

The Changing Seasons

Drifters

From the Plains eastward, most of the continent found that the spring of 2001 lent itself to few superlatives. Bannon, Denault, Aubry, and David report from Québec that “a never-ending series of nice sunny days was not conducive to the occurrence of any big fallouts.” Leberman in the Appalachian Region: “Nearly every field observer [...] commented on the generally poor flight and lack of significant ‘fallouts’ of Neotropical migrants. At Powdermill Nature Reserve [...] this spring’s banding total of about 1800 birds was the third lowest ever and 35% below the 40-year average.” Davis in the Southern Atlantic Coast Region: “The spring migration through the Region was generally uneventful, with mostly fair weather keeping birds on the move. [...] With low numbers of migrants and no new rarities found, many observers felt that this was one of the slowest, poorest spring migrations in years.” Brock in the Middlewestern Prairie Region: “Cool conditions in late May proved unfavorable for generating migratory waves; consequently, many correspondents relegated the spring flight to the mediocre category (or worse).” Myers and Wallace in the Central Southern Region: “In general, landbird migration was quite dull. [...] At Ft. Morgan, Alabama the Sargents had the poorest banding spring of their career. Robert Duncan in nw. Florida and Myers in se. Louisiana both considered the migration among the worst in memory.” Martin in the Northern Great Plains Region: “Passerine migration was unspectacular, with warblers making a particularly weak showing.” Iliff in the Middle Atlantic Region: “Relatively little frontal activity was blamed both for the lack of many significant landbird flights and the extremely poor hawkwatching season at Ft. Smallwood. Perhaps as a result, comments on this spring’s migration were another echo that this year was even poorer than last.” Elder in Ontario: “Spring moved across the province in a series of stops and starts but with no real weather events that affected bird migration.” And Sexton in Texas: “After spectacular fall and winter seasons, it was perhaps predictable that the next avian passage would be a letdown. In most areas, both the weather and the migration were commonly termed ‘unexceptional.’”

A look back on “Changing Seasons” columns of the past reveals that not a few columnists have noted the abundance of negative adjectives in editors’ characterizations of the spring migration (Plunkett 1969, Smith 1976, Gee 1977, Howe 1978, Smith and McCrimmon 1979, Arbib 1981, Mackenzie and Weir 1985, Ralph and LeValley 1986, Lehman 1987, Kaufman 1996). Indeed, a reader of this column could easily take away the impression that the spring migration in eastern North America has shown a steady, pitiable decline in migrants, particularly Neotropical migrants over the last three decades—or that weather patterns in most recent years conspire (increasingly frequently?) to conceal these migrants from human eyes.

Arbib (1981), as is true of many later columnists here, was of the opinion that “migration seasons are not the best times of year to judge how species populations are faring: the variables of weather, fallouts, birders afield, and chance make year-to-year comparisons highly risky.” Talk of population declines in migrants is virtually taboo in the spring seasons’ columns of the past, but the



This adult Glossy Ibis in breeding plumage was along the Gila River in western Maricopa County 19-21 May, providing the first state record for Arizona. Northern California got its first record in spring 2001 as well, and the species and its close relative White-faced Ibis appeared at many unusual locations throughout the continent and through the season. To what extent are patterns of wind important in the dispersal of these and other migratory species apparently expanding their range in North America? *Photograph by Roy M. Jones.*

question of *why we so often bemoan a lack of migrants* in these pages is itself a culturally interesting one: could the persistence of our lamentation (whether attributed to weather or not) be indicative of actual population declines, or does it have some other motivation?

Initial analyses of data gathered from long-term Gulf coast monitoring projects certainly could be interpreted to suggest that the magnitude of migration is less than what it used to be in, for instance, the 1960s (Gauthreaux 1999), but interpretation of what we think of as “long-term” data sets can be difficult, particularly in light of the changing radar technologies used to monitor migrants; and radar studies do not distinguish among passerine species, of course. It is possible, too, that gradual climate changes have influenced the concentration of migrants in recent decades: as the average arrival of “spring” creeps back a bit in the calendar in this era of global warming, our migration may be more protracted, the birds spread more thinly rather than radically reduced in number. An interesting recent paper also suggested that shifts in storm activity or wind patterns in the recent decades may be linked to changing patterns of migration, vagrancy, even colonization (Butler 2000), another recent paper (Veit 2000) argues that population increases show correlation with vagrancy. Both arguments have merit.

If every other year is truly “the worst in xx-odd years of birding,” then the magnitude of (some?) migrants’ decline would seem to be precipitous. This remark is not intended to minimize or mock some birders’ perception of decline, as the decline is known to be quite real for some species (Robinson 1997). One has only to stand in the field with observers who have spent three dozen springs or more on the Gulf coast to give this perception its due. But this column has always been about field observers’ *impressions* of migration (Eubanks 1988, Kaufman 1990) rather than about comparable sets of data gathered in standardized fashion, a laudable goal for which a few Changing Seasons columnists have argued in the past (Smith and McCrimmon 1979, Lloyd-Evans et al. 1980, Adams 1982). Given that birders’ expectations, impressions, activities, goals, and (one must confess) energy levels can change over a lifetime, and because we gather and compare “data” largely in narrative form in this journal, our regional reports—and especially this column—are vulnerable to nostalgia, to a yearning for the “old days” of birding when migrants fairly dripped from the trees by the hundreds. It is safe to say that nearly every generation claims that “children were better behaved” in times past; likewise, rose-

colored memories of more-abundant birdlife in the past may have common cultural underpinnings that distort, if only slightly, our perceptions of the present.

I plead guilty to this sort of nostalgia. My childhood on the banks of old Paradise Creek in Norfolk, Virginia, was spent in anxious anticipation of each spring migration. If I woke to a warm light rain or fog along the Elizabeth River in early May, I knew the Live Oaks would brim with scores of warblers—Blackpolls, Bay-breasteds, Cape Mays, sometimes even numbers of Tennessees. To return to places where one spent one's formative years birding and fail to see the spectacles of the past is painful: even though I know now that those years were ones of "artificially" high populations for the "spruce budworm" warblers during the budworm's spread through the boreal forest (Morse 1989), it is nonetheless profoundly disappointing to go through spring after spring without their company (the Blackpolls, I should note, are still numerous).

Arbib (1981) would not have stood for all this pining and mooning: "although most reporters and regional editors dismissed [this spring season] as dull, uneventful, lackluster, dismal, or worse, the reactions were much more to personal experiences and dashed expectations (and perhaps to a dearth of mid-week birding) than to what might have actually been happening above us, or beyond us." Kaufman (1996) was similarly blunt: "On the upper Texas coast it is an annual pastime to complain about how terrible the migration is in each particular spring. (This has been standard practice at least since the early 1970s, when I started visiting there.)" If one were just to skim the regional reports this spring, the season might in fact seem a dull one in many respects for the sport of birding. It is customary in this column to combat that impression in an accounting of all that was rare and rich in the season and to caution against any conclusions about the migration in the tortured "relationship between our perceptions and reality" (Eubanks 1988). Twenty years of this column's admonitions about negative characterizations of spring migration have not changed these characterizations; perhaps something really has changed.

Whatever the situation with migration generally or with particular migrant species, when so many Regions report that their seasons were "uneventful," our Changing Seasons chalkboard is refreshingly uncluttered, which provides us pause to glance back over the past 40 spring columns, many of which were written by specialists in bird migration studies. Exceptions within this otherwise uneventful spring were plentiful; comparing them to events of the past, we note to our guarded satisfaction that some of that theories advanced in this column in years past, particularly those that link singular weather events to birds' movements in migration and vagrancy, are borne out again and strengthened by the events of spring 2001.

The Weather Report

March: March was wet and cool or cold through much of the East, where groundings of migrating waterfowl here and there were observed but little movement of landbird migrants in most places. Heavy snow cover stretched from the northern and middlewestern prairies east to New England and Newfoundland, where the season total of 630 cm in St. John's broke all manner of records for the city, the province, and the country. In Québec, the month was merely "a continuation of last winter," and this held true through much of the northeastern quadrant of the continent, which had endured a cold and snowy winter. Monthly snowfall totals such as 114 cm in Syracuse and four or five times that in some places farther upstate in New York appeared to retard the progress of early-season migrants, as was felt to be the case in snowy New England, where an early April snowpack up to two meters brought Perkins to ponder: "Do northbound migrants respond to the presence of a pronounced snow line? Large numbers of jaegers have been observed in spring stacking up along the pack ice off Alaska, and it seems reasonable to assume that other spring migrants, especially insectivores like phoebes, and ground-feeders like woodcocks, would avoid proceeding too far beyond the southern limit of the snow pack."

By contrast, March in the far West showed signs of mildness but later turned wet and cool, particularly in British Columbia and Alaska, where all of April was

spent in "an endless funk of cold, wet, windy weather" according to Tobish California's editors report that weather conditions were rather dry and "uneventful," but in the Southwest and southern Great Basin, a wet winter and early spring produced a lush, green spring, particularly in Arizona. The Prairie Provinces, Northern Great Basin, and Montana, on the other hand, were dry.

April: While March in much of the continent continued patterns from winter—a "wet front" in eastern Texas at the close of March was a welcome exception—April and early May were memorable in most of the Midwest and East for high temperatures, as the jet stream retreated northward, allowing southerly winds to blow roughly to the east of the Rockies, from southern Manitoba through to New England. In Colorado, according to Percival and Truan, spring was two weeks ahead of average, and trees were leafed out by 1 May. In Boston, temperatures soared to 85° F on 22 April, bringing a similar early leaf-out. The track of the jet stream meant that most low-pressure systems tended to ride north, toward the United States–Canadian border, so storms were relatively few that would impede the progress of migration, and conditions were also extremely dry through much of the East. In the Southern Atlantic, by contrast, April was slightly cooler than average. An early leaf-out, often cited as a problem for detecting numbers of migrants (e.g., Smith 1976), probably poses fewer difficulties for modern birders than some have opined, but if temperatures are low and song infrequent, then this can naturally lead to the impression that few migrants are about. Such may have been case in the Midwest and southern Great Lakes through New England, similarly in western Texas through Arizona, a verdant spring probably contributed, as Sexton notes, to "dispersed migration (and thus migrants are perceived to be at low densities)."

It is not unusual to have a warm April in the southern states, but the early, sustained warmth of April 2001 that ranged up to southern Canada was well above the average. In a "typical" year, southerly or southeasterly winds blow with regularity east of the 105° W meridian from the Gulf of Mexico, a fetch set up by the development in April of a high-pressure cell (the "Bermuda High") off in the North Atlantic, and this flow continues into May. As the continent's eastern portion lies roughly on the western edge of this area of high pressure, winds from the south are relatively reliable. On this past April's infrequently interrupted southerly winds (coastal Texas's fallout 23–24 April was an exception) rode waves of record early birds, along with notable "overshooting" individuals well north of typical range.

In the Maritime Provinces, particularly in Nova Scotia, a fallout of granivores, chiefly Blue Grosbeaks, Indigo Buntings, and Rose-breasted Grosbeaks, occurred early and on the heels of a coastal northeaster ("Carolina Low") that moved rapidly up the coast 18–19 April. It would appear that northbound migrants move offshore and downwind in the southerly winds on the "tail" of the low, and this sometimes happens in the autumn, when, rather than "overshooting" the behavior is usually termed "reverse migration" (McLaren et al. 1999). Similar fallouts have occurred in previous springs (cf. Howe 1978, Kaufman 1991). Likewise in New England, Simon Perkins reports that "all the regular passerine 'overshooters,' including Blue Grosbeak, Summer Tanager, and Yellow-throated, Hooded, Kentucky, and Prothonotary Warblers, made their usual spring (mostly coastal) cameos"; most of these can likewise be linked to sustained southerly flows. At both northern and southern latitudes through the interior, east of the Rockies, birders found almost countless record-early individuals on the south winds Québec birders had at least a dozen record early arrivals, most of them warblers, whereas "scores of early dates" were set in Illinois, Indiana, and elsewhere in the Middlewestern Prairie Region. "Numerous early dates" were recorded for migrants through Minnesota, Michigan, and Wisconsin, and Wallace and Myers likewise recorded too many early dates in the Central Southern Region to list out individually.

Readers of this column will recall warm, dry Aprils in the East from 1967, 1985, 1986, 1988, 1991, 1998, and to a lesser extent 1981 (Bagg 1967, Mack and Weir 1985, Ralph and LeValley 1986, Eubanks 1988, Kaufman 1991, Warner 1998; Arbib 1981). Naturally, quite a few springs do not have the warm April (or

warm April combined with cool May) of 2001: years such as 1966, 1971, 1973, 1975, 1982, 1989, 1995, and 1996 had cool or rather cold Aprils (Bagg 1966, Paxton 1971, Gauthreaux 1973, Gauthreaux and LeGrand 1975, Adams 1982, Kaufman 1989, 1995, 1996), with in some cases a cool or partly cool May, whereas 1981, 1990 and apparently 1970 had alternating warm and cool weather through both months (Arbib 1981, Kaufman 1990, Craig 1970).

May: May's first week was balmy, even blistering in the East, with thermometers in Boston and New York City topping over 90 degrees each day between the second and fourth of May. In northeastern Canada, the early and middle dates of May saw a Purple Gallinule on St. Pierre, a Chuck-will's-widow in Nova Scotia, and Labrador's first Eastern Kingbird. These birds were all noted just after a pronounced period of mostly southerly winds aloft that extended into May and preceded a two-week period of northerly winds in the second half of May in the Region. During the same May stretch, Québec's lower St. Lawrence region had its first Orchard Oriole, Winnipeg a Prothonotary Warbler, and Massachusetts and New Hampshire single Anhingas, while wayward Swainson's Warblers were locally very rare on Naushon Island, Massachusetts, in Nashville, Michigan, Washtenaw County, Michigan, and in Berks and Westmoreland Counties, Pennsylvania. It is worth noting that although air temperatures were below average when some of these "overshoots" were discovered (11–15 May or so), 11 May was the first Friday following the cool-down, which happened after the previous weekend.

The month changed utterly in the second and third weeks across much of the Midwest and East, as the jet stream dug a trough deep into the Southeast and several fronts passed in quick succession. On 7 May, temperatures throughout most of central New England went rather suddenly from a genuine heat wave in the upper 80s to lows in the mid-twenties. This shift back from a warm April toward a cooler mid-May is a familiar pattern from 1968, 1974, 1976, 1977, 1983, 1984, and, roughly speaking from 1992 (Andrews 1968, Gauthreaux and LeGrand 1974, Smith 1976, Gee 1977, Hamel 1983, Roberson 1984, Kaufman 1992). Grzybowski's simile likening the 1992 spring migration to "a chunk of taffy shot out of a gun" is apropos: "some of the birds got out there fast, but the season was still drawn out and sluggish" (Kaufman 1992), a situation reminiscent of the 1976 season where "the early spring was early and the late season late" (Smith 1976).

Normally, the groundings of migrants associated with "good birding" at hotspots on the Gulf Coast, Great Lakes, and Eastern Seaboard are easily tied to the interaction of the southerly windflow and frontal activity, especially low-pressure cells (cyclones) with precipitation (Gauthreaux and LeGrand 1974); northerly winds on the east side of high-pressure cells; the presence of fog; or in some cases, combinations of all of these (Richardson 1978). After the warm, undramatic April, the stage in May was thus set for fallouts, and these took characteristic forms, with most of them north of Texas occurring around the middle of the month or third week of the month. On 17 May, light southerly winds that moved into a fog bank on the north shore of Lake Erie brought one of those nowadays-elusive mega-fallouts at Point Pelee National Park in Ontario, with many thousands of migrants observed. *Imagine* seeing 110 Philadelphia Vireos in a morning—and this was only one of several all-time records for the Park set that day (actually, Texas fallouts have held at least up to 113 Philadelphias, but who's counting? [Lehman 1987]). As thrilling as that morning must have been, David Elder's comments are ominous: "Veteran Pelee birders fortunate enough to be there recalled similar days in the distant past when such occurrences were apparently much more common."

In the Carolinas and Georgia, mid-May saw several frontal passages with moderate northerly winds that produced the spring's only groundings of migrants. In Virginia and Maryland and north to southern New Jersey, a substantial fallout of largely Neotropical migrants occurred on the coast 19–20 May. Southerly and southwesterly winds on 18 May brought the birds into place; on that evening, a high-pressure area with three wet low-pressure areas on eastern and southern flanks moved coastward, changing favorable winds to northerly

and northwesterly winds. As two of the lows settled offshore, precipitation from Delaware Bay south to southern Virginia held hundreds of birds grounded for a full day, including some rather late individuals of species one thinks of as early migrants (Ruby-crowned Kinglet, Savannah Sparrow). As one of the lows moved northward offshore, prevailing winds went westerly, then northerly, occasioning a smaller fallout between Pennsylvania, Delaware, and New Jersey 22–23 May. What birders along the Atlantic coast call a spring fallout, of course, consists typically of hundreds of migrants at a given location; one exception on the Delmarva Peninsula 27 April 1965 reportedly numbered in the many millions (Bagg 1965).

The states of the western Gulf coast, the only places with spring spectacles to rival or exceed Point Pelee's, also count their fallouts by the hundreds—per minute (Eubanks 1988). Coastal Texas, arguably *the* Migration Capital of the continent, had a significant grounding of migrants 23–23 April that orchestrated all the key elements for a Texas "classic": initial southerly winds from the Yucatan Peninsula and farther south; winds shifting to southeast and east over much of the Gulf out to Florida and the passage of a Great Plains low-pressure system ahead of a high-pressure cell over northern Texas, producing precipitation and north winds all along the western Gulf Coast just as the migrants were arriving. Another fallout 4–6 May saw no contrary (northerly) winds for migrants, but they continued to have the persistent easterly crosswinds from Florida out over most of the central Gulf, along with precipitation along the coast. An atypically late fallout 22–25 May, more evidence of the "late season late," was clearly occasioned by the arrival of another inland high-pressure cell 22 May, with a strong frontal boundary that hugged the Texas coast from Corpus Christi to the Louisiana border that day. It gradually drifted out over the Gulf, producing north winds over much of the northwestern portion of the Gulf over the next day or so. All events were consonant with what is known about migration in this marvelous place. Wind patterns, on the other hand, conspired to produce little in the way of fallouts farther east on the Gulf Coast, in Alabama and the Florida panhandle.

The four corners

Though the Lower Rio Grande Valley's avifauna and weather are distinctly subtropical, most of the weather in Texas fits in familiar context. The outermost margins of our continent, on the other hand, are usually ruled by weather conditions beyond the spring's mid-continental clashes of warm tropical air from the Gulf and systems tracking along the jet stream. In Alaska, as in much of the Northwest, the absence of El Niño conditions allowed us all a break from reading about warming trends there, at least for a time. Tobish writes that "the Aleutian Low apparently stabilized in a position such that continental high pressure developed over the Mainland. In this process, North Pacific storms tracked mostly south of the Aleutians and a few lows crept into the Region in the northern Bering Sea." One consequence of the passage of these North Pacific storms to the south of the Aleutians was a cool, stormy, wet May in British Columbia, where Western Tanagers flocked to suet feeders by the many dozens. Another apparent consequence was a relatively quiet season for Aleutian rarities. For only the second time in several decades, Attu was without birding tour groups, but Shemya was well covered, and a mid-May storm's passage there dropped dozens of wagtails and pipits, a pair of Smew, a Red-flanked Bluetail, three Siberian Rubythroats, a Dusky Thrush and up to 17 Eyebrowed Thrushes per day, three Rustic Buntings, and 176 Bramblings. (Unrelated to the mid-May storm were another Smew, a Northern Goshawk, a Lesser Yellowlegs, and a Great Spotted Woodpecker here, the latter one of two in Alaska in May.) The connections of spring weather and fallouts/vagrancy in the Aleutians are nearly as well known as those on the Gulf Coast; it is hoped that birders can devise another beachhead for Aleutian trips in years to come.

On 15 May, the day that Shemya's weather turned hard and Asian birds began to appear, persistent northerly winds from an offshore low blew in eastern Newfoundland and continued to blow for two weeks, stalling migration through much of the Northeast and transporting eagerly sought-after European

birds to Newfoundland, including the Region's largest fallout of Northern Wheatears—42 of them—which spilled over a bit into Québec (one) and New England (three). The "Iceland Express," as Kaufman (1994) termed Atlantic low-pressure systems situated to the southwest of Iceland, apparently played a role in bringing a Black-tailed Godwit, a Garganey, and a Common Greenshank to Newfoundland; of these, only the godwit nests on Iceland, but the other two vagrate to Iceland from Europe or Africa. State-first *islandica* Black-tailed Godwits found earlier in April in Connecticut and Long Island, birds thought to be the same individual, were clearly *not* related to this phenomenon; they (or it) may have wintered in the New World. Perhaps more intriguing still, the French island of St. Pierre, not far from Newfoundland, had reports of two *Streptopelia* species in the same May period: European Turtle-Dove and Eurasian Collared-Dove, both of which have strayed to Iceland. Did the latter make it from Europe or from our burgeoning North American population, the nearest records being from New York—or does the bird's description, which includes a "pink bill," cast a bit of doubt?

In Florida, after a few weeks of southerly winds in early April, east winds blew from 16 April until mid-May in the eastern Gulf of Mexico (with the exception of 20 April, which had southeast winds, and 3 May, which had east-southeast winds). The prevailing winds at this time of year can be from the east, but there are typically longer periods of southerly winds here. Accordingly, Pranty documents a shift in migrational pathways of several species toward the west: "Caribbean-wintering species, such as Cape May, Blackpoll, and Black-throated Blue Warblers, American Redstarts, and Common Yellowthroats, were abundant along the Gulf coast and in the Keys. In contrast, migrants that winter in the Tropics, such as thrushes, Scarlet Tanagers, and Rose-breasted Grosbeaks, were conspicuously absent; these presumably were blown west of the Region." This is a phenomenon remarked upon for at least three decades (cf. Gauthreaux 1972, 1999) and is certainly supported by the migrational shift of "record numbers" of Cape May Warblers onto the coast of Texas, along with "an analogous bumper crop of Black-throated Blues" there this spring, according to Sexton. Secondary evidence of such a shift is provided by the wave of "southeastern" migrant warblers and vireos into central and southern California.

Ah, California. What part of the continent doesn't envy a state that manages to record a rush of trans-Gulf migrants among such other fare as an Eyebrowed Thrush (a long way from Shemya's fallout and a week or so later), a Nazca Booby, a Black-backed Oriole, a Varied Bunting, and several of the "now annual" Dark-rumped Petrel—a species the A.O.U. has reportedly just voted to split into the (nearly?) indistinguishable Galápagos Petrel (*Pterodroma phaeopygia*) and Hawaiian Petrel (*P. sandwichensis*)? (As if the boobies' split weren't challenge enough!) California took the lion's share of another displacement of what must have been many hundreds of trans-Gulf migrants this spring. There have been other such displacements in the past, but only one known to have been larger, that of May-June 1992 (Kaufman 1992, Terrill et al. 1992). The species involved—White-eyed and Yellow-throated Vireos, Northern Parulas, Kentucky and Hooded Warbler—went almost unrecorded in the Pacific Northwest but, with the interesting exception of Hooded Warbler, were also noted through Wyoming and Colorado in smaller numbers. Northern Parula and Kentucky Warbler were likewise recorded on the Baja California Peninsula of Mexico, where quite rare.

Methods of transport

Dare we ask: How did these birds get there? Strictly speaking, we cannot know with the data available to us. But let us hazard some thought anyhow. As Gauthreaux and LeGrand (1975) point out, we stumble if we look to understand the conveyance for eastern birds into California's southwest in the vector-resultant wind charts that represent average wind direction and velocity at low altitudes, because in the West, "rough topography greatly affects the surface wind patterns to the extent that mean monthly winds are not as representative of synoptic weather patterns as they are in the East." Wind directions at higher altitudes, where birds often migrate, are obscured in the lower-altitude charts. Thus charts depicting surface winds show no obvious continu-

ous pattern of wind flow toward California on a continental scale, whereas charts showing wind direction at higher altitudes, where birds migrate, gives a better sense of why birds initially moved westward from their trans-Gulf migratory path would end up both in the continent's center and along the lower Pacific coast but *not* necessarily in Oregon or Washington, for instance.

Just as patterns of winds in the eastern half of the continent generally follow the curve of the Bermuda high-pressure cell (anticyclone), recurving back toward the east and even east-southeast, so the winds in the southwest follow the edge of the low-pressure area (cyclone) typically present in the vicinity of northern Mexico (Gauthreaux 1972, Gauthreaux and LeGrand 1975). The resulting wind patterns are far from static or symmetrical with respect to the continent's mass, but one might use the visual mnemonic of a lopsided *fleur de lis* superimposed on the continent to envision how the spring winds blow. Thus, it is possible in some springs, for instance, to have migrants arriving in the piedmont of South Carolina from the northwest, having flown along a "dogleg pattern" to arrive on the nesting grounds (Gauthreaux 1972).

In 1992, the juxtaposition of cyclone and anticyclone off the corners of the continent appears to have been appropriate *both* for moving southeastern birds to the west (with easterly and northeasterly winds on the Gulf coming off the southern edge of the Bermuda High) *and* thence into California, as the southwestern region's cyclone produced 24 days of easterly and southeasterly winds in May (Terrill et al. 1992). The apparent effect on migrating birds was in effect to roll them along as on a conveyor belt toward California (and to a lesser extent elsewhere). In some seasons, these atmospheric features are not propitiously positioned, the conveyor belt does not function, and Californians find only very small numbers of these trans-Gulf migrants. The year 1996 was one such year, but it was noteworthy that the Southwest and areas just east of the Rockies held a slew of Hooded, Kentucky, and Worm-eating Warblers, among other southeastern species; and 1990 showed a similar pattern (Kaufman 1990, 1996).

Most intriguing is a recent paper by Patten and Marantz (1996) that documents an increasing trend in appearances of these southeastern warblers and vireos in California; the authors consider a range of possible factors and conclude that both favorable weather patterns *and* population increases in these species, rather than pesticide-induced misorientation, observer bias, or shifts in winter range, are fuelling this relatively recent and growing trend. If the westward shift in southeastern warblers' and vireos' migrational routes occurs as theorized, one could likewise look to population dynamics and patterns of weather to account for the remarkable, mostly mid-May showing of dozens of Indigo Buntings and Rose-breasted Grosbeaks out of range in California, Montana, Idaho, Nevada, Utah, British Columbia, Oregon, and Washington this year (much as was the case in 1999; cf. *N.A.B.* 53: 448). Why these mainland migrants were detected this spring across an area so much broader than the central/southern California region than held their trans-Gulf brethren is far from clear perhaps because both species' breeding ranges include areas relatively farther north and west than the southeastern species, their dispersal on easterly and southeasterly winds tends to encompass the higher latitudes more routinely than does the more insectivorous southeastern species' dispersal.

And still more questions pose themselves. Bill Evans (pers. comm.), who has been conducting Texas coast migration studies using monitoring of nocturnal flight call-notes since 1994, suggests that pattern of "eastern birds showing up in California and the West was likely related to the lengthy easterly wind phenomenon, but the exact mechanism here is really anyone's guess. The Dickcissel flight over south Texas, for instance, peaked during this period of easterly winds but did not seem to be similarly affected, except that it was about five days later than last year's. Possibly the Dickcissels took longer because more were coerced into flying around the Gulf than usual. The number of calls detected across the south Texas acoustic transect was extraordinarily similar to spring 2000. See <<http://www.oldbird.org/comp0001.htm>> for a display of the comparison between spring 2000 & 2001." Could it be that different species are affected in different manners by crosswinds?

Semantics of movement: displacements, shifts, overmigrants, overshooters ...

In these pages, Howe (1978) considered movements of migratory birds out of their core ranges in two categories: "I use the term 'shift' to describe an apparent movement of numbers of a given species east, west, or north of its normal migrational route. 'Displacements' are occurrences of isolated individuals well outside their normal route but not clearly part of a phenomenon involving a whole population of a species." Howe allowed that both could be "functions of a partially innate tendency to disperse" or "they may simply be proximate results of local weather happenings." Kaufman (1990), in a pivotal *Changing Seasons* essay, reconsidered his earlier positions between these two explanatory models: "I have argued for years that most birds out of range get there because of their own mistakes, not because of weather, but this spring made me pause to reconsider." Our quandary at present is partly that we, scientists and nonscientists alike, remain relatively agnostic about any particular bird's "innate tendency to disperse," much less about the causes of various impairments to such tendencies (Able 1999). In the field, with binoculars, we necessarily see effects rather than clear causes. Was a given bird genetically predisposed to disperse in spring migration well away from its natal area? Were there other pressures on the nesting grounds, such as a saturation of available territories, that brought about a move? How important was the direction of wind in determining where the bird ended up?

As fascinating as these questions might be, we don't really need to have them answered in order to monitor and think about bird movements in relation to weather. We know that a migrating bird prone, for whatever reason, to move in a particular direction may be entrained by weather that works completely against its bearing, much as a seabird is entrained by a tropical cyclone (e.g., McLaren et al. 1999). We know too that "reverse" migration is a very common response to contrary winds or to unfavorable stopover sites in both spring and fall (Richardson 1971). An overemphasis on (what appears to us to be) "passive" downwind transportation that discounts other factors in birds' out-of-range movements would be unwise, but field birders' most convenient access is to meteorological data, so it makes sense to attempt to correlate these data with observations of birds, including birds apparently out of range ("Range," of course, is a human convention to describe what is known about past distribution of most members of a species; as European experiments with Blackcaps and other species have shown, "range" is a most malleable thing, subject to rather rapid change through alteration of migrational pathways.) What fascinates many die-hard fans of bird migration, and what this column has suggested on many occasions, is that so many species that one might have put into Howe's "displacement" category come to fall squarely under his rubric of the "shift," as more and more birders seek out migrants and vagrants, more birders learn *how* to seek out such birds (through birding strategies of many sorts), and increasing numbers of people communicate and document and their finds. Clear patterns emerge where once random "accidentals" were perceived before. And so many of these patterns do seem to follow the flow of wind and weather, as birders in Iceland and the British Isles have demonstrated for decades.

Patterns need not reveal themselves to us. The species that most of us term "overshooting" birds, such as the smattering of southern species that reach Canada and New England (which Smith [1976] described as "birds 'surfing' the warm fronts a little too aggressively"), fall largely into Howe's category of the more or less singular "displacement." But if one considers the topography and especially the vegetation in the East, it is certainly conceivable at least that our scattered records of Swainson's Warbler (Michigan, Pennsylvania, Massachusetts) or the Hooded Warblers in the Northeast this spring might hint at more widespread phenomena involving many more individuals. After all, *four* of those 20+ California Hooded Warblers were seen *together* at Butterbredt Spring, a copse of just a few trees in an otherwise rather blank area, a classic western vagrant trap. The forests and swamps of the East would no doubt have given these birds far more opportunities to conceal themselves. Gauthreaux

and LeGrand's (1975) suggestion that windflow may correlate with some patterns of vagrancy goes a long way to explaining why western vagrants in the East are invariably very few in number in the spring, never in the numbers of eastern birds in the West (the few weak exceptions prove the rule, e.g., the springs of 1973 and 1979 [Gauthreaux 1973, Smith and McCrimmon 1979]) We in the East would prefer to believe this; the idea that unseen western warblers lurk in our thickets in spring is odious.

Ornithologists often refer to "overshooting" events as "overflights" or more generally as "overmigration" (Gauthreaux and LeGrand 1974). This happens both beyond the typical limits of a given species's range as well as rather commonly at coastal and offshore sites; a team of observers on San Clemente Island off California's southern coast this spring had the advantage, as McCaskie notes, of detecting even modest flights or fallouts of birds based on waves of overmigrants. On the mainland there, weak flights of birds are much more difficult to determine with certainty.

On the other hand, the waves of southeastern warblers and vireos in California or the fallout of Northern Wheatears in the northeastern portion of the continent would be considered a "shift," in Howe's terms. Most specialists in migration studies, however, would refer to the California example as a *longitudinal displacement*. Hundreds of Rose-breasted Grosbeaks falling out in eastern Florida or hundreds of Bramblings on Shemya would also constitute significant longitudinal displacements, as these species migrate mostly through Central America and eastern Asia, respectively. However one might name these occurrences, what both "shifts" and "displacements" have in common, usually, is that birds in both instances fly with the direction of air currents, as do most migrating birds (Lowery 1951, Gauthreaux and Able 1970, Gauthreaux 1999). It is not the case, by any means, that spring migrants simply follow the wind (Richardson 1971), but in the cases of apparent overmigrants and assemblages of birds out of range, at least part of their journey can often be linked convincingly to the direction of the wind. So perhaps instead of juggling five or six terms, we could conceive of overshoots/overmigrants also as displacements, whether they appear to arrive in neat patterns on a single front or otherwise. They may not be longitudinally so much as latitudinally displaced. But what about birds that we segregate in yet another category, those apparently undergoing range "extensions" or "expansion" through the spring and warmer months?

Range expansions: the slow wave

"It is interesting that almost all range changes noted in the regional reports were all northward expansions" (Smith 1976)—25 years later, this holds true, with a handful of exceptions (such as Tree Swallows nesting in South Carolina). I have always liked the rather unscientific description of species expanding their ranges as a "slow wave" (Ralph and LeValley 1986), and one can only wonder whether a careful study of records of such "expanding" species would find any significant relationship with continental weather patterns. We have to this point considered obligate long-distance migrants; the concept "migration," after all, is applicable to a "broad spectrum of behavioral solutions to the ecological problem posed by variability in the environment" (Able 1999). What about other instances of movement?

Stars of the slow-wave scene this spring were Glossy and White-faced Ibises, birds whose gradual northward spread on several fronts on the continent has been often cited in these pages (recently cf. Patten and Lasley 2000), but their appearances out of range this year were called "extraordinary" on many fronts. Glossy Ibis were out in force on the periphery of their range, with 11 upstate New York records, 13 in Ontario, 17 in the Middlewestern Prairie states, seven in Colorado, three in Michigan, one in Wisconsin, and Regional firsts in Arizona and the Middle Pacific Coast. White-faced Ibis made a similarly spectacular drive into the East, perhaps its strongest showing yet. Records of singles came from Connecticut, Maine, Rhode Island, Virginia, Michigan, Ohio, Minnesota, with at least three and as many as five in New

Jersey Growing populations, along with dry conditions in the northern Great Basin and interior West generally, may have fuelled the dispersal of White-faced Ibis, as appears to have been the case with Black-necked Stilt (both invaded Oregon and Washington this year). The spread of Glossy Ibis, described as a series of rapid “bursts” of range expansion since the early 1800s (Patten and Lasley 2000), may or may not have recent drought in Florida as a cause in this most recent spring. Other Ciconiiforms, as every year, landed well beyond typical range (in most cases, this means to the north), but no species approached the ibises’ push. The four Limpkins in South Carolina may have been drought refugees.

Nearly as impressive as the movement of ibises has been the northward thrust of kites, in particular Mississippi Kites but to a lesser extent Swallow-tailed Kites. Both typical spring overmigrants, their flights appear to be carrying them farther afield each year—consider Nova Scotia’s second Swallow-tailed Kite (on 25 March) and South Dakota’s third Mississippi Kite (on 15 May) Both records were made in a context of substantial influxes, such as a record 13 Mississippis in Massachusetts, a healthy dozen in the Hudson-Delaware Region, “continued increase” in the Middle Atlantic, where the species nests, and as far north as Ontario, where three were seen, and Duluth, Minnesota, where Nicoletti found one on 16 May. Swallow-tailed Kites were seen in the much the same areas but in about one-third of Mississippis’ numbers, as has been true in recent years (Wood 1999, 2000).

The doves on the move—White-winged and Inca Doves and Eurasian Collared-Dove—continue to spread beyond core range in both gradual and more sudden patterns, with populations beyond typical range consolidating themselves and growing and records of “vagrants” on the increase. Eurasian Collared-Dove has now reached the Baja Peninsula!

One may ponder what part directions of wind currents play in the “slow wave” spread of such birds as the ibises, kites, and doves. Hiff in the Middle Atlantic Region puzzles over why the collared-dove “has taken an amazingly long time to investigate the East Coast” north of North Carolina—in rather surprising contrast to the Southeast, Southwest, and center of the continent. Might it be that the prevailing spring winds tend to bring dispersing birds more to the Southeast coast, the Great Plains, the Midwest and southern-central part of the continent generally, and the Southwest (cf. Figure 4c in Romagosa and McEaney 1999)? Certainly, this species has a well-documented pattern of dispersal in Eurasia, but the areas it reaches first may end up showing some correlation with patterns of wind.

Many birders active today did not experience the invasion of Cattle Egrets in North America in mid-century. After the first specimen was collected (in April 1952, in Massachusetts), Changing Seasons columnists wrote with wonder about numbers such as 30,000 in a single roost in Florida—only ten years later. What even fewer birders will recall is that the columnists for that season, Aaron and Theodora Bagg (1962), produced a painstaking account that showed a startling, complex correlation between patterns of wind and singular appearances of Cattle Egrets at new locations: “while early April occurrences of this species in the Northeastern Maritime Region must be related to airflows associated with Atlantic coastal disturbances, subsequent spring occurrences of these egrets north of Chesapeake Bay are products of *overland* southerly airflows in which members of expected, native species similarly arrive in such areas.” One could make the case that general meteorological patterns of the spring of 2001 do appear to correlate, for instance, with the appearances of ibises out of typical range—that is, the birds by and large appeared in these areas during or following winds that blew from the direction of the species’ respective core ranges. Patten and Lasley (2000) refer to most records of Glossy Ibis in the West as being of “overshoots” in the April-May period. As with so many Changing Seasons items, the ibises’ movements and their relations to weather phenomena could fill a small volume. Clearly, to leave the level of surmise will require careful vetting, computerization, and analysis of such records over the long term.

Are the movements of the spring’s “slow-wave” birds in part theorizable using the principles we apply to the “onrushing wave” of migrating landbirds (Bagg et al. 1950)? For the past nearly three decades, active birders and ornithologists interested in migration have resolved several general principles about landbird migration by which to (attempt to) forecast birds’ appearances: 1) that most migrating birds, aside from those in special circumstances (offshore overshoots returning landward; and “mirror” migrants) and seabirds, tend to move toward their destinations when tailwinds are available, that is, on a following wind; 2) that under most circumstances, strong contrary winds, fog, and precipitation can ground migrating birds rapidly, in what Bagg et al. (1950) called an “arrested wave”; and 3) that crosswinds can shift the migrational path of substantial numbers of birds and that subsequent encounters with other weather features can displace birds even farther from typical range (Lack 1960, Richardson 1978, Gauthreaux 1999).

With each passing decade, birders get better at predicting and perceiving patterns in the spring migration. Where Bagg (1967) saw “paradox” and in what Eubanks (1988) called “a meteorological hodge-podge more paradoxical than patterned,” we cannot pretend to produce in the journalistic endeavors here a unified theory for spring bird movements. On the other hand, it should be apparent that the reports in this journal, and their summaries in this column, are far more than collections of curiosities, high counts, early arrivals, and baseless speculations, “too subjective” and based on “flimsy, localized impressions” (Andrews 1968). To judge from Internet postings, many veteran observers out there were able to anticipate the rhythms of this migration by glancing at the daily weather charts, and their findings *very often* accorded with their predictions. It might take years to hone an ability to predict such phenomena on a local level, and of course long-time observers are regularly surprised by nuances of various weather phenomena and the birds they reveal (or fail to reveal); indeed, some of the more savvy watchers of weather and birds on the coasts of the Gulf of Mexico suggest that confident prediction is for the unwary (cf. Muth 1993). Nevertheless, on both a local and a continental level, careful study of past weather patterns and their apparent connections to birds’ movements clearly provide at least the rudiments for such prognostications (Eubanks 1988).

Smith and McCrimmon (1979) wrote that the “data upon which the spring and fall migrations in the ‘Changing Seasons’ are based remain largely the result of *uncoordinated* efforts and random observations.” But they also wrote that “the correlational approach is often all we have from which to form opinion; the processes we measure are of such a scale that experimental manipulation to determine causative relationships more precisely isn’t possible.” We pursue the birds of spring, through bounties and busts, for the pleasure they give us, including the intellectual insight into their movements, and we should not shy from forming and testing our notions of spring bird movements’ relations to weather phenomena in these pages, despite the present limitations to our inquiries. If we err, as we often will, we cast our thoughts into the wind again next spring. Epistemologically, we continue to be both humbled and spurred on by our relative ignorance of avian navigation. But we live in an era in which biometeorology, an attempt to understand “the relationship between atmospheric phenomena and living organisms” (Eubanks 1988), will flourish beyond its remarkable beginnings in the twentieth century’s second half, and we should not underestimate our potential contributions to the field. Collectively, though, we should keep ourselves abreast of scientific research in the field. If you’re new to the subject, read up on it in *A Gathering of Angels Migrating Birds and their Ecology* (Able 1999) and *How Birds Migrate* (Kerlinger 1995). If radar ornithology captures your fascination, check out Clemson University’s website: <<http://virtual.clemson.edu/groups/birdrad/>> And if you’re game to see how birders and scientists might coordinate ground efforts with migrational data gathered both by radar and nocturnal listening stations, go to the BirdCast pilot project’s website at <<http://www.birdcast.org>>. Happy surfing.—Ed.

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