THE HAWK FLIGHT OF SEPTEMBER 1983

by Paul M. Roberts, Medford

September 12, 1983, was officially the third best hawk flight ever reported from Wachuset Mountain in Princeton, Massachusetts. Totals for the day included 3037 Broad-winged Hawks, a Bald Eagle, 9 Northern Harriers, and an incredible 57 Ospreys! The day was even better than the count suggests, because the hawks were flying quite low and were easily seen, identified, and appreciated.

The magnitude and timing of this impressive flight were certainly unexpected. The first eleven days of September had seen record-breaking heat and brisk southwest winds. The hawk flight had been almost non-existent. Only once had more than 150 hawks been seen: 213 were reported on northwest winds on September 8. No one expected a large flight on the twelfth. The birds would be flying into a west-southwest wind estimated at eight to twelve miles per hour. It is generally believed that hawks, and Broad-winged Hawks in particular, do not migrate into adverse winds - at least not early in the season. That is why there were only eight observers at the site on the twelfth. That evening, those observers went home relishing the fact they had seen one of the most beautiful hawk flights - the third largest - ever seen at Wachusett. It was assumed that that flight would also be the largest of the 1983 season.

The weather forecast for the thirteenth was not very favorable: mostly cloudy with a 40 percent chance of showers. We have never had two flights of 3000+ back-to-back at Wachusett, and it seemed at first that it might be best to wait for the next cold front to push through. However, winds were from the northeast, and experienced Wachusett observers know that a northeast wind can be a godsend. I decided to go to the mountain, to take a half-day vacation from work, on the chance that northeast winds would bring birds. En route, I stopped twice to evaluate the weather and reconsider my trip. It was cool, predominantly overcast, and the northeast winds were weak. I almost turned around in Acton when the weather appeared to be deteriorating. But I recalled that this was September 13. Five years ago this date, I had seen the most spectacular birding event of my life - a flight of of 10,086 hawks! I decided to take the half-day to celebrate this anniversary on the mountain where it had occurred.

As in 1978, the crowd was on the mountain top the day after the big flight. By midmorning, at least twenty-five observers were present. Surprisingly, we were well rewarded. The flight of the twelfth had continued until 3:00 P.M. eastern standard time. On the thirteenth, the early morning flight was heavy. Between 8:00 and 9:00 A.M., 231 Broad-winged Hawks were seen. Over the next two hours, we tallied 151 and 179

"wings," and, as on the previous day, the birds were flying quite low, affording magnificent views. However, the highlights for me were the 26 Northern Harriers and 24 Ospreys seen between 8:00 A.M. and 12:00 noon. The harrier total was a single-day Eastern Massachusetts Hawk Watch record, and the Osprey flight gave us 71 Ospreys in a day and a half! It was really quite a morning.

The flight began to diminish after 11:00 A.M. Our skies had been predominantly overcast, with weak northeasterly winds estimated at eight to twelve miles per hour. We had seen clear skies to the northeast, over New Hampshire, for most of the morning. The ceiling was now dropping, and clouds had devoured most of the blue sky to the northeast. The birds had lost their lift and were no longer moving. I prepared to return to the office. Fortunately for me, I dawdled, and at about 11:45 A.M., an unidentified hawkwatcher, to whom I shall always be grateful, spotted a small kettle of 10 Broad-winged Hawks. Everyone looked up; it had been a while since we had seen any birds.

Suddenly, we saw a "peel" of approximately 800 Broad-wings streaming off from a kettle that had formed and dissipated without having been observed. Then another peel was seen - approximately 1850 hawks in less than ten minutes. Although they had peeled, the birds were gliding slowly and quite low.

The next hour may never be adequately reconstructed. A second wave of birds, larger than the first, then materialized and rekettled directly over the stunned observers. The estimate was 2600 hawks. Then came the ultimate wave. At 12:25 P.M., huge kettles were seen to the northeast. Slowly, they swirled north of the mountain, peeling off only to rekettle closer to the mountain. But as birds passed by, others appeared to the northeast - a river of hawks had formed.

Bart Kamp, a gifted hawkwatcher and the site leader for the day, reported, "At its peak, the north-to-west sky was a mass of streaming and kettling birds. There were more than a dozen kettles going on at one time, while simultaneously, the sky between the kettles was filled with birds streaming to and through existent kettles. Some of them were so dense, it is a wonder the birds did not fly into each other. Two of the kettles were multi-tiered, twice as large and twice as dense as the 900-bird kettle . . ., which means that the two kettles alone [must have] totalled 7000 to 8000 birds."

These kettles had formed <u>over</u> the mountain. The views were mesmerizing. While the <u>first</u> multi-tiered kettles developed, I counted the birds across the horizon. Six almost stationary thermals were in sight from northwest to northeast. The existence of the thermals was revealed by the thousands of birds within them, but while the hawks kept moving, the thermals continued at the same locations. Birds would boil up within the thermal, peel off, and stream to the bottom of

another, the top of which was boiling over with hawks. This cauldron of birds continued for almost thirty-five minutes. An estimated 13,615 hawks passed during that time.

My prose cannot capture the beauty or the magic of that flight. Never have I seen hawkers, birders, so overwhelmed, dwarfed as they were by the magnitude, the sheer natural force, of what they had witnessed.

The flight dwindled rapidly over the next two hours while estimates and counts were being evaluated - 20,106 hawks! Would anyone believe the report? Fortunately, twenty-five people had witnessed it. Only four people had been present five years earlier. The "hawkwatch hot line" was activated that night, warning hawkwatchers to the south to "get out tomorrow." Seth Kellogg, who watches in Southwick, Massachusetts, was one who did not disbelieve our report when he heard it. He had seen 12,381 Broad-wings that day!

When all the reports came in, the flight seemed even more incredible. Three Massachusetts sites reported a flight of more than 37,000 Broad-winged Hawks. The location of the sites and the times of their peak activity indicate that there was little, if any, duplication in this total.

Table 1. Hourly Broad-winged Hawk Counts, September 13 and 14, 1983.

E.S.TIME:	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	TOTAL
September 13, 1983											
Wachusett	-	213	151	179	2611	16216	436	90	16	-	19,912
Hatfield	-	-	25	328	625	45	0	-	-	-	1,023
Mt. Tom	-	-	181	2547	1285	847	411	39	-	-	5,310
Southwick	-	28	120	900	6605	3745	798	185	-	-	12,381
September 14, 1983											
Wachusett	140	694	580	55	34	7	5	1	0	-	1,516
Hatfield	-	-	175	2700	157	5	2	-	-	-	3,039
Mt. Tom	-	151	3029	780	45	12	4	245	-	-	4,266
Southwick	-	69	2653	1420	142	2	22	-	-	-	4,308

Only two interpretations of these reports seem reasonable. Either three or more rivers of hawks had moved through central Massachusetts, cutting a swath at least forty miles wide, or a tidal wave of birds stretching more than forty miles across had swept through the middle of the state!

As demonstrated in Table 2, the flight over Wachusett continued, on a lesser order of magnitude, through September 15.

Table 2. Wachusett Mountain Daily Hawk Count, September 11-16, 1983.

DATE	HOURS OF COVERAGE	WIND DIRECTION	TURKEY VULTURE	NORTHERN GOSHAWK	SHARP-SHINNED HAWK	COOPER'S HAWK	RED-TAILED HAWK	RED-SHOULDERED HAWK	BROAD-WINGED HAWK	BALD EAGLE	NORTHERN HARRIER	OSPREY	MERLIN	AMERICAN KESTREL	UNIDENTIFIED HAWKS	TOTALS
9/11	4.0	SW	0	0	0	0	0	0	3	0	0	0	0	0	1	4
9/12	8.5	WSW	16	0	9	0	6	2	3037	1	9	57	0	5	4	3146
9/13	8.3	NNE	6	0	34	1	6	3	19912	1	50	70	0	21	2	20106
9/14	9.0	NE	7	1	126	0	6	0	1516	0	11	46	0	25	13	1751
9/15	10.1	NNE	23	0	99	1	4	2	1013	0	8	11	0	21	28	1210
9/16	6.8	var.	0	1	39	0	2	0	34	1	5	8	1	3	7	101

No Rough-legged Hawks, Golden Eagles, or Peregrine Falcons were observed.

The magnitude of the flights raises two questions. First, are the totals credible? Second, what could have spawned such a concentration of birds?

With regard to the Wachusett count, the initial wave of birds was so close, so low, and (we thought at the time) so large that counting procedures lapsed momentarily. The enormous, complicated living mobile swirling above and about us overwhelmed our more rational selves. Bart Kamp, Chris Floyd, and I quickly estimated the flight individually and then met to agree on the lowest, "hardest" estimates.

The second, larger wave was noticed sooner and was more carefully estimated. The third and by far the largest wave was the most carefully estimated, even though a reported 13,000+ hawks had moved by in little more than thirty minutes. Once the leading edge of that wave was seen, the course of the river of hawks remained relatively stable. Birds passed northwest of the mountain, often rekettling in very tight knots just off the summit. Two kettles were roughly estimated at 3600 to 4000 birds. However, these birds had been counted earlier.

The river of hawks stretched approximately 130 degrees along the northern horizon. Six kettles were always in view, while hawks streamed from one kettle to another. I slowly moved my 25X spotting scope from west to east, estimating the birds in the kettles and counting the birds streaming between them. At the very limits of vision, kettle after kettle formed, seemingly between the Uncanoonuc and Pawtuckaway mountains; To avoid duplication in counting, I then focused on that spot to count the birds forming into kettles.

A Kettle of Broad-winged Hawks. *Photographed in Panama by Neil Currie.*

The two site leaders, Bart Kamp and Katie Durham, and Chris Floyd and I then compared our estimates. Three of the estimates pretty much agreed, but Katie Durham thought some of the estimates of kettle size were too high. However, her separate, rough estimate of 18,000 birds for the seventy-five-minute flight was virtually the same total determined by the other observers.

Leif Robinson, who had been present on September 13, 1978, viewed much of the 1983 flight from a site to the southwest of the mountain. He missed the first and most of the second wave while en route to his site. However, he independently reported some 8000 birds within nine minutes, between 12:33 and 12:42. Considering that the flight, as seen from the summit, continued until one o'clock, the estimate of 13,000+ birds in the third wave seems quite reasonable.

A comparison of the 1978 flight with that of 1983 reveals differences which affected the counts. First, the flight of September 13, 1978, occurred over a much longer period of time. The birds were almost steadily streaming, which made it easier to count them reliably. The 10,086 total, however, was a minimum figure; the skies were so clear and the birds so high, the observers undoubtedly missed many migrants. As much as one-third of that flight was visible only through spotting scopes. The flight of 1983 was much more concentrated: 18,000 birds in seventy-five minutes! However, the birds were moving slowly, so it was reasonably easy to

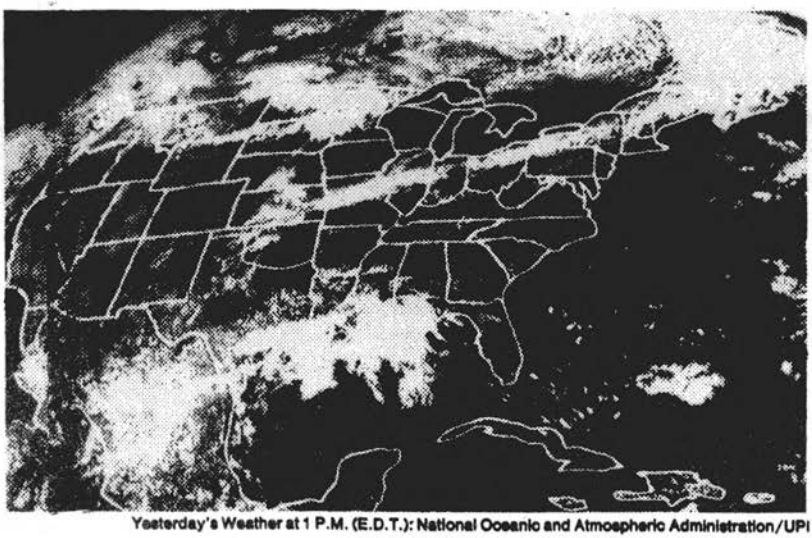


Figure 1. *Weather satellite photograph taken at 12 noon E.S.T., September 11, 1983.*

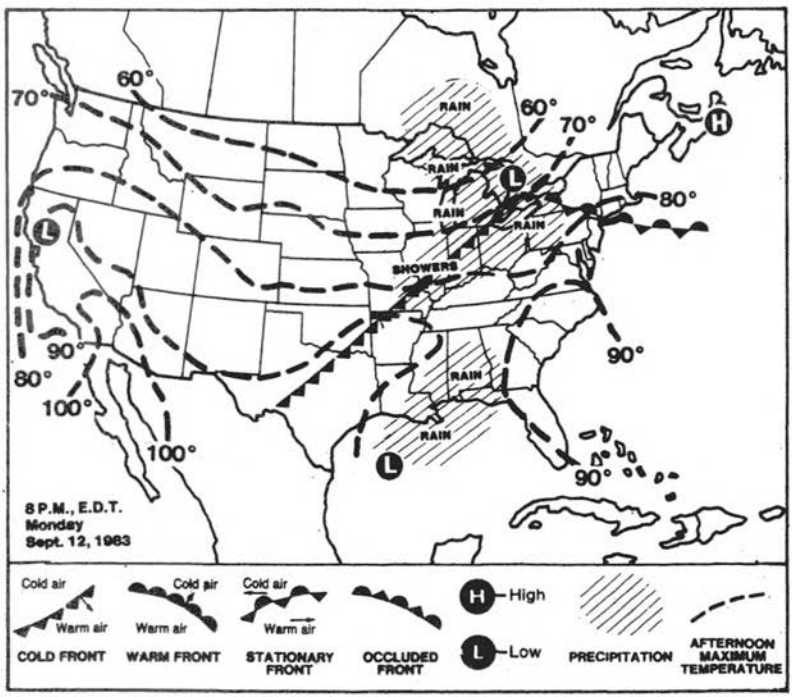


Figure 2. *Weather forecast for September 12, 1983. (Courtesy of* The New York Times*)*

estimate the numbers. The larger volume of birds seen in a shorter time period undoubtedly reduced the relative accuracy of the estimates compared with those of 1978. However, there was one compensating factor. The 1983 flight was so low that many observers stopped using binoculars, to better judge the dimensions of the kettles overhead. Because the flight was concentrated at a low altitude, it seems unlikely that many Broad-wings could have escaped our attention.

Though the observers felt the Broad-winged Hawk total was reasonably accurate, they all acknowledged that totals for other species were lower than they should have been. For example, there was an unusual flight of Northern Harriers and Ospreys in the morning. Between noon and 1:00 P.M., an additional twelve harriers and 29 Ospreys were recorded, but observers had been so mesmerized by the panorama of Broad-wings that they had spent little time actively looking for other species. In fact, during the first wave, a Bald Eagle that must have flown low, directly over the twenty-five observers looking up into the sky, was overlooked until it was flying well away from the mountain! Despite the gaps in coverage, the day's total of 50 Northern Harriers was only 6 short of the all-time record for one season! The day's Osprey count of 70 was also an all-time Eastern Massachusetts Hawk Watch record for one day, and it gave Wachusett a two-day Osprey total of 127!

How could such a concentration of hawks develop? Using newspaper weather maps and scattered hawkwatch reports, it is possible to reconstruct the weather systems in northeastern North America for the week preceding the great flight. On September 6, a cold front pushed through eastern Canada and the Ohio valley. Cool, northwest winds swept through southern Ontario and Quebec on September 7, while New England simmered in hot, southwest winds. This Canadian high pressure system dropped almost due south into northern New England on the tenth. On the eleventh, a cold front swept into western New England (see Figure 1), while a low moved slowly off the Maine coast. An occluded front developed along the northern Massachusetts border on the twelfth (see Figure 2). Weak northwest winds predominated north of that front, weak southwest winds to the south of it.

On September 13, however, a low pressure system funneled northeast winds into southern New England while a large, diffuse high, centered in southern Alberta, extended into northern New England with weak northwesterly winds. A minor "egg-beater" effect was created (see Figure 3). Northeasterly winds enveloped most of New England on September 14 and 15, primarily because a high pressure system was centered near the Gaspé Peninsula, and a weak high was moving east of the Great Lakes (see Figure 4).

How does the weather help explain the flight? First, a series of cold fronts sweeping through Canada had produced cool, northwest winds and clear skies - excellent conditions for

Broad-winged Hawk migration. Presumably, wind drift shifted the flight to the east of its normal path. Birds thus migrated toward and into northern New England between September 6 and 9. Westerly winds, which could have pushed the migrants toward the coast, prevailed in northern New England on the tenth. A wind shift to the south-southwest on the eleventh most likely slowed movement, but considering what happened at Wachusett on September 12, it is no longer possible to say that few hawks move on such winds.

On September 12, northern New England was covered by a cool air mass, clear skies, and a northwest wind, suggesting a heavy movement of Broad-wings. Strangely, few sites were covered in New Hampshire or Maine on this date. The only significant flight observed - 644 Broad-wings - was seen at the McKelvie School in southeastern New Hampshire. The flight through southeastern New Hampshire was certainly larger than this. As the hawks neared the New Hampshire/Massachusetts border, they encountered a wind shift to the south-southwest, but they continued moving. This would explain the fairly constant stream of birds at Wachusett on the twelfth and their very low altitude. The birds found little lift in the warm air and weak opposing wind. They nevertheless kept moving, but slowly, and thus, were easy to see and count.

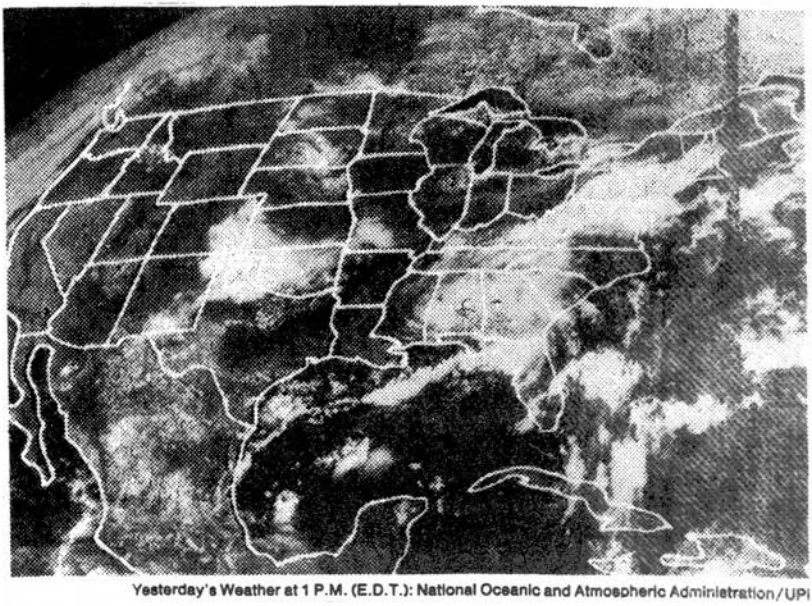
On September 13, New Hampshire, Maine, and points north continued to enjoy northwest or west-northwest winds and clear skies. Only modest flights were recorded at Oak Hill and other New Hampshire sites to the south or southwest. However, two sites located in southeastern New Hampshire, Blue Job and McKelvie School, reported large flights (see Table 3).

Table 3. Broad-winged Hawk Flights in New Hampshire, September 12-14.

SITE	September 12	September 13	September 14
Oak Hill	---	312	4309
Prospect Hill	---	180	1009
Harris Center	---	---	1542
Pack Monadnock	---	657	647
Antrim School	---	---	2290
Blue Job	---	1244	---
McKelvie School	644	2851	91

As these hawks reached the southern New Hampshire border, they encountered a wind shift to the northeast. The stratus clouds over Massachusetts were thick, heavy, and low, the cloud base no more than 2000 feet above the ground. Lift in such conditions is poor, and the birds were unable to achieve any great height, but they did have a modest tail wind pushing them in the desired direction - southwest.

The earlier northwest winds of northern New England appear to have pushed the flight east into a narrow, congested corridor.



Yesterday's Weather at 1 P.M. (E.D.T.): National Oceanic and Atmospheric Administration/UPI

Figure 3. *Weather satellite photograph taken at 12 noon E.S.T., September 13, 1983.*

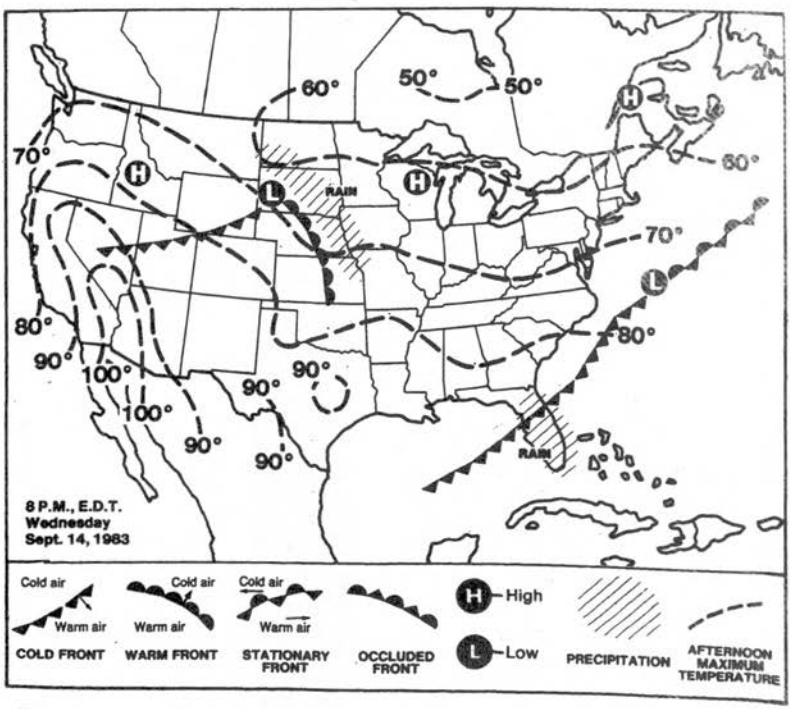


Figure 4. *Weather forecast for September 14, 1983.* (Courtesy of The New York Times)

But the birds were not pushed out to the coast. George Appell, observing at Harpswell, Maine, had his poorest Broad-wing season ever in 1983! When the birds encountered the northeast winds on September 13, the westernmost birds in this corridor hit Hatfield, Mt. Tom, and Southwick. The eastern portion of the corridor flew over Wachusett.

On the fourteenth, the second day of the northeast winds that now covered northern New England as well, the center of the flight shifted westward (see Tables 1 and 3 and Figure 5). Sites in central and southwestern New Hampshire, including Oak Hill, Prospect Hill, Antrim School, and the Harris Center, recorded their biggest flights of the season.

William Welch, photographing the wave of September 14 from a plane, saw no hawks anywhere until he passed south of the old Agawam, Massachusetts, airport. There he discovered a "true parade" of hawks, a river of birds that stretched more than fifteen miles to the south, beyond Simsbury, Connecticut. Connecticut was covered by legions of observers on that date, but only three sites picked up a significant part of the wave. A very narrow river of birds, totaling 10,500, passed between Goshen and South Litchfield. These same sites (excluding North Litchfield) had recorded the two largest flights in the state on the previous day as well.

What happened to the flight after it passed through southern New England? The reports of September 13 had tantalized observers at Hawk Mountain. On September 14 in 1978, one day after Wachusett's then record flight, Hawk Mountain had its all-time record flight of 24,000+ hawks! But, in 1983, Hawk Mountain recorded only 904 Broad-wings on September 14 and the largest flight of the season, 1741, on the fifteenth. The narrow river of hawks that had passed through Massachusetts and Connecticut apparently moved east of the traditional ridge sites and west of the montane sites near the coast, including Hook Mountain and Montclair (see Figure 5). On the fourteenth, Stone Mountain in New Jersey reported 18,500+ Broad-wings. Easton, Pennsylvania, a few miles to the west, reported 10,000+. I believe both reports were all-time records for these sites. The following day, September 15, Rockfish Gap near Waynesboro, Virginia, also reported an all-time high of 18,500 Broad-wings.

The data suggest that there may have been a very narrow, very dense migration corridor through the eastern United States, a corridor that probably did not exceed 50 miles in width at any point. There were, of course, migrants seen at many other sites, but no concentrations were seen approximating what has been described here. All major coastal sites in the eastern United States reported very poor Broad-winged Hawk counts for September 12 through 15. Their seasonal totals were also significantly lower than usual. Presumably, the northeast winds kept the hawks inland. Ironically, these coastal sites reported very poor flights for most other species as well, including the traditionally numerous accipiters and falcons.

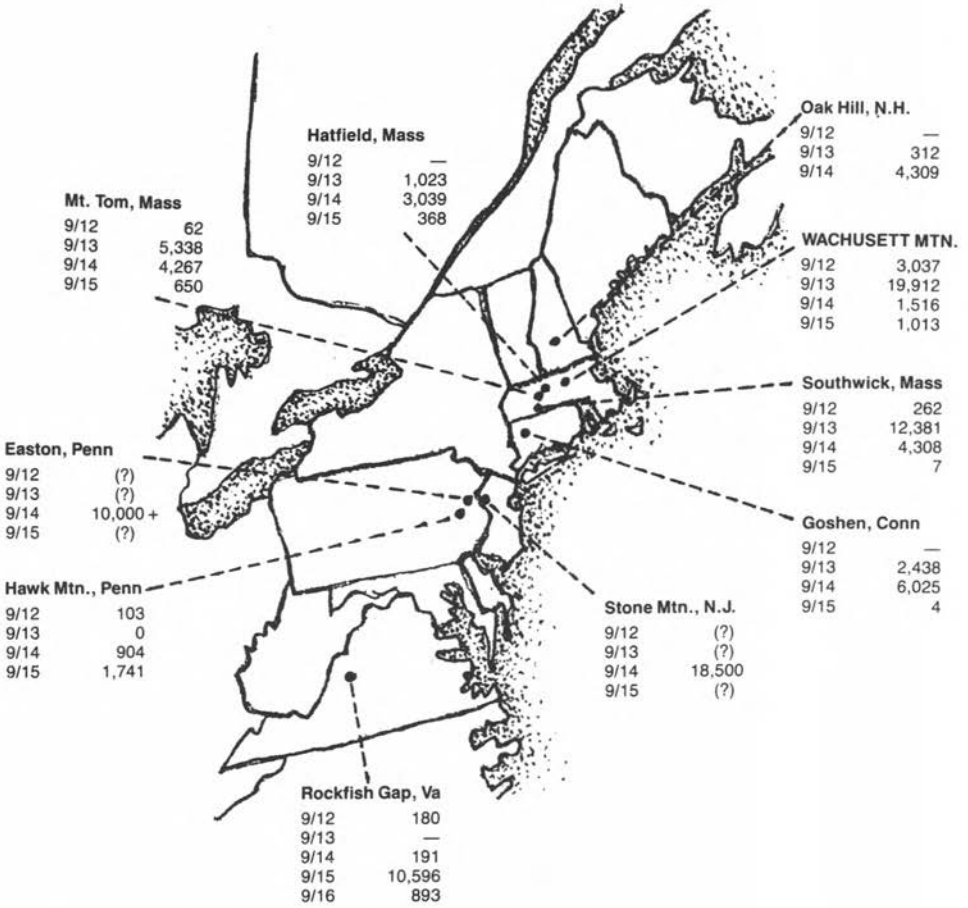


Figure 5. Progress of the Broad-winged Hawk flight, September 1983.

The flight of September 12 through 15 has perhaps taught Massachusetts birders several lessons. First, hawks do not always fly only when we think it best for them. The size of the flight on the twelfth was a real surprise and was followed by the overwhelming spectacle of the thirteenth. The 1978 flight had occurred on a superficially similar weather pattern, with a high moving into the region and a low moving off the coast, creating an egg-beater effect. However, in 1978, the high had been strong, the low deep, the local air mass cold, and the winds fairly strong. The birds had found great lift. The flight of 1983 occurred on a weak high, a shallow low, and weak winds, and the cloud cover was so thick in Massachusetts that the birds had very poor lift. That so many hawks would move together in such unsatisfactory conditions should cause us to reexamine our thoughts on hawk migration.

If we accept the hypothesis that a narrow corridor of hawks moved through the eastern United States, we must question the speed with which they moved. No sites recorded large numbers of Broad-wings south of Massachusetts before September 13. The distance from Wachusett to Rockfish Gap is approximately 525 miles as the crow flies. The somewhat more erratic Broad-wing would navigate more than 600 miles to cover that distance. If the birds seen at Easton and Stone Mountain on September 14 and at Rockfish Gap on the fifteenth were part of the flight observed in Massachusetts on the thirteenth, then they must have flown at least 250 to 300 miles per day in less than optimal circumstances. Do Broad-wings migrate faster than the maximum of 25 to 45 miles per hour generally assumed? Do they spend more time aloft than generally supposed?

The observers who saw 20,000 hawks on September 13 questioned whether there could be any Broad-wings left to migrate later. Had we seen the entire Broad-winged Hawk population of eastern Canada and northern New England in one day? Or, had we seen all the adults and were the immatures yet to follow? The flight continued on September 14 and 15, and observers tried to age the birds seen then, but the sample was too small to be reliable.

We may never see another hawk flight like that of September 13, 1983, at Wachusett Mountain. In years to come, perhaps greater coverage throughout eastern Massachusetts will enable us to understand better how hawks migrate through this region. What numbers might have been seen by someone hawkwatching between Wachusett and Southwick or in northwestern Essex County on the thirteenth? The questions continue. We have much to learn about hawk migration. Fortunately, that learning process can be very exciting.

ACKNOWLEDGMENTS

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PAUL M. ROBERTS founded the Eastern Massachusetts Hawk Watch in 1976. He has served as chairman of the New England Hawk Watch and will complete in the fall of 1984 his third and final term on the board of directors of the Hawk Migration Association of North America. He has served as chairman of that association for the past four years.

Several happy hawkwatchers on Wachusett Mountain, September 13, 1983.

Paul Roberts
Bart Kamp
Jim Samdahl
Chris Floyd
Norma Holmes
Katie Durham
Leif Robinson