Upstream Along an Eastern Tributary (Far From the Funneled Floods of Vera Cruz)

Susan Fogleman

Introduction

In 1972 former New Hampshire Audubon Society President the late Robert Smart wrote, "It will take a number of years of systematic watching to determine the patterns of the New Hampshire Broadwing flights." Serious efforts at systematic watching have now shed light on those patterns, and have also led to a clearer understanding of the migration patterns of the other raptors passing through the state, especially during the fall migration.

The New Hampshire Story

In the years that followed the establishment of Hawk Mountain Sanctuary, efforts were launched in other states to look for major hawk flights. The first New Hampshire effort was made near New Ipswich in the 1950s (Tudor Richards in an interview with Cole 1972). Peaked Hill in Bristol was discovered by the late Vera Hebert (pers. comm.) to be an excellent site not long after that. By 1960 Hebert and Smart had begun monitoring hawk flights there every fall, although not on a daily basis. An item in the fall 1960 bird reports section of *NH Audubon Quarterly* (Smart 1961) suggests that the importance of hawk migration monitoring was becoming more and more apparent to them and to New Hampshire Audubon members: "An excellent hawk migration occurred.... Unfortunately, it has been reported that gunners had a 'field day' on Cranmore Mountain shooting hawks. It will behoove members to cover as many mountains as possible, particularly in the September 13-25 period, to alert Conservation Officers when violations of the law occur, and to continually inform the public tactfully of the benefits of hawks and owls as well as the laws protecting them."

By 1969 Smart had become President of NH Audubon. That September he organized a field trip to the Peaked Hill site to show NH Audubon members the wonders of hawk migration. Over 50 people showed up, and saw over 360 hawks of 9 species (Smart 1969a). The following day he counted over 2500 Broadwings and 30 Ospreys (Smart 1969b). That is the same year that he discovered another hill in Bristol to be even better than Peaked Hill for the observation of the autumn flights. One day in early September he took a short hike to the summit of Little Round Top. On reaching his destination, Smart is reported to have looked skyward and seen a Bald Eagle and several dozen Broad-winged Hawks soaring overhead (V. Wright, pers. comm.). And that was the beginning of possibly the longest-term migration study in northern New England. (Because of its excellent exposure to the south and southwest, Peaked Hill is now used only for monitoring spring migration). All central NH fall reports from 1970 on (Smart 1971) come from Little Round Top, although the site received only scant coverage during the mid-1980s. Little Round Top has become

a teaching site as well as a monitoring and research observatory. School groups, college classes, and bird clubs visit throughout September and are given on-location lessons in migration ecology, hawk biology, and identification.

As awareness of and interest in hawkwatching grew, the search for other lookouts in New Hampshire and elsewhere in New England was on. Several other sites in New Hampshire have received occasional attention over the last two decades, their popularity largely dependent upon their proximity to the address of the site leader and the numbers of hawks (usually Broadwings) seen. Only three of the ten sites monitored in New Hampshire during the autumn of 2000 received coverage for more than a few days: Prospect Mountain at Weeks State Park in Whitefield, Little Round Top, and Blue Job Mountain in Strafford/Farmington. Little Round Top had the highest numbers of total hawks, as well as the highest numbers of Broad-winged Hawks, consistent with its history.

Patterns in New England

Geography and topography are major factors in shaping migration dynamics — particularly in the eastern part of North America. The NE-SW direction of the coast influences those birds breeding in eastern Canada and New England to fly southwestward toward their wintering grounds and return northeastward to their breeding areas in the spring. So do the predominant mountain ranges. And Broad-winged Hawks must maintain such headings to avoid the Gulf of Mexico. The Atlantic Ocean, Long Island Sound, Delaware Bay, and Chesapeake Bay all present barriers to most hawks (Fogleman 1993).

Broad-winged Hawks travel the longest distance of all New England's raptors. With South America their winter destination, these buteos especially must utilize rising air in order to save energy for that long journey and avoid depleting stored resources. They must find updrafts (air rising at a rate faster than the bird is sinking) in order to gain altitude. Once such air is found, then the bird can maintain and even increase altitude without flapping (Fogleman 1993).

There are two types of rising air currents: obstruction currents (updrafts caused by the prevailing wind striking and rising over objects such as hills) and thermals. The latter result from uneven heating of air near the surface and form after solar energy is absorbed by the surface.

Broadwing migration begins in August in northern New England. Bald Eagles, too, begin heading south during that month. But September, of course, is the month when these birds really get serious about leaving the region. (The raptors tallied at most Maine and New Hampshire sites probably include not only breeding season residents of those states but of the Maritime Provinces.)

What conditions should would-be hawkwatchers look for in order to catch the big flights? The search for the answer to that question has kept me on the watch sites for over twenty-five years, and I think I can now report with some confidence.

Studies of flights occurring at Little Round Top and Mount Agamenticus in York, ME, from 1978 through 1991 (Fogleman 1993, Figure 1) and data collected subsequently have contributed to an understanding of the relationship between synoptic weather patterns and hawk migration in northern New England.

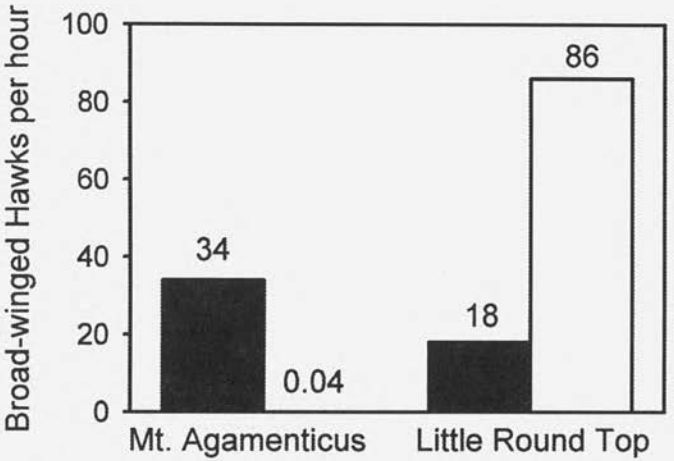

Figure 1. *Average numbers of Broad-winged Hawks per hour counted at Little Round Top and Mt. Agamenticus (1978-1991) under winds with opposing directional components (adapted from Fogleman 1993): filled bars = westerly vectors, open bars = easterly vectors*

The old textbooks on fall migration told us that northwest winds following the southern push of a cold front would bring hawks (Haugh 1972, Heintzelman 1976). But things are not as clearcut as that might indicate — especially in New England — and here is where it gets interesting, where the old textbook only applies to certain specific situations. Kerlinger (1989, p. 97) wrote, "Birds utilizing updrafts are extremely subject to drift.... The direction taken in the glide when the bird leaves the ... updraft varies with the wind direction...."

In order to explain the influences of wind on hawk migration in northern New England, I have developed what I call the "basin effect hypothesis." Any westerly direction to winds accompanying the movement of a cold front across New England will tend to drift the birds migrating over broad valleys and the coastal plain eastward. An easterly component will do the opposite, shifting birds toward the foothills of the White Mountains in the New England coastal plain, or toward the western side of broad valleys.

Think of a toy sailboat floating in a basin. If you blow across the surface of the basin, the boat obviously moves toward the opposite side. If you blow hard enough, your little boat may actually lift against the side of the basin. Winds deflected upward against the slopes of hills provide hawks with such lift. Along the coast, Broadwings in particular are reluctant to allow themselves to be drifted far out over the water

where there are neither thermals nor obstruction current lift. There they tend to fly at a lower altitude when westerly or northwesterly winds prevail, and are often forced to flap more in order to keep from being blown off course.

Advice to the Would-be Watcher

If the winds have an easterly component, go to sites in the eastern foothills of the White Mountains to see good autumn flights of Broadwings. What produces those ideal easterly-vectored winds? A high-pressure system moving into the Gulf of Maine along with a low-pressure system situated over the Ohio Valley is one of the best scenarios.

Really big flights can occur when a high-pressure system is sitting right over the region. These will be high and difficult to see in blue cloudless skies. It is then that hawks use strong thermal activity, especially over broad valley floors and the coastal plain. Monadnocks, isolated mountains sitting in midbasin such as Blue Job Mountain does in the middle of the coastal plain, offer the best vantage in such a situation. In fact, atop Blue Job, and other monadnocks or isolated ridges, hawkwatchers can fare well in almost any of the conditions.

Coastal sites are favored when a cold front has moved through the area. Northwest winds following the passage of a cold front can produce excellent flights of Sharp-shinned Hawks and the three falcons along the coast, especially into October.

The September flights of 1999 (Figure 2) provide an example of the effects described above. Westerly-vectored winds predominated over the region on September 11, 12, 17, 20, 23, and 25; easterlies on September 13, 14, 15, 16, 24, 26, and 27. (Most of the Broadwing flight had passed through by those latter three dates.) Westerlies on September 18 gave way to quieter air by mid-to-late afternoon as a high-pressure system moved into the area. Some inland sites saw late afternoon and early evening flights as birds came in looking for roosting spots. With the high right over central New England the next day, Blue Job observers witnessed an excellent flight. Downstream Pack Monadnock, Wachusett, and Watatic fared quite well also.

Hawkwatch Sites

	Maine	New Hampshire
Inland	Rumford	Prospect Mountain
		Little Round Top
		Deering
		Pack Monadnock
Coastal	Cadillac Mountain	Odiorne Point
	S. Harpswell	
	Mt. Agamenticus	
Midbasin		Blue Job

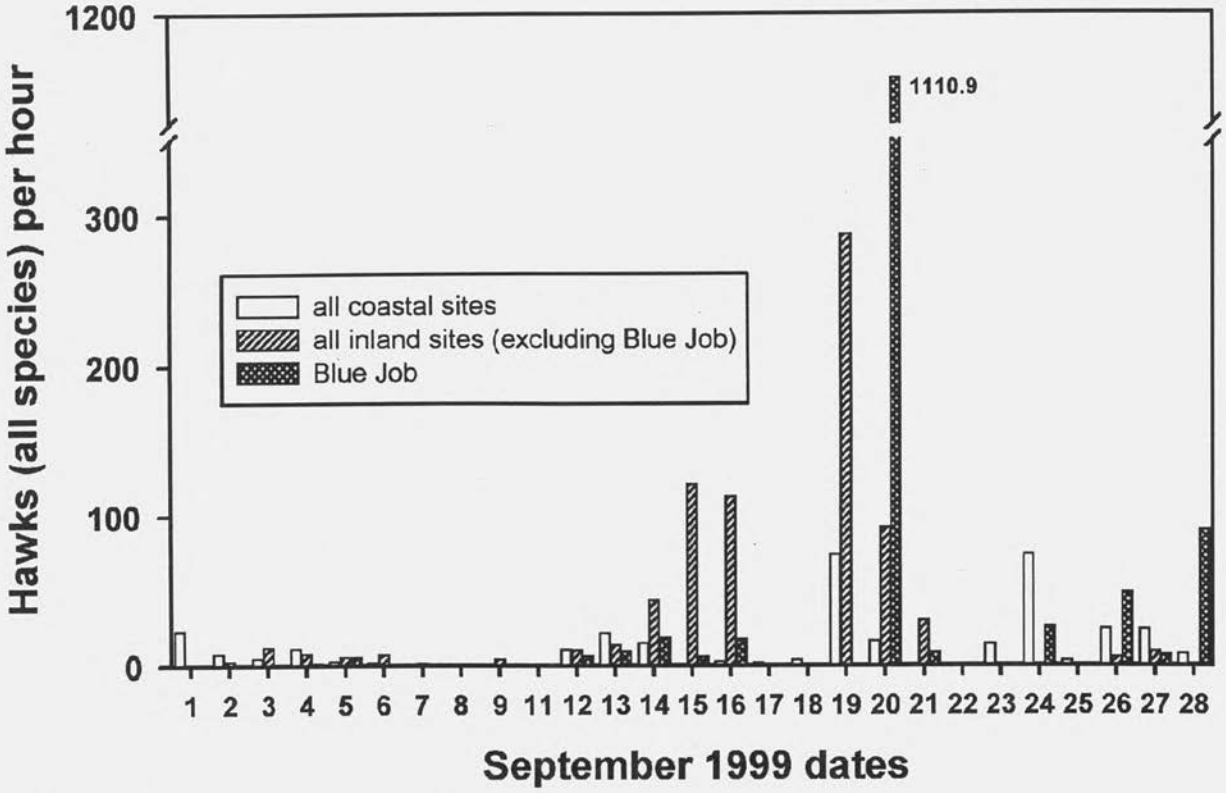

Figure 2: *Flight comparisons for all New Hampshire and Maine sites in 1999*

How does this relate to Massachusetts? It is likely that birds passing by Little Round Top continue on a heading that would take them past Mount Tom. Observers on Watatic or Wachusett are likely to see the birds when the flight is shifted eastward, or when Blue Job is the beneficiary as on September 19, 1999.

But because all the Maine sites and most of the New Hampshire ones are to the east or south of the White Mountains, pieces of the migration puzzle remain missing. New Hampshire's northernmost and newest site on Prospect Mountain is pioneering the quest for insight into the movement of birds west of the Whites. The establishment of other regularly attended sites along the western foothills to its south would help us better understand the eastern tributaries of the wonderful raptor river. To update Bob Smart's challenge will take additional years of systematic watching at strategically chosen sites to have a clearer picture of the patterns of New England hawk flights.

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Susan Fogleman *is a member of the Board of Directors of NorthEast Hawk Watch and New Hampshire/Maine Coordinator and records editor for the Hawk Migration Association of North America. A field biologist, consultant, writer, and lecturer, she is an independent researcher specializing in migration dynamics — especially involving hawk migration — and in relationships between marine mammals and pelagic birds. She also conducts personalized tours, and invites readers to accompany her to witness the world's most spectacular hawk migration at Veracruz, Mexico.*