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A Cargo of Birds to Arkansas, the Hurricanes in 2008 and the Swept Clean Hypothesis

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Abstract

Three hurricanes in the hurricane season of 2008 brought to Arkansas several unusual marine and other birds from southerly locations. There were 10 species noted, totaling 44 individual birds. Sooty Terns, numbering 15, were the most numerous. Laughing Gulls were next in abundance. In the mix of birds there was only 1 new species for the state, a Least Grebe. The hurricanes brought vastly different cargos of birds, and two hypotheses relating to how hurricanes transport birds are proposed. The findings supported the "swept clean" hypothesis over the "blown through" hypothesis.

Introduction

Hurricanes making landfall on the northern coast of the Gulf of Mexico often displace oceanic birds to unexpected locations in the interior of the USA. This phenomenon has happened in the past in Arkansas with respect to several of these species: Magnificent Frigatebird (*Fregata magnificens*), Laughing Gull (*Larus atricilla*), Bridled Tern (*Onychoprion anaethetus*), Sooty Tern (*Onychoprion fuscata*), and Black Skimmer (*Rynchops niger*) (James and Neal 1986). Other descriptions of marine birds displaced by hurricanes have been published especially pertaining to the east coast of North America (Tuck 1968, Davis et al. 2004, Davis et al 2007), but also with respect to the interior in Kentucky, Tennessee, and Oklahoma (Sloan and Palmer-Ball 2005, Heck and Arbour 2010).

The hurricane season in the late summer and early fall of 2008 produced an unprecedented event of this kind in Arkansas in terms of high numbers of extralimital species found and high numbers of displaced individual birds encountered. These sightings were quickly posted by bird watching enthusiasts on ARBIRD-L, which is a web based list serve dedicated to the discussion of Arkansas birds. Material for this work was gleaned from ARBIRD-L.

In the text that follows, individual bird sightings are sometimes followed by Form numbers. These are

designations that refer to the numbering system used in identifying documentation forms describing bird sightings that are submitted to the Curator of the Bird Records for the Arkansas Audubon Society. The records in 2008 described here, plus the previous records since 1985 are listed on the web site of the Arkansas Audubon Society (AAS 2010). Photographs mentioned in this manuscript are archived by the Curator.

The Hurricanes

There were 3 hurricanes of note in 2008 that made landfall on the Gulf Coast south of Arkansas and, in progressing inland, either impacted the state weather wise and/or brought unusual birds. These hurricanes were named Dolly, Gustav, and Ike. The main characteristics of the 3 hurricanes are summarized in Table 1. When hurricanes accomplish landfall south of Arkansas on the Louisiana and eastern Texas coasts the characteristic strong counter clockwise winds that circle the center of these storms would send a forceful stream of air directly northward toward Arkansas. This trajectory is capable of transporting birds to the north to Arkansas even when the storm center misses the state.

Dolly—Hurricane Dolly, the weakest of the 3, entered the Gulf of Mexico on 22 July after crossing the northeastern tip of Yucatan Peninsula. From there it journeyed across the western Gulf to reach southern Texas as a category 1 hurricane accompanied by 137 km/hr (86 mph) winds. It made landfall on 24 July 2008 in the vicinity of South Padre Island on the Texas-Mexico boundary (Pasch and Kimberlain 2009). From there it coursed inland to the northwest, through northern Mexico, then northward across New Mexico and dissipated at the tip of the Oklahoma panhandle. It did not come close to Arkansas, yet it seemingly delivered a new avian species to the state (see below).

Gustav—Hurricane Gustav arrived from the Caribbean south of Cuba and entered the Gulf after crossing the western tip of Cuba. It was a category 2 hurricane with 167 km/hr (104 mph) winds when it

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Table 1. Characteristics of the three hurricanes in 2008 and species and numbers of unusual birds transported to Arkansas.

	Hurricanes		
	Dolly	Gustav	Ike
Landfall date (2008)	22 July	1 Sept	13 Sept
Landfall region	TX-Mexico	SE LA	SE TX
Landfall wind speed—km/hr (mph)	137 (86)	167 (104)	175 (109)
Crossed Arkansas	n/a	3&4 Sept	14 Sept
Arkansas wind speed—km/hr (mph)	n/a	37 (23)	50 (31)
Arkansas wind gusts—km/hr (mph)	n/a	77 (48)	90 (56)
Birds counted:			
Least Grebe	1	0	0
Magnificent Frigatebird	0	4	0
Laughing Gull	0	14	0
Royal Tern	0	2	1
Bridled Tern	0	1	0
Sooty Tern	0	15	0
Black Skimmer	0	2	1
Pomarine Jaeger	0	1	0
Parasitic Jaeger	0	1	0
Cave Swallow	0	1	0
Total birds counted	1	41	2

made landfall on 1 September 2008 on southeastern coastal Louisiana coursing inland to northwestern Louisiana and southwestern Arkansas (Beven and Kimberlain 2009). From there it journeyed northward through western Arkansas and then across the northwestern part of the state into Missouri. Gustav crossed Arkansas on 3 and 4 September 2008, producing sustained winds of 37 km/hr (23 mph), gusting to 77 km/hr (48 mph). On 5 September its center was over central Illinois

Ike—Arriving from the Atlantic, Hurricane Ike, the strongest of the 3, missed the Caribbean instead raked much of Cuba, then coursed over open water to southeastern Texas. It was a category 2 hurricane with 175 km/hr (109 mph) winds when on 13 September 2008 it made landfall on Galveston Island in southeastern Texas (Berg 2009). Inland from there it went very rapidly north through eastern Texas to southwestern Arkansas and then to northwestern Arkansas and into Missouri. Ike crossed Arkansas on 14 September 2008 with sustained winds of 50 km/hr (31 mph), gusting to 90 km/hr (56 mph). A day later

on the 15th its center was over Lake Huron, Ontario, Canada.

In the Atlantic Ike's diameter was the widest tropical storm ever recorded. It became the worst hurricane ever in Texas and scored high on several measures of force and destruction. It produced flooding and damage through the Midwestern states producing 129 km/hr (80 mph) winds up the Ohio River Valley (Lehman and Brinkley 2009).

Results

There were 10 avian species totaling 44 birds reported in Arkansas that normally are found in association with the Gulf of Mexico and are unusual in Arkansas, including 1 new species for the state. Below are the main species that appeared in the state coincident with coastal hurricane events in 2008. The avian information is summarized in Table 1.

Least Grebe (*Tachybatus dominicus*)—This species, a new bird for Arkansas (James et al. 2009), was discovered at the State Fish Hatchery at Centerton,

Benton Co., on 2 August 2008 (Form 1004 and photograph). This date was ten days after Hurricane Dolly landed from the Gulf at the Texas-Mexico boundary in the vicinity of South Padre Island. Although the inland track of Dolly went far to the west of Arkansas, the coastal region impacted by Dolly is a well documented nesting area for the freshwater Least Grebe, which extends as far north as southern Texas (Storer 1992). There have been scattered records further northward in recent years (Anonymous. 2008). The strong winds that blew through northwestern Arkansas on the night of 30-31 July (D. James, personal observation) could have moved the grebe to Arkansas after first being blown inland by Hurricane Dolly. The fierce counterclockwise winds associated with hurricanes, described above, initially would have sent the grebe toward Arkansas.

The Least Grebe was the only species noted that could have been displaced to Arkansas after Hurricane Dolly. Of the remaining 9 species that are accidental in Arkansas, all were associated with the passage of Hurricane Gustav and only 2 individual birds of the 9 appeared with Ike.

Magnificent Frigatebird (*Fregata magnificens*)—This is an extralimital species that arrived in Arkansas on the winds of Hurricane Gustav. There were three sightings on 2 September, at the following locations: Grand Lake in Chicot Co. White Oak Lake in Ouachita Co. (Form 1027 and photograph), and Lake Millwood in Hempstead/Little River cos. The one at Lake Millwood was joined by a second bird on 3 September thus totaling 4 birds for the season. There were 11 previous Arkansas records, often associated with coastal hurricanes (James 1964, James and Neal 1986, James et al. 1994, 2007). The species nests throughout the Caribbean and at a few locations in the southern Gulf of Mexico (Diamond and Schreiber 2002).

Laughing Gull (*Larus atricilla*)—There are many past records of this gull in Arkansas, often after hurricanes (James and Neal 1986, AAS 2010). This is consistent with its pattern of wandering north of its normal range on the northern Gulf Coast (Burger 1996). Considering its normal range, it is a prime candidate for being transported northward by hurricanes. Significant in this regard were the 12 birds seen on 2-7 September at Lake Millwood, (photograph), 2 at Lake Dardanelle, Yell/Pope cos., on 4-6 September, associated with the winds of Hurricane Gustav crossing Arkansas. Because almost all previous sightings of Laughing Gulls in Arkansas were of scattered single birds, the relatively high numbers found in early September 2008 implicates a massive

transport of birds from the Gulf shores by Gustav. Totaling 14 birds, it was the most numerous Gulf shoreline species found in Arkansas during the hurricane season in 2008.

Royal Tern (*Sterna maxima*)—The Royal Tern is another species that normally is confined to coastal areas, but can range from the Gulf Coast to the eastern coast of North America, and is known to journey inland especially after tropical storms (Buckley and Buckley 2002). Two arrived with the aftermath of Gustav winds, 1 at White Oak Lake on 2 September, the other at the State Fish Hatchery at Centerton on 4 September. Another one was found at Lake Millwood, Little River Co., on 16 September, which means it probably was transported by Hurricane Ike. There were previously only 5 reports of Royal Terns in Arkansas (James et al. 1994, 2007, AAS 2010).

Bridled Tern (*Onychoprion anaethetus*)—This tern is another oceanic bird that seldom ventures into the interior of North America (Haney et al. 1999). One was observed on Lake Millwood on 3 September carried by Gustav winds (Form 1021 plus photograph). This is only the second record for Arkansas. The previous one, also found at Lake Millwood, was observed on 7 September 1985 in association with Hurricane Elena (James and Neal 1986).

Sooty Tern (*Onychoprion fuscata*)—By far the greatest influx of marine birds associated with Gustav was exhibited by the sightings of 15 Sooty Terns at wide ranging locations in Arkansas, as follows listed by date: 2 on 2 September at Lake Chicot, Chicot Co., and 1 at White Oak Lake; on 2-7 September, up to 9 at Millwood Lake, and 2 at Lake Dardanelle; on 6 September 2008, 1 at Beaver Lake, Benton Co (Forms 999, 1024, 1025 plus photograph). One was found dead in emaciated condition at Lake Dardanelle by R. Wiedenmann on 8 September (specimen now in the Museum of Natural Science Cat. No. LSUMZ 181469 at Louisiana State University.) There are only 3 previous records of Sooty Terns in Arkansas, all hurricane related (James and Neal 1986, AAS 2010). Sooty Terns are essentially a Caribbean bird (Schreiber et al 2002).

Black Skimmer (*Rhynchops niger*)—Three Black Skimmers, a Gulf shoreline bird (Cochfeld and Burger 1994), were observed in Arkansas associated with the hurricane-generated winds in 2008 passing through Arkansas. Two were found with respect to Gustav: an adult bird on 6 September and an immature on 7 September, both at Lake Millwood (Form 1026 and photograph). Another bird was found on 14 September, a date that coincides with the arrival of

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winds from Hurricane Ike in the state. This skimmer was discovered on the Arkansas River, 2 miles south of the David D. Terry Lock and Dam, Pulaski Co. Previously there were 5 skimmer records in Arkansas (James and Neal 1986, AAS 2010).

There were 3 other species observed with the hurricanes in 2008 that could have been moved to Arkansas. However, these birds are not regularly associated with hurricane winds through the state, and although they are uncommon in occurrence, they are more regular in occurrence than the species named above.

Over the years, 2 fall migrants have been noted at Lake Millwood that nest in the Arctic and are headed to the Gulf of Mexico. Single observations of each species were made there again in the regular fall season of migration in 2008, but this time when Gustav impacted Arkansas. This suggests that they could have been brought from the Gulf on the winds of Hurricane Gustav. The rarest was one *Pomarine Jaeger* (*Stercorarius pomarinus*), (Form 1023 plus photo) which was only the third record for the state (James and Neal 1986, AAS 2010). One *Parasitic Jaeger* (*Stercorarius parasiticus*) (Form 1022), was at least the eighth Arkansas record (James and Neal 1986, AAS 2010). Both of these were found on 6-7 September.

Cave Swallow (*Hirundo fulva*) The breeding range of this swallow has been expanding northward in Texas and now has reached the northeastern part of the state (Koscuich et al. 2006). Recently juvenile birds and an adult have been found in spring in Arkansas (AAS 2010). One was found at Lake Millwood on 2 September 2008, possibly transported by Gustav. It was the fourth record for Arkansas.

Discussion

Three hurricanes, Dolly, Gustav, and Ike, brought unusual birds from the Gulf of Mexico and its environs to Arkansas in the hurricane season of 2008. Six species were either oceanic birds or marine shoreline inhabitants, and 2 were fall migrants possibly blown in a reverse direction. One was a bird whose northern distribution ends in southern Texas, and 1 was a bird that normally nests north to central Texas. All 10 species combined, there were 44 individual birds involved, 41 of which were associated with Hurricane Gustav, but only 1 bird arrived after Dolly and only 2 with Ike. Fifteen Sooty Terns were the most abundant, followed in numbers by the 14 Laughing Gulls.

The minimal effect of Dolly is understandable due to its relative weakness and also the fact that it missed

Arkansas. However, both Gustav and Ike were strong hurricanes and both crossed Arkansas, yet Gustav was responsible for 41 displaced birds while Ike produced only 2. Ike arrived quickly after Gustav, they were less than two weeks apart, and made landfall on essentially the same part of the Gulf coast. Perhaps the Gulf birds that were in position and therefore exposed to being transported were all removed northward by Gustav and none remained when Ike arrived shortly thereafter. This possible phenomenon could be called the "swept clean" hypothesis.

Another hypothesis pertains to the speed at which Ike went inland compared to Gustav. Gustav took two days to cross Arkansas and next day had moved only as far as Illinois. The faster moving Ike exhibited stronger winds than Gustav. It crossed Arkansas in a single day and by the next day was over Lake Huron in Canada. The opportunity to deploy its avian cargo may have been greater with slowly moving Gustav compared to rapidly moving Ike, whose high velocity strong winds could have held its displaced birds until reaching far northern localities. This possibility could be named the "blown through" hypothesis.

A test of these two hypotheses is present in the list of storm birds found in the Central Southern and Midwestern States in association with the hurricanes. The first storm Gustav brought significant numbers of hurricane birds to Arkansas, Louisiana, and Oklahoma, but even with continued heavy coverage by avian observers in states to the north plus Ontario virtually none of the storm birds were found (Lehman and Brinkley 2009). Because Gustav stalled and weakened in Arkansas taking two days to cross the state, the subsiding winds were not capable of producing a "blown through" event.

Ike was wholly different, following Gustav by less than two weeks, it maintained strong winds into the Midwestern states, crossed Arkansas in just one day and was in Ontario, Canada, the next day. Ike brought a few hurricane birds to Louisiana, especially Sooty Terns, but it was noted that Gustav produced the "greatest variety of inland pelagic birds" there (Cardiff 2009). Ike brought almost no storm birds to Arkansas (Cardiff 2009), and as with Gustav were absolutely not detected in states to the north despite extensive coverage by observers there (Lehman and Brinkley 2009). Ike certainly qualified for a "blown through" event but because no storm birds materialized in northern regions this possibility is rejected. The fact that Louisiana received relatively fewer birds and Arkansas received only two hurricane birds with Ike shortly following Gustav supports the "swept clean"

hypothesis, which suggests that few ocean and coastal birds were left by Gustav to be transported by Ike.

Heck and Arbour (2010) described the birds brought with hurricanes Gustav and Ike to southeastern Oklahoma. Their results are similar to those in Arkansas, reporting many of the same species named in the present paper plus a possible Cory's Shearwater (*Calonectris diomedea*). Most of the 36 birds observed were associated with Gustav, only 4 with Ike.

Similar support for the "swept clean" hypothesis occurred in 2005 when first hurricane Katrina made landfall at the Louisiana-Mississippi boundary on 29 August followed less than a month later by Rita landing in the same region at the Texas-Louisiana border on 24 September. Katrina transported inland "an assortment of grounded seabirds and coastal birds the likes of which had never been observed after a Gulf hurricane," whereas with respect to seabirds carried by the later arriving Rita "only a few were reported" (Dinsmore 2006). Apparently Katrina "swept clean" most the available seabirds leaving few for Rita. Therefore, based on the hurricane events described herein, it seems the "swept clean" hypothesis is supported in which the first of two closely following hurricanes removes almost all birds that are in a position to be transported inland leaving few for the one that follows. The dead emaciated Sooty Tern found in Arkansas portends the fate of the transported birds. They indeed may not survive to return to their marine environment.

The Magnificent Frigatebird is a special case. This bird is superbly designed for sailing with the wind and it does. All four hurricanes detailed here transported frigatebirds in significant numbers inland to widely distributed locations even into the northern states (Dinsmore 2006, Duncan and Duncan 2006, Cardiff 2009, Lehman and Brinkely 2009). Cardiff reports hundreds brought by Ike occurring in southern Louisiana and adjacent Texas. Frigatebirds definitely are easily blown and sail everywhere with the wind.

(We note in the Fall Migration, August to November 2008, issue of North American Birds that the numbers of storm birds reported for Arkansas differ from the numbers reported herein. Our figures were obtained from the official records maintained by the Curator of bird records for the Arkansas Audubon Society that were posted on ARBIRD-L).

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