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DISTRIBUTION AND STATUS OF LEAST TERN NESTING COLONIES IN SOUTHEAST FLORIDA

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Abstract.—Six counties in southeast Florida were surveyed for nesting Least Terns (*Sterna antillarum*) in 1995**.** Previously documented sites were reexamined and locations of new sites were obtained from other wildlife agencies and organizations or by field observations by the authors. Of 46 sites surveyed, 29 were active and contained a minimum estimate of 1,437 breeding pairs. Ninety-three percent of the colonies were on gravel-and-tar roofs and 7% were on natural ground-nesting habitat. Seventeen (65%) previously documented sites were no longer active; however, 20 new sites were found. Construction, human disturbance and roof repairs were suspected causes of abandonment for some of these colonies. Our findings suggest that the Least Tern population in southeast Florida has increased since last surveyed. However, increasing use of plastic polymer roofs unsuitable for nesting and continuing loss of suitable ground-nesting habitat due to beach front development and human recreation are clear threats to the population. Surveys should be conducted more frequently in order to monitor population trends effectively.

Historically, in Florida and throughout their breeding range, Least Terns (*Sterna antillarum*) nested on open, mainland or barrier island beaches covered with a coarse substrate of sand, shells or small stones (Clapp et al. 1983, Spendelow and Patton 1988). Unfortunately, the increase in beach front development and human recreational activity in Florida has reduced suitable ground-nesting habitat for terns. More than 75 percent of Florida's human population now lives in a coastal county. Additionally, the state receives about 39 million visitors each year (Duda 1987). The infrastructure built to accommodate both residents and tourists often conflicts with Least Tern breeding habitat.

Terns will readily abandon sites which fail due to habitat loss and human disturbance (Burger 1984). Perhaps as a result, Least Terns have adapted to nesting on artificial/man-made substrates such as dredge-material islands and gravel-and-tar roofs (Downing 1973, Fisk 1978, Hovis and Robson 1989, Gore and Kinnison 1993). These factors contributed to the listing of the Least Tern as a threatened species in Florida in 1975 and have spurred recent surveys of nesting colonies. Surveys have been conducted in the Panhandle area (Gore 1991), central Florida (J. Hovis unpubl. data), and the Florida Keys (Kushlan and White 1985, Hovis and Robson 1989). In 1987, 37 colonies containing ≥689 breeding pairs were located from Key Largo to Key West (Hovis and Robson 1989). In northwest Florida (Gore 1991), 42 colonies containing ca. 2364 nests were found in 1990, and 51 colonies containing ca. 1660 nests were found in 1993 in northeast Florida (J. Hovis unpubl. data), but comparatively few data have been collected on Least Tern colonies in southeast Florida. Downing (1973) and Fisk (1978) included southeast Florida in their surveys but their lists of colonies were not comprehensive, and we know of no recent surveys in this area. The objectives of this survey were to (1) visit historical and new nesting colonies of Least Terns in southeast Florida, (2) determine colony status, substrate type and number of breeding pairs, and (3) assess possible causes of colony abandonment.

Study Area and Methods

The study area encompassed the coast from Indian River County through Dade County. In general, areas west of the coastal ridge were not surveyed. All coastal sites where terns were known to have bred in previous years were visited. The majority of the sites surveyed were gravel-and-tar roofs on commercial buildings, condominiums, and schools. Ground-nesting colonies were located on dredge-material sites, coral rock islands, and beaches.

An initial list of sites was compiled from the Florida Game and Fresh Water Fish Commission's (Commission) statewide Wildlife Occurrence Database (Runde and Reynolds 1990). This database contains information on Least Tern nesting sites documented between 1981 and 1992 by Commission biologists, other wildlife and conservation agencies, and the general public. New or previously undocumented sites were added to this list by contacting federal, state, and county biologists in the study area. Local chapters of the Audubon Society as well as the authors' own field observations also contributed to the list of sites. Locations obtained from the Commission database were considered as previously documented, whereas all others were considered new. New locations are not necessarily recently colonized sites, just sites new to the database. Due to time limitations, potential ground and roof sites were not surveyed.

Fieldwork was conducted from 15 May to 26 June 1995. To minimize the possibility of double-counting colonies that might have failed and moved, counties were generally surveyed from north to south with field work lasting less than two weeks in each county. Sites were visited only once. Surveys were conducted in the morning or late afternoon to minimize heat stress to eggs and chicks in case adults were flushed. On roof sites, access was requested from the management or owner of the building; if access was refused the site was observed from an adjacent roof with spotting scopes. Nesting activity was ob-

served from the edge of the colony with binoculars to minimize disturbance. Each location was then recorded as an active or inactive nesting site. Active sites were those which contained terns in incubating posture and/or eggs or flightless young. Breeding pairs were estimated by counting adult terns in incubating posture (i.e., one incubating tern equals one breeding pair). In instances where adults flushed, we delayed counts until birds returned to incubating posture. If Least Terns were not present on the survey date, the site was recorded as inactive. Land or building managers were then questioned on the history of the site to determine possible causes for abandonment.

Latitude and longitude of new sites were determined with either a portable Geographic Positioning System (GPS) receiver or a computer mapping program (Atlas Pro, Strategic Mapping, Inc. 1992). Coordinates of previously documented nesting sites were taken directly from the Wildlife Occurrence Database.

RESULTS

New locations obtained from the above sources which were vacant on the survey date were discarded. Only those locations (n=46) which contained Least Terns, or had a history of occupation, were used in our analysis (Appendix 1). An estimate of ≥1,437 breeding pairs was recorded in 29 active colonies (Figure 1). Ninety-three percent (n=27) of these colonies were located on roofs and only 7% were on natural ground-nesting substrate (beach or coral rock). Twenty-six (57%) of the sites used in the analysis were previously documented; of these, seventeen (65%) were inactive (Figure 1) and presumed abandoned. In contrast, 20 new active sites were recorded. It is unlikely that inactive sites were colonized later on, at least for this year, since the earliest survey date was in mid-May and terns usually arrive at their nesting sites by early to mid-April.

Reasons behind the apparent abandonment of these sites vary. Robson and Zambrano (pers. obs.) noted that construction eliminated tern nesting habitat at a previously documented colony in Broward County. At Sebastian Inlet State Recreation Area in Indian River County, a combination of encroaching vegetation and human traffic probably discouraged nesting (E. Egensteiner pers. commun.). Also, some abandoned sites were subjected to roof repair or air-conditioning work around the time terns usually begin arriving.

DISCUSSION

Gravel-and-tar roofs are not always a suitable alternative to natural ground-nesting habitat. Modern technology could soon make gravel-and-tar roofs obsolete. As they age, it is becoming more common for gravel-and-tar roofs to be replaced with a plastic polymer material with no gravel cover that renders them unsuitable for nesting (Gore and Kinnison 1993). None of the abandoned sites in this survey had undergone re-roofing; however, some building owners who consider Least Terns a nuisance reported they are contemplating changing to

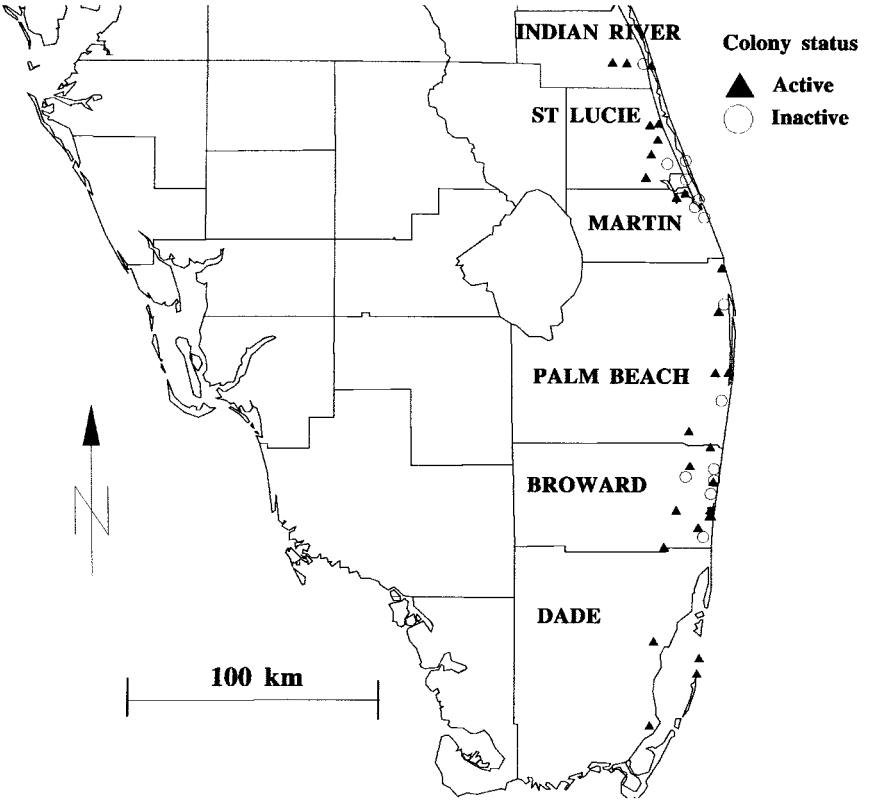

Figure 1. Distribution of least tern nesting colonies in southeast Florida, 15 May - 26 June 1995.

plastic roofs. While the number of available gravel roofs and the rate at which they are being converted is not known, the enormous shift from ground colonies to roofs in southeast Florida leads to concerns regarding the availability of nesting habitat in the future. When Downing (1973) first surveyed the area, all Least Tern colonies found were on ground dredge-material sites. Fisk (1978) later reported 21% of the colonies on the entire Florida Atlantic coast were on roofs. Eighteen years later, we find the majority (93%) of the colonies in coastal southeast Florida are on roofs. By comparison, 14 of 37 colonies (38%) in the Florida Keys (Hovis and Robson 1989), 24 of 42 colonies (57%) in northwest Florida (Gore 1991), and 38 of 51 colonies (75%) in northeast Florida (J. Hovis unpubl. data) were on roofs.

Despite this shift in occupied nesting habitat, the number of breeding pairs seems to be increasing. Downing (1973) reported 195 breeding pairs in southeast Florida, which is only 14% of the number found

in this study. Apparent increases in Least Tern numbers have also been reported in northwest Florida (Gore 1991) and the Keys (Hovis and Robson 1989). However, given the large gap in time between studies and the lack of recent surveys throughout Florida, we concur with Gore (1991) that population trends can only be determined through more frequent and intensive surveys.

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Appendix 1. Estimated number of Least Tern breeding pairs in southeast Florida, 15 May - 26 June 1995.

Colony	County	Latitude	Longitude	Survey Date	Breeding Pairs	Nesting Substrate	Breeding Status
Coconut Creek High School[a]	Broward	26.275000	80.216667	25 May	0	Roof	Inactive
Coral Springs Mall[a]	Broward	26.266667	80.250000	25 May	0	Roof	Inactive
T.J. Maxx, Hillsboro Beach[a]	Broward	26.283333	80.091667	25 May	0	Roof	Inactive
Mears Parkway, Margate[a]	Broward	26.251793	80.199204	25 May	10	Roof	Active
National Distributing Co., Deerfield	Broward	26.317095	80.121144	1 June	175	Roof	Active
Lakes Estates Medical Center, Pompano Beach[a]	Broward	26.197685	80.110268	2 June	34	Roof	Active
Home Depot, Plantation[a]	Broward	26.098583	80.250895	2 June	36	Roof	Active
United Parcel Service, Hollywood[a]	Broward	26.038318	80.165335	2 June	20	Roof	Active
Jodee, Hollywood	Broward	26.038173	80.166638	2 June	10	Roof	Active
West Lake Regional Park, Hollywood[a]	Broward	26.033333	80.116667	6 June	0	Dredge material	Inactive
Foreign Trade Zone Warehouse, Port Everglades[a]	Broward	26.079658	80.123499	14 June	24	Roof	Active
Techmarine, Port Everglades[a]	Broward	26.080033	80.117689	14 June	30	Roof	Active
Warehouse 1, Port Everglades[a]	Broward	26.099526	80.120528	14 June	30	Roof	Active
Mayan Beach Club, Harbor Beach[a]	Broward	26.100000	80.100000	14 June	0	Beach	Inactive
Miramar Exchange Park, Miramar	Broward	25.971956	80.297352	21 June	6	Roof	Active
Ragged Key 1, Biscayne Bay	Dade	25.536058	80.171008	9 June	2	Coral rock	Active
Soldier Key, Biscayne Bay	Dade	25.590333	80.161500	9 June	4	Coral rock	Active
Southern Warehouses, Miami	Dade	25.648240	80.337134	20 June	21	Roof	Active
Walgreens, Vero Beach	Indian River	27.638542	80.446713	28 May	30	Roof	Active
Kentucky Club Condominiums, Vero Beach	Indian River	27.629743	80.351978	28 May	129	Roof	Active
Holiday Inn, Vero Beach[a]	Indian River	27.635556	80.487778	28 May	0	Roof	Inactive
Days Inn, Vero Beach	Indian River	27.640062	80.501660	28 May	25	Roof	Active
Sebastian Inlet State Recreation Area[a]	Indian River	27.849145	80.455492	28 May	0	Dredge material	Inactive
Publix, Port Salerno[a]	Martin	27.133333	80.200000	22 May	0	Roof	Inactive
Horizon Realty, Hobe Sound[a]	Martin	27.058333	80.133333	22 May	0	Roof	Inactive
Village Center Shopping Plaza, Stuart[a]	Martin	27.175998	80.255323	23 May	50	Roof	Active

[a]Previously documented site.

Appendix 1. (Continued) Estimated number of Least Tern breeding pairs in southeast Florida, 15 May - 26 June 1995.

Colony	County	Latitude	Longitude	Survey Date	Breeding Pairs	Nesting Substrate	Breeding Status
Martin County Sheriffs Office, Stuart	Martin	27.190039	80.223302	28 May	66	Roof	Active
St. Lucie Inlet State Preserve[a]	Martin	27.150000	80.150000	28 May	0	Dredge material	Inactive
Publix, Jensen Beach[a]	Martin	27.250000	80.216667	28 May	0	Roof	Inactive
Stuart Fine Foods[a]	Martin	27.195000	80.243333	31 May	0	Roof	Inactive
Scotty's, Boynton Beach	Palm Beach	26.572592	80.054998	15 May	62	Roof	Active
J & M Tire and Service, Riviera Beach	Palm Beach	26.784737	80.092785	16 May	200	Roof	Active
Santaluces High School, Boynton Beach	Palm Beach	26.572250	80.105188	16 May	30	Roof	Active
Shurgard Storage, Riviera Beach	Palm Beach	26.782351	80.093028	17 May	75	Roof	Active
Pepsi Cola Bottling Plant, Riviera Beach[a]	Palm Beach	26.783333	80.078333	17 May	0	Roof	Inactive
Waterside Plaza, Lake Worth[a]	Palm Beach	26.595000	80.078333	17 May	0	Roof	Inactive
Publix, Jupiter	Palm Beach	26.933531	80.081104	22 May	90	Roof	Active
Allied Van Lines, Delray Beach[a]	Palm Beach	26.466667	80.066667	25 May	0	Roof	Inactive
Albertsons, Boca Raton	Palm Beach	26.370568	80.204234	30 May	22	Roof	Active
Floresta Elementary School, Port St. Lucie[a]	St. Lucie	27.295000	80.325000	28 May	0	Roof	Inactive
Ft. Pierce Police Department[a]	St. Lucie	27.429248	80.324850	31 May	140	Roof	Active
Indian River Community College, Fort Pierce	St. Lucie	27.424385	80.357910	6 June	20	Roof	Active
Winn Dixie, White City	St. Lucie	27.374353	80.327125	6 June	80	Roof	Active
North Point Middle School, Port St. Lucie	St. Lucie	27.324657	80.352713	6 June	8	Roof	Active
Windmill Point Elementary, Port St. Lucie	St. Lucie	27.244976	80.372892	6 June	8	Roof	Active
St. Lucie Power Plant, Port St. Lucie[a]	St. Lucie	27.341667	80.250000	6 June	0	Roof	Inactive

[a]Previously documented site.