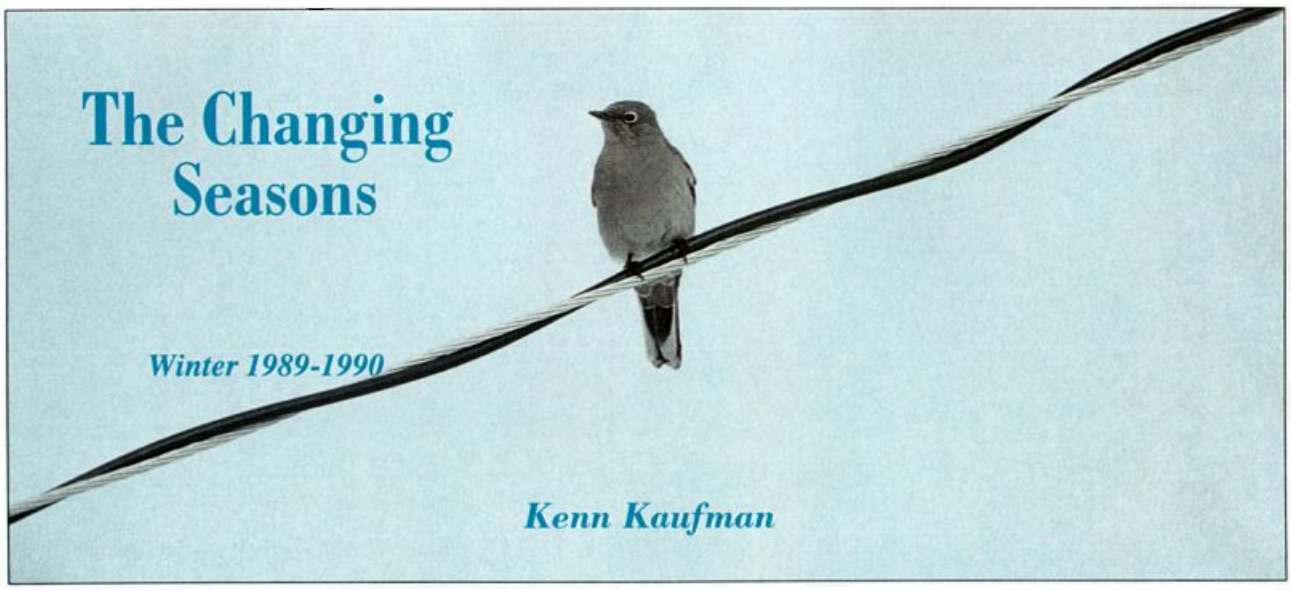

Townsend's Solitaire in Houghton County, Michigan, February 19, 1990. The species apparently staged a very low-density "invasion" toward the east during fall and winter 1989–1990. This was one of several widespread phenomena of the winter that would not have been detected in an era when fewer observers were afield in North America. Photograph/Bill Bouton.

LONG AGO, AS A BEGINNING BIRDER, I used to define winter as the period after all autumn migration ended and before any spring migration began. In winter, I thought, all birds —migrants and residents alike—were firmly entrenched, dug in for the cold months. I thought that one could run a Christmas Bird Count in mid-December and then relax, confident that nothing was going to change for the rest of the season.

Was I ever off base. That concept, already patently wrong, was thoroughly pulverized by the events of the remarkable winter of 1989–1990. In writing this summary column for that "sedentary" season, I found that my main topics concerned strategies of migration.

Commandments cast in plastic: The adaptable, changeable, dispensable rules of migration

Because they can fly, most birds are physically able to disperse over long distances. Many of them will use that ability, it seems, when and if there is some adaptive advantage to doing so.

If climatic conditions change over the long term, new patterns of migration will evolve. Sedentary populations may become migratory, migrants may move shorter or longer distances, earlier or later, in traditional or new directions; or migratory forms may cease to migrate and become sedentary. Evolutionary pressure will favor those individuals whose tendencies happen to fit in well with the climatic trend of the moment, and thus (through natural selection) will gradually change the tendencies of the population as a whole.

But overlying that process is the fact that individual birds are often very adaptable in their response to weather. In the temperate zones, many birds evidently will migrate only if, when, and as far as necessary.

Every winter season probably brings unique variations on bird movements. But in the exceptional weather of winter 1989–1990, some of those variations happened on such a large scale that they could be detected readily by observers and compilers.

Bottleneck weather: An exceptionally cold December in the east set the stage for some highly visible avian events

A single description will serve for the season's weather over most of the eastern two-thirds of the continent. January and February were remarkably mild, and offered easy living—to anything that had happened to live through December. But December was a killer.

December 1989 was the coldest on record in places as diverse as Louisiana, southwestern Quebec, Boston, much of Texas, parts of Michigan, and most of the Hudson-Delaware region. Most other areas of the east saw daily records broken late in the month. The culprit—revealed on National Weather Service maps for the upper atmosphere—was a series of intense low-pressure troughs that moved across southern Canada and the northern United States, funneling Arctic air flows south almost to the Tropic of Cancer.

A theme that has come up occasionally in these pages is that of a "bottleneck" to survival: a stressful condition, a tight squeeze that not all birds will get past. December 1989 presented a classic example of such a bottleneck. No matter that the rest of the season was mild; no matter that Boston, for example, wound up with a virtually normal *average* temperature for the winter. For survival, the extremes are what matter. For most birds in eastern North America, the critical question was how they responded to the Arctic air of December.

In discussing the season as a whole, we must keep in mind that some of the winter's avian happenings apparently had nothing to do with the cold, even in the hardest-hit areas—and that the western third of the continent had a different weather pattern altogether Winter in the west was abnormally mild, at least until February, when some areas (such as Alaska and British Columbia) had unusually cold temperatures and heavy snowfall. Events unrelated to the deep freeze in the east

are discussed toward the end of this column.

But, first, a look at the bottleneck weather of December. That incredible frigid blast had many detectable and widespread effects on birds, some of which are detailed below.

After the cold rush: Some birds moved south

The hard freeze in December locked up many ponds and lakes in the northeast. Effects on waterbirds were reported in some, but not all, northern regions. Many lingering herons and egrets disappeared by mid-month. Even the hardy Great Blue Herons were in reduced numbers in places like Nova Scotia and Ontario, yet Minnesota reported more than usual, and one in Quebec provided the first February record for that province.

Waterfowl showed mixed reactions to the freeze. Canada Geese departed early from Michigan and Wisconsin, and built up unusual concentrations in late December in Kentucky and southern Illinois, but the usual winter flocks in Nova Scotia seemed unaffected by the cold. As Henry Armistead points out, most locales in Maryland and Virginia had either record lows or record highs for many waterfowl species: where all water was frozen, ducks and geese departed, resulting in major concentrations in those areas where some water remained open.

Shorebirds not associated with the shore—Killdeer and American Woodcock—registered noticeable reactions to the weather. Coastal Virginia saw a big southward flight of Killdeer in mid-December, and one week later, record numbers were noted at some Florida locales. Subsequently, January counts of Killdeer in Maryland were extremely low. The accounts reminded me of the hard-weather movements that have been well documented for another field plover, the Northern Lapwing, in Europe.

American Woodcocks were pushed coastward and southward by the freeze, with big concentrations in coastal sections of New Jersey, Maryland, and Virginia. Such conditions are likely to be bad news for the woodcocks: for example, at Cape May, Paul Kerlinger found 47 dead woodcocks December 24, in the same area where 64 had been seen alive two days earlier. Reflecting the very widespread nature of the December cold blast, southern Texas also had a big influx of woodcocks during and after the freeze.

Some passerines evidently moved south as a result of the harsh conditions. The evidence consisted mostly of their arrival in southerly areas—since their mere disappearance in the north could have reflected mortality, not mobility.

Tree Swallow, Gray Catbird, and Yellow-rumped Warbler were all mentioned as arriving in heavy concentrations in Florida and along the Gulf Coast in December. The swallow and the warbler both represent oddballs in their respective families, wintering in temperate regions while most of their relatives go to the tropics; I suspect they are adapted to performing such hard-weather movements when necessary. *American Birds* Advisor Joe Siphron, making his annual survey of bird habitats on Eleuthera in the Bahamas, found high numbers of Yellow-rumped Warblers there in February; these were likely refugees from the earlier big freeze on the mainland.

Pine Siskins were reported as increasing noticeably after mid-December in Texas, and Florida had a few, but this movement may have been a coincidence, not a result of the harsh temperatures.

Some birds seemingly moved at random—even northward

The effects of December's freeze were felt beyond our southern borders. In the foothills of Mexico the cold did serious damage to the coffee crop, and apparently also to wild food crops, sending many birds to the lowlands in search of food. Some of those seekers came north, causing great excitement in Texas: three new records for the United States, and a good variety of lesser rarities.

We may take it for granted that birds escaping cold weather will move southward—but that assumption is probably wrong, especially in southerly areas of the continent. There is no reason why a resident bird in northern Mexico should "know" that south is the direction away from cold. Birds dispersing from a sudden shortage of food there may move in any direction. Greg Lasley and Chuck Sexton draw a parallel to the winter of 1983–1984, when a similar cold blast was followed by a similar influx of unexpected birds from Mexico. It seems most unlikely that this could be mere coincidence.

Some birds endured the cold, providing evidence that food supplies, not temperatures, provide the key to survival

Over the last several years we have watched the fortunes of the Carolina Wren at its northern limits. In a series of mild winters, this wren has gradually extended its range northward in the eastern states. Conventional wisdom predicted that the birds nearest the top of the map would be knocked off by conditions like those of December. But this apparently did not happen—at least, not everywhere. Two or three Carolina Wrens made it through the season in Quebec, singles were reported at 17 locales in northern New England, and the species was noted to be still doing well in the Western Great Lakes region. In the northern Appalachians, Carolina Wrens survived the season in good numbers. George Hall reports that the wrens there seem to be hurt by prolonged snow cover, not by mere cold.

Although Gray Catbirds and Yellow-rumped Warblers were among the species noted invading southerly areas after the freeze, not all of them vacated the north. In upstate New York, Ken Able reported good numbers of these (and some other "half-hardy" birds) in areas that had abundant supplies of wild berries. In Able's words: " . . . given sufficient available food, these species are little affected by cold temperatures, per se." I suspect that the numbers of these birds that moved south in December were mostly coming from regions with only marginal wild food crops.

Some birds died

Your required reading assignment this season is David Muth's essay, in the Central Southern column, on hummingbirds wintering along the Gulf Coast. He argues persuasively that these "winter arrivals" are actually leftover vagrants from early fall, surviving by the coincidental grace of hummingbird feeders.

Such birds won't necessarily survive a period like late December 1989, when temperatures hit single digits at some points and stayed well below freezing for more than three days straight even in coastal areas. One vagrant Buff-bellied Hummingbird rode out the freeze on Muth's front porch in New Orleans, making circuits between a heat lamp and a feeder—"All my plants froze, but the bird made it." But few birders had the diligence or time to keep feeders thawed out through this period, and many hummingbirds undoubtedly perished.

Elsewhere in Louisiana, Mike Musumeche found many waterbirds dead on the shores of hard-frozen Spanish Lake. A few hundred Brown Pelicans died, either of the cold directly or of freeze damage to their bills. As noted earlier, many American Woodcocks perished in New Jersey. But other documented cases were few. In many situations, birds disappeared but their fate was unknown. For example, following the cold snap, Belted Kingfishers largely disappeared from the Middle Atlantic Coast, Anhingas vanished from Louisiana, Smooth-billed Anis became scarcer in Florida, and Eastern Phoebes declined sharply in Texas; but whether they died or moved southward, no one could say.

One general observation came through clearly: although the cold set records in both the south and the north, it was in the south that it apparently did the most damage to birdlife. A bird resigned to spending the winter in Minnesota may put up with a day when the high temperature is twenty-two below zero; but for another bird adapted to the mild climes of coastal Alabama, a reading of eight degrees above zero can spell disaster.

Despite the cold, some fair-weather birds lingered late

The bane of Christmas Bird Count compilers (often reported but almost never actually present), a Swainson's Thrush was in Ontario in December. (Another was in northern California in late January. Both of these remarkable birds were well documented. As Dick Erickson writes, "Observers beware, the floodgates are not now open, and any future claims. . .will still be handled with the utmost care.")

Many other birds were surprisingly late in this cold season. Some, like the Palm Warbler in Alberta, represented the sort of odd record that could occur in any winter. In a few cases, the harsh conditions may have actually contributed to the records. For example, a very late Sora in Illinois was evidently driven out into the open by the freeze; normally, such lingering rails may pass undetected.

As Turkey Vulture extends its range northward, it is also extending its autumn stay later and later in the north. That trend continued this year in spite of the cold. Surprisingly late birds were found in Nova Scotia, in the Adirondacks of New York, in Michigan, and at several points in Ontario. In the latter province, at the end of December, Alan Wormington saw a Turkey Vulture trying to eat an old shoe on the beach—illustrating the hazards of lingering too late.

Seemingly ignoring the lessons of December, many birds were northbound early in the mild February

On the other side of the same coin, Turkey Vultures started north quite early. By mid-February, one had reached Wisconsin and several had appeared at new sites in New England and Ontario; a couple in upstate New York at the end of January could have been early migrants.

They were hardly alone. Many regions reported waterfowl moving north early in the mild weather of late winter. Flights by ducks and geese at this season are not unexpected—they can move in short stages, reacting to weather of the moment—but in Ontario, at least, waterfowl set a number of all-time early records. Very surprising (to me) was the report that Pectoral Sandpipers and White-rumped Sandpipers were showing up in Texas in mid-February; presumably, they had originated in South America, where they would have had no indication of the weather up north!

Killdeer and American Woodcock, two that had reacted to the December weather, were among the migrants showing up conspicuously in New England by mid-February. Woodcocks returned notably early to the upper Midwest, and Killdeer were also early in Ontario and the northern Appalachians. Horned Larks were moving by late January in North Dakota. Rough-legged Hawks were moving north in eastern Colorado by early February Mid-February brought returning Pine Warblers to Ohio and Illinois. In the Yukon Territory, northbound Snow Buntings appearing by late February were ambitious, but even more so were the Mountain Bluebirds that arrived there at the same time.

Apparently immune to the effects of weather, Snowy Owls stayed north, while Short-eared Owls, Rough-legged Hawks, and others staged fair flights

The Snowy Owl flight of this winter could be summed up with one word zilch. From coast to coast, virtually every region south of the boreal zone reported the lowest number in years Mere record-breaking cold was clearly not enough to bring these big birds out of the Arctic. Only Minnesota and parts of Saskatchewan saw anything approaching normal numbers. As sometimes happens in a non-flight year, however, there were a couple of anomalous records, with singles showing up very far south in coastal Virginia and southeastern Missouri.

By contrast, Short-eared Owls put in a good appearance in many regions From the Dakotas east to the Atlantic Provinces and New England, south through the Appalachian and Middlewestern Prairie regions, they were present in above average numbers Farther south they were mostly absent, as usual, and they drew no comment in most of the west.

Rough-legged Hawks, which share many habitats with Short-eared Owls in both summer and winter, also staged a good flight in many of the same areas. (For example, both species were noted as having the best numbers in several years in southern New England.) West of the Rockies, Rough-leggeds were scarcer than usual. Two remained in Alaska to February, for rare winter records there.

Out of the northwest came a major flight of Bohemian Waxwings, a good scattering of Varied Thrushes, and perhaps a very low-density "invasion" of Townsend's Solitaires and Mountain Bluebirds

As noted in the previous issue, the

winter flight of Bohemian Waxwings eastward to New England was both early and extensive. Numbers remained high all winter from the Prairie Provinces and North Dakota to the Atlantic Provinces and northern New England, with notable concentrations like 4000+ in Duluth and over 1000 in one field (!) in Quebec. These birds showed little tendency to spread southward, although some flocks came out of the Adirondacks to other areas of upstate New York, and single birds wandered south into Pennsylvania, Ohio, Illinois, and Iowa. Far away in Alaska, hundreds of Bohemians stayed through the season around Anchorage, where they normally clear out by late winter.

The strong eastward push of Varied Thrushes described in the previous issue continued through the winter. Overwintering birds were rare in Alberta, Manitoba, and North Dakota. Some thirty-five were found north and south of the western Great Lakes. The Middlewestern Prairies had a good flight, including a third record for Missouri. Single birds were in New York and western Virginia, New England had at least five, and three Varied Thrushes in the Maritimes included a first for St. Pierre et Miquelon. The species also moved well south in the western states, with rare records in New Mexico and north-central Texas, and good numbers in southern California. It may be significant that this species was in very low numbers in several areas of British Columbia this winter—suggesting that "their" Varied Thrushes had gone elsewhere.

It may seem odd to talk about an "invasion" when the number of individuals involved is very low. Yet I am convinced that very low-density invasions do occur, and that the network of observers on this continent is just now approaching the point where we may detect such movements.

Consider this season's "invasion" of Townsend's Solitaires. Tracing this very faint flight from west to east, there were good numbers in the Dakotas; two were in Iowa, where they are scarce; rare singles were in Wisconsin and Michigan; one in New York furnished a third state record; and one in Connecticut was the first documented there. To flesh out this "flight," look at the preceding fall season: five in Minnesota were more than usual; Michigan and Ontario each had one; farther east, solitary solitaires made news in Pennsylvania, New Jersey, New Brunswick, and Newfoundland.

Even more tenuous is my guess that there might have been a faint invasion of Mountain Bluebirds. But Ohio had its first, one was in Wisconsin for a rare record, and one in Texas got all the way east to the coast (Padre Island); during the fall, strays had reached Nova Scotia (first provincial record) and Ontario. Male Mountain Bluebirds are hard to miss (and hard to beat), but I wonder how many of the drab grayish females might be simply overlooked out of range.

Since all four of the species named here are fruit-eaters with major breeding areas in western Canada, it might not be unreasonable to guess that there is some connection, some common cause affecting their movements eastward.

A widespread but unexplained push brought Harlequin Ducks to southerly latitudes

In what appeared to be another concerted low-density movement, a surprising number of Harlequin Ducks showed up away from usual areas or well south of usual limits. At least two (maybe six) were in Florida; Texas had its first documented record (most of the way to the Mexican border); and Arizona birders found three in northwestern Mexico, establishing a second record for that country. Four off southern California were rare there, while one was an oddity inland in the Central Valley region of northern California. In the east, good numbers in New England and coastal birds in Virginia were not unexpected, but individuals in Connecticut and at three points on upper Chesapeake Bay were out of place. The Great Lakes had a good handful, while one inland in Wisconsin was surprising.

It is tempting to try to link this to the cold weather, but some of these Harlequins were found out of range *before* the onset of the worst of those conditions. Besides, it seems unlikely that the freeze in the east could have pushed the birds to California or northwest Mexico.

Drought, not cold, was apparently the driving force behind bird movements in the west

Over much of the southwest quadrant of the continent, the winter's big story had been written during the fall: a massive exodus of birds leaving the drought-stressed montane woods and invading the lowlands. Evidence of this movement was widespread and obvious, including such birds as Cassin's Finches on the plains and in the desert, Pygmy Nuthatches in El Paso, Mountain Chickadees all over lowland New Mexico, and various corvids everywhere.

Steller's Jays were major players in this flight, remaining all winter in many lowland areas. The winter saw numbers of Steller's in east-central California, where they had been unmentioned in the fall report. Pinyon Jays put in some appearances in unusual areas of southern California. A new twist on these corvid movements involved the unprecedented push of American Crows into southeastern Arizona during the season; exceptional numbers also moved south along the Rio Grande in New Mexico.

A trashy, well-lighted place: or, how raven maniacs can feed the birds

This winter, like any other, saw the kinds of changes that keep the changing seasons from becoming routine. Some birds made momentary adjustments to temporary conditions, while others continued long-term trends.

For a final note on corvid survival, and on the strategies of birds in general, consider the adventures of the adaptable Common Raven. Some birders who sought a stray raven in northern New Jersey in February were frustrated in their attempts. Maybe they were looking in the wrong habitats. Observers in Saskatchewan have found that ravens there—spreading onto the prairies from the boreal forest—spend most of the winter around fast-food outlets. Even more opportunistic are the birds around Prudhoe Bay, on Alaska's Arctic coast, a region of round-the-clock darkness and incredible cold in winter. For most of each day's 24 hours, those ravens could be found foraging around dumpsters and trash heaps in well-lighted spots. Proof, once again, that birding is an activity that can be carried on almost anywhere! ■