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Spring Mortality of Insectivorous Birds in Southern Manitoba

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Migrating passerines frequently encounter adverse weather during their northward movements in early spring. Inclement weather often causes temporary halt of migrating passerines short of their destinations (Curtis 1969). In May 1974, such a grounding of spring migrants occurred in southwestern Manitoba due to unseasonable weather. Many insectivorous birds became weakened or died of starvation as a result of exposure to low temperatures, depletion of fat reserves, and lack of available food.

Arrival of Spring Migrants

The first large influx of insectivorous birds, mainly Myrtle (*Dendroica coronata coronata*) and Yellow (*Dendroica petechia*) Warblers, was noted on 19 May 1974 at Minnedosa, Manitoba. The migration continued through 21 May when daily counts at Delta, Manitoba, were highest. Most numerous were Least Flycatchers (*Empidonax minimus*), Myrtle, and Wilson's (*Wilsonia pusilla*) Warblers. Normally when these birds arrive in southern Manitoba during May they spend much of their time actively searching the aspen (*Populus tremuloides*) woodlands for food. In 1974, however, large numbers of Myrtle and Yellow Warblers were observed feeding in emergent stands of flooded cattail (*Typha latifolia*) and bulrush (*Scirpus* spp.) along the margins of ponds and sloughs. Arthur S. Hawkins (personal communication) reported "several hundred warblers, mostly Myrtles, in a quarter-mile stretch or less, and they appeared to be obtaining some kind of insect food from underneath the emerging sedge (*Carex* spp.) leaves." At Delta, Myrtle and Wilson's Warblers were observed feeding in a similar manner in flooded white-top (*Scolochloa festuacea*). Near Minnedosa, Myrtles reached densities of 15-20 per acre and usually were observed actively feeding in fields and wetlands. Some individuals were easily captured by hand and were obviously weak

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Incidence of Bird Mortality

The first dead birds at Minnedosa were observed on 23 May when mean daily temperatures dropped into the 30's (F°) accompanied by light precipitation and northwest winds. These weather conditions continued through the following day, when numerous dead Myrtle, Yellow, and Tennessee (*Vermivora peregrina*) Warblers, Least Flycatchers, and American Redstarts (*Setophaga ruticilla*) were found around pond edges, along roadsides, and in farmyards. A few dead birds were also found on 25 May, but with clearing skies and warmer weather, fewer birds were noted throughout the area. At Delta on 24 May, numerous dead Yellow, Myrtle, Magnolia (*Dendroica magnolia*), Black-and-white (*Mniotilta varia*) Warblers, and Eastern Wood Pewees (*Contopus virens*) were found.

Local residents near Minnedosa also noted many dead birds during this period. Ronald Harland (personal communication) reported 20-30 Myrtle and Yellow Warblers dead in his farmyard. One farm wife reportedly gathered about 25 exhausted warblers and kept them warm in an oven overnight. Those that survived the night were released the following morning.

A die-off of passerines also occurred in other nearby areas during this same period. On 23 May, Howard Hove (personal communication) reported 3 Magnolia Warblers, 2 Wilson's Warblers, 1 Traill's Flycatcher (*Empidonax traillii-almorum* complex), and 1 American Redstart dead on his farm near Osnabrock, North Dakota. Dead birds were reported in the Winnipeg area by Gardner (*Winnipeg Tribune*, Saturday, June 1, 1974) and by Hatch (*Winnipeg Free Press*, Saturday, June 8, 1974. Gardner (op. cit.) reported that Jack Lewis found at least 17 dead Yellow and Myrtle Warblers and American Redstarts on his farm. During 19-22 May, David Hatch (personal communication) received reports of heavy kills in the Oak Lake, Reston, Lyleton, Killarney, and Brandon areas of southwestern Manitoba. At his parents' farm at Oak Lake, 6 Tennessee Warblers, 2 Yellow Warblers, 1 Magnolia Warbler, 1 Black-throated Green Warbler (*Dendroica virens*), 2 Blackburnian Warblers (*Dendroica fusca*), 1 Mourning Warbler (*Oporornis philadelphia*), and 1 American Redstart were found dead on 20 and 21 May. On a visit to St. Ambrose Beach on 22 May, Hatch found “. . . much sign of a heavy die-off with on dead warbler for every eight inches of shoreline along that part of Lake Manitoba.” Similar observations were also reported by Gauthreaux and LeGrand (1974). Paul Goossen (personal communication) reported 10 dead birds on 23 May at the University of Manitoba field station on Lake Manitoba. During the die-off period, the Manitoba Museum of Man and Nature received numerous reports of dead and weakened birds in the Winnipeg area.

Influence of Weather Conditions

Weather maps from the U.S. National Weather Service at Bismarck, North Dakota, during 18-20 May indicated a strong climatic influence from the western edge of a high pressure system located over James Bay, Canada. This frontal system provided southeasterly winds resulting in ideal atmospheric conditions for a mass migration which apparently brought large numbers of birds into southern Manitoba (Figure 1). Following the eastward movement of this front, a low

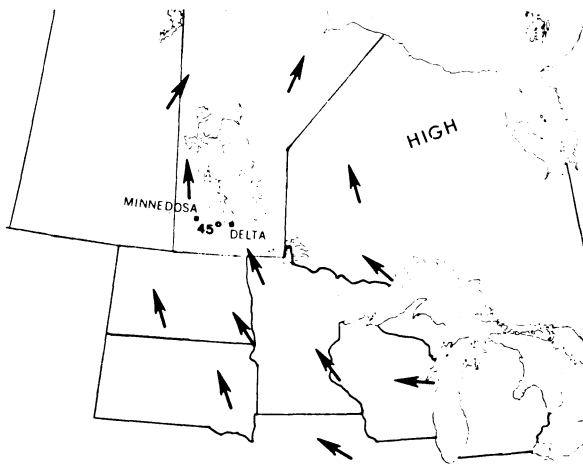


Figure 1. High pressure system on 19 May 1974 showing wind direction and mean daily temperature that produced favorable conditions for northward migration. (Source: National Weather Service, Bismarck, North Dakota).

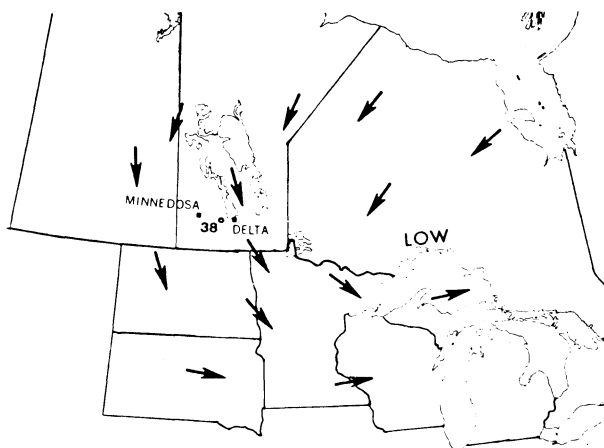


Figure 2. Low pressure system on 23 May 1974 showing wind direction and mean daily temperature that caused a grounding effect and unfavorable migrating conditions. (Source: National Weather Service, Bismarck, North Dakota).

pressure system moved across southern Manitoba on 22 May bringing northwesterly winds, lower temperatures, overcast skies, and precipitation (Figure 2). This produced weather conditions generally unfavorable for migration. Curtis (1969) found a positive correlation between the northward progress of migrants and southerly winds associated with the western edge of a high pressure system. His studies also demonstrated the grounding effect on spring migrants along the western edge of a low pressure system.

In May 1974, food resources available to small insectivorous birds may have been changed considerably from the typical situation for this time of the year. Temperatures lower than normal (Figure 3) had occurred from 14 May through 25 May with cumulative daily temperature differences from the normal mean of -86° for Brandon, -105° for Delta. Apparently these lower than normal temperatures delayed the emergence of insects in the aspen woodlands and forced the warblers to feed in aquatic habitats. The microclimate associated with wetlands perhaps provided a moderated temperature regime. Investigations of swallow mortality in May 1965 by Sealy (1966) indicated a similar cumulative daily temperature difference of -86° between 14 and 29 May at Winnipeg. It appears that the same phenomenon may have been operative in May 1965 as in May 1974.

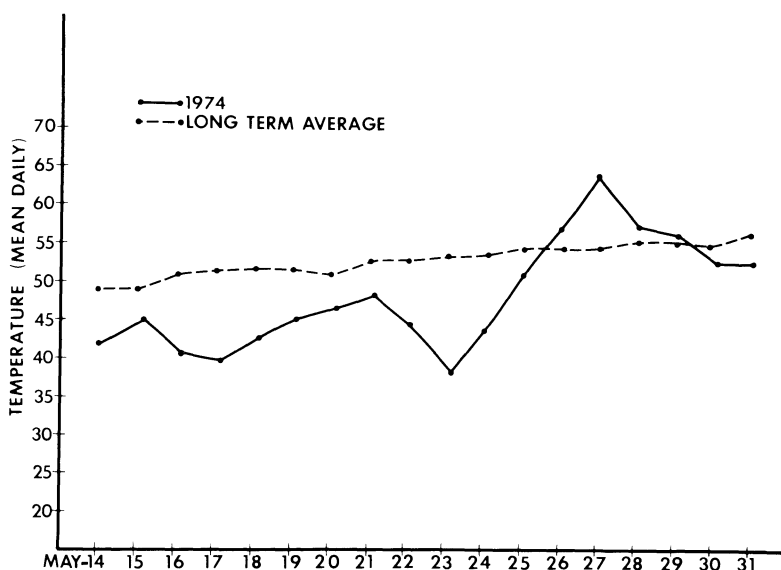


Figure 3. Comparison showing mean daily temperatures for late May 1974 from two stations in southern Manitoba (average from Delta and Brandon) to long term average.

Condition of Migrating Birds

A regular banding program conducted at the Delta Waterfowl Research Station allowed some comparisons to be made of the condition of small birds captured in 1974 with the 1971-73 average when die-offs did not occur. Although sample size is small, most of the 1974 live weights were lower than those of previous years (Table 1). Dead warblers and Least Flycatchers that were weighed showed weight losses exceeding 20 percent (Bay-breasted [*Dendroica castanea*] — 21 percent, Myrtle — 28 percent, Tennessee — 29 percent, and Least Flycatcher — 39 percent). Weight differences between 11 healthy and 6 dead Barn Swallows (*Hirundo rustica*) picked up at Moose Mountain by Sealy (1966) were 31 percent. Granivorous birds such as White-throated Sparrows (*Zonotrichia albicollis*), Northern Oriole (*Icterus galbula*), and Swamp Sparrow (*Melospiza georgiana*) captured in 1974 did not show major weight differences from those taken in 1973 at Delta.

Gross pathological examination of 3 Myrtle Warblers, 2 Yellow Warblers, 1 Tennessee Warbler, and 1 Least Flycatcher from Minnedosa, Manitoba, and 3 Magnolia Warblers, 2 Wilson's Warblers, 1 Willow Flycatcher, and 1 American Redstart from near Osnabrock, North Dakota, by Gary L. Pearson, D.V.M., of the Northern Prairie Wildlife Research Center, Jamestown, North Dakota, indicated no evidence of trauma, but subcutaneous and visceral fat reserves were totally depleted. Eight of these birds contained evidence of insect skeletal debris in the gizzard.

Significance of Spring Mortality

Widespread bird mortality occurred throughout southern Manitoba and North Dakota in May 1974. Apparently spring migrants interrupted their northward movement when rapidly changing frontal systems produced conditions unfavorable for migration. A low pressure system prevented further migration northward and perhaps reversed migration to the south. Delayed development of insect foods resulting from prolonged cold weather, coupled with the depletion of metabolic reserves, forced many birds beyond their physiological limits. Although insectivorous birds apparently adjusted their normal feeding habits from woodland to aquatic habitats for body maintenance, many birds evidently died of starvation as a result of insufficient supplies of insects. While the actual number of birds that died during May 1974 would be impossible to measure, a projection of the reported mortality over the entire area affected suggests that their population losses were significant. Although similar unfavorable climatic and habitat conditions may not occur annually over large areas, it does appear as though weather patterns may play a critical role in the placement of migrating birds in areas where food supplies are sufficiently developed to meet their needs. Lack (1966) has suggested starvation to be a major density-dependent factor in wild birds.

In May 1965, Anderson (1965) reported hundreds of dead swallows floating in the ditches of Agassiz National Wildlife Refuge in Minnesota. He associated the death of these birds to starvation caused by cold weather and lack of available insect food and suggested the mortality to be widespread. His report soon triggered further evidence of bird mortality during the same period from Janssen

Table 1. Weights of migrating insectivorous birds banded at Delta, Manitoba between 15 - 31 May 1971-1973, compared with birds banded between 15-25 May 1974.

Species	Mean Weights (gm)		Percent difference
	1971-1973	1974	
Least Flycatcher	12.7 (12)*	11.1 (11)	- 12.6
House Wren	11.0 (1)	10.0 (2)	- 9.1
Gray Catbird	39.0 (4)	36.0 (2)	- 7.7
Swainson's Thrush	36.5 (4)	27.7 (6)	- 24.1
Gray-cheeked Thrush	35.0 (5)	33.2 (6)	- 5.5
Ruby-crowned Kinglet	6.0 (1)	5.5 (2)	- 8.3
Black-and-white Warbler	11.5 (4)	10.0 (2)	- 13.0
Tennessee Warbler	11.2 (10)	9.0 (1)	- 19.6
Yellow Warbler	10.9 (17)	11.0 (2)	+ 0.9
Myrtle Warbler	13.4 (5)	13.0 (2)	- 3.0
Palm Warbler	12.0 (1)	11.0 (1)	- 8.3
Ovenbird	21.0 (1)	20.0 (1)	- 4.8
Northern Waterthrush	19.6 (6)	18.8 (5)	- 4.1
Common Yellowthroat	11.5 (2)	12.0 (1)	+ 4.3
Wilson's Warbler	9.0 (1)	9.0 (1)	0

* Sample size in parentheses

(1966) in Clearwater County, Minnesota, and McDonald (1966) in Pembina County, North Dakota. Independently, Sealy (1966) reported a large scale mortality of four species of swallows at Moose Mountain in southeastern Saskatchewan about the same time. Avian mortality due to cold weather and lack of food during spring has also been reported by Green (1962), Janacek (1966), Ligon (1968), and Kilham (1974).

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