

BIRD SIGHTINGS ASSOCIATED WITH HURRICANE DAVID

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Late in the afternoon of 4 September 1979, northward-moving Hurricane David slammed into the coast near Savannah, Georgia. That day, a Sooty Tern was sighted at Charleston, S.C., and two Magnificent Frigatebirds were seen soaring over Wrightsville Beach, N.C. During the next few days, observers at coastal localities and inland reservoirs and ponds witnessed the most significant avian "fallout" from a tropical storm or hurricane recorded in the Carolinas in this century. The purpose of this paper is to summarize all obviously hurricane-related observations in the Carolinas and to discuss briefly the notable patterns and significance of these records. (For an overview of David's fallout along the entire East Coast, see *American Birds* 34:133-160.)

HISTORY OF HURRICANE DAVID

On 25 August, in the tropical Atlantic about 2000 miles E of the Lesser Antilles (11°N, 36°W), a depression formed on an easterly wave and David was born. (See Figure 1 for path of David.) Moving westwardly, David strengthened rapidly. On 26 August, the storm had reached tropical storm intensity, and by the next day, it was already a full-fledged hurricane. Continuing WNW through the West Indies, David reached its greatest intensity—winds as high as 150 mph—and became extremely deadly and destructive when it crashed into the island of Hispaniola on 31 August. After passing over Hispaniola's mountains, David weakened to minimal hurricane strength and moved toward the United States, skirting Florida's east coast 3 September and finally going ashore near Savannah on the fourth.

David was barely of hurricane strength when it made this final landfall, and soon weakened to tropical storm status as it tracked NNE across the Carolinas 4 and 5 September (Fig. 2). Although the storm was theoretically a hurricane in lower South Carolina, no full hurricane-force winds (i.e. *sustained* winds of 74+ mph) were reported in the state. Nevertheless, David's presence was still evident across much of the Carolinas. There were very high tides and locally moderate to severe beach erosion along the South Carolina coast and extreme southern North Carolina coast. Rainfall was very heavy at some places, and there were a few scattered tornadoes. Relative to bird movement, the most significant effect of the storm was the strong easterly to southerly winds off the Atlantic (Table 1). It is noteworthy that, in general, inland points close to the storm's center experienced lower wind speeds than adjacent coastal points did. Thus, in South Carolina, Columbia's peak gust was 43 mph, but at Charleston it was 56 mph; in North Carolina, Greensboro, just east of the storm's center, had gusts to 36 mph, but Cape Hatteras, over 250 miles eastward, had gusts to 43 mph. Disparities between sustained wind speeds probably were even greater.

EXTENT OF OBSERVATIONS

Locations of all storm-related observations are shown in Figure 2. Although some of these reports represent incidental findings, it was apparent from the contents of the reports that the Lake Hartwell and Charleston areas of South Carolina and the Southport, Wilmington, Morehead City, and four inland areas of North Carolina, were all visited during and after peak storm activity by persons searching for storm waifs. At the three North Carolina localities where large numbers of subtropical terns were seen (Southport, Wilmington, and Morehead City), observers commendably recorded some interesting details of movements and activities of those birds. In addition to the local birders, observers from the North Carolina State Museum of Natural History were in

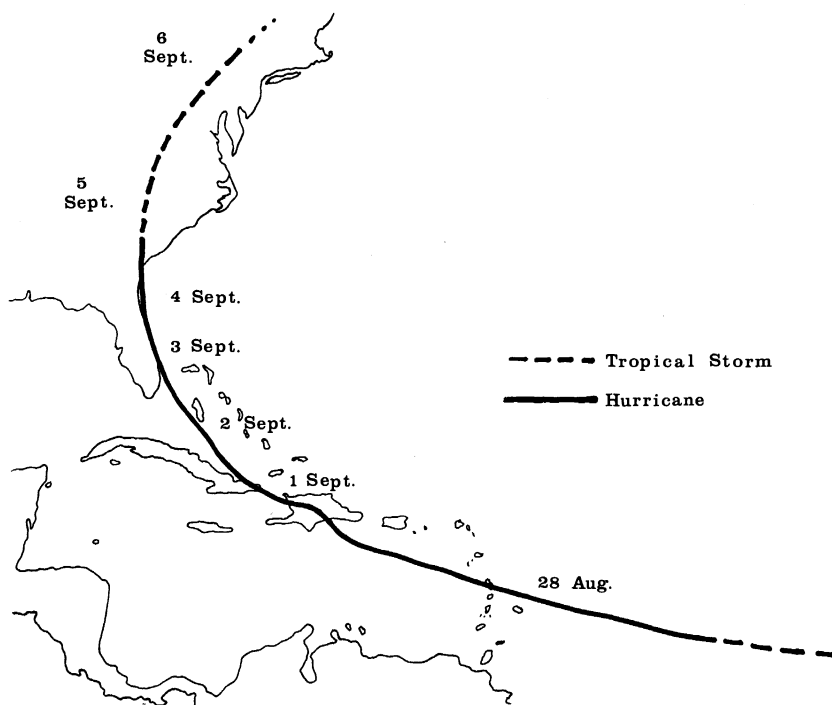


Fig. 1. Path of Hurricane David, 28 August through 6 September 1979.

the Wrightsville Beach-Fort Fisher area 6 September and the Morehead City-Atlantic Beach area 6 and 7 September to watch movements of birds and to collect storm casualties.

From August to November of 1979, Richard Rowlett conducted almost daily day-long censuses of marine mammals and birds seen from different U.S. Coast Guard cutters patrolling offshore waters from Maryland to Florida, and some of these censuses were made off the North Carolina coast just before and after David. Rowlett has kindly agreed to our publishing some of his data (Table 2) in conjunction with this paper.

Unfortunately we lack important negative information about Hurricane David observations. What areas were not visited by bird students? What areas were checked but produced no sightings of unusual birds? We ask these questions mostly in regard to North Carolina's Outer Banks and the reservoirs close to the storm's track, especially in South Carolina.

OBSERVATIONS

Included in this paper are records that logically appear to be due to David's presence. These extend from 4 September, when David's direct effects were first felt, to 9 September on land (excluding dead birds) and 10 September offshore. Interesting observations on pelagic trips off Cape Hatteras 2 September and Morehead City 3 September (Chat 44:45,49) may have been indirectly related to David. (Steady SE winds at that time may have been due to interaction between David to the south and Bermuda high pressure.)

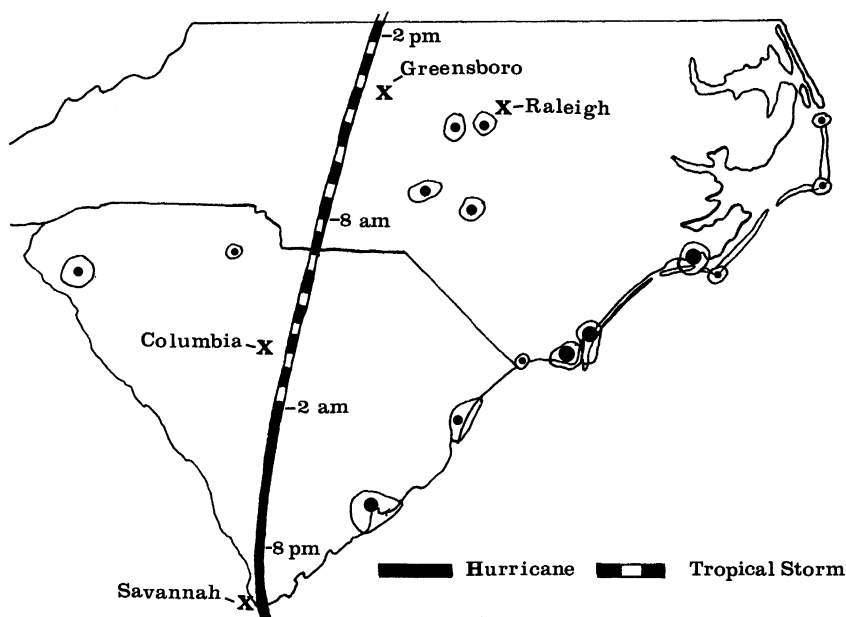


Fig. 2. Hurricane/Tropical Storm David moved across the Carolinas 4 and 5 September 1979. Encircled dots indicate the areas where storm-related bird sightings were reported. Dot size indicates the relative number of birds involved.

TABLE 1. Wind velocities (in miles per hour) at three U.S. Weather Service Offices in coastal Carolina during and immediately following the passage of Hurricane David, 4 through 6 September 1979. These are *sustained* wind speeds; gusts were up to 10 to 15 mph greater. The Wilmington and Charleston weather stations are located inland; wind speeds on adjacent beaches were undoubtedly greater than the official readings. (Data courtesy of individual weather offices and U.S. National Climatic Center, Asheville, N.C.)

EDT	4 Sept.			5 Sept.				6 Sept.			
	7AM	1PM	7PM	1AM	7AM	1PM	7PM	1AM	7AM	1PM	7PM
Cape Hatteras	SSE 5	SW 9	ENE 14	SSE 23	SSE 23	S 21	S 25	SSW 28	SW 28	SW 20	SW 16
Wilmington	ESE 4	NE 9	ESE 12	ESE 21	SE 16	S 18	S 19	S 19	SW 14	S 9	SSW 8
Charleston	NE 16	E 28	ESE 31	S 33	SSW 24	SSW 22	SSW 17	SSW 15	S 10	SSW 12	SSW 7

Pelagic Species

AUDUBON'S SHEARWATER. Three were onshore: one at Fort Moultrie, S.C., 5 September, Nugent, and two at Yaupon Beach, N.C., 5 September, Goodwin and Moffett.

WILSON'S STORM-PETREL. One was found far inland (and far west of the storm's track) at Lake Hartwell, near Clemson, S.C., 5 September, LeGrand, Gau-threaux, and Hamel. It was studied well to rule out the possibility of an even rarer storm-petrel being overlooked. This is apparently the only noncoastal record of a Procellariiform species in South Carolina. Much less unusual were two coastal reports, both 5 September: one at Yaupon Beach, Goodwin and Moffett, and another at Wrightsville Beach, Hardwick.

WHITE-TAILED TROPICBIRD. An adult was found at Seaforth Lake in the lakebed of uncompleted Jordan Reservoir in Chatham County, N.C., 6 September, by Payne and the Wagners, who studied it thoroughly for 30 minutes. It departed soon afterward. This is the first inland record of a live bird in North Carolina; however, there are two previous inland records for South Carolina, both of which were associated with tropical disturbances (Sprunt and Chamberlain 1970).

MAGNIFICENT FRIGATEBIRD. Two were over Wrightsville beach, 4 Sep-tember, Robert Needham, and one was at Kiawah Island, S.C., 5 September, Burns.

NORTHERN PHALAROPE. Four were in a rain pool on the golf course at Caswell Beach, N.C., 5 September, Goodwin and Moffett, and 35 on 7 September and 15 on 9 September on a spoil pond at Brant Island near Fort Macon, N.C., Fussell et al.

SABINE'S GULL. An adult was seen in the harbor at Southport, N.C., 5 Septem-ber, by Goodwin and Moffett. It was still in breeding plumage, and the combination of

TABLE 2. Selected observations from Rowlett's offshore censuses prior to the passage of Hurricane David (24 and 28 August) and shortly thereafter (8 through 10 September).

	165-mile transect off Cape Lookout to off Cape Fear	143-mile transect off Cape Fear to off Cape Lookout, in Gulf Stream	77-mile transect SE to SW of Cape Hatteras, in Gulf Stream	116-mile transect off Core Banks	104-mile transect off Cape Lookout to Diamond Shoals
	24 Aug.	28 Aug.	8 Sept.	9 Sept.	10 Sept.
Common Tern	3	—	158	143	138
Arctic Tern	—	—	17	20	30
Roseate Tern	—	—	8	2	10
white <i>Sterna</i> sp.	—	—	85	855	143
Sooty Tern (ad.)	25	132	222	575	13
Sooty Tern (im.)	10	27	23	93	2
Bridled Tern	29	27	45	16	5
Black Tern	34	—	151	220	96
Brown Noddy Tern	—	1	—	3	—



Fig. 3. The adult Sooty Tern (above) was photographed by Bob Coffee at Pea Island, N.C., on 5 September 1979. The subadult Bridled Tern (below) was photographed by Bill Faver at the west end of Holden Beach, N.C., about 0900 on 5 September 1979 while winds were still gusting to 40 mph. The latter bird was standing in a road with assorted shorebirds and appeared to be exhausted. In flight the light collar of the Bridled Tern is a foolproof field mark separating this species from the Sooty Tern. However, the collar normally does not show in a sitting bird, and age variations in face patterns make it difficult to distinguish between the two species on this basis alone. The intensity of black on the back is variable and difficult to determine even under the best field conditions. The bill of the Bridled Tern is always shorter and appears deeper than that of the Sooty Tern. This is by far the best means of identifying sitting birds.

dark head and unique wing pattern easily ruled out all other species. This is the third state record.

ARCTIC TERN. Off the North Carolina coast, 8 to 10 September, after David, Rowlett found a large number of "white *Sterna*" terns (Table 2). The total number of Arctic Terns is astounding, far outnumbering all previous records for the state (Lee and Booth 1979). These birds were almost certainly southbound migrants pulled westward toward the United States by David's circulation. However, David's circulation didn't extend more than 400 to 500 miles off our coast; thus, the birds apparently originated far west of the species' primary fall migration route over the eastern Atlantic (Lockley 1974).

ROSEATE TERN. This species is primarily a rare transient in the Carolinas, and the total number of individuals, 20, that Rowlett (Table 2) saw off the North Carolina coast 8 to 10 September, is surprising. These birds, like the Arctic Terns, apparently represent southbound migrants concentrated by David's onshore winds.

SOOTY TERN. The most notable feature of David's fallout in terms of sheer numbers was the abundance of Sooty Terns (and likewise Bridled Terns, see below) at several localities. Never before has this species been recorded in such numbers in the Carolinas.

Far inland, one adult and one immature were at Lake Hartwell, near Clemson, 5 September, LeGrand; and in the same area on 5 September an unknown person found an exhausted adult (specimen to Clemson University), fide LeGrand. Also, an exhausted adult was found in a parking lot at Chester, S.C., 6 September, fide Cely.

Coastal records of live birds were: one (age not given) at Charleston, 4 September, Compton; three adults at Fort Moultrie, 5 September, Nugent; two (adult and immature) at Litchfield Beach, S.C., no date given, Probst; an exhausted immature at Huntington Beach State Park, S.C., no date given, fide McIlwain; 110+ in the Southport area, 5 and 6 September, Goodwin and Moffett; 100 resting on the rock jetty south of Fort Fisher, 5 September, Mark Galizio, and an adult was collected at the same site, 6 September, Mobley and Platania (NCSM 7323); 80+ at Wrightsville Beach, 5 and 6 September, Parnell et al.; 90+ (12+ immatures) at Morehead City, N.C., 5 and 6 September, Fussell et al.; and an exhausted adult (Fig. 3) was photographed by Coffee at Pea Island, N.C., 5 September.

Several dead individuals were found during peak storm activity and afterward (some still being found in winter 1979-1980): one near Georgetown, S.C., Christy; one at Isle of Palms, S.C., Huff; six at Mount Pleasant, S.C., Huff and Farrar; one at Litchfield Beach, Probst; at least three in the Wrightsville Beach-Carolina Beach area, Parnell et al. (including NCSM 7353 and 7354); five (three adults, two immatures) in the Morehead City area, Fussell (including NCSM 7324). [Also, a freshly road-killed adult was found at the Alligator River bridge, Dare County, N.C., 23 September, by Lee and Platania (NCSM 7322). The date and condition of the bird are surprising; the bird did not die during David's peak activity in the area. Possibly it was associated with the circulation of Hurricane Frederic, which passed northward just west of the Appalachians 13 and 14 September and which also produced strong SE winds on the North Carolina coast.]

Some of the detailed Sooty Tern observations are noteworthy. At the North Carolina areas where large numbers were seen, relatively few birds were over the ocean; most were over inlets and estuaries. On the north-south coastline at Wrightsville Beach, Parnell, on 5 September, found most birds to be milling around, apparently with no dominant movement. However, along the east-west coastlines just west of Southport and at Morehead City, Goodwin and Moffett and Fussell observed strong eastward flights the same day. All observers who mentioned immatures noted that, in most cases, each was flying with a single adult, and Probst saw an adult feeding an immature. In

addition to dead birds that were examined, many exhausted birds were closely approached, but no one mentioned seeing banded individuals. This is notable because thousands of birds have been banded on the Dry Tortugas, about 70 miles W of Key West, Florida; occasionally, bands are found on hurricane-displaced birds on the Gulf Coast.

The Sooty Terns headed offshore quickly after winds began to abate. No apparently healthy individual was seen on the South Carolina coast after 5 September and none on the North Carolina coast after midday on the sixth. Many birds apparently lingered off the coast for a few days (Table 2). Off the southern Outer Banks of North Carolina, Rowlett counted 245 and 668 individuals 8 and 9 September. However, many of these could have been David-transported birds from farther north—such as New York and New England—returning southward.

Rowlett also found many Sooty Terns off the lower North Carolina coast several days before David's arrival (Table 2). Prior to his observations, there were only 20 published records, totaling 25 to 30 individuals, of Sooty Terns in North Carolina offshore waters (Lee, pers. comm.). It may be significant that Rowlett's pre-hurricane birds contained a greater percentage of immatures than the post-hurricane birds did.

BRIDLED TERN. This was also a "big news" species, especially in southeastern North Carolina, where large numbers were seen. These numbers are all the more remarkable in that the species had never been recorded alive on land in North Carolina before David. There are only two previous onshore records of dead Bridled Terns in the state (Chat 37:23,24; Am. Birds 26:48).

No Bridled Terns were found inland. Coastal reports, all of live birds, were: two adults at Fort Moultrie, 5 September, Nugent; an injured adult captured near Georgetown, 5 September, Christy; one subadult (Fig. 3) photographed by Faver at Holden Beach, N.C., 5 September; 50+ in the Southport-Long Beach area, 5 and 6 September, Goodwin and Moffett; 120+ in the Wrightsville Beach area, 5 and 6 September, Parnell et al.; three (two adults, one immature) in the Morehead City area, 6 September, Fussell et al.; and one immature photographed at Cape Hatteras by Scott, 7 September (see cover photo). No dead Bridled Terns were reported during David or afterward. (Adult Bridled and Sooty Terns are very similar in appearance, and during the storm conditions of strong winds, driving mist and salt spray, and poor light, individuals often could not be positively identified. In the Southport and Wrightsville Beach areas, where many birds of both species were found, observers were tentative in their estimates of relative abundance.)

Bridled Terns also returned offshore quickly, no healthy individual being seen on morning of the sixth, virtually all closely approached birds at Southport and Wrightsville Beach were Bridled Terns; and at Morehead City, where all positively identified birds on the fifth were Sooties, three of eight closely approached birds were Bridleds. Two possible reasons for this are: (1) the stronger-flying (and possibly more nocturnal) Sooty Terns headed back to sea at night or earlier in the morning of the sixth; (2) a higher proportion of Bridled Terns on the fifth were not as evident (i.e. flying), being nestled behind sand dunes and other windbreaks (Goodwin and Moffett reported this to be the case near Southport).

Bridled Terns are common late summer residents in Carolina offshore waters (Lee and Booth 1979); it is possible that the onshore David birds came from Carolina offshore waters as well as from waters farther south. Unfortunately, the storm reports contained almost no information on relative numbers of adult and immature Bridled Terns. Contrary to the case with Sooty Terns, Rowlett did not observe a dramatic peak in Bridled Tern numbers just after David (Table 2).

BROWN NODDY TERN. None were reported in South Carolina, but the total of 18 in North Carolina easily surpasses all previous records for the state: two at Sunset



Fig. 4. Although there is always a possibility that the Black Noddy Tern might occur in the Carolinas, all positively identified individuals thus far have been Brown Noddies. The minor differences in size and particularly in coloration between the two species of Noddy Terns known from North America make them difficult for even experienced observers to identify in the field. Documented sightings are welcome even when the observer cannot be positive whether the bird was a Black or Brown Noddy Tern; all Noddy Tern specimens should be deposited in the scientific collection of an appropriate museum or university department of zoology. (Photo by Claudia Sailor)

Beach, 5 September, were photographed (Fig. 4) by Sailor, *vide* McCoy; two at Long Beach, 5 September, Goodwin and Moffett; three (including NCSM 7352) at Wrightsville Beach, 5 September, Parnell et al.; at least 10 (three specimens, including NCSM 7319 and 7320) along east Bogue Banks, 5 and 6 September, Fussell et al.; and one dying bird (NCSM 7321) at Cape Lookout, 8 September, Chip Davis. These specimens are the first for North Carolina, and the species has been added to the state list.

All specimens and photographed birds were definitely Brown Noddy Terns, and it is likely that all sight records were of that species. However, the more southern Black Noddy (*Anous tenuirostris*) occurs sparingly north to the Dry Tortugas, and it should be considered as a possibility if one encounters a noddy in the Carolinas.

Like the other subtropical terns, the noddies returned offshore rapidly. No healthy individual was seen after 6 September on land. Off Core Banks, 9 September, Rowlett observed three Brown Noddies (Table 2). This was the same day he observed the peak number of Sooty Terns. His sighting of a noddy 28 August, a week before David, is interesting.

Other Noteworthy Sightings

Most records in this category are of inland observations of primarily coastal species that are generally or locally rare in inland areas. Although some of the species listed below normally occur as fall migrants, these particular sightings appear to have been storm-related.

WHITE PELICAN. Very rare inland, one was found at Jordan Reservoir in Chatham County, 6 September, by Payne and the Wagners. It remained until the next day and was seen by numerous observers.

DOUBLE-CRESTED CORMORANT. One at Lake Surf near Vass, N.C., 6 September, Howard and Thomas, was the first fall record locally.

AMERICAN GOLDEN PLOVER. One was at the Wilmington, N.C., airport, 7 September, R. Davis.

PECTORAL SANDPIPER. High counts in David's wake were: 25 near Charleston, 6 September, Nugent; 50 at Fort Moultrie, 5 September, Nugent; 55 at the Wilmington airport, 7 September, R. Davis.

LONG-BILLED DOWITCHER. One seen by R. Davis in a flooded field at Wrightsville Beach, 5 September, was early and locally uncommon.

SEMIPALMATED SANDPIPER. Eight at Lake Surf, 5 September, J. Carter, constitute a locally high count.

WESTERN SANDPIPER. Three at Lake Surf, 5 September, J. Carter, provided the second local record.

BUFF-BREASTED SANDPIPER. Unusual were single birds near Charleston, 6 September, Nugent, and at Long Beach, 9 September, R. Davis. The latter bird was on the beach with Sanderlings and Ruddy Turnstones.

SANDERLING. Rare were two at a farm pond near Raleigh, N.C., 6 September, Hader and Quay.

RING-BILLED GULL. Locally unusual were one near Fayetteville, N.C., 5 and 6 September, Crutchfield, and two at Lake Surf, 5 September, J. Carter.

FORSTER'S TERN. Notable were: eight at Lake Hartwell, near Clemson, 5 September, LeGrand; five on 5 September and two on 6 September at Fayetteville, Crutchfield; five on 6 September and two on 7 September at Jordan Reservoir, Lewis.

COMMON TERN. One was at Lake Hartwell near Clemson, 5 September, LeGrand. Noteworthy were 40 near Fayetteville, 5 September, Crutchfield, and 12 at Lake Surf, 5 September, J. Carter.

LEAST TERN. This species is rare in inland North Carolina. The following birds were well described: one at Pinehurst, N.C., 4 September, Howard; one near Fayetteville, 6 September, Crutchfield; one at Greenview Pond, near Raleigh, 6 or 7 September, Mulholland.

SANDWICH TERN. One found on Brant Island on 7 September (NCSM 7325) by Allen-Grimes was weakened and emaciated, apparently as a result of having been storm-driven for a long time. The following, all well described, are apparently the first inland records of the species in the Carolinas: an immature near Fayetteville, 5 September, Crutchfield; one at Lake Surf, 6 September, Howard et al.; one at Lake Wheeler near Raleigh, 7 September, Quay et al.

CASPIAN TERN. Locally unusual were two or three near Fayetteville, 5 September, Crutchfield, and one at Lake Surf, 5 September, J. Carter.

BLACK TERN. During David this species was unusually common, both inland and on the coast. High counts inland were: 12 at Lake Hartwell near Clemson, 5 September, LeGrand; 9+ near Fayetteville, 5 September, Crutchfield; 5 at Lake Surf, 5 and 6 September, Carter et al.; 10 at Jordan Reservoir, 6 September, Lewis; 20+ at Lake Wheeler near Raleigh, 6 September, Hader and Quay. From Southport north to Morehead City, observers found them to be common; the only count available was 200 in the Morehead City area, 5 September, Fussell.

PASSERINES. Just after passage of a cold front the morning of 8 September, Laurie and Nugent recorded some unusually high counts of migrant passerines at Fort Moultrie. These were probably indirectly related to David. Notable were 1000+ Eastern Kingbirds, 50 Red-eyed Vireos, 500 Yellow Warblers, 500 Common Yellowthroats, 1000+ Bobolinks, and 15 Northern Orioles.

CONCLUSIONS

David, the first hurricane or near-hurricane to strike the Carolinas in almost a decade, produced more unusual bird records in the Carolinas than any previous storm. Five reasons for this are: (1) One to two days before David's trip through the Carolinas, the eastern (or "right-hand") side of the storm (the section which, because of the storm's wind pattern, is more likely to pull birds into the storm's circulation) was located over the waters of the Bahamas and Gulf Stream edge off the southeastern United States. (2) With the center of the storm moving far inland, much of the Carolinas, including all coastal areas, were exposed to strong easterly winds off the Atlantic—an unusual situation because few hurricanes go ashore on the Georgia coast (Johnson et al. 1974). Up to 24 hours after the passage of the storm, winds on the coast had not gone any farther in their clockwise shift than southerly, thus still basically onshore and capable of keeping pelagic birds penned against the shore. Often winds would have gone around to a westerly direction more rapidly after the passage of such an intense low-pressure storm. (3) Along the North Carolina coast no hurricane warnings were issued; therefore, beach areas were accessible on 5 September. Most beach areas did not have rain that day, and the onshore winds, although strong enough to make birding difficult, were not severe enough to prevent it. (4) Recently constructed inland reservoirs provided additional concentration points for displaced coastal birds. (5) Finally, there are more bird watchers in the Carolinas than ever before; they are more adept at field identification and more alert to the possibility of finding rare birds brought in by storms.

Most of the unusual storm observations in the Carolinas fell into two major groups: pelagic species (especially subtropical terns), most of which are rarely seen from land in the Carolinas, and primarily coastal species that were displaced inland. Except for exhausted individuals, virtually no subtropical and pelagic species lingered much more than 24 hours after peak storm activity. Some of the coastal birds displaced inland lingered a little longer, but only about a day more on the average.

Of the pelagic species recorded, extremely few were Procellariiformes. Probably these birds are relatively well adapted to riding out storm conditions (Murphy 1936).¹ However, the subtropical terns, so common during David, may be more capable of fleeing from a storm, and it may be almost mandatory that they do so. Lockley (1974) cites the relative perviousness of the Sooty Tern's plumage to water.

Surprisingly, there were many more reports of subtropical terns from the North Carolina coast than the South Carolina coast. Possibly equally large numbers were also ashore in South Carolina late on the fourth and during the night. They could have moved offshore early on the fifth, for winds at Charleston had shifted to SSW by 7 AM. The several Sooty Tern specimens after the storm in South Carolina suggest this was the case. Another possibility is that there were at no time as many birds ashore in South Carolina as in North Carolina—that the mass of northward-moving terns was indeed staying ahead of the main part of the storm and encountered the more eastward projecting coastal North Carolina the night of 4-5 September. A similar situation farther north, where much larger numbers of Sooty Terns occurred on Long Island and in southern New England than along the coast from New Jersey to Virginia (Am. Birds 34:133-160), suggests this is a possibility. If another storm ever

¹On the other hand, the single most dramatic recorded effect of a hurricane on pelagic birds on the Carolina coast involved what were probably mostly or all storm-petrels (reported as Mother Carey's Chickens). Pearson (1899) described local reports of thousands of these birds left dead and dying along Shackleford Banks, N.C., by a severe hurricane in late August 1893. Through the Carolinas, that storm's track was similar to David's.

follows David's path through the Carolinas, it will be interesting to see whether or not the pattern is repeated.

Most of the unusual bird records associated with David in the Carolinas apparently do not represent birds that were trapped in the storm's eye. There is no doubt that such entrapment does occur (Murphy 1936; and see Audubon Field Notes 15:23 for an account of Sooty Terns in eye of Donna in coastal Maryland), but the distribution and timing of these Hurricane David records strongly suggest that the birds had come in directly from the adjacent ocean, not that they had been carried inland in the eye and were then in the process of returning to the coast. Actually, when David was located in inland North Carolina, it was probably too weak to have kept birds trapped within its eye. Probably the best place in the Carolinas to have found fallout from the storm's eye would have been reservoir areas in South Carolina along the storm's track, such as the northwest end of Lake Marion. However, we received no report from that locality.

FUTURE STORMS

David was not the last hurricane the Carolinas will see. There will be others, and there will be more storm-transported birds. Some things to consider before the next hurricane comes our way are:

Hurricanes are dangerous storms; they should be avoided. Actually, if you are in a hurricane, birding is impossible; strong winds and driving rain reduce visibility almost to zero. Coastal areas 300 miles or so "to the right" (NE in the Carolinas) of the storm and inland reservoir areas along the storm's track (especially if the storm goes ashore at night) are, all things considered, the best places to look for unusual birds. Just don't lose track of where the storm is. Also, remember that tropical systems as weak as depressions, even ones going ashore in the northeastern Gulf of Mexico, have produced numerous notable records of pelagic birds ashore in the Carolinas by causing prolonged easterly winds.

Be careful in the identification of any out-of-place bird. If the bird is dead or dying, make sure it is forwarded to a museum that maintains a bird collection. If collection is impossible, get a photograph. If neither is possible, make as detailed a description as possible. Do not rule out a species based on range; ideally, identifications should be made with a knowledge of and after consideration of all possibilities. See Lee and Booth (1979) for a summary of what occurs off our coast, and Shackleton and Stokes (1968) for drawings and range maps (not all are accurate but most are generally useful) of all species that occur in the Atlantic.

If sightings of unusual birds are made, record any pertinent data—weather, birds' behavior, relative abundance. Remember, hurricane-transport of birds is still not well understood, and detailed sight reports could provide important data on this phenomenon. In looking over the David observations and through the literature, we kept coming back to some basic questions: How does a bird respond when it encounters the periphery of a storm? Do different species respond differently? Does the bird's response vary along the different sides of the storm? Keep these questions in mind when another storm comes our way and watch for clues to the answers.

CONTRIBUTORS AND OTHER OBSERVERS

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CHRISTMAS BIRD COUNT DATES

Saturday, 20 December 1980 through Sunday, 4 January 1981