THE CHANGING SEASONS
The Big Picture

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In reading the regional reports from this past autumn, I was struck by how much we as a community of birders continue to learn about avian distribution and abundance, and struck too by the value and potential uses of these reports. I find it remarkable that after more than two centuries of North American bird study, the efforts of *North American Birds* contributors continue to illuminate little-known corners of the continent and its offshore waters. With each season's migration, we re-evaluate the suppositions put forth by the many previous authors of this column. What new questions will arise, and what questions seem to have been answered? Which species will continue to decline or expand, to irrupt or withdraw? And what might the underlying causes of these dynamics be? As our abilities to predict appearances of out-of-range species based on weather forecasts improve, is our understanding of the connection between birds' movements and weather systems also improving? Will November low-pressure systems tracking toward the Northeast again produce extralimital Cave Swallows—or were the flights of the past decade tied to factors that have less to do with weather patterns *per se* than with population dynamics? And will those same systems continue to disperse wayward western migrants and vagrants to the eastern United States and Canadian Maritimes (and even on toward Europe)?

Even as we confirm, annually, that certain meteorological events do have an influence on bird movements, still more questions than answers suggest themselves: Are Cave Swallows changing their usual migratory patterns, or have we simply become more aware of this species, when to expect it, and how to identify it? Has the flight of Cave Swallows been overlooked, or is the increase in East Coast records a recent by-product of their expanding breeding distribution in North America? What other species might we expect to find associated with these systems (such as Ash-throated Flycatcher), and what accounts for the differences in their numbers and distribution in the East? Have there been changes in recent years in meteorological conditions that might affect migratory movements of these species? The pages of this journal brim with questions of this nature; it is refreshing that we have the freedom here to ask questions for which there may be no easy answers or even scientifically testable hypotheses.

Whatever our relationship to the many ornithological puzzles that appear in this journal, there is little doubt that we are rapidly becoming more astute birders in this hemisphere and that we as a group are also increasingly sanguine about the importance of the documentation of our time in the field. As to "rarities," birders in the Americas have minds now more open than ever: possibilities formerly thought extremely remote are now known to be regular. In the regional reports, records of Siberian species stretch from Hawaii to Alaska, from California to the Midwest and the East—almost all of them found by birders who *anticipated* their appearances. Tropical pelagic species were moved to the Great Lakes after a hurricane—and birders knew where and how to look for them. California birders found *two* new shearwater species this season, one from the North Atlantic, one from the South Pacific Ocean—and were fully prepared to identify and document both. Outlandish hummingbirds out of range? Only the Arctic regions seem out of bounds for these birds, whose appearances are catalogued and admirably documented by an army of backyard feeder-enthusiasts, almost a birding subculture in itself. In these pages one can detect scores of patterns amid the over 100,000 words of seasonal summary. I confess that I once gleaned these pages for images of rare and unusual birds, and I still enjoy this aspect of the journal; but increasingly I perceive it to be a valuable resource for documenting the often dramatic plight of our avifauna—the dynamic movements of species, whether in migration or more subtle passages, the ever-changing canvas of breeding distribution, and even the difficult questions of birds' conservation in a landscape that seems ever more stressed.

On some level, it is difficult to conceive that birds' distribution and migratory patterns are substantially different than they were 200 years ago, or even 2000 years ago. But a careful reading of even just one's own regional reports—spanning back just a half century—is enough to broaden our imagination of how things must have been. Sixty years ago, much of Long Island was farmland and indeed much of the East Coast, especially in the South, was free from "development." One hundred years ago, California was largely wilderness; and Ivory-billed Woodpeckers were still to be seen in suitable habitat in several states. Two hundred years ago, contiguous forests stretched from the Atlantic Coast almost to the Mississippi River; the West was not yet "won," and native prairies burned annually. The paths of migratory birds and movements of mammal herds were not altered then by vast expanses of suburbia, telecommunications towers, skyscrapers, highways, or light pollution. Surely these anthropogenic influences have greatly altered bird movements and distribution and are in part responsible for the new patterns we read about here.

But as the natural history of North American birds has changed, so too, radically, have the natural historians. The growing numbers of birders in North America, the advances in bird identification that continue to be pioneered, and the truly new age of information-sharing clearly influence the permanent record of American bird distribution. One hundred years ago, who could have foreseen, for instance, the coordinated teams of Great Lakes birders, linked by cell phones and pagers, scouring their areas for hurricane-driven petrels and storm-petrels? A hundred years ago, hurricanes were horrible, unpredictable shocks to coastal communities; our satellites now witness their movements from birth, often thousands of miles from our shores, to extra-tropical extinction. Where naturalists of the nineteenth century perceived little in the way of ornithological patterns in such disturbances, twenty-first century birders execute sophisticated searches for seabirds in the interior, drawing on both history and technology. We live in the time of the Big Picture.

Figure 1. Up to four American Pipits of the Asian race *japonicus* were found in the Southern Pacific Coast Region in fall 2003. This bird photographed 12 October near Imperial Beach, San Diego County shows the distinctive features of the subspecies, including heavier back streaking, grayer back, bold blackish streaking in the malar area and underparts, and pinkish legs, all distinctions from North American taxa. ***Photographs by Larry Sansone.***

That the American landscape will continue to be altered is incontestable: human populations will grow, habitats will be lost, resources will be consumed, and species will become endangered and extinct. The planet's changing climate, whose Big Picture we are slowly coming to understand, will ensure that other, perhaps radical changes in habitats that are forecast will come to pass: Alpine meadows become forested, ice sheets melt, sea levels rise, the Everglades vanish. To step back from the specifics of the regional reports herein, and to imagine the future birdlife of the Americas as different from today as today's is from that of 1604: the Big Picture can seem bleak. After all, who could have imagined two centuries ago that the Passenger Pigeon would become extinct, when clouds of this species once moved like great storms across the skies? We have few quantified data on these birds, just the anecdotal astonishment of observers who found them innumerable. Take heart, then, in the contributions made within these pages. Thousands of birders across the reporting regions have *counted* the birds they observed, have *recorded* the details of plumage, habitat, voice, and movement. We are moving away from anecdote and toward serious citizen-derived, citizen-driven science, whatever our errors or occasional misidentifications along the way. The information contained in these reports does not lack value, whether or not it influences public policy, land-management decisions, or conservation biology (as it does, frequently). Most important to realize, when we take that extra time to send the regional editors our findings, is that we cannot know today *how* the contributions made here—the hard work of many observers that collectively produces a snapshot of North American birdlife each season—will prove useful or important in the future. The astonishing information in these pages is invariably subtler than the wayward Siberian Accentor in Montana or Yellow Wagtail in Alabama (though these are marvelous discoveries). It is instead the Big Picture that can be intimated in the many and interconnected patterns of bird movement across the continent, weather-related or otherwise. For the autumn of 2003, patterns that suggested themselves to me involved: migratory birds' movements in relation to the Polar Jet Stream; the "invasions" of pipits and fulmars along the Pacific Coast; the riddle of "reverse-migration" in the northeastern quadrant of North America and its possible connections to the vagrancy of western birds in the East; the influences of Hurricane *Isabel*; and the continuing increase in records of extralimital hummingbirds.

Weather Synopsis

As an enthusiast of both birds and weather, I read each regional editor's weather descriptions and bird-related hypotheses with great interest. Not only does this information brighten the regional reports with local flavor, it allows all of North America's birders to glimpse the conditions encountered in each region and imagine what it might have been like to bird there. The compilation of this information over time will lead to a better understanding of how bird migration, extralimital occurrences, and weather phenomena are linked.

By and large, the Northeast south through the Carolinas experienced an active weather pattern this fall, more so after September, hurricanes aside, that is. August and September were quite wet over most of the East (especially in the Middle Atlantic, Appalachia, and Southern Atlantic but also south to Florida and north to southern Québec), with heavy precipitation coming to eastern New England in October. A persistent weather pattern of strong cold fronts moving through from late September through the end of November surely contributed to the plethora of western species in the East this fall, especially on the Atlantic coast. Away from the outer coasts, fall migration was considered "average" or poorer: concentrations of migrants or unusual species were not extensively observed, as is often the case. Farm fields were filled with water during the peak of shorebird migration, producing some remarkable counts of low-density species and rarities across the coastal plains, but interior reservoirs were often too full to provide good shorebird habitat, as in Pennsylvania. In general, the season was a few degrees warmer than normal—so reported from northern Québec through Georgia—and this mildness was often connected in the regional reports to the survival of lingering migrants. The prairie states and provinces, the Midwest, and the Western Great Lakes region had generally mild, dry weather this fall, and most regional editors remarked on the lack of striking weather events and lack of concentrated migrants (though jaegers were in very high numbers on the Great Lakes). Iowa was especially dry, but neighboring Missouri had above-normal rainfall, and both were colder than usual. To the south, in Tennessee and Kentucky, warmer-than-average temperatures and a pronounced passerine migration were reported, both potentially associated with record-late dates for several species. The Gulf Coast, too, saw strong migration after a wet August; the rest of the season was meteorologically mediocre but filled with interesting bird reports, though Texas reported an "uneventful" season.

The interior West was also quite warm: Glasgow, Montana had 39 straight days with highs exceeding 85° F, with warmth continuing through the third week of October. Idaho, too, had its warmest August on record. Reservoirs in many places ran dry, offering shorebirds habitat but negatively affecting migrant waterfowl later in the year. Late October and November, however, changed the season dramatically, with repeated cold fronts and low temperatures the rule. To the south, New Mexico and Arizona continued very dry and unusually warm, but the drought was eased in Nevada and Utah, where late-season snowfalls that continued into winter promised better reservoir levels in spring.

"Warm and dry" were also the adjectives applied to most of the U. S. Pacific coast this fall, where wildfires were especially severe in the southern quarter of the British Columbian interior and in southern California. Away from the fires, skies were reported as "clear" and migrants and vagrants in low numbers. As in Idaho and Montana, the warm, dry early season ended abruptly in mid- to late October, when Pacific storms pounded first southern British Columbia, then Washington, Oregon, and northern California. The westerly gales in the Pacific Northwest were associated with a "wreck" of Northern Fulmars that eventually extended all the way into Mexico. To trace the genesis of these areas of warmth and cold, calm and storm, one has only to observe the movements of the Polar Jet Stream: where it moved north, dry high pressure with associated warm air settled in "below" it; along its path spun low-pressures systems, some of which displaced birds from typical migrational routes; and where it plunged southward, cold, dry air moved in "above" it, the first overtures of winter.

The Jet Stream

Most birders look to weather events on the local and regional level when planning their time in the field: storm squalls at inland reservoirs, coastal cold fronts, tropical cyclones, rainy days with drenched farm fields and sod farms—all are the stuff of fall birding at many points on the continent. Yet many of us, despite good resources on the Internet and even television, never think to look at weather from a wider meteorological vantage. The Jet Stream is generally understood as a steering mechanism for "synoptic-scale" (large-scale) weather systems (such as one sees represented on weather maps) in North America, but it rarely receives mention in this journal's regional reports, at least away from Alaska and the Pacific Northwest, where its effects in guiding in those pounding, moisture-laden Pacific storms are duly noted. Even more rarely does one read about the Jet Stream's effect on birds' movements, perhaps because it seems an indirect influence, perhaps because we associate birds' movements with more proximate meteorological phenomena. We may find, however, that studying the condition of the Jet Stream and understanding its complex influence on surface weather patterns will prove important in understanding the cross-continental and transoceanic movements of birds. What follows is a simple description of the mechanics of the Jet Stream, for those unfamiliar with it (see also Lehman 2003).

The Jet Stream (hereafter "Jet") is comprised of two relatively narrow circulations of air (the Polar and Subtropical Jets) that flow at high speeds, more or less from west to east, around the earth at middle and subtropical latitudes, respectively. These bands are mostly in the Upper Troposphere, at variable altitudes of roughly 5–15 km, with 10 km (about 32,000 feet) an average altitude. The Polar Jet is normally located at the boundary between cooler "polar"-modified air to the north (the Polar High) and the warmer, moister, "subtropical"-modified air to the south (the Subtropical High). While this elevation might seem too high to have an influence on migrating birds directly, the conditions and direction of air in these streams powerfully influence and help to steer synoptic-scale systems, including those low-pressure systems (called "mid-latitude cyclones" by meteorologists) that we watch for on familiar weather maps. Not only does the Jet influence the direction of storm systems: the temperature contrast across the Jet provides much of the systems' energy. This is one of the chief reasons that such systems stay near (or are "advected by") the Jet.

The air that comprises the Polar Jet typically travels at about 240 k.p.h. (150 m.p.h.; though this is variable); airspeeds at the surface and those in the lower atmosphere, where nocturnal birds migrate, are typically much lower, but the systems with which these birds must contend are mostly guided, in some way, by flow of the Jet. The weather systems associated with these arcs typically move eastward at 30–50 k.p.h. (or about 20–30 m.p.h.). Much like a stream of liquid, the Jet's path is influenced by other aspects of its surroundings and thus flows in variable, buckling patterns that resemble sinusoidal waves. These "loops" in the Jet's flow form ridges (shaped like large hills on weather maps) and troughs (shaped like valleys), both of which have major effects of the steering, strengthening, and weakening of storms. Troughs tend to intensify and accelerate mid-latitude cyclones: a strong, persistent trough might steer storm after storm into a certain region, as we often see in the Pacific Northwest, affecting its avifauna in the process. (The interactions between mid-latitude cyclones and the Polar Jet are complex enough that further summary risks oversimplification.) As this journal's features have demonstrated on many occasions, strong mid-latitude cyclones have often been implicated in the dispersal of avian migrants to regions far outside their areas of normal occurrence (synopsis in Lehman 2003).

Much of the focus in past "Changing Seasons" essays has been on the Polar Jet's effect on both short- and long-distance bird vagrancy in the Midwest and East, where astoundment has turned to anticipation in the case of Siberian species such as Sharp-tailed Sandpiper, Long-billed Murrelet, and Black-tailed Gull (all noted this season), as well as a few other nonpasserines, and where western North American species are awaited following even moderate low-pressure events. It should be pointed out that some exceptional birds such as these Long-billed Murrelets may indeed be flying at altitudes of five km or greater and thus flying *along with the Polar Jet itself* (how else does a Siberian Flycatcher reach Bermuda, as one did on 28 September 1980)? It seems reasonable to assume, more modestly, that the strength and position of the Polar Jet in the North Pacific could have considerable effect on the number and composition of migrant landbirds found on North Pacific islands and along the Pacific Coast. If conditions are favorable for many low-pressure systems to form, these systems will likely be responsible for influencing the movements of migratory birds; if the Jet arches northward or southward, so too do the surface weather systems, and the birds whose migratory pathways lie in their paths will have to contend with them. The Polar Jet's movement is roughly toward the east and thus more or less *with* the flow of the dominant Mid-latitude Westerlies, which are produced ultimately by the rotation of the Earth. This does not mean that low-pressure systems guided by the Jet simply have westerly winds, however; in the northern hemisphere, low-pressure systems have winds *both* easterly/northeasterly (on the north side of the system) *and* westerly/southwesterly (on the south side). The winds that pose a challenge for long-distance Siberian migrants and for westbound "Trans-Beringian" migrants—birds that nest in Alaska but migrate across the Bering Sea to winter in Asia—are the westerlies, which are unfavorable for their migrations toward the southwest. (Most truly Asian birds found on Alaskan islands have been associated with winds blowing from Asia, not surprisingly; but we should bear in mind that a bird caught in a cyclone might well experience what appear to be favorable winds initially—a tailwind in the appropriate direction for migratory needs—but then be moved contrary to this direction as the cyclonic winds bring the bird around to the system's other side.) As troughs develop in the Polar Jet, advecting low-pressure systems eastward in the eastern North Pacific across lower latitudes, migrant landbirds south of Alaska too will be affected, moved in directions contrary to typical routes. As a trough develops and intensifies, fall migrants from Alaska may follow the southward winds associated with the trough toward the Hawaiian Islands, especially if this trough's progression is slow. The growing list of Asian avian visitors to the Northwestern Hawaiian Islands would seem to support the idea that migratory Asian species are being affected by systems steered toward the south by the Jet or by the Jet itself (Pratt et al. 1987), but see also this season's S. A. box in the Hawaiian islands report for an account of three major North American vagrants there in November.

Looking at the pattern of the Polar Jet during autumn 2003, one can see how some Siberian migrants might have been directed into North America by its movements. (We cannot offer here an inter-annual comparison of the Polar Jet's movements and the so-called avian "Siberian Express" years in North America, but it would make for fascinating study.) The late-August Polar Jet—arcing north from mainland China just below the Kamchatka Peninsula and into the Aleutians—allowed several cyclones to move across the Bering Sea, potentially influencing the movements of both coastal Asian migrants and Trans-Beringian migrants (Figure 2). The counterclockwise rotation of these systems and the associated southwesterly to northeasterly winds (depending on one's position in relation to the center of the low) possibly helped steer unusually high numbers of Red-throated Pipits and American Pipits of the race *japonicus* to the Alaskan islands, certainly more than seen in an average season here. By 10 September, the Polar Jet had become more powerful, steering surface systems toward the northeast from China across the Pacific Ocean south of the Aleutians, resulting in many days of easterly and northeasterly winds on the Pribilofs and thus the appearance there of numerous vagrants of *North American* origin here. (After the two Fork-tailed Swifts there in August, birds of Siberian origin reappeared only in late September and early October, when winds again became westerly there.) By 17 September, this very strong Jet had dipped still farther southward, with the strongest winds now plowing into the North American coast at the latitudes of Oregon and northern California, and by month's end, the Jet shifted still more to the south. Beginning in early October, the coasts of California and Baja were awash with reports of Red-throated Pipits.

The Great Pipit Invasion

The big story along the Pacific Coast was the large-scale invasion of Red-throated Pipits, in some cases accompanied by reports of the eastern Russian race of American Pipit (*Anthus rubescens japonicus*; Figure 1), hereafter for convenience's sake referred to as Siberian Pipit, following Lee and Birch (2002), rather than as "Japanese Pipit," its older name. The breadth and scope of the 2003 invasion had not been seen since the remarkable invasion of these taxa during fall of 1991 (McCaskie 1992, Yee et al. 1992). Early signs of this movement were already in evidence by late August at two Alaskan outposts: at Gambell, on St. Lawrence Island, Paul Lehman and others reported record-high numbers of both Red-throated and Siberian Pipits; and farther south in the Bering Sea at St. Paul Island, Derek Lovitch and the St. Paul Fall Survey reported excellent numbers of both. By early September, it was clear that a sizable dispersal of these birds, along a broad front, was underway.

At Gambell, Lehman noted record totals of no fewer than 94 Red-throated Pipits (21 August to 21 September) and 26 Siberian Pipits (27 August to 28 September), with single-day record totals of 26 Red-throated Pipits on 22 August and 40 on 28 August, and the single-day record total of Siberian Pipits being 13, seen daily between 30 August and 3 September. (The pipit spectacle there also featured three Pechora Pipits in September.) Farther south on St. Paul Island, Lovitch reported Red-throated Pipit high counts of 40 on 28 August and 49 on 29 August, with considerable numbers daily through 12 September, and additional scattered individuals appearing through month's end. Siberian Pipits were also in evidence on St. Paul, where up to 3 per day were seen regularly from 1 through 27 September (maxima of 6–8). (At the same time, greater-than-expected numbers of Yellow Wagtails appeared on St. Paul.) With at least 88 Red-throated Pipits encountered on these two islands on 28 August, it appears that hundreds of Red-throated Pipits must have been moving through these islands during late August and early September. Red-throated Pipits were in evidence farther south as well: one was on Adak in the Aleutians on 22 August (Ted Floyd and Chris Wood), and three were in coastal Southeast Alaska: one in Ketchikan 7 September and 2 in Juneau 7–20 September. Via the Internet, Lehman recommended that observers along the Pacific Coast be on the lookout for unusual numbers of these species.

These predictions bore fruit, as a veritable deluge of Red-throated Pipits hit the Pacific Coast in early October, stretching from Southeast Alaska and British Columbia through Baja California Sur. A combined total of at least 103 Red-throated Pipits was reported in these regions from 23 September through 25 November. High counts for the period from single locations included: 17 on San Clemente Island, California; 8–10 north of El Socorro, Baja California; a remarkable 8–10 at Santa Teresita, Baja California Sur; and 5+ at Cantamar, Baja California. The invasion of 2003 was comparable only to that documented in 1991, when 79 individuals were reported in twelve California counties, prompting the California Bird Records Committee to remove it from the state's Review List (C.B.R.C., in ms.). This species was first documented in California 40 years ago, when 12 were found by Guy McCaskie in the Tijuana River Valley 12–27 October 1964 (Garrett and Dunn 1981); it has proven to be nearly annual in the state since, although numbers fluctuate considerably from year to year. In recent years, Red-throated Pipits have been relatively scarce: fall 2000 produced only three in California and one in Baja California; fall 2001 produced nine; and only three were in California and one in Baja in fall 2002. An average year for this species in California produces about four individuals, which underscores how extensive the invasion of 2003 was.

The strong showing of Siberian Pipits on the Alaskan islands also translated to the southern Pacific Coast, including the first three records for Baja California and no fewer than eight birds in California (four in each region). While our incomplete understanding of the distribution and variation in American Pipit subspecies certainly makes some extralimital records difficult to interpret (Lee and Birch 2002), Siberian Pipit is clearly being detected regularly in North America, particularly in the Bering Sea region, where it has been carefully video-documented on many occasions. Previous records of this subspecies in California have shown correlation with the appearance of numbers Red-throated Pipits (McCaskie 1990, McCaskie 1992, Yee et al. 1992), especially the 1991 invasion; thus it is no surprise that Siberian Pipit has once again shown up in numbers in what turned out to be a stellar year for Red-throated Pipits. While some records are certainly a result of the increase in birders' awareness of this subspecies, it seems highly likely that the weather factors that influence the movements of some Red-throated Pipits also influence the movements of some Siberian Pipits.

With two veritable "invasion years" of these species now on record, birders are naturally inclined to theorize about such movements. So many factors come into play here, and so many questions insist themselves, that we focus first on the most obvious: What was or were the route(s) taken to Alaska and California (and elsewhere)? How much of the flight was coastal, how much over open water? Why are these pipits overwhelmingly coastal in their distribution in the autumn? And finally, why is there a lack of winter records from the south at latitudes comparable to those of their normal winter grounds—and why so few spring migrant records anywhere outside Alaska in the United States?

Distributional clues •

The distributions of these two pipit taxa are divergent, enough so that finding a single, clear reason for their convergence in California is difficult. In North America, Red-throated Pipit is known to breed only in small numbers on the western tip of the Seward Peninsula, Alaska, with other breeding records spanning from Cape Lisburne to St. Lawrence Island (Kessel and Gibson 1978). While relatively few breeding records exist for this rugged and somewhat inaccessible region, it is possible that this species could be breeding in larger numbers than currently known. The great extent and remoteness of their preferred breeding habitat (dry hillside tundra) in western Alaska contribute to the uncertainty about North American populations, and it does not seem outside the realm of possibility that hundreds breed in this area. The fall migration of Alaska's Red-throated Pipits is thought to proceed across the Bering Sea into Siberia and then south down the Asian coast to wintering grounds in coastal Southeast Asia (Alström and Mild 2003). This would suggest that, in typical years, relatively few would reach North America south of the Bering Sea region.

Siberian Pipit, however, is not known to breed in Alaska, and its nearest breeding grounds may lie no closer than the central Kamchatka Peninsula, according to at least some authorities; Alström and Mild (2003), however, assign all eastern Russian breeders to *japonicus*, including those on the Chukotskiy (Chukotsk) Peninsula in easternmost Siberia, just north of St. Lawrence Island. (The breeding America Pipits here, it should be mentioned, have also been called subspecies *hărmsi* [Portenko 1989]; the affinities of Chukotskiy Peninsula breeders are thus somewhat unclear but probably lie with *japonicus*.) Like Red-throated, Siberian Pipit migrates south to winter in Japan and China.

While some might argue that Red-throated Pipits in southern North America must come from the small Alaskan population, in numbers that vary with breeding success and other factors, it seems more likely to me that the synchronous irruptions of Siberian and Red-throated Pipits, particularly in 1991 and 2003, indicate a common mechanism of displacement between taxa that share migratory pathways, at least on part of their fall migrations. (This basic assumption could be wrong, of course.) Whatever the ultimate sources of North American migrants and vagrants, Red-throated Pipits have consistently outnumbered Siberian Pipits during influxes in North America, even at Gambell, where both pipits occur regularly and where neither can be considered a "vagrant" in any real respect. It is quite possible, of course, that a mix of Red-throated Pipits from both the Old World and the New World (which are only a few miles apart here, after all) combine with smaller numbers of Siberian Pipits at some point on the migratory route and are thence displaced much greater distances. Although there is no way at present to distinguish Alaskan-nesting from northeastern-Asian-nesting Red-throated Pipits (also the case with Yellow Wagtails), it seems doubtful that Asian-nesting Red-throateds are outnumbered by Alaskan birds in these flights. We will leave that question open.

Vectors of vagrancy •

The question of the geographic origin of the Red-throated Pipits and Siberian Pipits involved in these invasions is a matter of substantial debate, particularly in California. The question is in fact germane to all Siberian vagrants that have turned up in California and Baja California, as there are relatively few records of Siberian species north of California and south of Alaska. Two theories have been put forth to explain the migratory routes taken by these pipits on their way to coastal California and Mexico, and the long-distance vagrancy of these taxa may be explained by one, both, or of course neither.

The first, which we will term here the "coastal migration theory," suggests that these birds cross into North America from Siberia and then move southward along the coast, largely escaping detection until they reach northern California. The second theory—let's call it the "trans-Pacific theory"—suggests that these birds undertake long-distance water crossings from Siberian and Alaskan breeding grounds southwestward across the Bering Sea. When displaced, such birds settle on landmasses to the northwest of the Pacific Coast, and then continue southeastward, flying directly over the Pacific Ocean until they make landfall, primarily in California. While both theories seem plausible, each has its confounding factors. One potential Achilles' heel of the coastal migration theory is that relatively few U. S. (or Canadian) records exist for Red-throated north of California: a few for the Yukon, 18 from British Columbia, and through 2003 one each from Washington and Oregon. One reason I suspect the agency of the Polar Jet in the 2003 invasion of pipits is this surprising geographic gap in the records of these pipits but also of other Siberian passerine vagrants: they appear annually in Alaska and to a lesser degree in offshore and coastal California, Baja California, and even Hawaii (albeit in smaller numbers than in western Alaska)—but are rarely recorded from the Pacific Northwest and southeastern Alaska. Records of long-distance migrants such as Red-flanked Bluetail, Arctic Warbler, Black-backed Wagtail, Dusky Warbler, Rustic Bunting, Olive-backed Pipit, Lanceolated Warbler, Little Bunting, and Gray Wagtail would seem to support this scenario; importantly, North American records of Eurasian species that regularly winter at higher latitudes—such as Siberian Accentor and Brambling—do not conform to the pattern.

Perhaps the gap in records can be explained by the seemingly tenacious coastal distribution of these pipits, as access to these areas and the offshore islands is limited from Southeast Alaska to British Columbia. If these taxa tend to stay as far west on the outer coasts as possible, then they would occur primarily on islands, even the western coasts of such islands—areas that receive little birding coverage. Certainly, though, coastal Washington and Oregon are fairly heavily birded in autumn, if not nearly so well canvassed as the San Francisco Bay area or Southern California. The paucity of pipits south of British Columbia and north of California—single records of Red-throated Pipit from Oregon (inland at Wickiup Reservoir, 6–11 October 2003), and Washington (San Juan Island, 14–16 September 1979)—does not suggest that these birds are being routinely overlooked. When one considers in particular the number of pipits involved in the 1991 and 2003 invasions, it would seem that even relatively less-birded areas should have produced more records of Red-throated Pipit at least. Nevertheless, there is danger in interpreting a dearth of data as an absence of birds. There *are* certainly many fewer birders working the vast coastlines north of California than are active in California; and it's also possible that pipits are almost never detected in Oregon and Washington because of the vast expanse of pipit habitat or because the birds are moving through these latitudes more rapidly than in southern California, which match wintering latitudes in Asia. I would be delighted to read in a future column that Pacific Northwestern birders found vagrant pipits aplenty on their coasts; the thinking below does not preclude this possibility.

It would appear that pipits undertaking a migration route between northeastern Russia and Japan (described as a "maritime" route by Lee and Birch [2002] for Siberian Pipit) might be easily influenced by synoptic-scale weather systems and thus be more prone to disastrous (the majority of birds perishing) or successful (the majority surviving) migration events, which would then result in the variable patterns of influx observed in California. The ability of passerines to make long-distance water crossings when entrained by such east-bound systems is well known in the northeastern Atlantic: the arrivals of Nearctic and Neotropical landbirds in Iceland, Great Britain, western France, even Norway and the Azores following strong low-pressure systems from the North American landmass are eagerly awaited each autumn. It seems likely to me that migrant Red-throated Pipits are sometimes caught up in low-pressure systems, steered ultimately to the south/east of their normal migration pattern by the westerly winds associated with the southern edges of the systems. In years when these systems do not predominate, Red-throated Pipits may end up reaching Siberia in typical fashion, thus resulting in very few or no records farther south than Gambell. On the other hand, if just a few powerful systems push through the Bering Sea region at the appropriate time, intercepting large numbers of Red-throated Pipits, the end result might be dramatic. Instead of ending up in eastern Siberia, Red-throated Pipits would find themselves over the Bering Sea, and would thus be forced to fall out on islands in the region—St. Lawrence Island, the Pribilofs, and the Aleutians, as in late August 2003 (Figure 2). As the birds attempt to reorient and continue southwestward, the westerlies of east-bound cyclones might catch them up once again, forcing them to fly on until reaching the next bit of land, which appears to be—at least for the few fallouts on record—coastal California.

Why then the slight discrepancy between the timing of Alaska and California records? Red-throated Pipits move through Gambell and the Pribilofs beginning in late August and continue through mid-September (Lehman, in press; D. Lovitch, pers. comm.), whereas the majority of California records fall between mid-September and early November. A simple explanation for the disparity is that these birds linger on the Alaskan islands, perhaps to refuel and wait for favorable local conditions before

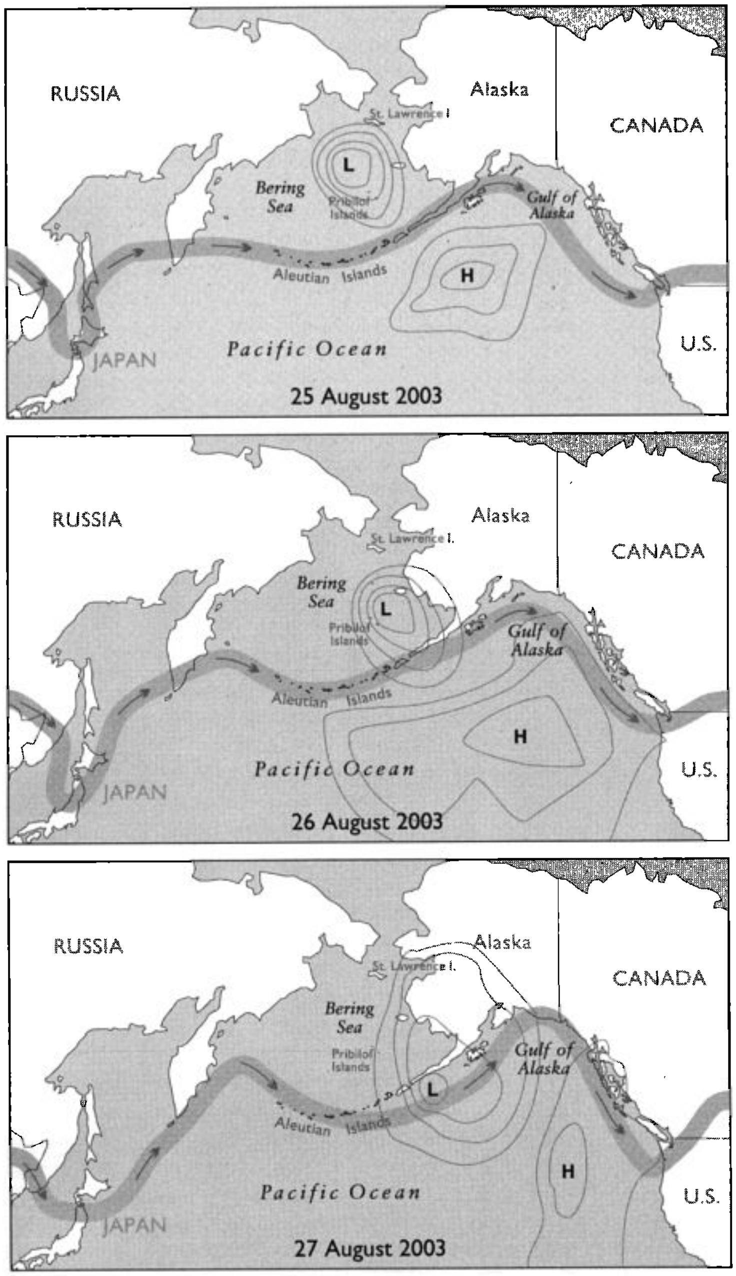

Figure 2. These three maps showing both the Polar Jet Stream and the surface weather phenomena for late August 2003 give some idea as to why record-high numbers of Red-throated Pipits and "Siberian Pipits" turned up on St. Lawrence Island and St. Paul Island in the Bering Sea at that time. The Jet Stream's winds, stretching from the Kamchatka Peninsula toward southern Alaska along the Aleutian Islands, brought a Bering Sea low-pressure system (cyclone) to the southeast, so that birds attempting to move southwestward toward the Eurasian landmass might mostly be shunted southeastward, with the system, and toward Alaska. With high pressure (anticyclone) to the south of the Jet's flow, surface winds between the high- and low-pressure systems would follow the direction of the Jet's winds. Thus, as the Jet shifted notably southward in September, pipits attempting to reorient toward Asia could, in theory, be moved over water through the Gulf of Alaska, southeastward offshore of Canada and the Pacific Northwest, making landfall chiefly in California, where the Jet at that time turned back toward the North American landmass. ***Maps by Virginia Maynard.***

attempting to reorient themselves toward Asia—a behavior that has been documented in some of the Asian vagrants encountered on Southeast Farallon Island off northern California (P. Pyle, pers. comm.). Indeed, both Lehman and Lovitch noted large numbers present for several days to weeks at Gambell and on St. Paul respectively, and both found it difficult to tell if new birds were arriving or if they were simply accumulating here. If these species indeed wait for favorable weather to continue southwestward, it could be weeks (in some years) before these birds would depart. Perhaps, in some years, they successfully return to the Asian mainland, and perhaps, in others, unforeseen weather events ultimately guide them to the North American mainland. A bit of September birding on the Aleutians might shed light on this question.

The Jet's influence on weather systems and the related displacements of birds is a topic that abounds in questions but yields few obvious answers, despite ample meteorological data available on the WorldWideWeb (see <ftp://virga.sfsu.edu/pub/jetstream/jetstream_norhem/>). For instance, why were mostly pipits displaced during fall 2003, with little mention of other Siberian passerines making headlines away from the Bering Sea? Perhaps the position of the Jet was unfavorable to Trans-Beringian migrants during fall 2003, displacing mostly Alaskan Red-throated Pipits (and a few Siberian Pipits from northeasternmost Russia) toward the southeast but leaving Asian-nesting landbirds much less affected. Or are pipits able to endure displacement events over the ocean better than some other species-groups—and the less-hardy species perish before making landfall on North American soil? Or perhaps it's a matter of the density and composition of species moving southward along the Siberian and northeastern Asian coastlines during autumn: are these pipits two of the most common landbirds migrating through coastal northeastern Siberia (or offshore there) during fall?

The coastal bias •

Once in the lower latitudes of sunny southern California and the Baja California Peninsula, these pipits would probably be influenced much less by the Polar Jet, which tends to be more active to the north. Where are these birds being found within the Lower 48, once arrived from the north? Historically, and in 2003, almost entirely in coastal areas. This fall, most atypically, five Red-throated Pipits also appeared at inland locations: Oregon's first (this season); one of the Middle Pacific Coast's 32 was discovered at Ukiah Wastewater Treatment Plant, Mendocino County; two were in Palmdale, Los Angeles County; and one was at Galileo Hill Park, Kern County in the southwestern Mojave Desert. Canada has but one inland record of Red-throated—from the Whitehorse Sewage Ponds, Yukon Territory 18 September 2000 (Eckert and Grünberg 2001)—and, prior to 2003, there were only eight inland records for California, six of which came during the 1991 invasion (McCaskie 1992). The inland record of a Red-throated from northeastern Arizona at Kayenta 12–17 October 1989 (Rosenberg and Stejskal 1990) stands as the farthest inland record of this species in North America.

Why the discrepancy in records between coastal and interior sites: is it the distribution of the birds—or of the birders—that produces this difference? If pipits experience unfavorable weather conditions during migration and attempt to compensate for these conditions later, it makes sense that most would be encountered along the Pacific Coast, where they would be concentrated first by initial arrival and subsequently by attempts to reorient themselves toward the west or southwest. It may also explain their numerous appearances on the California Channel Islands and Southeast Farallon Island. If they are arriving on the northern California coast and attempting to jump off at each migratory opportunity to head southwestward, then the majority should either return to the coast again farther south, or end up over the Channel Islands (or the sea). Interestingly, Red-throated Pipits that I observed last fall on San Clemente Island did not appear in association with other large movements of western (and eastern) landbirds. Rather, they appeared under a variety of atmospheric conditions, without any correlation to any particular condition, certainly *not* to the local conditions that produce fallouts of a great variety of migrants here. These appearances suggested to me that migrational urges, rather than any specific small-scale weather events, governed the birds' movements locally. Thus it would seem that if these species show up on the Pacific Coast largely as a result of weather-related entrainment (rather than impaired navigation, by "mirror-image" migration, for instance), their range of occurrence would remain relatively confined to the coast and offshore islands, as they continually attempt to reorient themselves toward the southwest. To test this notion, we should seek them out in appropriate habitat and times in the California (and western) interiors. Our bias toward birding the coast clouds questions about bird distribution with relation to noncoastal areas—nevertheless, the power of ocean coasts to "trap" migrating birds reluctant to cross *the* big ecotone is probably even greater than we grasp. Radar studies of bird migration, especially in remote areas, will hopefully unlock secrets that our eyes, even with scopes and binoculars, cannot.

The silent spring •

Given the large numbers of Red-throated Pipits detected in North America during invasion years, at least a few should be found as spring migrants in North America, or so one would think. There are but two spring records of alternate-plumaged Red-throated Pipits for mainland Mexico: one on 11 April 1988 in Michoacan, and one in March 1992 in Colima (Howell and Webb 1992, 1995). The only winter record is of one collected at San Jose del Cabo, Baja California Sur on 26 January 1883 (Ridgway 1883). There are now only four other spring records for Red-throated Pipit outside of Alaska. What is happening to birds that successfully over-winter at latitudes comparable to those of their normal winter areas? Perhaps it's a matter of the lack of interest in birding their preferred habitat at the appropriate time of year (probably May in California), or the scant precedence to stir interest. As this issue is going to press, three Red-throated Pipits have been seen in Oregon and Washington in May 2004! In interior Europe, Red-throateds are more numerous during spring than fall (Alström and Mild 2003). An azimuth orientation set from eastern China to western Alaska, if translated to North America, would bring birds theoretically wintering in Middle America across the central United States and into the Canadian Arctic! There are probably North American contexts for vagrant birds of other continents reorienting in spring as they would on their home continent: Little Egret (Mlodinow et al. 2004), Garganey (Spear et al. 1988), and White-winged Tern (Campbell 2000) come to mind.

Our usual caveat must be stated again in closing: all of the above is speculation. And very probably, all of the ideas, or some combination thereof, about these birds' movements may be valid under certain conditions. Nevertheless, as the seasons progress and birders continue to report these species, more intriguing information will surely come to light. All birders should be aware of these pipits' movements—not just in Pacific coastal areas, but continentally: very possibly, these birds are going undetected inland. It also seems likely that eventually one will turn up on the East Coast; after all, there are many records for Britain, and if Asian birds such as Black-backed Wagtail and *ocularis* White Wagtail can turn up in the East, it would seem that the numerous Red-throated Pipit is even more likely. Maybe poring over flocks of American Pipits in fall is not your idea of fun, but such patient activity may yet reveal this species in the East. The best way to prepare is to learn its diagnostic flight-call, a high, thin, slightly buzzy "*speee!*" As birders become better versed in the identification of these two taxa, we will undoubtedly learn more about their occurrence in North America.

Reverse-migration & western vagrants in the East

The topic of avian vagrancy to the Canadian Maritimes, and to the Northeast generally, has occupied a place of prominence in *North American Birds* and its forerunners for some years, with commentators in years past referring to the so-called "Scotia Shadow," a vagrancy shadow of North American Neotropical migrants that extends from New England into the Maritime Provinces (cf. Brinkley and Lehman 2003). Emphasis in the past has been on relationships of strong low-pressure systems to these movements, but too little consideration has been given to another question: Why are these birds lingering in these northerly latitudes to such late dates in the first place? Such reverse-migration has been identified as a potential reason why certain Eurasian strays end up in Alaska, or why Fork-tailed Flycatchers and Tropical Kingbirds end up in the Northeast and Northwest, respectively, but its effect on birds within their home continent is less often explored.

It seems likely that the phenomenon of reverse-migration is far more common than we might suspect. If what we know of reverse-migration is based largely on the appearance of vagrant birds, then what of this phenomenon on a smaller scale, or in low-profile (that is, more common) species? Does it also take place in short or medium-distance migrants, but we simply fail to recognize it as such? My guess is that it occurs in many migratory species but that we connect the behavior chiefly with those species making large-scale migratory movements. In the case of the Canadian Maritimes and most of the Northeast, the appearance of very late Neotropical migrants is surely an example of this behavior. It seems possible that large numbers of such migrants commence their migration already misoriented, making their way mostly north during the fall instead of south. Over time (say, several weeks in September), this would result in wayward individuals attempting to find resources in the relatively cold northern areas during late September and early October. Perhaps these individuals continue to move slowly northward at this time, despite the increasingly northerly winds of late autumn, or perhaps they find a location that has ample resources and remain there. Perhaps these birds "stage" on a broad front across the Northeast and Canada, foraging on what resources remain, resulting in fewer records of vagrants in the less-birded interior, and when conditions become favorable for migration—in the mind of a reverse-migrant, this would be the southerly or southwesterly winds that make for energy-efficient flight to the north-northeast—they take flight and arrive en masse across the mid-Atlantic and the Northeast, concentrating at the last bits of land to the northeast, the Canadian Maritimes and New England, but also detected to the south along most of the East Coast. The champions make it to Iceland and western Europe.

The lists of migrants (perhaps more technically "vagrants") associated with these fallouts in the Maritimes are sometimes astounding—reading more like the results of a September day on the Gulf Coast than a normal October day in the Maritimes (see McLaren et al. 2000). Just as with the Asian pipits, two questions pose themselves: Where did these birds come from? How far did they travel? In the case of the 1998 fallout in Nova Scotia, McLaren et al. (2000) make a good case for over-water entrainment by a fast-moving *offshore* low-pressure cell. But in most cases involving fallout of "late" migrants in the Northeast, such birds are found at coastal or insular locations following the passage of a low-pressure system onshore, from the west. How far might these birds have traveled to reach these locations? Again, the cited Maritime Canadian example (McLaren et al. 2000) involved an apparently long flight over water from the south, but in most instances, Neotropical passerines would probably travel at most 600–650 km non-stop under these conditions (based on my observations in the Gulf of Mexico). My hunch is that migrants arriving in the Northeast during these events must have been present not far away *in the interior* prior to these storm systems, perhaps originating from areas only a few hundred kilometers to the west or southwest.

My supposition is that large numbers of vagrants are likely present throughout the interior continental United States and Canada, and it is chiefly when weather events concentrate them (dominant southwesterly, then northwesterly winds)—or concentrations of birders find them—that they are detected. I suggest that misoriented migrants move *northward* on a broad front across North America and that they might be (and to an extent are) found anywhere over the course of an autumn. The heavy concentrating effects of the coast, coupled with offshore winds on either coast, can produce remarkable concentrations of migrant and vagrant birds, but interior sites—especially along "coastal" edges at lakes, reservoirs, and major rivers—are turning out to be increasingly productive places to witness this autumn phenomenon on a usually smaller scale.

The conspicuous Cave Swallow provides a striking example of a species for which this scale is *not* smaller for interior sites: of some 77 reported this autumn (north of Florida, east of the Mississippi), about 28 came from sites away from the Atlantic, mostly along the Great Lakes (Table 1). The pattern this fall was similar to that of the autumn 2002 flight in the Northeast—but the southern component, assumed in 2002 to be "reorienting" individuals moving back southward on north winds (Brinkley and Lehman 2003), was completely missing this year. First records for New Brunswick, New Hampshire, and Massachusetts were noted to the north of 2002's sites. In all cases, Cave Swallows were located during southwesterlies that preceded the passage of cold fronts (a few) or during/after northwesterly winds of the passing cold front (most); a few of these birds seem to linger around lakes or coastal areas in most places, for up to a week. These Cave Swallow events show clear patterns: 1, 7/8, and 24/25 November were the main displacement events, all days of cold-frontal passage. One could surmise that Cave Swallows first move northeastward on southwesterly winds and are subsequently concentrated and made more findable by the subsequent northwesterlies. On the one hand, the consistently late dates of their appearances (sometimes with a few other late swallows, including vagrant Brown-chested Martin and Mangrove Swallow) suggests that these birds are "classic" misoriented migrants, but on the other hand their apparent reorientation southward (at least in 2002) would seem to support the argument that these birds were displaced rather than misoriented. One wonders whether a capacity to reorient southward during increasingly cold weather is incompatible with migratory misorientation as we currently describe it.

Widening the view from Cave Swallows to encompass a sample of other western species located in the East this spring (Table 2), the neat correlation of birds' first appearances with cold fronts' passages falters somewhat—but not as much as one might anticipate. In fact, an analysis of the dates in Table 2 shows that a clear majority of "first dates" corresponds to frontal activity in their respective regions, which of course vary more than do those of the more-concentrated Cave Swallows'. (Though many such birds are found on weekends, this may be less true now than in the past.) What's striking in the roster of rarities in Table 2 is that *so many* of the rarest were noted in association with the big three November fronts that moved Cave Swallows—Maryland's second Mountain Bluebird, Massachusetts' second Hammond's Flycatcher, South Carolina's two

Table 1. Cave Swallows in the Great Lakes and Northeast in fall 2003, ordered by date.

NUMBER	LOCATION	FIRST DATE
1‡	Cape May, NJ	29 Oct
1	Niagara Falls, ON	1 Nov
1	Pt. Lepreau, NB	3 Nov*
3	Tobermory, ON	4 Nov
1	Cranberry Marsh, ON	6 Nov
3	Point Pelee N.P., ON	7 Nov
2	Long Pt., ON	7 Nov
23	Connecticut coast (various)	8 Nov
1	Charlestown, RI	8 Nov
2	Erieau, ON	8 Nov
2	near Point Pelee N.P.	8 Nov
1	Sturgeon Creek, ON	8 Nov
1	Pt. Petre, Prince Edward, ON	8 Nov
1	near Hillman Marsh, ON	9 Nov
1	Point Pelee N.P., ON	9 Nov
1	Jones Beach, NY	9 Nov
1	Culver's Lake, NJ	10 Nov
1	Cedar Springs, ON	10 Nov
1	Lighthouse Pt., CT	15 Nov
2	Orleans, MA	15 Nov*
5	Hamlin Beach, NY	24 Nov
4	Rye, NH	26 Nov*
1	Lighthouse Pt., CT	25 Nov
2	Bridgeport, CT	26 Nov
1	Cranberry Marsh, ON	26 Nov
1	Chatham, MA	27 Nov

* = first state or provincial record
‡ = At least 13 more were reported from Cape May during November 2003, mostly after cold fronts, with several lingering for days or even weeks afterward; this has been a typical pattern there since about 1997, where November records extend back to 1991.

Calliope Hummingbirds (at the same feeder), Delaware's first Say's Phoebe, both the Tropical/Couch's Kingbird in New Hampshire (its first) and the Couch's Kingbird x Scissor-tailed Flycatcher hybrid in New York (a first anywhere), a Cassin's Kingbird in Florida, a good number of Ash-throated Flycatchers, Virginia's three Harris's Sparrows, a Western Meadowlark on Martha's Vineyard, New Hampshire's third Bell's Vireo, Québec's Townsend's Solitaire, a few Varied Thrushes, Tennessee's first Sage Thrasher, a flock of Smith's Longspurs in Indiana .... the list goes on. And it's probable that a few birds were not discovered in the first day or two of their arrival in the locations where found, so one would not expect even the high degree of correlation that Table 2 appears to document (there are, after all, still many more weekend-only birders than not).

What one misses with the limited focus on western vagrants, however, is the massive context, the Big Picture: the enormous flights of commoner species that accompany these birds on the fronts and provide context for their appearance. Read the "S.A. Box" in the Hudson–Delaware report on the million-plus birds, among them hundreds of thousands of American Robins, that passed through that region 8 November. No other eastern regions reported birds in such numbers that day, but Newfoundland had its second firm record of Vesper Sparrow at Cape Spear 7 November, a species that was numerous at Cape May, New Jersey the next day and detected as far south as Virginia's coast that weekend. Vesper Sparrow, though not a far-western species by any means, provides a good index for how broad the flight on this front probably was, as do numerous other species (see the regional reports). In narrowing the focus to westerners, too, we miss genuinely rare reverse-migrants from the Scotia Shadow such as the Least Flycatcher on 18 November at Marblehead, Massachusetts—not to mention very late birds such as Maryland's 9 November Yellow-throated Vireo, a host of November cuckoos, Rose-breasted Grosbeaks, Rufous Hummingbirds, Indigo and Painted Buntings, southern warblers, Blue Grosbeaks, Yellow-headed and Brewer's Blackbirds, Scissor-tailed and Fork-tailed Flycatchers, possible late Great Crested Flycatchers in several states, and less-common sparrows such as Le Conte's, Clay-colored, and Lark. (And I have not even mentioned White-winged Doves.) Excluding areas immediately west of the Mississippi River caused the omission of one of the most surprising vagrants in the "East," a Costa's Hummingbird in Minnesota that almost escaped identification (see the S.A. Box). Truncating the season at November's end, too, eliminates the incredible Gray Flycatchers in Ontario and North Carolina found in December and the apparent coastal incursion of Common Ground-Doves to North Carolina on 30 November and Virginia on 1 December.

Despite its shortcomings, Table 2 prompts a few more interesting observations and speculations. First, the "commoner" or more widespread rarities from the West—Ash-throated Flycatcher (minimally 19 birds), Say's Phoebe (7), Gambel's White-crowned Sparrow (7), Vermilion Flycatcher (6), Black-headed Grosbeak (5)—tend to show up on a wider range of dates and seem less tied to severe cold fronts' passage than do some other categories of species. Second, the farther south and west one goes in the "East," the less correlation to cold fronts there appears to be for *most* species or groups of species. And third, some species—notably most western *Dendroica* warblers and those few Lark Buntings—turn up decidedly earlier than the main push of late flycatchers, Cave Swallows, and sparrows. Some of these points seem intuitive: these warblers and Lark Buntings are usually early migrants, so why shouldn't they turn up earlier than most sparrows, which move later in the fall? But if one wanted to argue that all the birds in Table 2 are specifically *misoriented* migrants, then such birds do not seem to fit with the October/November window for other wayward westerners.

In fact, there must be multiple reasons for the birds included in Table 2 to have strayed. The Lewis's Woodpecker in Wisconsin, for instance, is likely the outlier in a major flight of that species and of Acorn Woodpecker, probably linked to drought and to the widespread failure of the acorn crop out West; the Band-tailed Pigeons may have a similar connection. The Black-throated Gray Warblers that pass through the East in September, for example, may be *displaced* migrants, or possibly "mirror-image" migrants, whereas those that arrive in late November or December could be considered more severely *misoriented*. In trying to perceive a Big Picture here, it is important to consider that the passage of cold fronts in the fall surely reveal multiple phenomena: both those birds that have experienced modest-to-significant longitudinal displacement (such as the September Lark Buntings and more commonly Lark Sparrows and Dickcissels) *and* late birds that are found far, far north of normal, such as the October/November/December flycatchers, vireos, southern warblers, and tanagers. The widespread November 2003 records of "Summer" Tanagers in Michigan, Wisconsin, Indiana, and Nova Scotia depict the latter phenomenon across an especially wide swath. In more numerous species, and in those whose breeding range is close to the East (or whose winter range includes the East, especially Florida), we probably see a mix of both displaced and misoriented individuals: an Ash-throated Flycatcher on 5 September in Florida may be less likely to be severely misoriented than one on the French island of St. Pierre on 22 November. The Hudson–Delaware report and other reports sometimes (tentatively) distinguish migrants found during southwesterly winds (at Cape May, for example, 7 November 2003) from those noted after cold fronts; with years of observations at sites like Cape May, we may be able to distinguish such birds with more confidence in the future: birds moving northeastward, ahead of cold fronts, from

Table 2. Western passerines and near-passerines found east of the Mississippi River, fall 2003, ordered by date within taxa.

SPECIES	NO.	LOCATION	FIRST DATE
Band-tailed Pigeon	1	Westree, ON	26 Sep
Band-tailed Pigeon	1	London, ON	17 Nov
Black-chinned Hummingbird	1	Simpsonville, SC	18 Oct
Black-chinned Hummingbird	1	Savannah, GA	30 Oct
Black-chinned Hummingbird	1	Savannah, GA	14 Nov
Black-chinned Hummingbird	1	Ripley Gardens, DC	17 Nov*
Calliope Hummingbird	1	Blount County, TN	28 Oct
Calliope Hummingbird	2	Greer, SC	9 Nov
Allen's Hummingbird ¶	1	Cape May, NJ	14 Nov
Lewis's Woodpecker	1	Ozaukee County, WI	21 Oct
Western Wood-Pewee	1	Assateague I., MD	4 Oct
Western Wood-Pewee	1	Virginia Beach, VA	12 Oct*
Hammond's Flycatcher	1	Tuckernuck I., MA	1 Nov
Say's Phoebe	1	Whitefish Pt., MI	31 Aug
Say's Phoebe	1	West Tisbury, MA	10 Sep
Say's Phoebe	1	Whitefish Pt., MI	23 Sep
Say's Phoebe	1	Miller Beach, IN	29 Sep
Say's Phoebe	1	Fort Pickens, FL	13 Oct
Say's Phoebe	1	Bon Portage I., NS	15 Oct
Say's Phoebe	1	Carlyle L., IL	31 Oct
Say's Phoebe	1	Bombay Hook, DE	1 Nov*
Vermilion Flycatcher	1	Mobile County, AL	10 Oct
Vermilion Flycatcher	1	Jackson County, MS	16 Oct
Vermilion Flycatcher	1	Bald Pt., FL	19 Oct
Vermilion Flycatcher	1	L. Apopka, FL	22 Oct
Vermilion Flycatcher	1	Frog Pond W.M.A., FL	25 Oct
Vermilion Flycatcher	1	Fort Walton Beach, FL	22 Nov
Ash-throated Flycatcher	1	Santa Rosa County, FL	5 Sep
Ash-throated Flycatcher	1	Pointe Verte, NB	11 Oct
Ash-throated Flycatcher	1	Fort Morgan, AL	15 Oct
Ash-throated Flycatcher	1	Bald Pt., FL	19 Oct
Ash-throated Flycatcher	1	Fort Walton Beach, FL	23 Oct
Ash-throated Flycatcher	1	Fort Pickens, FL	29 Oct
Ash-throated Flycatcher	1	L. Apopka, FL	5 Nov
Ash-throated Flycatcher	2	Paynes Prairie, FL	5 Nov (+)
Ash-throated Flycatcher	1	Stoneham, MA	7 Nov
Ash-throated Flycatcher	1	Pea Island N.W.R., NC	8 Nov
Ash-throated Flycatcher	1	San Felasco Hammock, FL	10 Nov
Ash-throated Flycatcher	1	Orleans Parish, LA	10 Nov
Ash-throated Flycatcher	1	Melrose, MA	11 Nov
Ash-throated Flycatcher	1	Cape May, NJ	10 Nov
Ash-throated Flycatcher	1	New River Beach, NB	18 Nov
Ash-throated Flycatcher	1	Martha's Vineyard, MA	18 Nov
Ash-throated Flycatcher	1	St. Pierre, SPM	22 Nov
Ash-throated Flycatcher	1	Emeralda Marsh, FL	27 Nov
Ash-throated Flycatcher	1	North River, NC	30 Nov
Tropical Kingbird	1	L. Apopka, FL	12 Nov
Tropical/Couch's Kingbird	1	Claremont, NH	2 Nov*
Couch's Kingbird hybrid	1	Leicester, NY	9 Nov
Cassin's Kingbird	1	L. Apopka, FL	27 Nov
Bell's Vireo	1	Kennesaw Mt., GA	5 Oct
Bell's Vireo †	1	Exeter, NH	1 Nov
Cassin's Vireo	1	Cap Tourmente, PQ	1 Oct
Rock Wren	1	Bay County, MI	20 Oct
Mountain Bluebird	1	Assateague I., MD	8 Nov*
Townsend's Solitaire	1	Sept-Îles, PQ	9 Nov
Townsend's Solitaire	1	Lyons Woods, IL	19 Nov
Townsend's Solitaire	1	West Beach, IN	21 Nov
Varied Thrush	1	Marquette County, MI	9 Oct
Varied Thrush	1	Chincoteague N.W.R., VA	19 Oct
Varied Thrush	1	Bushnell, IL	20 Nov
Varied Thrush	1	Neenah, WI	27 Nov
Sage Thrasher	1	Fort Walton Beach, FL	23 Oct
Sage Thrasher	1	Knox County, TN	8 Nov
Virginia's Warbler	1	Fort Morgan, AL	29 Sep
Audubon's Warbler	1	Frog Pond W.M.A., FL	28 Oct
Black-throated Gray Warbler	1	Cape May, NJ	6 Sep
Black-throated Gray Warbler	1	Kennesaw Mt., GA	8 Sep
Black-throated Gray Warbler	1	Cape May, NJ	16 Sep
Black-throated Gray Warbler	1	Assateague I., MD	22 Oct
Townsend's Warbler (type)	1	Napatree, RI	30 Sep
Grace's Warbler	1	Montrose Beach, IL	8 Sep
MacGillivray's Warbler	1	Radnor, TN	25 Oct
MacGillivray's Warbler	1	Bradford, MA	1 Nov
MacGillivray's Warbler	1	Tree Tops Park, FL	16 Nov
MacGillivray's Warbler	1	Westport, MA	27 Nov
Western Tanager	1	Cape Lookout, NC	29 Sep
Western Tanager	1	Port-Daniel, PQ	19 Oct
Western Tanager	1	Plymouth, NH	30 Nov
Green-tailed Towhee	1	Whitefish Pt., MI	24 Sep
Green-tailed Towhee	1	Wayne County, MI	29 Nov
Spotted Towhee	1	Sept-Îles, PQ	12 Nov
Spotted Towhee	1	Waukesha County, WI	12 Nov
Brewer's Sparrow	1	Fort Pickens, FL	24 Sep
Lark Bunting	1	Racine County, WI	25 Aug
Lark Bunting	1	Appledore I., ME	7 Sep
Lark Bunting	1	Scarborough Marsh, ME	18 Sep
Lark Bunting	1	Whitefish Pt., MI	13 Oct
Harris's Sparrow	1	Great Meadows N.W.R., MA	7 Oct
Harris's Sparrow	1	Headlands Beach S.P., OH	12 Oct
Harris's Sparrow	1	E. Shore of Virginia N.W.R., VA	7 Nov
Harris's Sparrow	1	E. Shore of Virginia N.W.R., VA	9 Nov
Harris's Sparrow	1	Harvey, NB	15 Nov
Harris's Sparrow	1-2	Julie Metz Wetlands, VA	22 Nov
Gambel's White-crowned Sparrow	1	Tadoussac, PQ	8 Oct
Gambel's White-crowned Sparrow	1	Rimouski, PQ	12 Oct
Gambel's White-crowned Sparrow	1	Northampton County, PA	13 Oct
Gambel's White-crowned Sparrow	1	Terrapin Park, MD	18 Oct
Gambel's White-crowned Sparrow	1	Newbury, MA	26 Oct
Gambel's White-crowned Sparrow	1	West Brattleboro, VT	28 Oct
Gambel's White-crowned Sparrow	1	Cuyahoga County, OH	2 Nov
Oregon Junco	1	Pipestone S.P., WV	29 Nov
Smith's Longspur	1	Whitefish Pt., MI	26 Sep
Smith's Longspur	1	Whitefish Pt., MI	9 Oct
Smith's Longspur	1	Miller Beach, IN	29 Oct
Smith's Longspur	8-10	Richland, IL	2 Nov
Black-headed Grosbeak	1	Beaverdam Park, VA	12 Sep
Black-headed Grosbeak	1	San Felasco Hammock, FL	26 Sep
Black-headed Grosbeak	1	Monhegan I., ME	early Oct
Black-headed Grosbeak	1	Derry, NH	31 Oct
Black-headed Grosbeak	1	La Pocatière, PQ	21 Nov
Western Meadowlark	1	Martha's Vineyard, MA	26 Nov
Western Meadowlark	1	Greene County, GA	15 Nov

* = potential first state or district record
† = other Bell's Vireos were noted in Florida and Tennessee, where less unusual
¶ = many other eastern *Selasphorus* were often not identified beyond Rufous/Allen's

those moving southeastward, on the wakes of the fronts. Again, radar studies and satellite tracking could be immensely useful in making such distinctions. A recent paper (Gilroy and Lees 2003) argues against the model of "reverse-migration" and contends that birds disperse in *many* directions other than normal and its inverse.

The Polar Jet's hand in moving such birds is almost always apparent, as with the pipits in the West, but here I argue against reverse-migration (misorientation, or faulty navigation in the broad sense) in the pipits and for it in the case of *some* late-season Atlantic coastal vagrants for several reasons. First, a reversed orientation in the pipits would not account for the directions of movement observed. Second, pipits' movements, at least as we have documented them in North America thus far, appear to be similar to those in eastern Eurasia, with birds moving

Table 3. Strictly pelagic seabirds found coastally & inland following Hurricane *Isabel* in September 2003.

SPECIES	NO.	LOCATION	DATE
Herald (Trinidade) Petrel	1	Kerr Res., VA	19 Sep
Black-capped Petrel	5	Chesapeake Bay Bridge-Tunnel, VA	19 Sep
	4	Chesapeake Bay Bridge-Tunnel, VA	20 Sep
	1•	Fort Erie, ON and vicinity	20 Sep
	2	Fairhaven S. P., NY	21 Sep
	2•	Waverly Beach, ON	23 Sep (1*)
	1	Syracuse, NY	24 Sep*
Cory's Shearwater	1•	Bellefonte, PA	19 Sep
	12	Chesapeake Bay Bridge-Tunnel, VA	19 Sep
	2	Chesapeake Bay Bridge-Tunnel, VA	20 Sep
	1•	Bald Eagle S. P., PA	20 Sep
	1	McClure, PA	21 Sep
Audubon's Shearwater	1	Cape May, NJ	19 Sep
Manx Shearwater	1	Cape May, NJ	19 Sep
Manx/Audubon's Shearwater	1	L. Gaston, NC	19 Sep
	2	Cape May, NJ	19 Sep
Wilson's Storm-Petrel	9	L. Gaston-Roanoke Rapids L., NC	19 Sep
	1	Goldsboro W.T.P., NC	19 Sep
	2•	Hunting Cr., VA	19 Sep
	56•	Chesapeake Bay Bridge-Tunnel, VA	19 Sep
	2	Swift Creek Res., VA	19 Sep
	3•	Potomac R., DC	19 Sep
	1	Susquehanna R. at Fort Hunter, PA	19 Sep
	1	Rose Valley L., PA	19 Sep
	1	Cape May, NJ	19 Sep
	5	Chautauqua L., NY	19 Sep
	1	Woodlawn Beach S. P., NY	19-20 Sep
	1•	Van Wagners Beach, Hamilton, ON	19 & 22 Sep
	20•	Chesapeake Bay Bridge-Tunnel, VA	20 Sep
	2	Cayuga L., NY	20 Sep
	3	Riis Park, Queens, NY	20 Sep
	1	Athol Springs, NY	20 Sep
	1	Charlotte, VT	20 Sep
	3	Fairhaven S. P., NY	21 Sep
	1	L. Champlain, NY	21 Sep
	1	Pearce P. P., ON	23 Sep*
	1	Tip on Long Point, ON	27 Sep
	1	Crescent Beach, ON	27 Sep
	1•	Van Wagners Beach, Hamilton, ON	27 Sep*
Band-rumped Storm-Petrel	1	Sunset Beach, Northampton Co., VA	18 Sep
	1	Satterwhite Pt., Kerr L., NC	19 Sep
	1	Kerr Res., VA	19 Sep
	17•	Chesapeake Bay Bridge-Tunnel, VA	19 Sep
	1•	Hunting Cr., VA	19 Sep
	1	L. Anna, VA	19 Sep
Band-rumped Storm-Petrel (continued)	1•	Potomac R., DC	19 Sep
	1•	Bellefonte, PA	19 Sep
	1	Cape May, NJ	19 Sep
	1•	Bald Eagle S. P., PA	19-20 Sep
	7•	Chesapeake Bay Bridge-Tunnel, VA	20 Sep
Leach's Storm-Petrel	1	Airlie Res., VA	19 Sep
	1	L. Anna, VA	19 Sep
	1	Yellow Creek S. P., PA	19 Sep
	1	Bald Eagle S. P., PA	19 Sep
	15•	Chesapeake Bay Bridge-Tunnel, VA	19 Sep
	20•	Chesapeake Bay Bridge-Tunnel, VA	20 Sep
unidentified storm-petrel [mostly Band-rumped/ Leach's Storm-Petrels]	1	L. Frederick, VA	19 Sep
	3	Swift Creek Res., VA	19 Sep
	1	between Front Royal & Luray, VA	19 Sep
	1	Belvoir Rd. Pond, Fauquier Co., VA	19 Sep
	38•	Chesapeake Bay Bridge-Tunnel, VA	19 Sep
	3	Cape May, NJ	19 Sep
	2	Port Bruce, ON	19 & 22 Sep
	25•	Chesapeake Bay Bridge-Tunnel, VA	20 Sep
	1	Susquehanna R. at Fort Hunter, PA	20 Sep
	1	Ithaca area, Cayuga L., NY	21 Sep
White-tailed Tropicbird	1	Roanoke Rapids L., NC	19 Sep
	1	Richmond, VA	19 Sep
	1	Chesapeake Bay Bridge-Tunnel, VA	19 Sep
	1	s. of Smithfield, Johnston Co., NC	20 Sep*
Sooty Tern	7	Sunset Beach, Northampton Co., VA	18 Sep
	1	Chesapeake Bay Bridge-Tunnel, VA	19 Sep
	2	Conejohela Flats, Lancaster Co., PA	19 Sep
	1	Delaware R., Philadelphia, PA	19 Sep
	1	Nockamixon S. P., Bucks Co., PA	19 Sep
	2	Cape May, NJ	19 Sep
	2	Shinnecock Inlet, NY	19 Sep
	1	Hamlin Beach, NY	19 Sep
	3	Point Breeze, Monroe Co., NY	21 Sep
	1	Point Pelee N. P., ON	22 Sep
	1	Hamlin Beach, NY	23 Sep
Bridled Tern	1•	Suffolk, VA	18 Sep
	1	Cheriton, VA	18 Sep
	3•	Sunset Beach, Northampton Co., VA	18 Sep
	130•	Chesapeake Bay Bridge-Tunnel, VA	19 Sep
	5	Cape May, NJ	19 Sep
	1	Shinnecock Inlet, NY	19 Sep
	1	Hamlin Beach, NY	19-23 Sep
	9•	Chesapeake Bay Bridge-Tunnel, VA	20 Sep
	1•	Suffolk, VA	21 Sep*
	2•	Chesapeake Bay Bridge-Tunnel, VA	21 Sep
Sooty/Bridled Tern	3•	Chesapeake Bay Bridge-Tunnel, VA	19 Sep
	1	Riis Park, Queens, NY	19 Sep
	2•	Chesapeake Bay Bridge-Tunnel, VA	24 Sep*

• = possible or probable duplication of individual birds in adjacent locations and/or on other dates involved * = dead birds observed or specimen taken farther and farther south with the coming of colder weather; the timing of their extralimital appearances is nowhere notoriously late. And third, the flights of pipits are relatively homogeneous, whereas the fallouts of Neotropical and other migrant birds in the Northeast through Europe are most remarkable for their heterogeneity: the variety of species is often more remarkable than the number of any particular species. There must surely be misoriented pipits out there, but such a bird that flies north or northeast or east from breeding areas is not likely to encounter any birders—or to survive for very long. The tug-of-war between concepts of weather-related displacement and migratory misorientation in this journal has gone on for decades; it should be clear that both models, alone and in concert, apply to situations such as those considered above. Knowing to what degree a particular bird is moved away from "normal" migratory pathways by one factor or another is probably impossible, but the rather different coastal fallouts of pipits and November's Neotropical migrant passerines in the Northeast do present us with at least a hint that discrimination may some day be feasible.

Hurricane *Isabel*

Autumn 2003 brought Hurricane *Isabel* to the mid-Atlantic coast. Watched with a mixture of dread and anticipation by birders through mid-September, the storm wavered little in its final week offshore, making a beeline for the southeastern coasts of North Carolina, hurricane alley itself. The storm made landfall near Drum Inlet, North Carolina at mid-day on 18 September, and then like *Fran* of 1996, charged to the northwest toward the Great Lakes, depositing numerous pelagic species in its wake (Table 3, Figure 3), along with scores of birds clearly moved from littoral areas—such as Black Skimmers, Royal Terns, American Oystercatchers—and hundreds of seabirds probably or possibly moved from offshore and the coast (many Laughing Gulls, six Sabine's Gulls, nine additional species of tern, all three jaegers, both phalaropes, and possibly Brown Pelican). Not since *Fran* had such a diversity of seabirds been observed in the eastern interior. The pelagic birds found inland after the storm conformed classically to past models (as theorized in e. g., Fussell and Allen-Grimes 1980, LeGrand 1990), inasmuch as >99% of such birds found were along the track of the disintegrating eye (the "center of circulation" marked on Figure 3) or to the *east* of this track. (The most powerful winds in a moving hurricane are found in the "right-front" quadrant, where it is thought, along with the storm vortex, most birds are caught up.) The few birds to the west of the track were seen in North Carolina, the state of landfall, and at Point Pelee, Ontario, where a lone Sooty Tern was seen three days after the storm had passed (Figure 3). The great girth of *Isabel*—a storm that covered more area than the state of Colorado—can surely account for a few birds "left of center."

Despite such conformity to overall expectations, *Isabel* proved that we know far less about such storms than we might think. Given the patterns of displacement from previous similar mid-Atlantic storms (see previous issues of this journal), *Isabel*'s pelagic bird composition was unique. Of special interest was the unprecedented inland displacement of Wilson's Storm-Petrels, the high counts of Band-rumped Storm-Petrel so late in the season, the unusual proportion of Bridled (versus Sooty) Terns, and the displacement of multiple tropicbirds. The combined efforts of innumerable individuals made *Isabel*'s fallout surely the best-studied in history. For the particulars, see the Special Interregional Report on the storm-birds in this issue.

Tropicbirds of both species are scarce in the inshore Gulf Stream by late September. *Isabel* entrained at least four White-tailed Tropicbirds, two each in Virginia and North Carolina. Tropicbirds associated with hurricane landfalls are quite rare, but *Isabel*'s number was not unprecedented. Of the now 30 records of hurricane-driven White-tailed Tropicbirds recorded in the East north of Florida (1876–2003), all but three are clearly associated with the passage of major (Category 3 and above) hurricanes. (Not included here is a report of a White-tailed from Shubenacadie, Nova Scotia 6 September 1870, a year for which there are no hurricane data.) The all-time record is held by Hurricane #4 of 1938, which struck Long Island and New England as a Category 3 on 21 September, displacing *six* tropicbirds, three to New York and three to Vermont. Hurricane *Hazel* of 15 October 1954, a Category 4 storm, displaced four: one to Virginia, two to Pennsylvania, one to New York.

Storm-petrels are displaced into the interior to a lesser degree than several other "hurricane-birds" such as Sooty Terns or Laughing Gull, and most confirmed records in the East refer to the Leach's Storm-Petrel (at least 35 reports, 1879–1989, totaling 81+), with a few of Band-rumped Storm-Petrel (five reports, two showing no relation to hurricanes; Brinkley, in ms.). Between the years 1842 and 1996, storm-related reports of the smaller Wilson's Storm-Petrel number only about 23, though many of these are

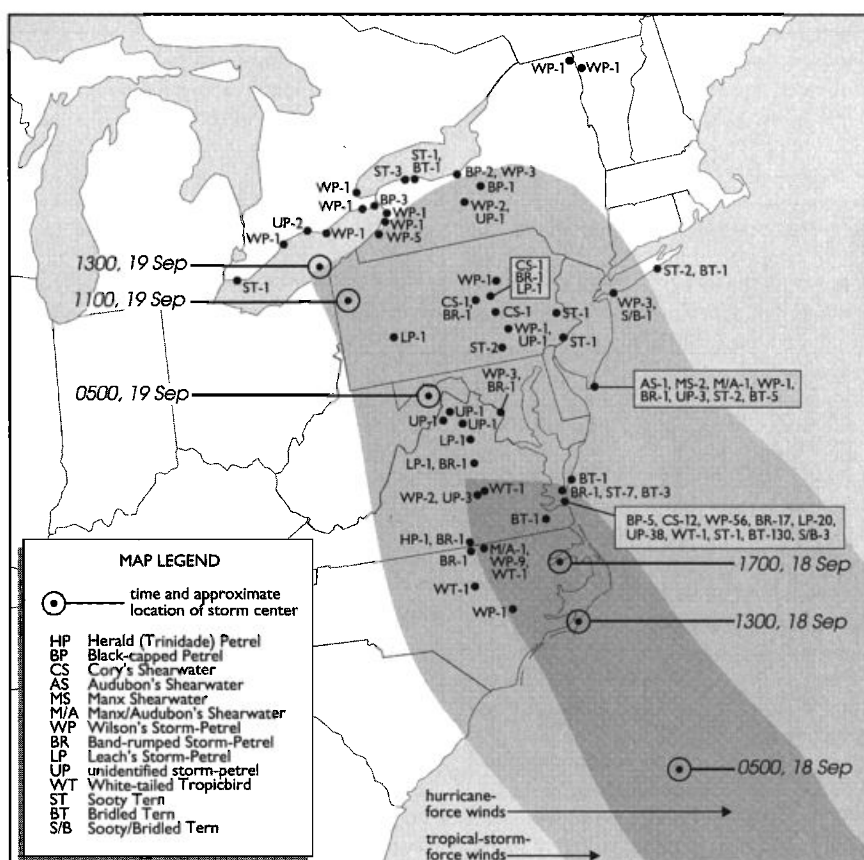

Figure 3. Plottings of onshore and inshore tubenoses, tropicbirds, and tropical terns during and following the landfall of Hurricane *Isabel* of 2003, most from 19 or 20 September (cross-reference Table 3). Potential duplication involved in adjacent reports is not represented. All reports considered tentative unless verified by the appropriate state/provincial bird records committee. *Map by Virginia Maynard.*

unverifiable and there are at least a dozen reports of live, unidentified storm-petrels 1884–1985 (Brinkley, in ms.). Many Wilson's have been seen along Atlantic coastlines during and following hurricanes, and there was apparently a very large kill of storm-petrels noted 27–30 August 1893 that stretched from Beaufort to Cape Lookout, North Carolina and south to the Isle of Palms, South Carolina (*Auk* 16: 247). Comments such as "10 miles of beach covered" with storm-petrels and "beaches strewn" with storm-petrels suggest massive mortality of at least some Wilson's (the only species mentioned) in this "Great Hurricane of 1893." Nevertheless, *contra* the historic assumption that this species is not likely to be moved inland by hurricanes, some 38 Wilson's Storm-Petrels were located in the interior along *Isabel*'s path, including the interior lakes and rivers of North Carolina, Virginia, Pennsylvania, New York, Vermont, and Ontario (Table 3, Figure 3), a figure approaching twice the total of such reports *ever*.

What factors were different about *Isabel* that caused this remarkable displacement event of these small seabirds? In terms of storm track and timing, *Isabel* was most closely related to *Fran* of September 1996, also a Category 2 hurricane at landfall, though *Fran* did not have the Category 5 history of *Isabel* and was a more compact storm with an intact, well-defined eye at landfall. Diel timing was different between storms, with *Fran* making landfall during the night and *Isabel* during early afternoon. The seasonal timing was also different, by two weeks, perhaps as important as the storm's strength in accounting for its unusual constituency. Wilson's Storm-Petrels move south along the Atlantic Coast during fall and form large rafts along the edge of the Gulf Stream and in its interior by mid-September. Most landfalling hurricanes in the mid-Atlantic, including *Fran*, come ashore during the late summer or earlier September (*Hugo*, which made landfall in South Carolina 21 September 1989, was so devastating that there was little birding done along its path—it may well have killed thousands of storm-petrels, but there was no possibility of surveying outer beaches in this case). The later timing of *Isabel* would have put very large numbers of Wilson's Storm-Petrels almost directly in the path of *Isabel* just before it made landfall. Observers also found remarkable numbers of Band-rumped Storm-Petrels (at least 18 in Chesapeake Bay, 1 at Cape May, 6-7 inland) associated with the storm. This species is very rare in the North Carolina Gulf Stream after late August (Brian Patteson, unpubl. data), and the large numbers associated with Hurricane *Isabel* were a genuine surprise. Storm totals such as this one suggest that this species can be carried inland from areas well out to sea (as Murphy [1936] first argued), certainly beyond the areas explored by pelagic trips at this time of year.

The composition and numbers of species present in and near the Gulf Stream off the southeastern United States immediately prior to hurricane landfalls, however, could well be very important in determining which species are moved into the interior. This influence is potentially illustrated in the pattern of "tropical tern" displacement shown by *Isabel*: Bridled Terns had been, as usual, very common in these waters through September, but Sooty Terns had been scarce or absent in September, according to Brian Patteson, who suggests that the earlier September sweep by Hurricane *Fabian* east of the area might have been a factor in the Sooties' scarcity. The absence of large schools of Yellowfin Tuna, which Sooties follow when foraging, could also account for their low numbers with *Isabel*.

If one were to look only at raw numbers, this storm was unique among mid-Atlantic hurricanes in displacing larger numbers of Bridled Terns than Sooty Terns. These two outwardly similar species have historically been displaced by numerous hurricanes in the past, with records of Sooty Tern regularly stretching into the interior after storm events, while displaced Bridled Terns have occurred primarily along the coast. Documented records of Bridled in the North American interior are in fact few: three each after *Hugo* of 1989, *Diana* of 1984, and *Fran* of 1996 in North Carolina, 2 in Virginia after *David* of 1979, and one at Long Point, Ontario 20 September 1988 after the powerful *Gilbert*. (Others were moved into the Chesapeake Bay region by *Fran* and by *Donna* of 1960, and there is an anomalous record of one "killed by boy with a tennis racket" 17 June 1932 in Orangeburg, South Carolina.) All other reports (over 50, totaling over 100 birds) between 1960 and 2001 are from the Atlantic and Gulf coasts. In 2003, a Bridled Tern at Hamlin Beach State Park in upstate New York was thus among the least expected of *Isabel*'s birds.

Are Sooty Terns over-reported after hurricanes because they are the "expected" inland hurricane species, that is, are some observers misidentifying Bridled Terns as Sooty Terns? Given the advances in field identification techniques in recent years, this explanation seems unlikely. It has been suggested by Brinkley (1999) that divergent wing-loading and aspect ratio, as well as general natural historical differences, might be responsible for the stark differences in inland dispersal of these two species. The "results" of *Isabel* appear to support this theory, as all Bridled Terns (139+ total) save the one in upstate New York were noted on the Atlantic outer coasts (7), Chesapeake Bay mouth (130+), or its tributaries (1–2). Sooty Terns were seen on the outer coasts (11) and also located, as expected, far inland on Lakes Erie and Ontario (5, at least) and eastern Pennsylvania (4). Why precisely Sooties appear so much more inclined to be displaced inland, while Bridleds hug the coast, is not clear, but Sooty Tern's natural history—it forages in the open Atlantic and makes frequent trans-Atlantic flights—would seem preadapted for long-range dispersal or displacement. Atlantic Bridled Terns, by contrast, specialize on the pelagic drift community in the western North Atlantic, commonly use flotsam perches between bouts of foraging, and do not normally disperse far from natal areas.

Relatively few seabirds are recorded during the actual landfall of these storms, when conditions make it difficult or impossible to search for birds in any case; most seabird records instead come from areas that seem to concentrate birds returning toward the sea. During the landfall of *Isabel*, I spent the day with several observers on the southern tip of the Delmarva Peninsula watching the mouth of the Chesapeake Bay from shelter on Sunset Beach. We saw only a few Sooty and Bridled Terns during the worst of the storm, along with one Band-rumped Storm-Petrel (at high altitude, remarkably). By late morning the next day, however, as the storm's center of circulation moved across western Pennsylvania and local winds had dropped to under 20 knots, the mouth of the Bay was alive with pelagic birds (Table 3). This procession of birds heading back to the sea through the open channels (between the artificial islands of the bridge-tunnel) continued throughout the late afternoon and the following day, enabling dozens of birders to observe them from the islands. These birds had presumably been scattered across the wake of the storm and were reorienting and finally finding their way down various rivers to Chesapeake Bay and ultimately the Atlantic Ocean. Many groups of observers in Virginia's interior also witnessed large flights of seabirds, especially terns, orienting to the southeast, toward the ocean, and one observer even saw an adult tropicbird fly over I-95 at Richmond, heading to the southeast! Just how many of the storm-displaced birds end up at such concentration points as the Chesapeake Bay mouth, however, is unknown. Were the birds seen on 19 and 20 September at the mouth of the Chesapeake Bay simply birds that had been displaced into the Bay itself, or did they include birds that were carried far inland during the storm? Were the birds seen 20 September different individuals from those of the 19th, with the first day's birds having already found their way back to the ocean? Speculative answers to these questions may differ, depending on the species involved. Many of the birds seen at the mouth of the Bay after *Isabel* appeared to be resting during late afternoon, particularly Bridled Terns, and many of the storm-petrels were rafted in flocks at this time. Throughout the day, however, many birds were returning to the ocean: Black-capped Petrels and Cory's Shearwaters could be seen at a distance approaching the channels and moving directly out to sea. The behavior of these birds unambiguously suggested to those watching them that displaced seabirds capable of moving back to proper habitat do so rather quickly, and that those taken inland continue to head to the southeast until they reach the sea via one of the larger bays, as was seen during Hurricane *Bertha* of 1996 at both Chesapeake and Delaware Bays.

Some other interesting hurricane-related questions beg to be answered. What proportions of storm-blown birds are actually seen and documented during these events? My gut feeling is that only small numbers of storm-related birds are actually encountered by birders. Given the huge area affected by these storms, and the fact that relatively few birders are able to get out after such an event, it seems likely that the great majority of storm-birds goes unseen. A key to understanding hurricane's effects on seabirds (and other birds) is for birders to spend time at their local patches (especially large and medium-sized bodies of water), rather than on the coast, as hundreds of birders in fact did during *Isabel*. Seeing seabirds in large bays or at the coast is, by now, quite expected; but the fact that so many species turned up on rather small bodies of water in Pennsylvania (and a few in small towns' parking lots, as in *Fran*), suggests that only a fraction of such birds have been found in the past.

Do the majority of storm-blown individuals actually successfully return to the sea? After birds are displaced a certain distance inland, the likelihood of their successful return to the ocean seems minimal, especially in the case of the tubenoses. Records of Black-capped Petrels and Wilson's Storm-Petrels seemingly "stuck" on the Great Lakes for weeks after the storm (and found dead in later days) seem to bear this out. Some birds taken perhaps a few hundred miles inland might be able to return to the ocean by following seaward-flowing river systems, surely, but most storm-blown birds are seen in the 48 hours immediately following landfall (most from *Isabel* were from 19-20 September), presumably when those still living have enough energy to move back to sea. There are many records of birds that remain on inland bodies of water after these storms, in some cases for several weeks, and then presumably die when their energies are exhausted, as appeared to be the case with Black-capped Petrels following *Fran*. For this reason, especially, we should be vigilant in our efforts to document the effects of hurricanes upon seabirds: Black-capped Petrels, with probably fewer than 1000 breeding pairs, are listed as "Endangered" by BirdLife International (Stattersfield and Capper 2000), and every set of available eyes is needed to monitor the impact of these storms on such vulnerable species. Hurricane *Hugo*, we should bear in mind, appears to have reduced the population of Bermuda Petrel, a Critically Endangered relative of the Black-capped, by five percent (D. B. Wingate, unpubl. data). Other gadfly petrels, such as the obscure Herald (Trinidade) Petrel (Figure 4), are so little studied that their conservation status and even taxonomic status is a matter of guesswork. This taxon, which nests on a few islands in the South Atlantic, may number no more than 2000 birds and is listed as "Vulnerable" (Stattersfield and Capper 2000).

Pelagic headliners

The southward irruption of Northern Fulmars along the Pacific Coast provided counterpoint to the plight of pelagics caught up in *Isabel*. Countless hundreds of this species were reported from far offshore to just off the beach along almost 6000 km of coastline from Washington through central Baja California. Words used to describe this invasion ranged from "unprecedented" to "the highest number on record," and it seems that this species could be seen from just about any coastal vantage on the Pacific Coast during late October and November. Exceptional counts of this species throughout the period were: 250+ off El Socorro, Baja California 5 November; 550 off Punta Banda, Baja California 8 November; 7000 at Boiler Bay, Oregon 31 October; 5000 off Seaside, Oregon 19 November; and 800 off Westport, Washington 6 November. Sadly, all regions reported a subsequent die-off, with countless numbers washing ashore on coastal beaches and offshore islands. Analysis of beach-wrecked specimens showed that the vast majority of these, at least from central and southern California waters, were juveniles that had starved to death.

One must wonder how much such a large-scale die-off impacts the overall population of this species in the Pacific. With numbers reported like those of fall 2003, one wonders too what proportion of the birds involved in the incursion were juveniles. Of the age classes documented by specimens during the die-off, first-year birds predominated, which suggests that their survivorship was very low. By early January, however, the majority of Northern Fulmars that I saw in southern California waters appeared to be older non-juveniles. One assumes in most cases that adults and subadults are better prepared than young, inexperienced foragers to withstand periods of prey scarcity (which presumably drive such "invasions"), though it is probably just as likely that the fulmars were concentrated *first* by an abundance of prey and then affected by some disease that spread rapidly because of their

Figure 4. This light-morph Herald (Trinidade) Petrel was found well inland by Brian Patteson after the passage of Hurricane *Isabel*, on the dam at Kerr Reservoir in Mecklenburg County, Virginia 19 September 2003. It is shown here being prepared for release at the Chesapeake Bay Bridge-Tunnel by Grayson Pearce. *Photograph by Edward S. Brinkley.*

unusual concentrations. Episodes of this sort are not all that unusual along the Pacific Coast and probably occur at least once per decade, though earlier die-offs have not been as well publicized (P. Pyle, pers. comm.). In the southern hemisphere, episodes of large-scale mortality among tubenoses are rather common around New Zealand and Australia; combinations of prey scarcity, disease, and sustained periods of inclement weather often cause "wrecks" of the more abundant species. There is limited North American literature on this phenomenon in tubenoses; in the North Atlantic, most shearwater "die-offs" appear to be associated with becalmed conditions during spring migration or prey scarcity in summer, and there are a few known instances of shearwater "wrecks" during hurricanes that stall just offshore, as with *Dennis* of 1999. Northern Fulmar's response to cyclones (Manikowski 1971) may actually differ somewhat from Atlantic shearwaters', a subject worthy of study. Thinking back through the fulmars' mortality to those 2–3 Cory's Shearwaters in landlocked Pennsylvania, one wonders why it is that so few shearwaters were associated with *Isabel*—and why so few have been connected with hurricanes historically. Were the Pennsylvania Cory's the least fit of their kind, already too weak to fight the storm? Or were they among the survivors, as hundreds were exhausted by the winds and ultimately died at sea? Are the hurricane-driven birds we detect among the fittest, or the least fit, of their respective species? Is the rather incredible heterogeneity of species we observe in hurricanes similar to the great variety of landbirds seen in those Maritime "fallouts" in late autumn, or do the seabirds just have the misfortune to be in the wrong place during landfall? Bird mortality, a fascinating subject, is a true frontier in ornithology, especially for pelagic birds, whose lives are only slowly becoming known to us through long-term seabird studies from ships and pioneering satellite-tracking studies, which reveal journeys of unbelievable distances in the albatrosses, for instance.

The Pacific pelagic frontier astonished observers during fall 2003 no less than the Atlantic: it is remarkable how many vagrant pelagic species continue to be found in waters so regularly surveyed. Who would have dared predict Cory's Shearwater(s) would be seen in California? The first was discovered at Cordell Bank on 9 August, furnishing the first record for the entire Pacific Ocean. Remarkably, a Cory's was subsequently found off Point Pinos 22–23 August! There is some opinion that these sightings refer to the same bird; however, given the massive number of shearwaters present in the area at the time, it is impossible to say that two birds were not involved. How this bird or these birds managed to make it to the Pacific is a subject almost beyond the limits of polite speculation; surely, they (or it) somehow made it across the Central American isthmus (records of the species from the western Caribbean appear to be increasing) ... assisted by a tropical storm? (Far less probable for this species would be a trip around Cape Horn.) No less exceptional in the shearwater pandemonium of autumn was the juxtaposition, within minutes, of the final Cory's Shearwater and a Streaked Shearwater, possibly the first time that the two *Calonectris* species have commingled. Only in California!

Another most unexpected Atlantic-Pacific nexus was documentation of four Little Shearwaters: one bird was nicely photographed in the familiar waters of Monterey Bay, California 29 October, and three were found in the previously unstudied ocean waters south of Sable Island, Nova Scotia 23–24 September. There are but two prior records for this species from North America, both from islands (Sullivan's Island, South Carolina in August 1883 and Sable Island, Nova Scotia in September 1896), but no convincing records of live birds at sea, making the discovery of three in one area all the more impressive.

Vagrant petrels also found their way into our waters this fall. A gadfly petrel that landed on a cruise ship near Maui was photographed and later identified through Internet discussion as a Stejneger's Petrel, providing Hawaii with its second record of this apparently rare wanderer; there are six records (seven birds) from California, plus a Texas specimen, but no other reports from North America. A long-range pelagic out of San Diego proved fruitful in September, turning up California's second Bulwer's Petrel about 50 km south of San Clemente Island on 4 September. These waters have been rarely explored in recent years, and future trips to this area well offshore hold promise. In addition to the Bulwer's Petrel, a Red-tailed Tropicbird was seen, along with a host of Red-billed Tropicbirds.

And the hummingbirds

As little as a dozen years ago, the appearance of a *Selasphorus* hummingbird in the East was occasion for what the British might call a "massive twitch." Today, birders are finding not only *Selasphorus* with regularity (including a startling proportion of Allen's) but species from as far away as Mexico as well. The Southeast maintained its pride of place in the vagrant-hummingbird department, but the envelope continues to be pushed northward: North Carolina's third Green Violet-ear was found this fall, as well as a remarkable third Magnificent Hummingbird in Georgia. California's first Magnificent Hummingbird found its way to Pacific Beach—surely the first time this species has been recorded in coastal states on the opposite sides of the North American continent. Reverse-migrations of misoriented birds, or storm-swept waifs? Maybe a little of both. Satellite transmitters are still too heavy for these mites; their Big Picture will have to wait a bit longer.

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