

WEATHER AND EARLY SPRING MIGRATION IN IOWA

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IT is generally accepted that certain weather conditions are associated with migration, as shown in studies by Bagg *et al.* (1950), Williams (1950), Gunn and Crocker (1951), and many others, although there is considerable speculation as to whether the reaction is to the general weather situation as such, or to one or more particular factors linked with it (Lack, 1960; and others). In this study I have attempted to analyze the meteorological events that were associated with a migration of 18–24 March 1959, at points in Iowa, as well as in a reverse migration on 25 March in north Marshall County, Iowa.

To supplement my information I wrote to several observers whose kindness in sharing their records was much appreciated. Valuable assistance was given by Henry Hurst, meteorologist of the U.S. Weather Bureau, Des Moines, Iowa, in supplying and interpreting certain weather data. To Dennis Carter I am grateful for reading the manuscript and offering suggestions.

NORTHWARD MOVEMENT

The mid-March weather in Iowa was dominated by a high-pressure system that by 18 March was centered over West Virginia. This followed a huge low-pressure cell that had moved northeastward—the “low” that on 14 March had brought Iowa its second blizzard in ten days. Temperatures soared on 18 March as the clockwise wind circulation around the high-pressure center gave Iowa southerly winds and bright sunshine, weather typical of the westward portion of a high-pressure area. These conditions accounted for the first period of continuous 24 hours of above-freezing weather of the season. A low-pressure area, while not originating in the southwest as in the ideal situation described by Bagg and his colleagues (1950), but centered over central Manitoba, intensified the southerly winds. This weather was favorable to a strong northward movement of birds into Iowa, pressure-pattern flying as described by Bagg *et al.* (1950), involving following winds and rising temperatures. Williams (1950) found that high temperatures were associated with big rushes in spring; Devlin (1954) associated spring migration with southerly winds; and Dennis (1954) found that warm weather and southerly winds were favorable to northward departures from Texas.

At Spirit Lake on 18 March, James G. Sieh noted the first influx of waterfowl and blackbirds. This movement continued for several days.

Although a cold front with strong NE winds crossed the state on 19 March, migration continued, with Dr. Milton W. Weller noting the first big push in northern Story and southern Hamilton counties. Blackbirds, Marsh Hawks

(*Circus cyaneus*), Common Crows (*Corvus brachyrhynchos*), Mallards (*Anas platyrhynchos*), Pintails (*Anas acuta*), and Snow Geese (*Chen hyperborea*) were well disturbed. "All were battling a strong northeast wind," observed Dr. Weller.

Iowa was on the eastern edge of a high-pressure center on 20 March, with light northerly winds and slightly cooler temperatures. That day Fred Kent observed near Iowa City "a huge influx of new migrants," Common Grackles (*Quiscalus quiscula*), Robins (*Turdus migratorius*), Red-winged Blackbirds (*Agelaius phoeniceus*), ducks, gulls, hawks, shrikes, meadowlarks, and others. These birds, perched in trees and flying, were apparently mostly overnight arrivals.

On 21 March northerly winds sent temperatures 15 to 20 degrees below normal. However, Fred Kent counted additional arrivals, ducks and hawks, in his area.

The days of 19 March through 21 March had weather characteristic of the eastern side of a "high" (generally thought to be more unfavorable to migration), and included accompanying northerly winds considered adverse winds by Imhof (1953:188): "Birds are generally grounded by strong head winds, but when the winds lessen they probably move on." The birds observed had possibly been held back by the snows and cold weather of the first two weeks of March—the relationship postulated by Hinde (1951:336) and cited by Lack (1960): "if the internal changes are well advanced then migration may occur even under apparently unfavorable conditions. . . ."

By 22 March, Iowa was again on the western edge of a high-pressure area, with strong southerly winds and fair skies. On that morning in north Marshall County, I saw many mixed flocks of blackbirds flying north, only a prelude to the movement observed later. In the afternoon migration continued at an accelerated rate. From 3:00 to 4:00 PM I saw approximately 25,000 blackbirds of various species pass over the fields. In one five-minute period in that hour I estimated at least 7,000 birds passed. As each flock of 80 or 100 birds passed I lifted my binoculars for a better look, and behind them, out of eye-range but clearly visible with binoculars, 300 to 500 birds were visible flying northward. For many minutes, as this pattern of heavy movement continued, there was not a moment when a large group of birds was not passing or pausing to rest in fields or trees close by. Some of these flocks were of blackbirds of different species, some were entirely of Common Grackles, some were entirely of Starlings (*Sturnus vulgaris*), with smaller numbers of Red-winged Blackbirds. Thousands of birds must have passed this one pinpoint on the map during the day, for migration continued for the remainder of the afternoon. A more detailed study of the 22 March weather reveals that a low-pressure area, while again not originating in the southwest,

but centered that day over the Saskatchewan-Manitoba border, intensified the southerly winds in this area. This situation (similar to that of 18 March) is described by Hochbaum (1955:118) as a "trough of southerly winds moving up the middle of the continent." In our area the warm front associated with the low-pressure system arrived at 12:00 PM on 22 March, and the cold front reached here around 1:00 PM, 24 March. So for 49 hours we were in the warm sector of the "low," the time of the strongest observed movement of birds. Bagg *et al.* (1950), Lowery (1951), and others found that in spring pronounced movement occurs during this interval. During the hour of greatest observed activity, from 3:00 to 4:00 PM on 22 March, the wind was south at 21 mph with gusts to 33 mph, with clear skies and temperatures from 52 to 55°F.

With our area still in the warm sector of the low on 23 March, the temperatures climbed into the 70's in southern and central Iowa with SW winds averaging 13 mph, and fair skies. The lowest barometric reading of the period, 29.80 inches, was reached at 4:00 PM and remained within .02 inches of that reading until 6:00 AM, 24 March. Robbins' study (1949) showed that "seven of the nine flights occurred at minimum points in the pressure curve, and the other two took place only one day away from a minimum." This minimum barometric reading, therefore, was only one day away from the strong movement of birds on 22 March, and coincided with Fred Kent's observations near Iowa City of "more ducks, Red-tailed Hawks, and huge flocks of blackbirds" on 23 March. Migration in north Marshall County continued in full swing on 23 March and the morning of 24 March, with gulls, Snow Geese, Killdeer (*Charadrius vociferus*), and hundreds of blackbirds on the move.

At about 1:00 PM on 24 March, the wind veered to the north as a slow-moving cold front (marked stationary on the weather maps) crossed the state. However, the warm air moving around the low had moved a great amount of warm air to the north of the quasi-stationary front, and the front had to move southward considerably before the cold air reached Iowa.

REVERSE MIGRATION

On 25 March the sky was heavily overcast with a NE wind ranging from 12 to 23 mph, and gusts to 34 mph, weather associated with high pressure. The center of this high was around Hudson Bay, with the clockwise winds bringing cold arctic air into Iowa. That morning in the village of Liscomb, in Marshall County, about 100 Slate-colored Juncos (*Junco hyemalis*) flew into our trees and bushes and gradually worked in a northerly direction. They were the only birds observed going north that day. All other birds seen were exhibiting what seemed to be a reverse migration. During the morning hours several

small blackbird flocks and one group of 30 Robins were seen flying south over our house. At 1:15 PM about 300 blackbirds of various species arrived from the north, paused to rest for a few moments in our trees, then flew off to the southwest. At 4:00 PM approximately 1,000 blackbirds were seen approaching from the north and heading south parallel to the Iowa River bottomlands. This flock was moving in a slowly-swirling manner. By this time a light rain was falling as a low-pressure (storm) area moved northeastward from the Oklahoma-Texas region.

During the night, with the temperature hovering just above freezing, rain accompanied a strong gusty NE wind. All the next day, 26 March, in Marshall County, rain fell intermittently, mixed at times with sleet and hail. Rain fell across the state, with up to two inches in central and southern Iowa and up to five inches of snow in northern Iowa. Hail and high winds accompanied the rain in some areas. Early on 27 March the low-pressure cell responsible for the storm moved out of the state and completed that weather cycle.

DISCUSSION

There seems to be no doubt that the birds observed moving south or southwest on 25 March were reversing their normal migration pattern for that season. It would seem that these birds were retreating before the much colder air and strong northerly winds associated with the eastern edge of a high-pressure area. Just as clearly, the migration movement earlier discussed was associated with another combination of weather. This mass northward movement would seem to have been initiated on 18 March, with weather typical of the western edge of a high-pressure system—strong southerly winds and fair skies, with an opposing low-pressure area intensifying the winds. Another similar weather pattern on 22 March, along with the warm sector of the low-pressure system, was favorable to continued migration of “wave” proportions until the adverse weather following the cold front of 24 March arrived.

SUMMARY

This study outlines the weather in March 1959 that was favorable to a strong northward movement of birds observed in Iowa. Meteorological conditions also appeared to effect a reverse migration. The weather associated with the northward movement was that of the western edge of an area of high pressure and the warm sector of a low-pressure system. The reverse migration followed weather associated with the eastern edge of a high-pressure area with a cold front and northerly winds, and occurred just before a severe storm from the southwest entered the area.

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