

SPRING MIGRATION OF WATERFOWL IN NEW YORK AND THE WEATHER

Canada Geese Pick A Stormy Day in 1965

A. Boyd Pack, State Climatologist, U.S. Weather Bureau,
Environmental Science Services Admin., Cornell University

The literature on the subject of waterfowl migration in North America presents the general conclusion that the onset of heavy spring movements is marked by the occurrence of southerly winds, rising temperatures and a falling barometer (H. Albert Hochbaum, *Travels and Traditions of Waterfowl*, U. of Minn. Press, Minneapolis, 1955). On March 23, 1965 Canada Geese (*Branta canadensis*) migrated in large numbers through south central New York. How closely did the weather conditions associated with this migratory movement agree with the generalized statements or conclusions found in the literature?

To set the stage for a detailed look at the weather associated with the March 23rd migration of geese a log is presented of the flights observed in the Binghamton and Ithaca areas.

The Migratory Movements—March 23, 1965

- (1) Mount Pleasant, Tompkins County: Flocks beginning at 3:50 a.m. and continuing intermittently all day. Birds flying northward at estimated heights of 500 to 1000 feet above ground or 2000 to 2500 feet above sea level. Reported by Mr. L. F. Pearsall, Lab. of Ornithology, Cornell University, who lives on the slope of Mt. Pleasant.
- (2) Broome County Airport, Binghamton: Some 100 separate flocks observed on radar between 10 a.m. and 3 p.m. Flights headed northward at estimated levels of 2500 to 3500 feet above ground or 4000 to 5000 feet above sea level. Observation by Federal Aviation Agency and Weather Bureau personnel.
- (3) Ithaca, Tompkins County: Almost continual flights of geese heard flying northward between 7:00 and 7:30 p.m. Darkness as well as low ceiling of cloud cover prevented visual observation of numbers, height of birds above ground, etc. Observed by writer a few miles southwest of city.
- (4) Ithaca: A few small flocks flying northward at 6:15 a.m. on March 24th. Observed by the writer.

In summary, numerous flocks of geese were observed flying northward from early morning into the evening hours of the 23rd with small numbers passing through early on the 24th. Since reports of migratory flights north of Ithaca are lacking, it is not known how far these flocks con-

tinued their flights before settling down, but as many geese use Cayuga Lake and Montezuma National Wildlife Refuge as a stop en route, they probably stopped there.

The Stormy Weather

The synoptic weather situation is illustrated by a reproduction of the Daily Weather Map for 1:00 p.m., E.S.T., March 23, 1965 as analyzed by the U.S. Department of Commerce, Weather Bureau (Figure 1). The map shows the pressure pattern and frontal system affecting the northeastern United States, southeastern Canada and adjacent coastal waters. Precipitation occurring at the time of the map is indicated by shading. The great bulk of the migrating geese passed through the Binghamton and Ithaca areas within approximately eight hours before and after the time of the map, that is, between 5 a.m. and 9 p.m.

The weather in the area of the observed flights was influenced by an active, slowly moving cold front which at 1:00 p.m. extended west from coastal waters off the Canadian Maritime Provinces through Nantucket Island to the vicinity of Pittsburgh and then southwest to an elongated low pressure system centered near Cincinnati. This frontal system had moved rapidly through New York late on March 22 before decelerating to very slow movement southward through northern Pennsylvania during the morning of March 23. The frontal position in northeastern Pennsylvania at 1:00 p.m. was very similar to that of 12 hours earlier, the main southward movement of the front between 1:00 a.m. and 1:00 p.m. having occurred in Ohio and western Pennsylvania. During the latter half of the 23rd southward movement was speeded up and by 1:00 a.m. on the 24th the cold front was as far south as Richmond, and Roanoke, Virginia.

Precipitation associated with the frontal system was general over New York and extended into Pennsylvania, most of New England and southeastern Canada on March 23. Light snow fell intermittently from about 9 a.m. to 11 p.m. in the area from which migratory movements were reported. Accumulations of new snow amounted to about three inches at both Binghamton and Ithaca. Lesser amounts of snow fell in northeastern Pennsylvania, while precipitation occurred mostly in the form of rain south of the Scranton area. North of the migratory flight area the storm yielded from four to five inches of snow, falling intermittently throughout the day.

The Barometer and the Approaching High Pressure From the Northwest

Barometric records of the Weather Bureau at the Broome County Airport and of the Department of Agronomy at Cornell University indicate atmospheric pressure was falling at a slow but steady rate

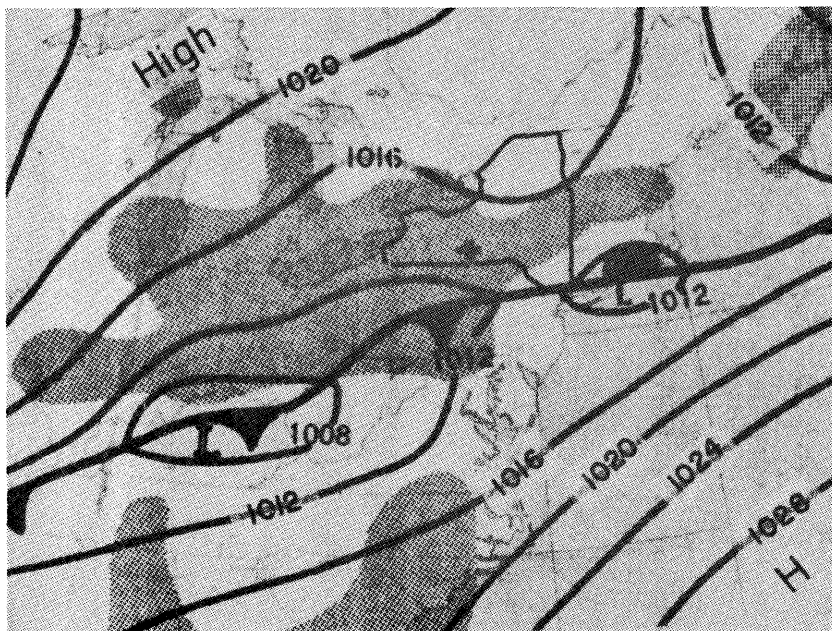


Figure I

Surface weather map for 1:00 p.m., March 23, 1965 in northeastern United States. Migratory flights observed in area marked by cross (+). Dark shading is area of precipitation occurring at time of map.

between midnight of March 22 and noon of the 23rd. The pressure fell sharply right after 12 noon and reached a minimum at 2 p.m. on the barometer at Ithaca and somewhat after 3 p.m. at Broome County Airport. The falling pressure was apparently caused by the movement southeastward of a weak low pressure system in southeastern Ontario, centered about 100 miles north of Toronto, and its merger by midday of the 23rd with the eastern extension of the main low pressure system centered near Cincinnati.

The factor which became increasingly dominant over New York weather on March 23 was the intrusion of a high pressure system from the north and northwest. The leading edge of this anticyclonic system can be seen in the 1:00 p.m. map as the 1016 millibar line protruding from Quebec into northern New York and Vermont. It was part of a mass of cold Arctic air centered in the Dakotas which extended in an approximate west-east line across central Ontario to southwestern Quebec. The

high pressure continued to push slowly southward, the 1016 isobar reaching a line from roughly Elmira to Albany by 1:00 a.m. on March 24. It thus became the controlling barometric factor in upstate weather the latter half of March 23. The records at Binghamton and Ithaca both show that the barometric pressure increased steadily after the early afternoon minimum on the 23rd and continued to increase until about noon on the 24th.

The early morning and forenoon flocks of geese were, therefore, migrating northward under weather conditions producing a falling barometer, while the flocks in the evening of the 23rd were in flight at the time of a rising barometer.

Low Clouds and a Wind Shift

Hourly observations on March 23 of cloud amount, ceiling height and surface winds are available from the Weather Bureau Office at the Broome County Airport. The Airport is located at an elevation of 1590 feet, about 10 miles northwest of Binghamton. Corresponding observations were not taken at Ithaca but it is a reasonable assumption that similar conditions of cloud and winds were encountered in this area by the migrating geese.

There was a solid overcast of low level clouds the entire 24-hour period on March 23 and it did not begin to disperse until about 7 a.m. on March 24, according to the observations at Binghamton. No sunshine was observed at the ground on the date of the heavy migration.

At the time of the early morning and forenoon migratory flights on the 23rd the base (ceiling height) of the overcast varied between 2000 and 2600 feet above ground through the hour of 10 a.m., except for a higher ceiling briefly around 7 a.m. The clouds lowered considerably an hour or so before 12 noon and a ceiling of only 300 feet prevailed between 1 and 6 p.m. From 7 p.m. until 4 a.m. the next morning the cloud deck lifted just a little, ranging between 400 and 800 feet, with occasional breaks revealing a second deck of overcast at 1600 feet above ground. It is not known from the surface observations what amount and height of cloud was present above this low overcast.

The migration of geese on the 23rd took place in a weather situation that produced significant changes in cloud height as well as in barometric pressure. The flights occurring before 10 or 11 a.m. were mostly under the overcast and having visual contact with the ground; those flying during the late afternoon and evening were, as an airplane pilot would say, "flying on instruments."

Surface winds at the Broome County Airport were variable in direction during the early half of March 23 with velocities of less than five miles per hour. North to northeast winds prevailed steadily from about

2 p.m. through the remainder of the day but velocities had increased only to about 10 miles per hour.

Winds in the atmosphere up to several thousand feet above the ground are a phase of the weather very pertinent to the flights of migrating waterfowl. On March 23 the low overcast, unfortunately, prevented measurement of these upper winds by pilot balloon except for a successful run at 7 a.m. at the Broome County Airport. Although the next successful pilot balloon run did not occur until 1 p.m. on March 24, more than 12 hours after the migratory flights had tapered off, the wind measurements are listed below in addition to those made on the morning of the 23rd.

Broome County Airport, Binghamton, N. Y.

Height in Feet Above Ground*	7 a.m., E.S.T., March 23, 1965		1 p.m., E.S.T., March 24, 1965	
	Direction in Degrees**	Velocity mph.	Direction in Degrees**	Velocity mph.
500	170	10	340	14
1500	220	14	350	14
2500	250	27	340	15
3500	260	38	300	16
4500	260	47	300	23

* Add 1600 feet for approximate height above sea level

** 360 degrees is north; 270 is west, etc.

The winds up to 2500 feet above ground were evidently favorable to the northerly movements of waterfowl during the forenoon. However, strong westerly winds prevailed at levels above 2500 feet. Developments in the meteorological situation late on March 23 suggest that the late afternoon and evening migrants had different upper wind conditions to contend with. The change in surface winds to north and northeast in the afternoon of the 23rd, described earlier, was very likely accompanied by a shift to northerly winds in the levels at which the waterfowl were flying in their passage over south central New York. Although at a considerable distance from the area of migratory movements pilot balloon measurements at 7 p.m. March 23rd at Burlington, Vermont showed north to north northeast winds up to 4000 feet above ground, and a surface wind comparable in direction to that observed at the same hour at Broome County Airport. The upper level winds at Burlington were comparatively light, however, with velocities of about 10 to 15 miles per hour.

A Possible Trigger for the March 23 Flight

Although it is not known when or where the migratory flights of the 23rd began, a look at the weather situation in the northern Chesapeake Bay region a day or two earlier is of interest.

The weather was unseasonably cold on March 21 in northern Chesapeake Bay due to northwesterly air flow between low pressure north of Lake Huron and an extensive belt of high pressure covering the southern states from Texas to the Carolinas and protruding northward into Minnesota. Daytime temperatures at Baltimore and Annapolis, Maryland attained a warmth of only 36 to 40 degrees, which is well below normal for late March.

The belt of high pressure over the southern states moved eastward to become centered some distance off the Carolina coast by midday on March 22 (Figure II). With air flow now prevailing from the southwest, temperatures warmed appreciably in the northern Bay and southeastern Pennsylvania regions. Daytime temperatures reached the lower 50s at Baltimore and Annapolis on the 22nd and the mid 40s in the Philadelphia area. Temperatures were 10 to 15 degrees warmer than those of the previous afternoon. From the morning of the 21st until the afternoon of the 22nd there was a net warming of more than 40 degrees. This sudden increase in warmth, operating simultaneously with biological factors associated with spring migration, could have provided the trigger or stimulus to launch the geese on March 22. From northern Ches-

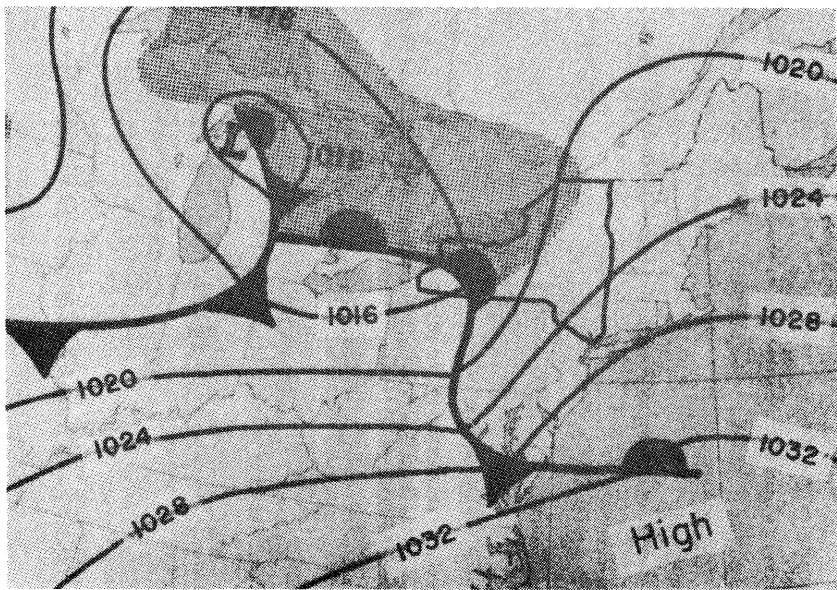


Figure II

Surface weather map for 1:00 p.m., March 22, 1965 in northeastern United States, showing conditions 24 hours prior to time of first map. Note pressure and frontal systems in vicinity of Chesapeake Bay.

peake Bay the flight plan then carried these migrants through the cold front somewhere in the rugged terrain of northeastern Pennsylvania into the stormy, changeable weather prevailing the following day in south central New York.

This example of a major waterfowl migration and its associated weather conditions is only one of many that occur as these birds move both north and south in their annual treks across New York State. More recorded observations of waterfowl flights during the spring and fall migratory seasons are earnestly solicited from bird enthusiasts and conservationists in the State. The observer is requested to record the following: date and hour of the observation, approximate number and species of waterfowl, direction and approximate height above ground level of the flight. Comments on local weather conditions at flight time are welcome. Please mail records at an early convenience to Weather Bureau State Climatologist, Box 13, Roberts Hall, Cornell University or to Dr. D. A. Lancaster, Laboratory of Ornithology, Cornell University, Ithaca, New York 14850.

Acknowledgements: The writer has been aided and encouraged in the investigation of the weather associated with waterfowl migration in New York by Dr. O. H. Hewitt, Professor of Wildlife Management, Department of Conservation, and Dr. D. A. Lancaster, Assistant Director, Laboratory of Ornithology, Cornell University.

Ed. Note: It should be pointed out that the movements of geese at any particular time are probably dependent on many factors. It is well known that Canada Geese and many other waterfowl make long flights and may stop only once or twice en route from wintering to nesting grounds. The central Finger Lakes area is one of the main stops, flocks of up to 50,000 Canada Geese remaining in the Cayuga Lake-Montezuma Refuge area for several weeks each spring. Many of these geese winter at Mattamuskeet in North Carolina. Heavy migration in the Ithaca-Binghamton area on a particular day could be the after-effect of conditions existing at the time the geese left their wintering grounds, and be unrelated to local conditions at the point of observation. With this possibility in mind, Dr. Pack has included data on the weather conditions in the Chesapeake Bay area at the time these birds might have left there.

Studies of waterfowl migration and related weather conditions have been made in the Mississippi flyway, but little has been done in the Finger Lakes region. Recent banding at Montezuma Refuge should add more information about wintering areas used by the Cayuga Lake geese, but many other questions remain to be answered. Mississippi flyway studies indicate that extremely adverse weather conditions, particularly fog, may occasionally cause waterfowl to stop in unusual places. Do the Cayuga Lake geese sometimes stop before they reach the area where they normally rest for days or weeks en route, and if so what are the weather conditions? Do they ever continue beyond their normal resting place if conditions are unusually favorable for such flight?

Dr. Pack's paper demonstrates the need for masses of data gathered by many observers at many places enroute, to be correlated with weather conditions. We are indebted to him for this introductory study. Within a month or so the geese will again be heading north. Keep records of flocks seen, time of day, direction and height of flight, local weather conditions, and send them to Dr. Pack as requested above.