THE CHANGING SEASONS

Spring 2005—Early and late

During the howling nor'easters of late May 2005, Red and Red-necked Phalaropes were common sights along the Massachusetts coast (here at Sandwich 26 May). *Photographs by R. Farrell.*

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The overall continental weather pattern in early spring 2005 was unusually warm owing to a strong southerly air flow, as the Rufous Hummingbird on 16 March in Alaska would attest; nearly as remarkable for Alaska were a Barn Swallow 1 May and a Warbling Vireo 9 May. This weather pattern was surely connected to the many astonishingly early arrivals mentioned in the regional reports. Then, in late April or May, depending on the location, the weather changed its tune. Cool and wet conditions with a northerly airflow predominated later in the season, especially in the eastern half of the continent. In this period, birds attempting to make their way northward across the continent, having arrived relatively early throughout the South, were slowed down or stopped. The bulk of migrants thus arrived belatedly in many areas, particularly in the northeastern quadrant of the continent (Northern Great Plains, the Midwest, New England, and Maritime Provinces), although the Southern Atlantic region noted a wet and cool May that resulted in late arrivals, too.

Some parts of the West received above-average rainfall, which affected birders' observations on migration; and some areas that did not receive a great deal of rain during the spring season had had above-average rainfall during the winter. These wetter conditions resulted in what could be considered more challenging birding, as birds were less tied to oases—that is, more spread out over habitats that in drought years would be less hospitable. (On the other hand, winter precipitation made snow cover more extensive than in drought years, which restricted available habitats above a certain elevation.) Like much of North America, the West had many early arrivals but did not see the delay of the bulk of migration in May that the East experienced. The generally wet conditions of the western Great Plains and the Great Basin certainly allowed prairie and shrub-steppe vegetation early and extensive growth for the second consecutive spring, after several years of drought conditions. Not surprisingly, these lush conditions in recently very dry parts of the continent allowed for prolific nesting by several species, most noticeably Long-eared Owls (but also, in places, Short-eared Owls), which took advantage of rodent populations' explosions.

The crowning weather event of the season came at season's end in late May—a set of coastal storms that affected the Atlantic Provinces, New England, and the Hudson-Delaware regions (and to a lesser extent the Middle Atlantic and Southern Atlantic regions). From 20 May through the end of the season, a series of slow-moving lows tracked up the coast from the Southern Atlantic region to the Maritime Provinces; two systems stalled off New England, where northeasterly winds slowed or stopped both coastal and inland landbird migration (Figure 1). During these storms, coastal birders from New Jersey to New Hampshire enjoyed a bonanza, as the onshore winds of these systems produced several spectacular wrecks of seabirds. This event was strongest in Massachusetts, which witnessed a seabird flight "the magnitude of which had not been seen in the Region in spring for nearly 30 years." Among migrant seabirds along the coast, Red and Red-necked Phalaropes and Arctic Terns dominated seawatchers' tally sheets, but there were alcids (Common Murre, Dovekie), Black-legged Kittiwakes, Sabine's Gulls in four states, all three jaegers, storm-petrels, shearwaters, Northern Fulmars, and Northern Gannets as well. In several states, including Pennsylvania, Arctic Terns and phalaropes were found well inland. The pearl of the storm, however, was certainly the adult Yellow-nosed Albatross 29 May at Tuckernuck Island, Massa-

chusetts—which a lucky regional editor managed to photograph and to hear vocalizing as it flew around the island for nearly an hour! In addition to their effects on seabirds, these coastal storms hurt nesting passerines (especially swallows, Purple Martin, Eastern Bluebird), many of which had arrived earlier than usual in April and were already feeding young; reports of both adults and young perishing were widespread. Northerly winds also delayed May migrants, already waylaid by the season's general paucity of warm fronts in the East. In some parts of the Northeast, large pushes of migrants continued well into June, while other regions' observers saw little in the way of migrants all season and wondered whether the birds were re-routed or simply failed to complete the migration altogether. Birds' responses to such conditions are not well understood: Blake Maybank, writing the spring Atlantic Provinces report, notes that a series of fallouts in late May on islands of New Brunswick probably indicate that migrants altered their typical migratory path but that thousands apparently perished doing so (see that region's S.A. box). This coastal area would seem a prime place to study such movements with modern radar, such as the new polarimetric (NPOL) radar in use in bird studies in the Southeast (see <www.clemson.edu/birdrad>).

"Northern" birds south: the irruptors' return

The past season's invasion of montane/boreal species abated in early spring, as irruptive species began to return to breeding areas. Townsend's Solitaires, Varied Thrushes, Pine Grosbeaks, crossbills, nuthatches, and Pine Siskins moved back to cooler climes, whether to mountains or boreal forest, but as is usual, a few lingered later than others, and some of the fringillids nested in unusual areas. Even the latest dawdlers in this bunch were mostly within the realm of the expected extremes, however—with the exception of mid-May Pine Grosbeaks on the eastern Colorado plains (Kansas recorded its last of the winter 15 March and New Mexico its last 18 March—where did these Colorado birds winter?). A few Red-breasted Nuthatches tarried in Florida until early April and one in central Texas through mid-May; in eastern Colorado, the return flight of Red-breasted Nuthatches extended into late May. Townsend's Solitaires continued all over northeastern North America until they headed back westward in March and April; Varied Thrush provided a similar story. Red Crossbills "began pouring into Southeast Alaska in March," and at the same time, Oregon's north coast and Willamette Valley began to see an influx of the species, which peaked in late May with daily counts of up to 2000 birds! Reports from Georgia and North Carolina were probably of Appalachian nesting forms—but who really knows? It would be *superb* to see documentation of the various Red Crossbill types with such reports. Our understanding of the complex movements of this species is still in its infancy. Pine Siskins lingered all over the Great Plains, often through late May, and one hung around in Tennessee until 24 May. Not all late siskins were concerned about returning homeward in a timely fashion, as they stayed to breed in Nebraska (two nests) and Kansas (several nests). After a landmark invasion of Bohemian Waxwings last fall and winter in the center of the continent, it was no surprise to have some of them linger later than usual: South Dakota recorded its first ever in May on the 14th. In similar fashion, the northern owl invasion of winter faded out in early spring, though the more conspicuous Great Gray and Northern Hawk Owls far outnumbered (detected) Boreal Owls in extralimital settings. On the Atlantic, cold-water pelagic species—notably Thick-billed Murre, Razorbill, and Northern Fulmar—were found well south of typical range through late winter into early spring, and Florida recorded its first fulmar this spring season.

"Southern" birds North I: Doves' expansions

When will it end? Or, *will* it end? Surely, there is an end somewhere in the great fin-de-siècle expansion of doves' populations, but the end would seem to be nowhere in sight in the early twenty-first century. These expansions did not all begin in the late twentieth century, of course, and a thumbnail history shows quite divergent trajectory and timing among five dove species' distributional changes.

Eurasian Collared-Dove ~ Prior to the 1930s, this species was restricted to southern Asia. Some mechanism allowed it to expand into most of Europe in about four decades, and it is rather remarkable that this southern Asian species now nests north of the Arctic Circle in Tromsø, Norway. The direction of this species' spread was toward the west and northwest; in Asia, the species still has a relatively restricted range. In North America, birders at Gambell are unlikely to see a Eurasian Collared-Dove coming in off the water from Kamchatka, but a Gambell birder facing to the east might have more luck: North American records (see Figure 2) appear to show a trajectory toward the west-northwest, with very few recorded from the Northeast but more and more from the West, including (as of spring 2005) Saskatoon, Saskatchewan and the Pacific Northwest: Oregon now has 26 records, Washington six. Though recorded for the first time in New England only in spring 2005 (a single in Essex, Massachusetts), the species is now quite common in cities and towns around the Gulf Coast, up the Atlantic Coast as far as southern North Carolina, and well into the Mississippi River Valley: teams searching for Ivory-billed Woodpeckers in eastern Arkansas this spring photographed collared-doves nesting deep in pristine tupelo-cypress swamps, well away from civilization! In eastern Colorado, collared-doves are downright common, with numerous outposts of the species in other parts of the state. In fact, collared-doves are so numerous that Rocky Mountain Bird Observatory's *Monitoring Colorado's Birds* program can no longer attempt to count all of them; several of Colorado Christmas Bird Counts record the species in triple digits, even as far north as Barr Lake, northeast of Denver. In the Midwest, numbers still lag far behind the Mountain West: three birds in Berrien County, Michigan this May provided only the third state report. Manitoba had its first confirmed nesting in 2005 at Lyleton.

Although western states lie much farther from the original source population (in Florida, which apparently came from the Bahamas) than do the states of the East Coast, western U.S. states and even Canadian provinces have played host to the species for several years now. But might there not be multiple source populations for the North American colonization? The species has been recorded in southern California for several decades, nearly as long as it has been in Florida. Could the Arizona and Pacific Northwestern birds (and Baja California and Great Basin birds) have come from southern California? And what of the intentional releases of this species reported, or rumored, in eight other states (Romagosa 2002)? We hope that some diligent person is tracking the spread of this species on a continental level; it would be a pity to lose track of this bird just because it is not native. The data harvest involved in a task of this magnitude could be easily handled by birders using eBird (<www.ebird.org>): if large numbers of observers would faithfully enter their reports of collared-dove, we could at least know, over time, where the birds are and in what numbers. Figure 2 maps the eBird data already entered 2001-2005, and although Canadian records and some of the more "extralimital" (including many eastern) records are not yet represented therein, the continental map agrees well with reports submitted to this journal through the present—and illustrates very nicely the tendency of the species to spread to the west and northwest. Maps and graphs of distribution and relative abundance can be generated quickly and easily on the new eBird version 2.0, available free of charge to anyone. (If a report seems unusual—whether because of species, season, or number—regional editors may request documentation to determine whether the report should be archived officially in the eBird database, but all records are maintained in a

contributor's private database, regardless of their disposition in the official database.)

White-winged Dove ~ It was not long ago that White-winged Dove was a "really good" bird in most of North America. The stays of most vagrant individuals were short in duration, and their occurrences as vagrants were spaced widely, both temporally and geographically. *No longer.* In Dallas, Texas, Christmas Bird Count participants formerly were thrilled to find a single White-winged Dove in their area; single areas now produce triple-digit counts. New Mexicans are finding them far north (and at higher elevations) in their state. Colorado has removed the species from its review list, and White-winged Dove is suspected of having bred in numerous locales there. This spring, both Dakotas scored a single bird each, South Dakota's fifth and North Dakota's fourth. By way of comparison, Colorado's fifth accepted record occurred in 1981, but its tenth came only in 1994. How long will it be before South Dakota reports breeding White-winged Doves? The species made now-expected peregrinations to Massachusetts, Maine, Virginia, New Jersey, New York, North Carolina, Georgia, Pennsylvania, Iowa, Missouri, Minnesota, Wisconsin, Illinois, Indiana, Nebraska, and northern California. (Northeastern Canada reported none, possibly because winds were northeasterly during much of the mid- to late May dispersal period.) This species' trajectory in spring is difficult to define: if Florida is the source of the eastern Whitewingeds but the Southwest supplies the West, then "north-northeast" would be a fair assessment. If, however, Florida is only a negligible source population, then "northeast" might be more accurate. In California, where the species has been expanding its range since 1944, it has moved more in a northwesterly direction, from the extreme southeastern part of the state toward Santa Barbara County. In still broader perspective, White-winged Dove has also shown a stark spread through the Caribbean, where expansion is eastward (the first for Barbuda were found in spring 2005). Formerly considered conspecific with White-winged Dove, Pacific Dove, a species of western South America, is also spreading—in this case, southward (or the equivalent of northward in the northern hemisphere!).

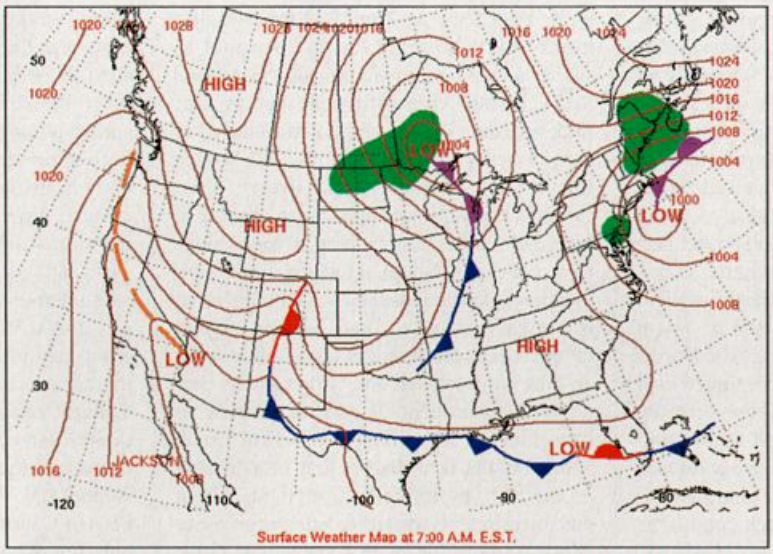

Figure 1. This syntopic weather map shows the offshore low-pressure system that produced strong north-easterly winds over much of the Atlantic Coast in late May (here 26 May) 2005. *Map reproduced courtesy of the National Climatic Data Center, Asheville, North Carolina.*

Inca Dove ~ At the time of European settlement of the Americas, Inca Dove was apparently not a member of the avifauna north of the Rio Grande River. In fact, the species was not described until 1847, from Mexico (A.O.U. 1998). The first U.S. record did not come until 1866, in Laredo, Texas (with first records from Arizona in 1872 and New Mexico in 1924; Mueller 2004). In Texas, the expansion was preceded principally by fall and winter occurrences (Oberholser 1974), and the species established itself along the Colorado River in California only recently, between 1948 and 1970 (Monson and Phillips 1981). So, one could say it took Inca Dove 139 years to get from Texas to Tennessee, which recorded its "long-expected" first in spring 2005. We could find only two other mentions of the species in the spring's report: continued range expansion in the Central Southern region (where three were found by Ivory-billed searchers less than a mile from Bayou de View in mid-April) and continued residency in southeastern Colorado. More diligent searching in spring along the Mississippi River floodplain, especially in small agricultural towns near water, would almost certainly produce a few more records. Michigan's recent record suggests that more of the Midwest should be prepared to see Inca Doves as well.

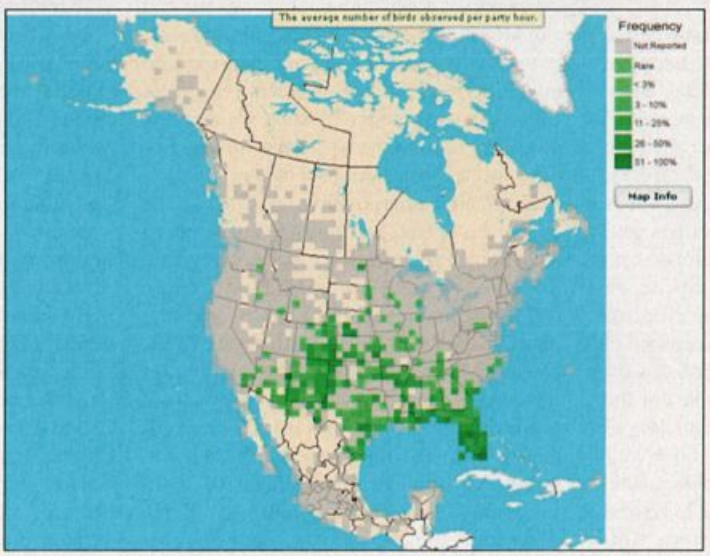

Figure 2. This eBird-generated map shows all reports of Eurasian Collared-Dove to the eBird project between January 2001 and August 2005. See also the animated maps accessible at <http://www.birds.cornell.edu/PFWMaproom/> and <http://www.birdsource.org/features/eucdov/>.

Ruddy Ground-Dove ~ Those who do not regularly read the southwestern regional reports in *North American Birds* may still think of Ruddy Ground-Dove as an irregular winterer in small numbers from southern California to western Texas. This has been true since the 1980s. The first records for California came in 1984 (one in 1978 was considered an escapee), and these records were linked to reports of the species in southern Sonora in fall 1982 and 20 or more in northern Sinaloa in 1984 (Stejskal and Witzeman 1985, Witzeman 1985). The species was unknown north of southern Sinaloa before that time. But in the past few years, this species seems to be doing its best to catch and surpass Inca Dove in its expansion in the United States. This spring in southern California, Ruddy Ground-Doves were "still present near Calipatria, Imperial County, where apparently resident and breeding," according to Guy McCaskie and Kimball Garrett. In Arizona, Mark Stevenson and Gary Rosenberg note that with "Ruddy Ground-Doves recently in year-round residence near Red Rock, nesting has been suspected" in Pinal County: four were found there this spring and a nest reported in mid-May. As was true in Arizona and California until recent years, New Mexico reported just the latest dates of wintering birds, but that state gets less coverage, by far, than states to its west, and the species may already be breeding there as well, according to

Sandy Williams. A continental map showing the spread of this species—as well as the four species above—is provided in the recent *National Geographic Reference Atlas to the Birds of North America* (Baughman 2003). White-winged Dove, Inca Dove, and Ruddy Ground-Dove (and Pacific Dove) are all species adapted to dry habitats, specifically desert environments. Perhaps their spread has been enabled by the proliferation of moist, human-modified habitats—but why?

Common Ground-Dove – In contrast to the news of other doves spreading through the Lower 48 (and one species into Canada), Common Ground-Dove makes fewer headlines. Where other columbids are regularly encountered in towns and other human-created habitats, this species of "semi-open habitats with low brush and grass" (Kaufman 1996) seems to prefer less-disturbed environments, at least in the United States. So scant are truly extralimital records of this species in recent decades that one hopes each reported vagrant is scrutinized carefully to eliminate other *Columbina*. The only notable reports from spring 2005 were single birds in Kentucky, that state's second ever (a holdover from the winter season), and a rare record from Oklahoma.

In Arizona and elsewhere in the Southwest, where it forages readily in orchards and ranch yards, Common Ground-Dove appears to be faring better than on the eastern fringes of its range (Sauer et al. 2005). New Mexico had two noteworthy reports of the species, whose range barely extends into southwesternmost New Mexico (National Geographic 2002), and Chihuahua also had two. Howell and Webb (1995) do not map Common Ground-Dove on the Central Mexican Plateau, which occupies most of the states of Chihuahua and Durango, though the species does occur there in small numbers. The importance of including Mexico in *North American Birds* is clear: had Mexico been represented in the regional reports in 2000, the report of Common Ground-Doves in February 2000 by a Rocky Mountain Bird Observatory field crew along the Río Nazas in Durango would have been published and would have provided more context for this spring's records. Even more importantly, had this regional report existed prior to 1995, more information on the status and occurrence of Common Ground-Dove (and a host of other species) on the Central Mexican Plateau may have been available, allowing more precise mapping in the excellent guide to Mexican and northern Central American birdlife by Howell and Webb (1995). (An aside: this book richly deserves to be translated into Spanish: can anyone find funding to have it translated?)

A tale of two tails: early arrivals and late departures

In compiling interesting observations from the spring season, we spent hours poring through the regional reports and noting in a spreadsheet those observations of particular interest, along with the reason for notation. In this listing of hundreds of records, we found that a fairly substantial percentage consisted of records of birds noted as being "early" (as opposed to "late"). This term includes an array of more specific terms from "rather early," to "unusually early" or "exceptionally early," to that pinnacle of earliness, "record early."

Figure 3. This Common Nighthawk 30 April 2005 at Plum Island, Massachusetts raises the question: were the many early arrivals documented in spring 2005 "overmigrants," simply carried northward on southerly winds, or were they rather indications of a strengthening trend toward earlier arrivals, an effect of a warming climate? And, likewise, were the many extralimital southern warblers and other passerines in New York and New England in spring 2005 "overmigrants"—or would-be colonizers, simultaneously expanding their ranges northward? And what connection to climate change might they have? ***Photograph by B. Lawless.***

For the spring 2002 season, Dinsmore (2002) suggested that birders employ a standard approach to determining whether particular early arrival dates were truly extraordinary (and thus possibly suspicious) or within the bounds of the expected. We laud this clear-headed application of statistical theory but wish to stress to those not conversant in statistics that this approach indicates only the probability that a particular observation is extraordinary—not necessarily whether it truly is extraordinary. For example, consider a record of a Yellow Warbler found 10 April in Scotts Bluff County, Nebraska. According to the formula recommended in Dinsmore (2002), the occurrence would be more than three standard deviations earlier than the mean for the state and thus be considered possibly erroneous. However, statistics can really suggest only what is improbable, not what is in-credible: in the context of many early arrivals across the eastern half of the continent in that week, the record seems less improbable, and indeed if verifiable, this sort of early arrival date invites reflection and bears investigation in context. It is our suggestion that Dinsmore did not intend the method to be applied in evaluating the likelihood of a particular report—merely in delimiting which "early" or "late" birds should be candidates for review by records committees, for instance. And surely, on the slippery, often subjective slope between "unusually early" and "record early," there is indeed a need for guidelines for the evaluation of records that lie outside apparently plausible dates of occurrence, just as we establish guidelines for "review species" that are geographically extralimital.

For decades, the spring Changing Seasons column has mentioned, if not analyzed in detail, records of individual birds arriving ahead of typical dates. Additionally, many informal discussions among birders touch on the seemingly never-ending parade of earlier and earlier arrivals of migrants and particularly of Neotropical migrants, some of these rather extreme, as in the case of the January Barn Swallow flights on the Pacific Coast. In recent years, "global warming" has been invoked to account for the phenomenon of ever-earlier arrivals of such migrants, and a growing body of European ornithological literature supports correlation between milder late-winter and spring temperatures (that is, a warming climate) and increasingly early arrivals of many migrant bird species. Although the phenomenon of climate change now has abundant scientific support, we feel that citing these earlier arrivals of migrants (usually First Arrival Dates or FADs are studied) as consequences of this phenomenon may be premature—certainly difficult to defend in the context of birding-generated data, but also difficult to connect causally to global warming. The question is: how can we frame studies that measure birds' (apparent) responses to this climate change or, at least, investigate whether the changing phenologies of breeding and migration show correlation with climatological data? And, a question more germane to readers of this journal: can data from birding excursions be of use in such studies?

This journal tracks early arrival dates in numerous bird species and thus would seem

to be a source of data for studies of migration and climate change. It may seem straightforward to search the regional reports in this publication for the word "early" and its variants, tabulate the appropriate records, and show the world how much earlier birds are arriving than in past years or decades. However, the abundance of the "record-early" arrival dates may obscure the pitfalls involved in such an endeavor: we must also consider the effects of the increasing sampling effort conducted by the burgeoning population of birders.

Migration in birds, as in many other creatures, has been shown to be genetically driven but with proximate cues, especially changing day length (photoperiod). Granted, there are many species with strong facultative aspects to their migrations (that is, triggered by stochastic events, such as cold snaps), and some birds' movements are most dependent on food availability—such as those of crossbills, owls, and some waterbirds, which are better termed "irruptions" than migrations. In Dinsmore's (2002) premise, a bell curve roughly describes the variation in most aspects of gene-driven migration: most individuals respond to cues such as photoperiod changes and arrive at particular locations at or near an average date (with the caveat that adverse conditions can delay individuals, even sizable numbers of individuals). But some small percentage of these migrants has genes that allow for different "interpretations" of proximate cues, so that some—those on the left tail of the curve—leave wintering grounds early and arrive earlier than most conspecifics. These genes may be more likely to be lost from the population, because birds that arrive too early more often encounter inhospitable conditions. Conversely, there is also a small percentage of a given population whose genes cause them to arrive later than normal—the right tail of the curve. Such individuals are less likely to be eliminated by foul weather (and lack of food); however, migrants arriving late on the breeding grounds have a lower chance of obtaining high-quality territories, thus a lower chance of attracting mates and of reproducing. And so these genes are also kept in the small minority. So, if it's bad to be early and bad to be late, why don't all birds of a particular species arrive at a particular breeding location on the same date? The variability among individuals in migration timing may allow populations and species to respond to changing conditions in an appropriate direction. Thus, in relative terms, each generation's genes may produce the same bell-shaped curve with regard to spring arrival. Such "balancing selection," as it has been termed, allows elasticity in bird populations' responses to changes in the environment and climate: different strategies are maintained in the gene pool "for use when needed," as it were.

The many "record-early" arrivals detailed in this journal are often foregrounded in the regional reports, sometimes at the expense of late arrivals or lingering birds, and this is an understandable blindspot or imbalance that we would like to consider here. This spring's Oregon & Washington column is exemplary in its balance between early arrivals and late departures (e.g., a Swainson's Hawk 5 March followed by a Rough-legged Hawk 23 May) and in its contextualization of the records it reviews overall. But many regional reports do not provide this degree of balance or context, and it seems that some have very few reports of "late" birds, even though the region did have late migrants or lingering wintering birds. If this bias is real (and in some cases, it certainly is), why does it exist? Do we overlook or skim past the "late" birds because they are intrinsically less interesting to us? Have the last waxwings of winter lost their luster by the time the first warm southern winds begin to blow, and our thoughts turn to more colorful species? (Ask any regional editor working on this journal: it is far easier to determine the earliest spring migrant of a given species than the latest-departing wintering bird, largely because birders keep better track of the "first" than the "last"—and surely, too, because the "last" bird is often more difficult to ascertain, even in an Internet-connected birding community, than the first arrival.)

An example: lingering Cedar Waxwings are often encountered in late spring south of their breeding areas and thus tend to be tracked poorly. In spring 2005—as might be expected after a massive winter flight deep into the West Indies and Central America—there were some exceptional records of this species: two tarried in the Upper Keys of Florida until 30 May; a few were near Mexico City in mid-May; 50 were noted on Bermuda through 4 May; 8 were seen in the Central Valley of Costa Rica on 10 May; three were still in Belize on 21 May; and one remained on Cozumel Island, Mexico 24 May. But across the southern tier of the United States, for instance, Cedar Waxwings were almost ignored—even though this is one of a handful of species in the East whose breeding range appears to be extending *southward*, if only slowly and sporadically. Reports from Bermuda, Mexico, and Central America show us that scores of Cedar Waxwings were still south of the border in mid-May, even late May, and it may be that these birds were at some disadvantage in getting north, or perhaps many were second-year birds, which are known to have less urgency to return northward in some species. Indeed, now that this journal's area of coverage extends south to Panama, some of the "incredibly late" spring birds have context that makes the bell curve's right-tail more plausible and more palpable: a Merlin in Belize 18 May; a Tennessee Warbler in El Salvador 8 May; a Magnolia Warbler in Guatemala 15 May; an Ovenbird in Guatemala 21 May; a Common Yellowthroat in Belize 23 May; a Scarlet Tanager in Guatemala 10 May; and a Prothonotary Warbler on Cozumel Island 22 May. The White-throated Sparrow in Belize 18 May was a first for the country—and southernmost on record. If global climate change is causing Neotropical migrants to arrive *earlier and earlier*, does it also cause some of them (as well as northern breeders that are irruptive or short-distance migrants) to stay in southern areas *later and later*?

The reality may be a matter of bell curves. With more and more birders providing more and more reports from more and more places at more and more times, the simultaneous manifestation of ever-earlier arrival dates and ever-later departure dates may simply be an effect of this increasing effort: more of us are looking, and so we are finding a larger percentage of both the left and right tails (even though we as birders tend to focus more on the left-tail birds, such as Maryland's Baird's Sandpiper on 8 March this season!). Climate change may have some detectable effect on migration timing, but simply compiling long lists of early-arrival reports—while not simultaneously analyzing reports from along the rest of the migration route (and from the wintering grounds)—is not the way to make the case. It can be argued that single birds found lingering on the wintering grounds or straggling back northward quite late are unimportant for studies of the relationship between migration and climate change (which should focus on first arrivals and on nesting), but "late" dates, if presented in balanced fashion, provide a more complete picture of the whereabouts of a given species, along with at least some indication of how observer effort affects this picture.

We suggest that the case for correlation between increasingly early spring arrivals and climate change should be made using situations of well-monitored areas using relatively constant effort and observer skill—situations which, unfortunately, are not as common in North America as in Europe, where the study of migration and climate is quite advanced. In western Poland (Tryjanowski et al. 2005), in Moravia (Hubalek 2005), in Lithuania (Zalakevicius and Zalakeviciute 2001), and in four central European sites (Anthes 2004), various long-term studies appear to confirm birders' impressions of increasingly early spring arrivals, especially by typically early spring migrants. Though agreeing on the advance in spring arrivals in many species, these papers provide as many questions as answers, and this should not be surprising. "Migration," after all, is by no means a uni-

form phenomenon: species use many different routes, stopover strategies, and paces in their migrations; there are marked differences between the sexes and among age classes in many species; and these factors all combine to bring migrants into contact with different meteorological conditions along their routes at various times. Not all classes of migrants (called "migrons" in one study [Hubalek 2005]) show uniform results with respect to climate change, and in Sweden (Stervander et al. 2005), spring arrivals were noted to be influenced by large-scale weather phenomena, such as the North Atlantic Oscillation, and long-distance migrants that winter south/southeast of the breeding grounds were found to have the greatest long-term positive change in early arrivals (see also Vahatalo et al. 2004, Hubalek 2003, Forchhammer et al. 2002). Conversely, analyses of data from Long Point Bird Observatory in Ontario, Canada (Mills 2005) and from the Cayuga Lake Basin of New York and Worcester County, Massachusetts (Butler 2003) show more pronouncedly early arrivals in short-distance migrants and reveal only modest advancement in spring arrivals overall; a less robust study from Maine (Wilson et al. 2000), by contrast, shows no significant advance in arrival dates between 1899-1911 and 1994-1997. A general overview of the literature on migration and climate change (Lehikoinen et al. 2004) finds that short-distance migrants show the greatest advance in arrival dates, which makes sense, if one assumes that these birds are responding to weather conditions nearer their breeding grounds, while long-distance migrants may rely more on photoperiod.

There are difficulties in studying spring migration that can seem almost insurmountable, especially when relying on rather small data sets. Mills (2005) notes that using first arrival dates to characterize migration systems can be problematic because they are data from one tail of a distribution, they comprise a mostly male population, and they may not correlate well with the balance (or the peak) of the migration period, which can be difficult to determine for many species. Moreover, migration in scarce and/or difficult-to-detect species is extremely difficult to monitor, especially in small birds. Another problem, rarely addressed, is how to account mathematically for subtle but potentially important differences in level-of-effort and sampling coverage. Minor variation in one or the other could explain quite a bit of variance in a set of data. Nevertheless, more and more papers are beginning to incorporate such factors into their analyses, and the results continue to support a correlation of climate change and advancement of spring arrival dates. A very recent paper (Root et al. 2005) not only makes the claim for a causal connection between this advancement and climate change but also argues for "joint attribution"—that is, further causal connection to anthropogenic alteration of the earth's atmosphere. This paper is the first (of which we aware) to synthesize ornithological data from North American, African, and Asian migrations.

Does earlier arrival on the breeding grounds correlate with earlier and earlier nesting? The first papers on this subject to be widely publicized (e.g., Crick et al. 1997) suggested so. A more recent study of 20 bird species in Oxfordshire, England (Cotton 2003) found that they arrived eight days earlier than 20 years ago; this advancement was shown to correspond to milder late-winter/early-spring temperatures on the African wintering grounds of these species. The same study found that these species also *departed* eight days earlier than 20 years ago, a pattern showing correlation with warmer temperatures in summer in England. A recent study of European birds that winter in sub-Saharan Africa (Gordo et al. 2005) suggests that weather conditions on the wintering grounds may be most important in triggering what the authors call "departure decisions" in these migrants. However, Ahola et al. (2004) found that Pied Flycatchers migrating to southern Finland have migrated and thus arrived earlier in spring than in the past—but that the phenology of breeding has not changed nearly as much as that of migration, apparently because temperature changes in the northern part of the species' range have shown less change in spring than those to the south. In western Europe, Coppack and Both (2002) note that mean egg-laying dates of Pied Flycatcher had in fact advanced there, if not to the degree that arrival dates had. Ahola et al. (2004) write: "the effects of climate change have to be studied at the appropriate time and geographical scales for each species and population concerned." In wider context, Moller et al. (2004) note the bias in such studies toward migratory temperate-zone nesters and call for "large-scale studies of a number of model species along [different] latitudinal gradients."

Because there is some indication that early breeders usually produce the greatest number of offspring (Perrins 1970), it seems reasonable to predict that for migratory birds, early arrival on the breeding grounds would be favored, at least at some latitudes. In North America, a few good papers on well-monitored nesting passerines such as Tree Swallows (e.g., Dunn and Winkler 1999) have come out in recent years; such papers demonstrate clearly that these species are nesting earlier and earlier in the United States. But instances such as this year's cold weather in late May (in the Northeast, at least) do not illustrate a clear advantage to earlier nesting—many swallows died or lost their broods. In Alaska, George Divoky, has studied Black Guillemots on Cooper Island near Barrow for three decades. Initially not focused on biological responses to global climate change, Divoky's study nonetheless illustrates a clear and rather radical shift toward earlier nesting in this species. "The warmer temperatures and subsequent early snowmelt [have] allowed Black Guillemots to lay their first eggs in mid-June, approximately two weeks earlier than in the mid-1970s. The observed changes in the Black Guillemot's breeding biology over the past three decades are among the first biological indications of the impact of recent warming in the Arctic" (see <www.cooperisland.org>; Krajick 2001). Preliminary investigations of Ivory Gull nesting areas suggests that they too have changed—but in this case, traditional colony sites appear to be abandoned, and Inuit hunters claim the species is disappearing (Gilchrist and Mallory 2005).

Such birds of the High Arctic are remote from most of us, but this environment, scientists generally agree, will be among the first to experience profound changes as a result of rising air and sea temperatures. Are the effects of the warming planet on bird populations visible in the Lower 48 and southern Canada—for instance, in Arctic nesters that pass through more temperate areas during migration? In Delaware Bay, the famous stopover area for Red Knots and other High Arctic nesters, the numbers of shorebirds continue to be depressed in 2005, some just a third of their numbers of the mid-1980s. The downturn in migrant shorebirds there has been often attributed to the overharvest of Horseshoe Crabs (which may well be true), but could changes in the Far North also have an impact on nesting habitat or nesting success in these species? The numbers from spring 2005 are difficult to read without wincing: only 20,000 knots were counted (compared to the all-time high of 96,000 and an average of 48,000 for the years 1982-1996); 43,000 Ruddy Turnstone seems like a high count, but it was well down from 1989's count of 108,000 (and the 1982-1996 average of 70,000); 12,765 Sanderlings is a count similar to numbers from as recently as 1993-1995 but a far cry from the 56,000 counted here in 1982; and of the 272,000 Semipalmated Sandpipers that once used the Bay, just one half of the average of 112,000 (from 1982-1996)—56,000—were tallied this spring (see Brokaw, in Hess et al. 2000, for data from past years). The conditions on the Arctic nesting grounds used by these shorebirds are changing rapidly: in some areas, shrubs are encroaching into tundra; biting insects such as mosquitoes are now more abundant and more prevalent earlier in the season, a problem for both caribou and Arctic birds (Krajick 2001, Gaston et al. 2002); and

the populations of several species of geese, especially *Chen*, are exploding, with deleterious effects on the tundra where flocks gather and graze. (An aside: one consequence of expanding goose populations is that our regional reports are filled with vagrants and high counts: for the present season, we note records of late or wayward Emperor, Ross's, Snow, Cackling, Canada, Greater White-fronted, Barnacle, Pink-footed, and Graylag Geese—the last species a new one for North America—in the regional reports. We also noted quite a few perplexing reports of goose hybrids, and a few swans of note, mostly extralimital Trumpeters but also single Bewick's in the Yukon, Montana, and Utah.) While we agree with conservation groups that a moratorium on Horseshoe Crab fishing is an imperative for the Delaware Bay region (see also the Middle Atlantic region's S.A. box on Red Knots), we believe it crucial to study other factors, such as those affecting reproductive success on the nesting grounds, in these species. This is a tall order, as these nesting grounds are remote and extremely challenging environments for humans; but time may be of the essence.

Southern birds north II: "Vagrants" and the question of climate change

In miniature, birds we call "vagrants," those found well outside of normal range, raise the same questions about climate change versus observer bias as early-arriving individual migrants that are not extralimital. Statistical models have even less applicability in these cases, as there are simply too few data points available to analyze. Nevertheless, some models of climate change predict a northward shift in the breeding ranges of scores of species (Price and Root 2000), and with increasingly warm weather recorded annually in recent years, it seems reasonable that we would expect to see the first northward pioneers, if not breeders, if these models have even a moderate degree of accuracy. A corollary could be that few bird species would be expected to extend their ranges *southward* in a period of warming climate. Let's take the latter case first. Which species are moving southward? Cedar Waxwings and Tree Swallows, noted above, have slipped quietly into the Coastal Plain of the Carolinas in recent years, and larger gulls (notably Herring and Great Black-backed) have also extended their ranges southward in recent decades. House Finches are creeping slowly southward on the Florida peninsula (presumably nearing the end of their colonization of the East after introduction in 1940)—but far more interesting were indications in Alaska this spring that House Finch may soon nest there! Common Raven, Merlin, and Sandhill Crane are apparently re-occupying former range and expanding a bit to the east and south of their core ranges, and wandering individuals or groups are turning up in areas where very rare in the twentieth century. On the West Coast, Chestnut-backed Chickadee has been spreading slowly southward. A few more species have been detected nesting south of usual in recent years (Great Gray Owl, Red-breasted Nuthatch), but by and large, these have been isolated, exceptional events rather than strengthening patterns. In short: the list is short and heavily qualified in most cases.

In the regional reports, we read of many remarkable records of eastern-birds-west and western-birds-east (often popular themes in the Changing Seasons essay when weather is the main topic), some of which involve latitudinal movements of some note, but in restricting our focus to rare birds found more *north or south* than *east or west* of typical range, we found that our list produced mostly the usual suspects. Birds on this rather lengthy list conform to patterns either decades old (Black Vulture, Mississippi Kite) or more recent but distinct (Crested Caracara, Cave Swallow):

- Glossy Ibis: PQ, MN, MO, MB, OR
- White-faced Ibis: MA, RI, VA IN, IL, TN
- White Ibis: NJ, IN, MB, ND
- Black Vulture: PQ, MI, WI, MO, KS, OH
- Mottled Duck: IL, KY, TN, AR
- Black-bellied Whistling-Duck: IA, MO, AR
- Swallow-tailed Kite: RI, MA, CT, VA, DE, NJ, MD
- Mississippi Kite: MA, SD, NJ, WI, IA
- White-tailed Kite: OK, NE, UT
- Crested Caracara: MS, OR, CA
- Common Moorhen: MN, OR, PEI
- Purple Gallinule: VA, IN, IL, TN
- Wilson's Plover: NS, NJ, NH, NY
- Black-necked Stilt: NS, MN, WI, BC, PA
- Chuck-will's-widow: WI, MI
- Vermilion Flycatcher: IA, OK, KS, NV
- Black Phoebe: WA, OR, CO
- Scissor-tailed Flycatcher: RI, MI, WI, PA
- Cave Swallow: AR
- Swainson's Warbler: MD, DE, NY, IL, NM, OH, PA
- Painted Bunting: WY, PQ, MA, ME, WI
- Great-tailed Grackle: IL, MN, WA
- Shiny Cowbird: NC

Those who follow extralimital records carefully will perceive our point in this mixed bag: the line is fine between outlandish "vagrants" and potential colonizers, and many species on this list—among them Scissor-tailed Flycatcher, Great-tailed Grackle, Glossy Ibis, Black-necked Stilt, Black-bellied Whistling-Duck—are known to be expanding the northward fringes of breeding range, whether contiguously or in "leap-frog" fashion, by establishing more eccentric breeding stations. A careful read of the Southern Great Plains regional report adds a few more that may have slipped under the radar: Blue-gray Gnatcatcher, Northern Cardinal; western South Dakota also had a cardinal. The New Mexico report also mentions northward cardinal expansion and adds Vermilion Flycatcher, which is expanding northeastward in that state (and in California and Oklahoma).

In addition to this list, there were southern species found well north of range that conform to much weaker spring patterns:

- Brown Booby: NC
- Wood Stork: NJ
- Fulvous Whistling-Duck: OH
- Brown Noddy: SC
- Costa's Hummingbird: WA
- Fork-tailed Flycatcher: MA, IL
- Seaside Sparrow: NB, PA

In these cases, none of the species are known to be expanding in number or range, and several are in decline—the whistling-duck and stork in particular. Species whose ranges or populations are rather limited (or whose numbers are falling) appear to be the source of fewer vagrants. Nevertheless, we should keep an eye on such species to see if weak patterns of vagrancy persist.

And then there were the vagrants with still less precedent: Buff-bellied Hummingbird in Georgia; Whip-poor-will (subspecies unknown) in Oregon and western Nebraska; Northern Cardinal in Washington; and Eared Grebe, American Avocet, and Virginia Rail in Alaska. But are these birds really so surprising? Buff-bellied Hummingbird has been increasing as a vagrant to adjacent Gulf Coast states; cardinals appear to be moving northward, as noted above; and Barred Owl's recent expansion in the West is well documented. Hooded Orioles—whose eastern Canadian appearances (1992 Ontario, 1998–1999 Québec) once seemed anomalous—were recorded this season in Michigan, Ontario, and (gulp) the Yukon Territory, all three in the first half of May. A Hooded Oriole in the Yukon: though it may have nothing to do with climate change, such a bird does set the mind to wondering. The subspecies of these extralimital Hooded Orioles and Whip-poor-wills should be investigated: multiple taxa of both are known from the United States, and western Nebraska's previous record of Whip-poor-will is of subspecies *arizonae*, or Mexican Whip-poor-will. Could these birds have come from northern Mexico? Certainly, Oregon has a history of recording Southwestern vagrants, making such a scenario at least plausible. Over much of the twentieth century, Hooded Orioles (of subspecies *nelsoni*) are known to have expanded northward in California, and these are clearly the source of vagrants to the Pacific Northwest (including the Yukon), whereas populations in South Texas (subspecies *cucullatus/sennetti*) have declined steadily (Pleasants and Albano 2001). The

Ontario and Québec birds from the 1990s, however, were of the nominate subspecies, as were the 2005 Michigan and Ontario birds. It is surprising that a supposedly declining subspecies would be the source of vagrants, as vagrants are sometimes considered an effect of expanding populations; but Wilson's Plover is also thought to be declining, and New Hampshire had its first this season (and Québec its first in early June). Fork-tailed Flycatcher is another curiosity: it is far rarer in North America in spring than in autumn, when most appear to be reverse migrants of the nominate subspecies (from South America). Though Fork-tailed is not known to nest in the United States, there appears to be nothing (other than perhaps the presence of other kingbirds) to bar the species from doing so. After all, if Barn Swallows can nest in Chiapas, Mexico and on the coast of Argentina—places where they have been assumed to be migrants or wintering birds—why not Fork-tailed Flycatchers nesting on the prairies?

Wind-borne "accidentals"? Or the leading edge of expanding populations? The spring Hudson-Delaware report—which treats a massive northerly influx of southern warblers, tanagers, and cardinalids over April and May 2005—puts the matter bluntly: all these southern birds were not swept up by storms and deposited over a seven-week period in New York and northern New Jersey. Reading through the surrounding regions' reports for context, we can certainly concur. The birds could easily have arrived on favorable southerly winds, of course (quite different by being storm-displaced), but were they simply "overmigrants"? In a season with few southerly winds, it is difficult to see those many dozens of Prothonotary, Yellow-throated, and Hooded Warblers (and a few Swainson's Warblers) as simply overshooting their targets by a few hundred kilometers. The gist of the Hudson-Delaware report seems to be that these birds were not "lost," not "accidental," not vagrants deposited by the caprice of weather but pioneers that appeared in some cases despite the season's contrary weather. (No association with climate change is invoked in that column, but its long list of southern visitors enjoins the reader to consider it.) These birds, it is suggested, were prospecting for territories, perhaps second-year birds, which may be the ones most likely to be found in such anomalous settings (including, perhaps, late lingerers on the wintering grounds). Was the same true for record-early arrivals of migrants in New England (Figure 3), where spring fallouts are known to be storm-related in some cases?

The five dove species considered briefly above give us five quite different examples of population dynamics of "southern" birds. Even within a single genus (*Columbina*), the three species show clear differences. It is to be expected that other species' population dynamics will also vary considerably. Which of the above-listed species will expand as breeders or as "vagrants," and what sort of speed will their expansion take: slow (Inca Dove), medium (Ruddy Ground-Dove), fast (White-winged Dove), or lightning-fast (Eurasian Collared-Dove)? Like the doves, kites make a good case study of this phenomenon—and few species are met with greater shock and awe than Swallow-tailed Kite. Not only were wandering Swallow-taileds "rather early" in many areas (e.g., 17 March in Pennsylvania; 11 March in Georgia), but the incursion into states from Virginia through Massachusetts was just the tip of the southern iceberg: the Southern Atlantic region had 26 reports of extralimital Swallow-taileds (more than three times the norm), 18 of those from North Carolina; Arkansas and Texas had rare confirmations of nestings; and Alabama had a possibly nesting pair at Eufaula National Wildlife Refuge. This species appears to be following in the footsteps of Mississippi Kite, which has shown gradual expansion of its breeding range to the north (note a one-day count of *198* in Illinois on 27 May 2005!) coupled with "vagrant" individuals seen annually hundreds of kilometers to the north of that range. In other words: not quite the "fast" of White-winged Dove, but pretty close.

If we shift southward still more, to the U.S. border states and Mexico, the situation is analogous, but with a different set of species. Not long ago, Rufous-capped Warblers were boldfaced when noted in Texas and Arizona. With nesting documented in both states, and the species apparently annual, Rufous-cappeds hardly raise an eyebrow nowadays. Green Violet-ears are now annual in Texas. Could this be the case with more such species in the near future? It's difficult to make the case that birders have simply overlooked flashy species such as Flame-colored Tanager and Slate-throated Redstart in well-birded southeastern Arizona—or failed to look up and notice Short-tailed Hawks there and in southern Texas. All were reported this season in these states, and all three (plus Crescent-chested Warbler) were *also* reported extralimitally in northern Chihuahua this spring. What's more, New Mexico got its first reports of Short-tailed Hawk and Tropical Parula in spring 2005. Common Black-Hawk was reported in four locations in California, in Lubbock, Texas, from Baca and Prowers Counties in Colorado, and in New Mexico from the Sandia Mountains hawkwatch, its first in 21 years of monitoring. To the east, in Florida, a Thick-billed Vireo, a Red-legged Honeycreeper, and a (green-backed) Western Spindalis were West Indian highlights. In later 2005 reports (we are poaching a bit here), readers will marvel at White-eared Hummingbirds in Colorado and Michigan, at Green Violet-ears in Pennsylvania, Iowa, and New Jersey. When one looks at these records singly, they have a certain vulnerability: hummingbirds can be transported in flower shipments; honeycreepers are sold in pet stores; a Burrowing Owl in North Carolina in May 2005 was suspected to be connected to a landscaping operation. Considered together, however, these and other records suggest that we should expect to see more and more birds north of typical range—and possibly more patterns developing. Until this year, most of us would have laughed at the thought of an occasional Hooded Oriole "flight" to the Midwest; after this season's records, and perhaps a few more seasons like this one, laughter may not be in order. But for birding records to be of greatest value, they must be made synoptic and electronic, as with data from banding stations, and they should carry clear indication of observer effort. Otherwise, our best efforts to document what we observe will remain parochial and mostly inaccessible. We will not be able to perceive changing patterns of bird distribution in all their complexity.

In this column for the autumn 1996 season (Brinkley 1997), the phrase "the Rise of the South" was used to flag North American birders' increasing cognizance of tropical American species (as well as austral migrants from South America) straying to the United States and Canada. In the context of spring migrants, the "southern-birds-north" problem was treated in much more detail four years later, with a review of conceptual frameworks used in Changing Seasons essays over four decades (Brinkley 2001). In 2005, we as a birding community have reached a pass: the changes in bird distribution we are observing and documenting are real, rapid in some cases, and possibly radical. They will be of great interest to posterity, no matter what their outcome. Whether or not they are causally related to the warming of our atmosphere and oceans, these changes pose clear challenges to us as a group. How do we best track these changes, on scales large and small? How do we contribute to projects that might, at some point, be usable for scientists working on the phenology of migration and the impact of climate change? As people who have put in long hours on ornithological projects of many sorts—atlases, censuses, surveys, point-counts, Christmas Bird Counts, and more—we can state plainly that making sense of such changes on a continental scale will not be possible through conventional, paper-based publications (or indeed through methods primarily involving paper archives or repositories). State and provincial journals, *North American Birds*, and peer-reviewed articles have too many limitations—in particular their lack of sufficient space to countenance all data collected, their fundamental inability

to offer real-time updates or graphic displays of data from particular periods, their lack of interactivity—to serve as media that will tell us what's going on with expanding species, especially at the edges of range, areas from which many reports end up on editors' cutting-room floors, owing to lack of space and interest. Both for the preservation of such data and for their accessibility, we must as a community embrace the web-based systems used to track bird distribution, whether for Christmas Bird Counts, Breeding Bird Surveys, state atlas projects, or even everyday birding outings. Your regional editors and project coordinators, and your fellow and future birders, will thank you for taking the initiative to become an electronic birder. And who knows? We may some day be able to make sense of the Yukon's Hooded Oriole(s).

Where will it end? *Will it end?* And, oh yes: Why were there three extralimital reports of Eurasian Tree Sparrow, from Wisconsin and South Dakota, this spring? Is this supposedly sedentary little bird poised to make its Canadian debut?

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