

THE CHANGING SEASONS

Madrean Summer

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Summer 2005 will be remembered almost everywhere as another warm summer in another warm year—the warmest year in the Northern Hemisphere since record-keeping began in the 1860s, and globally the second warmest year on record after 1998, which had strong El Niño conditions. On the Hudson Bay coast at Kuujuarapik, at the mouth of the Great Whale River, temperatures soared to a record 99° F on 12 July. In June, Boston temperatures averaged over 9° F degrees above normal; June temperatures were about 6° F above normal in upstate New York. Central and southern parts of Ontario were also abnormally hot (just the northwestern areas were spared), and Ohio and northern Appalachia had the fourth warmest summer on record (although east of the Allegheny Mountains, temperatures were more moderate). In Illinois, June was the warmest since 1971, almost 4° F above average statewide (6.2° F above normal in Chicago); July temperatures were high but less noteworthy. Across the middlewestern prairies, especially in Indiana, Illinois, and Iowa, it was the warmest June since 1991; Iowa had its first 100-degree days since 2003. To the southeast, in

Colorado's first Tropical Parula sang lustily, revealing its position high in the trees of Grandview Cemetery, Fort Collins throughout its stay from 18 June through 4 (here 1) July 2005. This bird, along with the state's two White-eared Hummingbirds this season, provoked much speculation about the "next" Mexican vagrants to follow. Photograph by Bill Schmoker.

Kentucky, temperatures hit the 90° F mark and higher in Louisville on 23 days out of 61; Nashville, Tennessee hit or surpassed that mark on 33 days. Denver, Colorado, which enjoyed a more seasonable June, matched its record high of 105° F on 20 July. The trend toward warmer years, and warmer summers, would seem to have no end in sight (Figure 1).

Large areas of the continent were not just hot but very dry. Forest fires in June in the Abitibi and Lac Saint-Jean regions of Québec disrupted the nesting season in this part of the boreal forest, while in the Alaskan interior, enormous fires raged in several areas, mostly in July, after the peak of breeding there. The very hot July in Arizona saw the second-latest onset of monsoon rains there on record, fully two weeks late; Arizona wildfires burned a record 270,000 hectares. The eastern Midwest was also dry, the driest June since 1992 in Indiana and Illinois; in 135 years of observations, Chicago has its driest 20 May–6 July period on record. Eastern Iowa and central/eastern Missouri suffered under drought, and Tennessee and Kentucky were also dry, but hurricane rains replenished reservoirs in the first half of July. Texas was mostly hot and dry—Houston's 20 mm of June rain made it the driest June on

record—but monsoons brought rain to the Chisos and Davis Mountains by late July, and Hurricane Emily brought coastal rains in late July. Colorado's June was average, but July was the state's third driest since 1895.

Naturally, the continent was not uniformly sweltering, and even in the hotspots there were cool spells. Southern Québec and New England cooled rapidly in mid-June (almost 12° F below normal), which had a negative impact on cavity nesters. Beach-nesting species in the Northeast also suffered during this cool, wet period, and high tides of 7 and 21 June washed out nesting attempts by many species across the mid-Atlantic region.

From the western Great Lakes westward, temperatures in June and July were far more moderate, and rainfall was much more plentiful. Northwestern Ontario had one of its coolest, wettest Junes on record, and cool, wet weather was the norm through much of the Yukon and Northwest Territories, making fieldwork difficult but sparing the region from the forest fires that have plagued it in recent seasons. In some areas, rains were too plentiful. In the southern third of the Prairie Provinces region (and adjacent northwestern Minnesota), heavy rains in June and early July caused record-breaking floods. June was one of the wettest on record in much of the U.S. Great Plains as well, although July was warm and mostly dry, and the same reversal was true in Montana and Idaho, where July was the sixth driest ever recorded.

For the most part, the Great Plains and Great Basin welcomed the rains. After six years of drought, Utah and Nevada (among

other western states) were in dire need of rains to boost breeding populations of many species, both in grasslands and wetlands. New Mexico, like Texas and Arizona, was mostly hot and dry but had had ample winter/spring rains to sustain a good nesting season. Most grassland regions that received ample rain reported good breeding by sparrows and other landbirds. Grasshopper Sparrows, Dickcissels, and Bobolinks seemed to benefit from the moist conditions and from delayed hay harvest through much of their ranges; Le Conte's Sparrow and Yellow Rails too were widely reported, though some may have simply moved from marshes to wet fields and thus become more conspicuous. Nonetheless, the report of "hundreds" of Yellow Rails in the Rainy River district of Ontario is most impressive, and strays were in the Dakotas, British Columbia, and Idaho, that state's third. Other wetland birds—such as Black Terns and *Anas* ducks—were also reportedly nesting well in the Plains; Joe Grzybowski and Ross Silcock report that marsh birds in the Southern Great Plains region will still take several more years of good rains to rebound. In eastern Montana, waterbirds displaced by flooding were sometimes able to renest elsewhere or delay nesting. In Manitoba, Saskatchewan, and Alberta, where riparian floods were devastating, observers report nesting losses by Spotted Sandpiper, Belted Kingfisher, and Bank Swallow, along with disruption of Western Grebe and Franklin's Gull colonies. As in 2004, the American White Pelican colony at Chase Lake National Wildlife Refuge, North Dakota, was again abandoned suddenly this season, for reasons unknown. Huge counts of that species from Manitoba and Saskatchewan, where the pelicans took advantage of widespread flooding, were surely one result of this abandonment. A bright spot in all the flooding, wildlife officials of the Saskatchewan Watershed Authority collected 260 Piping Plover eggs from nests about to be flooded out at Lake Diefenbaker; the young birds were captive-reared and released at Chaplin Lake.

The Pacific coastal weather was deftly described by Steve Mlodinow, Bill Tweit, and David Irons as "a mosaic varying from extreme drought to near deluge," especially in June. The Jet Stream guided storms mostly south of Alaska through the period, lashing southern British Columbia and Washington through June and northern British Columbia in July, giving more southerly areas an abrupt break from the rains. To the south, California's tranquil weather was little remarked, aside from a cool, wet June that hurt cavity-nesting species, especially insectivores like bluebirds

and swallows. But the calm summer was apparently disastrous for many seabirds: the lack of upwelling seawater, normally generated by persistent westerly winds, created oceanic conditions resembling those of El Niño events. Near-complete breeding failure and widespread mortality were documented in several alcids and in piscivores like cormorants. Over on the Atlantic coast, a sizeable die-off of tubenoses was not easily explained, but most of the dead and dying birds were emaciated; a dearth of prey resources was apparent from New England to Florida. And in the continent's interior, several unusual early-season hurricanes brought seabirds of many species to states that rarely witness such events.

Outside the usual contexts of nesting successes and losses and the vagaries of weather, the short summer season was long on records of unusual birds. To be sure, there was much continuity with the events of the spring, canvassed beautifully in the spring "Changing Seasons" (Leukering and Gibbons 2005): eastern warblers, vireos, mimids, Scarlet Tanagers, and Rose-breasted Grosbeaks continued to trickle into the West through the middle of June; the spring's memorable northward flight of Hooded Oriole was detected also in Seattle in June (Washington's fifth); Wilson's Plovers kept up their spring streak of straying, turning up in California, Québec (its first), New York, Rhode Island, and Massachusetts (up to 4 birds in that state!); May's Soras and Virginia Rails in Alaska tried to nest; White Ibis continued their explorings, reaching Ohio (thrice), West Virginia, New Mexico, and Missouri; and Crested Caracaras were noted in northern Califor-

McKay's Bunting possibly nesting at King Island, Alaska, and at Pauline Cove in the Yukon Territories in July; Manx Shearwaters off California, Oregon, Washington, British Columbia—and two Manx behaving as though nesting at Middleton Island, Alaska, for most of July. Singular vagrants, admittedly fewer than in other seasons, were still impressive: Gray Flycatcher in Alberta; Garganey at Barnegat, New Jersey; a possible Northern Jacana in Brownsville, Texas; Magnificent Hummingbird in South Dakota; Western Reef-Heron and two Little Egrets in Newfoundland; Tufted Duck in the Yukon; Black Turnstone in Arizona; Tropical Kingbird in Louisiana; Spotted Towhee in Nunavut; and Masked Duck at Sarasota, Florida. But the season's clear theme was the slight but startling influx of "Madrean" birds into new areas of the United States, whether as prospectors, vagrants, post-breeding dispersants, or all-of-the-above.

The Mexican Mountains and the Square (or Mostly Square) States

Readers unfamiliar with the ecoregional designation of the "Madrean Pine-Oak Woodlands" may appreciate a sidebar here. This region, in broadest terms, includes about 461,265 km² of Mexico's main mountain chains: the Sierra Madre Occidental, the Sierra Madre Oriental, the Trans-Mexican Volcanic Belt, the Sierra Madre del Sur, the Sierra Norte de Oaxaca, and isolated mountaintop islands in Baja California (particularly around the Sierra de la Laguna); smaller enclaves of subtropical pine-oak woodland are also found on mountaintops in southern Arizona and New Mexico and in western Texas, where they are often called the "Madrean Sky Island Archipelago" by biologists. Pines, firs, and oaks of many species dominate the ecoregion; these pine-oak woodlands have an island-like distribution because they are surrounded by more extensive floristic provinces, usually tropical or arid ones. This insular quality is especially prominent in the northern Mexican Highlands (Sierra Madre Occidental) and the Madrean Sky Island Archipelago.

Despite the isolation between these sky islands, bird species clearly move between them, as ornithologists and birders have noted familiarly in southeastern Arizona, where small influxes of Aztec Thrushes, Eared Quetzals, and Plain-capped Starthroats have been observed for several decades. The source for such small invasions would seem obvious enough: the mountains of the Sierra Madre Occidental extend southward from the United States through Sonora, Chihuahua, Durango,

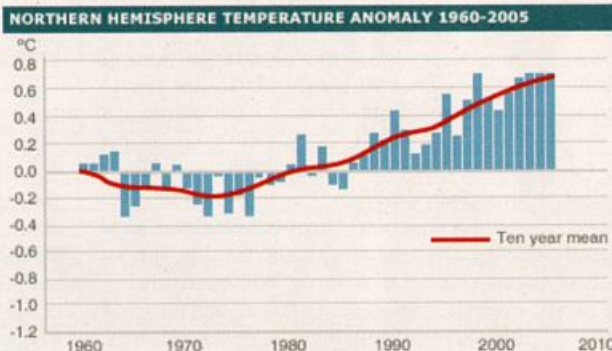


Figure 1. Northern Hemisphere average annual temperatures compared to the 1961-1990 average. Graphic courtesy of the Hadley Centre, University of East Anglia, United Kingdom.

nia. And there were new patterns, perhaps minor patterns but heartening for summer birders: single Short-tailed Albatrosses off Oregon, northern California, and southern California; a few Red-necked and Little Stints found on East and West Coasts (and inland, a Red-necked Stint at China Lake, California 13 June, and a Little Stint at Bitter Lake, New Mexico 31 May); single Lesser Sand-Plovers in Oregon, northern California, and Alaska;

Nayarit, Sinaloa, to the Rio Grande de Santiago in Jalisco. To the east, the Sierra Madre Oriental pine-oak forests reach their northern limit in West Texas and extend southward through Coahuila, Tamaulipas, Nuevo León, San Luis Potosí, Queretaro, and Guanajuato. Both corridors stretch for over 1000 km into Mexico and serve as natural pathways for expansion or for “escape” flights during times of scarcity or natural disaster. Naturally, most of the birds appearing in the United States are found in some abundance in neighboring Mexico; and most of the birds we consider vagrants are regular (if sometimes little-known) constituents of the montane avifauna of Mexican border states.

As Ted Floyd has pointed out in a recent editorial in *Birding* (37: 570-571), one of the repercussions of the potential rediscovery of Ivory-billed Woodpecker in Arkansas—at the heart of the continent, in a beautiful National Wildlife Refuge, just off an interstate highway, and “five miles from the nearest McDonald’s”—is the realization that the sport of birding has focused for decades on the liminal: Alaskan islands, the Florida Keys, the U.S./Mexican border, or pelagic waters. The woodpecker (whose confirmation, in the opinion of some, still awaits unequivocal published documentation) was apparently right here among us: we failed to look for it, we failed to see it, and in so doing we lost decades that could have been devoted to its conservation and the preservation of its habitat. Our hobby took the easy short-cut to “rarities”—not the high road, and certainly not the most difficult path. We have been neophiles. And in rushing to the edges, we failed to see the very heart of the continent and its wonders.

In our defense, sort of: most people live on the edges. Over half (55 percent or so) of all U.S. citizens now live in 772 coastal counties on the Atlantic and Pacific Oceans, the Gulf of Mexico, and the Great Lakes. Between 1965 and 1995, coastal populations grew by 41 million, much faster than the country as a whole; and between 1960 and 1990, coastal population density in the United States increased from 275 to nearly 400 people/km². By 2025, nearly three-fourths of all U.S. citizens are expected to live in coastal/lacustrine counties. The least populous parts of the Lower 48—the western mountain ranges, the Great Basin, and the Great Plains—have, of course, the fewest residents, fewest birders, and the least birding coverage. These Square States (or Honorary Square States, such as Nevada) in the

continent’s interior are positioned north of Mexico, and it is these states, along with the country-sized state of Texas, that are most likely to be the first recipients of birds pioneering northward from the Mexican mountains. We have, predictably and reasonably, sought Mexican birds on junkets to the Rio Grande Valley and southeastern Arizona over past decades, following what are predictable and usually productive routes laid out in bird-finding guides. But recent years have shown us, to our common alacrity, that Madrean wanderers and their ilk are not lim-



Figure 2. On 17 June 2005, Camas National Wildlife Refuge employees Sid Brown and Farrel Downs spotted a small heron and called refuge manager Rob Larranaga, who identified it as a Least Bittern—a first record for Idaho. The bird was present through 19 June. Photograph by Dave Lawrence.

ited to these border areas: they are turning up across Texas, in southern California, the Great Plains, the Great Basin, the central Rockies, and even the Midwest.

Despite their thin birding coverage (away from southeastern Arizona, yes), the Square States are turning in records that have captured the attention of birders in the “rest” of the continent. Although the Greater Pewee, Red-faced Warbler, Painted Redstarts (two pairs), and Hepatic Tanager in the mountains of San Diego County, California were all remarkable “Madrean” records for the 2005 nesting season, as Guy McCaskie and Kimball Garrett point out, the flagship species this summer were surely White-eared Hummingbird, Short-tailed Hawk, and Tropical Parula. In order to make this point, I’ll have to borrow a few autumn-season reports, with apologies to authors of the next Changing Seasons essay (who will probably find themselves sorting through the complex devastations and displacements of *Katrina* and *Rita* in any case).

White-eared Hummingbird is a species for which most U.S. birders must make a pilgrimage, hoping it will be a “good year” in Miller Canyon or similar areas in the Huachuca Mountains and neighboring ranges. In some years, the species is quite scarce in the United States. Arizona was

awash in White-eareds this season: at least 17 were reported, including one at Columbine, Graham County in the Pinaleno Mountains. Western Texas, where White-eared is always considered rare, had nearly as many as Arizona: 15 between Big Bend and the Davis Mountains! Another one in Texas was in Lubbock, just into the Panhandle, where the species is utterly unexpected. In New Mexico, a White-eared was near Cloudercroft 29-30 June, a first for the Sacramento Mountains and for southeastern New Mexico, and another was in Catron County 15 June. Farther north, in Colorado, single females were found 40 km apart in the Durango area: one was discovered 19 June (and remained through 7 August), the other 20 July, which stayed through 21 August. These represented first records for Colorado.

To see a Short-tailed Hawk in the United States once meant a trip to southern Florida. The species has begun to turn up often enough, though still rarely, in Arizona and Texas (and now once in Alabama) that New Mexico birders have been on the lookout for it. A light-morph adult Short-tailed seen in late May in the Animas Mountains of New Mexico was photographed 28 June, a first confirmed state record. Arizona had reports of the species at Barfoot Park, in Carr Canyon, and also well to the north, in the Pinal Mountains near Globe in mid-June.

The distribution of Tropical Parula in the United States has never been in doubt: southernmost Texas, a premier place of pilgrimage for so many species. Extra-Texas vagrants have reached southwestern Louisiana and southeastern Arizona on rare occasions. So when a male Tropical Parula, devoid of even a whiff of hybrid derivation, turned up on 18 June at Grandview Cemetery in Fort Collins, Colorado (where it sang through Independence Day), birders were stunned: the species had been found no closer than the Panhandle of Texas (almost a Square State in itself, if you will). Less heralded but just as significant was the Tropical Parula seen for one day, 30 April, in the Gila Bird Area of southern New Mexico—also a state first. Near Austin, Texas, a pair of Tropical Parulas at Hamilton Pool, Travis County tantalized birders through early June but were not reported thereafter (a Rufous-capped Warbler tarried in the same county). Though hardly an exclusively Madrean species, Tropical Parula is found up through 2000 m elevation in its range and occupies a wide variety of habitats, including pine-oak forest in some areas.

One could argue that these three species are just the tip of the iceberg, small patterns that fit fairly well with a host of southern species we have become more accustomed to seeing reported away from the Gulf Coast, Southwest, or South Texas: Cave Swallow (records from Colorado, Oklahoma, Arkansas, and Kansas this summer); Neotropical Cormorant (Kansas, Ontario, Colorado); Roseate Spoonbill (one in New Mexico; the fifth for the Texas Panhandle; five in Tennessee; 70+ from North Carolina to Georgia); Mottled Duck (Kansas; nesting in Arkansas); Black-bellied Whistling-Duck (Iowa's eleventh and twelfth; Indiana's second; one in Kansas). What Sandy Williams in the New Mexico regional report calls the "continued northward expansion by warm-country species" would seem to be spilling out into the Not-At-All-Square states as well, with outlandish vagrants by any standards: an adult male Varied Bunting at Siesta Key, Florida 1 June; an adult male Broad-billed Hummingbird on the Outer Banks of North Carolina 15 July; a Neotropical Cormorant crossing state borders between Maryland and Virginia on the Potomac River between August and November. And, as

if to underscore the pattern to those who might have overlooked it in June and July: an August White-eared Hummingbird and a November Short-tailed Hawk in Michigan. That's *Michigan*. In *November*. As Johnny Carson was fond of saying: "That's wild. This is some crazy stuff."

We are accustomed to the birds of continent's center appearing on both coasts. The Square States' signature species make headlines mostly when they turn up far out of range, often but not always coastally: this season's Scissor-tailed Flycatchers in the Yukon Territory, New Brunswick (three!), Montana, Maine, Ohio (two), and Colorado; or Sage Thrashers at Cabot Head, Ontario and Churchill, Manitoba; or Western Kingbird in the Northwest Territories, Pennsylvania, and Churchill; or White-winged Dove everywhere: Tennessee's third, Minnesota's and British Columbia's eighth, Oregon's ninth, plus two birds in Michigan, five in Nebraska, and a possible nesting in Missouri and Arkansas. Likewise, we are comfortable with Tamaulipan birds tip-toeing across the Rio Grande into Brownsville (which this summer had the first documented U.S. nesting of Gray-crowned Yellowthroat since 1894) or nearly so (confirmed nesting of Stygian Owl in Tamaulipas represented the first state record of the

species; Texas currently has two records). But we are arguably ill-prepared—both as field folks who are looking and listening for particular species and as people who experience a rush of adrenaline when something unusual appears in our field of view—for White-eared Hummingbird or Short-tailed Hawk in Michigan, much less on that state's Upper Peninsula, a stone's throw from Canada, and much less in November. (One has to wonder where the Tropical Parula was hiding in Michigan in 2005.) It may seem a trivial activity to reflect on our pre-



Figure 3. This Audubon's Shearwater was deposited on Kentucky Lake, Livingston and Marshall Counties, Kentucky by the remnants of Hurricane Dennis on 12 July 2005; it represents the first confirmed record of the species for interior North America. Image from videotape by David Roemer.

paredness for extralimital birds, whether intellectual or emotional. But in fact, many identifications of birds are based on expectations, and many unusual birds are discovered by people who are prepared to look for and to document birds that others would not expect and thus often also overlook even when they see them. This essay is in part an exercise in expanding our expectations such that all of us are able to refine our field birding: over the years, we pay careful attention to the changes in bird distribution and so look carefully at each frigatebird, each female teal, each flycatcher in order to rule out species that to less-prepared birders would seem far-fetched. In doing so, we try to explain how an unusual bird might find its way out of range—creating maps of "vagrancy shadows" to account for a Dark-sided Flycatcher on Bermuda; or showing the path of a hurricane inland; or plotting the autumn movements of Cave Swallows against weather maps. But the wandering Madrean birds of 2005 seemed both simple, in following the mountains northward, yet terribly unpredictable, in finishing the year so very far from home. Were the Michigan birds exceptional "reverse migrants," as we like to call them, birds whose faulty orientation took them northeastward rather than southwestward in autumn?

The greater context for the surprising birds of summer 2005 is a familiar one in this journal: global climate change. "It's simple physics," as one climatologist, Dr. David Viner of the Climatic Research Unit at the University of East Anglia, U.K., was quoted by BBC news this summer: "more greenhouse gasses in the atmosphere, emissions growing on a global basis, and consequently increasing temperatures." This Madrean season could, indeed, be considered a pedestrian set of observations, as something neatly predicted by ornithologists studying global climate change, after all—hardly surprising. But for those of us who have watched birds for decades, disbelief at the changes we are witnessing in bird distribution is something we experience nearly every time we log on to the computer and surf the web. The larger picture within the United States and Canada may not be as splashy as mangos and violet-ears (recorded this June in Texas) or other hummingbirds found in preposterous places, but it's pretty splashy: Least Bittern setting up camp in Idaho (Figure 2) and Boulder County, Colorado, nesting pairs in southern Nevada and eastern California,

"healthy" numbers across Missouri, Iowa, Illinois, and Indiana, and 60 calling males in the Québec portion of the Lake Champlain watershed; Blue Grosbeak and Summer Tanager creeping northward in the Midwest, Pennsylvania, and southern New England; Blue-gray Gnatcatchers cutting a path northward through the continent's center; and subtle, steady northward movements through wide areas of the West by Western Scrub-Jay, Lesser Goldfinch, Bush-tit, and Bewick's Wren. The signs of our own montane, if not Madrean, changes may already be all around us.

In closing, we should take note that not all vagrants to the Square States are coming from the south: the American Three-toed Woodpecker in Morton County, Kansas 3-9 July was a first for the state. If there is a moral to this summer's story: Some of the continent's most outlandish birding surely happens on its fringes, but the heart of the continent should never be underestimated. A Three-toed may not be an Ivory-billed, but, you know: I would have been delighted to find this little bird, busily scaling bark at a busy campground over the Independence Day holiday. And, yes, it was critically and patriotically identified as an *American* Three-toed. Pass the barbeque and the freedom fries, please.

Seabirds, hither and yon

Die-off in the Atlantic

Beginning about 9 June and continuing through early August 2005, over 900 seabirds—mostly shearwaters—turned up dead or dying on Atlantic beaches between Florida and Massachusetts. The bulk of the birds came from the Southeast, but significant numbers (78 shearwaters) came from as far north as Maryland/Virginia. Observers on populated barrier islands in the Southern Atlantic Bight (such as Hilton Head, South Carolina) were the first to notice the phenomenon, which peaked from late June through the 4 July holiday period. Most of the afflicted birds (about two-thirds) were Greater Shearwaters, a species prone to periodic die-offs when prey items are scarce, but Sooty, Manx, Audubon's, and Greater Shearwaters were also recorded, as well as a Northern Fulmar and a few Wilson's Storm-Petrels. Just under half of the birds recorded came from Florida, especially Volusia and Brevard Counties, where the peak count was of 150 shearwaters in a single day in late June, and a tally of 291 Greaters came from Volusia beaches 21-27 June; Kiawah Island, South Carolina had up to 50 in one day, 13 June. In the course of scouring beaches for birds, volunteers found dozens of Northern Gannets, a Brown Booby (South Carolina), and many Common Loons but not in unusually high numbers for those species.

Hundreds of these birds were admitted to wildlife rehabilitation or veterinary hospitals. As far as is known, all birds perished, even those in rehabilitation. Necropsies performed on several dozen carcasses submitted to the Southeastern Cooperative Wildlife Disease Study, the University of Georgia College of Veterinary Medicine, the USGS's National Wildlife Health Center, and the National Oceanographic and Atmospheric Administration revealed that almost all birds were emaciated, but some had a fair amount of fat on the body, suggesting that starvation was not necessarily the cause of death for all individuals, and indeed it is not unusual for Greater Shearwaters to be rather lean on arrival in U.S. waters in spring. Tests (still in progress) have ruled out Newcastle disease, West Nile virus, avian influenza, as well as poisoning by organochlorines, heavy metals, and algal biotoxins (such as those found in red tide), as culprits. (Some of the gannets tested showed signs of neurological impairment, and histopathology revealed unusual lesions on some birds' brains.)

Studies of this phenomenon are ongoing (tests for viral, bacterial, and fungal infections in particular), and no clear cause has been determined for this die-off, which is comparable to similar events from 1969 and 1975. It is certainly true that changes in one or more ecologic parameters (seawater tem-

perature, food resources, prevailing wind direction, etc.) can have disastrous effects on long-distance migrants such as Greater Shearwater, which cross the food-poor, wind-poor tropical Atlantic doldrums en route from Tristan da Cunha and Gough Islands to nonbreeding grounds in the northern North Atlantic. If the shearwaters arrive in the Southern Atlantic Bight to find little food and northerly winds that prevent them from continuing northward in search of food, the unfortunate result would likely be starvation.

What was missed, again, in this mortality event was an opportunity to obtain a good set of specimens for further study. Necropsied birds are usually not suitable for preparations as study skins, and because many of the birds found were long dead or waterlogged, their skins were typically incinerated (for fear of contagion) or otherwise destroyed if tissue samples could not be obtained. Several hundred shearwater carcasses went unidentified to species, though a competent birder probably could have identified many of these; and the Cory's Shearwaters found went unidentified to subspecies, a job for an ornithologist but a subject of particular interest, given the pending A.O.U. split of Cape Verde Shearwater (*Calonectris edwardsii*) from Cory's, as well as the need for resolving the distribution in our waters of both the nominate subspecies and *borealis*, the latter apparently the more numerous. Although status and distribution of seabirds should not be based on tideline corpses, assessing subspecies of Cory's Shearwater specimens is a good example of a potentially interesting field project that does not rely on collecting live birds at sea.

North of most of the season's tubenose news, Wayne Petersen reports that New England's summer saw another paucity of procellariids in inshore waters, apparently because small baitfish were again in short supply. "Based upon the modest totals of shearwaters on Stellwagen Bank and in the waters east of Chatham, Massachusetts in early June, one gets the impression that soon after their arrival from the Southern Hemisphere, austral-breeding seabirds found little to eat," Petersen writes, and that after an early (11 June) tally of hundreds of shearwaters, these birds went "essentially unreported for the rest of the period, suggesting that [they] may have quickly dispersed afterward." Arctic and Common Terns, some 3500, also failed to raise any young to fledging at Machias Seal Island, apparently for want of prey.

Not all seabird sightings along the Atlantic coast were of dead or dying birds, but it was clear that many species were recorded in inshore waters in much higher-than-normal numbers. At Cape May, New Jersey, sea-

watchers were rewarded with frequent studies of Sooty, Greater, and Manx Shearwaters—and even an Audubon's Shearwater on 26 July—among the gull flocks near shore. Some 200 large shearwaters (at least 60 Cory's) off John Lloyd State Park in Florida 24 June and at least 250 Cory's off Long Island's Robert Moses State Park 24 July must have been extraordinary sights; two Manx Shearwaters were seen at the latter site five days later, and three were off Jones Beach, Long Island 7 July. Two Manx off Norwalk, Connecticut 10 July represented just a second report of the species for the state; two visible from Rye, New York 15 June were also on Long Island Sound and were probably different individuals. Inshore counts of Wilson's Storm-Petrels were high from New Hampshire coast (1000+ on 9 July) to Long Island Sound (100+ in early July) to Chesapeake Bay (hundreds in July). In the North Atlantic, where South Polar Skuas are scarce, it is easy to forget that this species depends heavily on the shearwater flocks for its livelihood; singles seen just off the beach in North Carolina in June and July were probably following the shearwaters inshore.

Die-off in the Pacific

Along the U.S. Pacific coast, from spring through early July, there was a lack of upwelling winds, very high sea surface temperatures, a dearth of phytoplankton, and thus a scarcity of krill and other marine life. Among birds, the results of this food-chain collapse looked very like those in extreme El Niño events. There was especially high mortality among piscivores, reflected by extremely large numbers of beached seabirds. Hundreds of Common Murres turned up emaciated and dying on beaches in July; mortality among Brandt's Cormorants was 50-80 times the norm. In Oregon, Common Murres failed to breed, and in Washington, the few that bred did so a month late. In California, biologists with PRBO Conservation Science documented complete breeding failure of Cassin's Auklets on Southeast Farallon Island, a place where seabirds have been monitored for nearly four decades and where the event was called "unprecedented." Offshore, counts of Marbled Murrelet, Cassin's Auklet, and Rhinoceros Auklet were depressed, but Xantus's Murrelets and Brown Boobies were noted off Washington/Oregon, as might be expected in a warm-water event, and many seabirds not expected in the Puget Trough were observed there. A remarkable tally of 49 South Polar Skuas came from nearshore waters off the Strait of Juan de Fuca over a week-long survey (5-12 June); the species is normally observed a month later, and its early arrival in such numbers was perhaps related to the scarcity of prey and of seabirds offshore.

A Bane of Hurricanes: the Summer Preamble

The Square States, remote from salt water, rarely experience the breezes of a hurricane and thus almost never record species displaced from Gulf of Mexico or Atlantic waters. But landlocked states east of the Mississippi River have, until recently, also had little familiarity with these storms and the birds they drive inland. As of the early twenty-first century, their shelter from the storms would seem to be ended.

The autumn-season essay will review the record-breaking tropical storm season in detail, including some very unusual bird records. Although this summer's storms supplied some areas with needed rainfall, they damaged a great variety of habitats important to nesting, migrating, and wintering birds. The storms' history will ever be overshadowed by the monster hurricanes that followed them, but the summer storms were notable in their own right—never in recorded history (since 1886) had seven tropical storms formed before August. The debate continues about the connection of increasingly frequent (and stronger) Atlantic and probably also Pacific tropical cyclones with rising sea surface temperatures, but one scientist, Kerry Emanuel (2005), finds that such storms have increased in intensity and duration by about 50 per cent since the 1970s, corresponding to increases in the average temperatures of the ocean surface and to increases in average global atmospheric temperatures in the same period. Some scientists, notably Christopher Landsea (2005) with NOAA, dispute the findings because of Emanuel's treatment of mid-century storms, for which data are incomplete. Other scientists, using computer models, suggest that increases in hurricane intensity and duration will not be noticeable until about 2050. In 2005, that was a hard argument to sell.

Tropical Storm *Arlene*, which went ashore on the Florida panhandle on 11 June, was the first of the six tropical storms that came ashore in June and July, two of which, *Dennis* and *Emily*, were major hurricanes—the largest number of major (Category 3+) hurricanes ever recorded in July. Hurricane *Cindy*, which hit southeastern Louisiana on 5 July, was a Category 1 storm. Few storm-displaced birds were reported as a result of the weaker storms. A Band-rumped Storm-Petrel and 45 Sooty Terns were noted in Santa Rosa County, Florida as the remains of *Cindy* passed 6 July; a Cory's and two Audubon's Shearwaters on Texas beaches and a Brown Noddy at Padre Island Nation-

al Seashore 21 July were the only reports from *Emily*. The big bird storm of the summer was Hurricane *Dennis*, which hit less than a week after *Cindy*. *Dennis* was an important storm from a historical perspective: it represented the earliest formation of a fourth tropical cyclone as well as the strongest hurricane ever to form before the month of August. After striking Cuba twice as a Category 4 storm (with winds just under Category 5 strength), its track took it to beaches wrecked by *Ivan* less than a year earlier, along the Alabama–Florida line, where it made landfall as a Category 3 storm on 10 July. From there, it moved up through Alabama, into western Tennessee and Ken-

Noddies along various Gulf and Atlantic coast sites in Florida, there were reports from nine states of 130 displaced Sooty Terns (Table 1), probably just a small proportion of the Sooty Terns actually driven inland. As is typical, Sooties appeared for a shorter stay in areas near the point of landfall and lingered a bit longer (or were found later) in the states farthest from landfall: Illinois, Ohio, and Pennsylvania. Two reports of inland Bridled Terns were far more unusual: one at Pickwick Lake, Tennessee 11 July and two at Mermet Lake, Illinois 12 July—both potentially first state records. This skewed Sooty:Bridled ratio is expected; Bridled Terns seem not to be displaced as far inland (or as often far inland) as Sooties, though the species is usually abundant in the Gulf of Mexico and Gulf Stream, at least in late summer and fall. (The Bridled Tern visiting a Bird Island, Massachusetts ternery in June was a true rarity—and had no association with a tropical storm.) Also far rarer than Sooty far inland, at least in the context of these hurricanes, single Royal Terns were noted 11 July on Pickwick Lake, Tennessee; in Wilcox County, Alabama; at Lake Walter F. George, Georgia; and in Henry County, Alabama; four more were present that day at Lake Seminole, Georgia. As usual, a scattering of several dozen Laughing Gulls and various other terns (inland Common in Mississippi, two Least in Georgia) were probably connected to the storm's passage. Single Parasitic Jaegers inland—on Pickwick Lake, Tennessee 11 July, on Seminole Lake, Georgia the same day, and at Presque Isle State Park, Pennsylvania (and Conneaut Harbor, Ohio) 17 July—were probably best explained as storm waifs: mid-summer jaegers in these parts are rare and essentially never Parasitics. Inland Willets in Alabama 11 July and Georgia

10-11 July were not identified to subspecies; they may have been displaced nominate birds from the coast or perhaps just as easily storm-grounded migrants of the prairie race, *inornatus*.

Pelecaniforms and other problems

Gut-wrenching as these hurricanes may be, for birds and people alike, we birders are at minimum able to understand, if only crudely, one relationship between bird movements and weather, something that eludes us in so many other cases of bird distribution. However, not all seabirds' movements can be accounted for by studying weather charts. Extralimital appearances of frigatebirds, pelicans, and sulids are often more difficult to connect with tropical storm activity than are those of shearwaters or Sooty Terns, in

Table 1. Sooty Terns recorded inland in the United States as a result of Hurricane *Dennis*, 10-24 July 2005.

2	Newnan's L., Alachua, FL	10 Jul
17	Henry, AL	11 Jul
1	Lee, AL	11 Jul
4	Chickamauga Dam, Hamilton, TN	11 Jul
1	Tallahassee, Leon, FL	11 Jul
14	Pickwick L., Hardin, TN	11 Jul
26	L. Seminole, GA	11 Jul
17	L. Walter F. George, GA	11 Jul
5	Colbert, AL	12 Jul
4	Tishomingo, MS	12 Jul
1	Gibson, TN	12 Jul
1	J. Percy Priest L., Davidson, TN	12 Jul
1*	Putnam, TN	12 Jul
6+	Kentucky L., KY	12-15 Jul
1	Green Turtle Bay, KY	12 Jul
2-3	Smithland Dam, KY	13 Jul
1	near New Richmond, Campbell, KY	12 Jul
12	West Point L., GA	12 Jul
5	Lauderdale/Lawrence, AL	13 Jul
4	L. Oliver, near Columbus, GA	13 Jul
1*	near Nashville, Washington, IL	13 Jul (second state record)
1	Eastfork Lake S.P., Clermont, OH	13-19 Jul
2*	Franklin, FL	14 Jul
1	Carlyle L., IL	17-25 Jul (third state record)
1	Conejohela Flats, Lancaster, PA	24 Jul

Asterisks indicate dead birds.

tucky 11 July, and the next day into southern Illinois, where the tropical depression stalled for a bit before moving eastward. It was the first taste of a hurricane to transit Ohio in 50 years.

If for no other reason, *Dennis* will be remembered for its rarest waif, a beautifully documented Audubon's Shearwater on Kentucky Lake, Kentucky 12 July (Figure 3). To put this in perspective: the species has never even been reported inland, much less photographed; and: the only other tubenose associated with this storm inland was an unidentified storm-petrel at West Point Lake, Georgia 11 July. Landfaling Gulf hurricanes, if not notable for entraining tubenoses, are every bit as tern-rich as Atlantic hurricanes. In addition to 144 Sooty Terns, 127 Bridled Terns, and nine Brown

part because they wander widely outside the context of such storms, in part because they often linger and wander for long periods after being so displaced; the same is true of Laughing Gulls, Wood Storks, Roseate Spoonbills, herons and egrets, and, more rarely, flamingos. Hurricane *Dennis* was clearly responsible for the two-dozen Magnificent Frigatebirds recorded in Florida's interior 10 July, as well as the 50 or more seen coastally around Alligator Point, Florida the next day. Adjacent Georgia had 13 frigatebirds inland 9-11 July. But the species also turned up well out of range outside the context of tropical storms: three along the North Carolina coast (5-23 June), singles offshore in South Carolina and Georgia (15 and 23 July, respectively), one at the east end of Long Island, New York (28 July-early August), two at Cape May (19-30 July), and one at South Beach, Massachusetts (22 July). Were some of these later July birds drifters displaced by *Dennis*?

Brown Pelicans in the continent's interior have been making headlines for several years now. Single juveniles at Chickamauga Dam, Tennessee 11 July (and later) and at Lake Allatoona, Georgia 12 July were said to be connected to *Dennis*, but one at Lake Monroe, Indiana 29 July and one that traded between Minnesota (its first) and Iowa (its tenth) on Spirit Lake 14-27 July (a bird that turned up at month's end at Saylorville, Iowa) were not mentioned in connection with that storm. Once again this summer, Brown Pelicans from the Gulf of California began to wander: at least 65 were found in Arizona (north to Roosevelt Lake), hundreds were in southern California at the Salton Sea (and dozens scattered through desert and even mountain lakes to the north), and over 60 in the Mexicali Valley of the Baja California Peninsula. Three single juvenile Brown Pelicans that showed up farther east—17 June in Clark County, Nevada; mid-July in El Paso, Texas; 10-18 June in Weld and Larimer Counties, Colorado—were almost certainly not storm-driven and probably came from the Gulf of California, though distinguishing juvenile *californicus* from *carolinensis* (or even the small nominate subspecies) is not possible in the field, at least on current knowledge, as Chris Wood, Tony Leukering, and Bill Schmoker note. Juvenile Brown Pelicans at Lake Livingston in eastern Texas 9 July and the El Paso bird (1190 km away at the state's other end) were possibly of different taxa. A juvenile Brown Pelican 9 July in Carter County, Oklahoma was, well, a toss-up.

Pelicaniforms almost never seen inland or from mainland in the United States, tropicbirds made news in two places. Two White-tailed Tropicbirds at Florida's Boynton Inlet 9 July were clearly moved inshore by *Dennis*,

but the Red-billed Tropicbird seen 9-11 July in the Gulf of Maine—flying among breeding Common Murres—could not be tied to any storm. More bizarre still were two first state reports for Northern Gannet: in western Arkansas at Bull Shoals Lake 25 July and in eastern Oklahoma at Broken Bow Lake four days later. These locations are near enough to one another (about 300 km) that the same bird could be involved. But who thinks of gannets in Arkansas or Oklahoma? (And what a hat-trick for the square-state-lister: "Yeah, I saw the Three-toed in Kansas, the gannet in Oklahoma, and the Ivory-billed in Arkansas. It was wild. Some crazy stuff.")

Projects aplenty

Speaking of state lists, 2005 was a good year for Big Years, an undertaking that rarely gets much notice in these pages but one that is responsible for many of the field-hours that produce the publishable records in these pages. In Michigan, it was a good year to do a Big Year, and regional editor Adam Byrne topped his own (and the state's) highest mark by seeing, and documenting, 328 species there. Ricky Davis, regional editor for fourteen years in the Southern Atlantic region, closed the year with 348 species in North Carolina, highest ever for that or any surrounding state. Birders who take on ambitious year-long projects such as these are often underappreciated by scientists who study birds, or even dismissed as "hobbyists." But these amateurs—whose knowledge of bird distribution at the state level is encyclopedic, whose instincts about when and where and under what weather conditions to look for migrants and vagrants are honed through years of experience and study—are often the first to discover a new aspect of bird distribution, one that can sometimes then be studied by ornithologists. This is just as true offshore as onshore, just as true in the heart of the continent as on its periphery. To be sure, ornithologists in the field make exciting, serendipitous discoveries that expand our knowledge of bird distribution as well—quite often of birds that do not form the subject of their field study. Flammulated Owl, known only as a migrant in Wyoming until recently, was the subject of a search by Rocky Mountain Bird Observatory team this summer, which found 10 territorial birds in the Battle Creek drainage of that state. Biologists with the U.S. Geological Survey counted 410 Kittlitz's Murrelets off Unalaska Island, Alaska in June—a fine tally for this declining seabird. Biologists conducting a long-term study of seabirds on the Coronado Islands off Baja California found a Cory's Shearwater returning to an apparent nest site between March and October 2005—a long way from home. Was it originally displaced

to the Pacific Ocean by a hurricane that crossed the Central American isthmus?

For most of us, Big Years and long-term research projects are beyond the realm of possibility; our birding takes place in moments stolen from a life full of other activities and demands. But the possibility of fascinating discoveries is not only for the hard-core. The Important Bird Areas program of National Audubon Society has many volunteer projects on the state level that have turned up some marvelous birds and generated a wealth of new information about scarce nesting species. Among the results of such projects published in this issue are raptor nest searches in Iowa and a Golden-winged Warbler search in western Virginia. Breeding Bird Surveys (and Atlases) are superb ways to maximize field time in a way that challenges the senses and invariably produce surprising birds. This summer, the ongoing Ontario Breeding Bird Atlas project added a new breeding species to the provincial list—Ross's Goose, of which two nests were found near Cape Henrietta Maria. This year also marked publication of the *Arizona Breeding Bird Atlas*, an incredible resource for people curious about the avifauna of that handsome state. The 2005 nesting season was the final one for the New York State atlas and the first year for the Ohio atlas. As Victor Fazio writes of the latter project: "The initiation of the second Ohio Breeding Bird Atlas project in 2006 comes at a time well suited to documenting in detail whether these sporadic reports [of extralimital southern birds] represent real range expansions in the wake of what has amounted to a fifteen-year heat wave in the Region." Whether you're in Ohio or anywhere else, jump feet-first into an atlas project or a B.B.S. route: you won't believe what's out there.

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