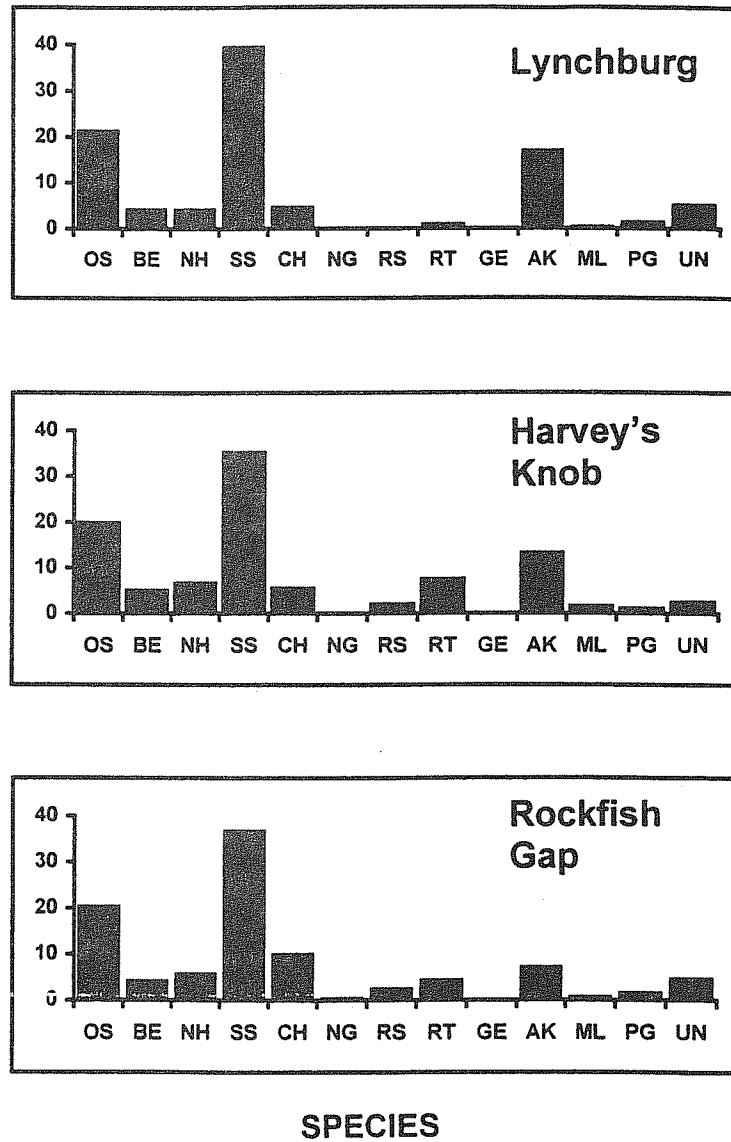


Figure 2. Percentage of the September 1997-1999 hawk flight for all species excluding Broad-winged Hawks in Lynchburg and at two Blue Ridge lookouts (Harvey's Knob and Rockfish Gap). OS = Osprey, BE = Bald Eagle, NH = Northern Harrier, SS = Sharp-shinned Hawk, CH = Cooper's Hawk, NG = Northern Goshawk, RS = Red-shouldered Hawk, RT = Red-tailed Hawk, GE = Golden Eagle, AK = American Kestrel, ML = Merlin, PG = Peregrine Falcon, UN = Unidentified raptor.

Table 5. Daily totals for Broad-winged Hawks observed from Candler Mountain (Site 3), and five auxiliary sites near Lynchburg during September 1998.

Date	Site 1 ^a	Site 2	Site 3	Site 4	Site 5	Site 6	All sites
September 11					14		14
September 12	3		145	15	27	50	240
September 13	7		20	2		6	35
September 14	58		6		9		73
September 15			31		6		37
September 16	3		33		7	2	45
September 17	36		206	10			252
September 18			4				4
September 19	1		396	42	3		442
September 20	1127	1712	1541	588	107	18	5093
September 21		10	4	3			17
September 22	85		77	50			212
September 23	12		31	81			124
September 24	169	469	635	22			1295
September 25	69	3	23	9	7		111
September 26	18	31	47	1			97
September 27	54		20	38		8	120
September 28			35				35
September 30			2				2
Total birds	1642	2225	3256	861	180	84	8248
Total hours of observation	68.2	23.0	100.3	58.8	40.1	43.0	333.3
Birds per hour	24.1	96.7	32.5	14.6	4.5	2.0	
Birds per hour excluding September 20	8.1	28.5	18.0	5.1	2.1	1.7	

^a See Figure 1 for locations of sites.

This preliminary survey of the autumn hawk migration in Virginia's Inner Piedmont has only begun to detail its magnitude, composition, and local flight paths. However, it has been sufficient to show that the flight is a significant component of a broader movement that until now has been little studied. Hawk migration studies in this area certainly warrant further attention.

Acknowledgments

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NEW FULL-SEASON AUTUMN HAWKWATCHES IN COASTAL TEXAS

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Abstract

Before 1997, local volunteers frequently conducted peak-season, autumn counts of migrating raptors at Smith Point on Galveston Bay, and at Hazel Bazemore Park near Corpus Christi, Texas. In 1997, HawkWatch International partnered with local organizations and volunteers to begin standardized, full-season counts at both sites. Three years of effort have demonstrated the significance of migrations through the area. The Corpus Christi migration now stands as the largest and most diverse concentration of migratory raptors known in the United States and Canada, with annual counts ranging as high as 992,000 individuals of up to 28 species of raptors (>90% Broad-winged Hawks, *Buteo platypterus*). In comparison, although the Smith Point count averages only 25,000–50,000 birds, it includes relatively high numbers of accipiters, kites, and falcons. Both sites also provide excellent opportunities to monitor migrations of Swallow-tailed Kites (*Elanoides forficatus*) and Mississippi Kites (*Ictinia mississippiensis*). Although the time span of full-season data is limited, comparisons of the seasonal and annual dynamics at each site reveal distinct differences. Corpus Christi probably draws from a broad range of eastern and midwestern flyways. Smith Point probably draws from a more limited range of eastern and southeastern flyways. The Smith Point flight also appears to be more affected by coastal weather conditions. Due to wind-related variation in flight paths, adequate coverage of the Broad-winged Hawk flight at Corpus Christi may require simultaneous peak-season counts at multiple sites along a northwest–southeast transect. Besides their scientific value, both sites also offer tremendous opportunities for public education.

Hawkwatching in the Americas (Bildstein and Klem, Eds.) 2001. Pages 67-91.

Introduction

Between 1997 and 1999, new partnerships enabled the first ever standardized, full-season counts of the autumn migration of diurnal raptors through two sites on the gulf coast of Texas. The first site is at Smith Point on Galveston Bay near Houston. The second site is at Hazel Bazemore County Park along the Nueces River on the outskirts of Corpus Christi. Local volunteers began conducting annual, peak-season counts (6–