Least Tern Biological Status Review Report

March 31, 2011

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
620 South Meridian Street
Tallahassee, Florida 32399-1600

Biological Status Review Report
for the Least Tern
(*Sternula antillarum*)
March 31, 2011

EXECUTIVE SUMMARY

The Florida Fish and Wildlife Conservation Commission (FWC) directed staff to evaluate all species listed as Threatened or Species of Special Concern as of November 8, 2010 that had not undergone a status review in the past decade. Public information on the status of the least tern was sought from September 17 to November 1, 2010. The three-member Biological Review Group (BRG) met on November 3 - 4, 2010. Group members were Janell M. Brush (FWC lead), Elizabeth A. Forys (Eckerd College), and Gary L. Sprandel (Kentucky Department of Fish and Wildlife Resources) (Appendix 1). In accordance with rule 68A-27.0012, Florida Administrative Code (F.A.C.), the BRG was charged with evaluating the biological status of the least tern using criteria included in definitions in 68A-27.001, F.A.C., and following the protocols in the *Guidelines for Application of the IUCN Red List Criteria at Regional Levels (Version 3.0)* and *Guidelines for Using the IUCN Red List Categories and Criteria (Version 8.1)*. Please visit http://myfwc.com/wildlifehabitats/imperiled/listing-action-petitions/ to view the listing process rule and the criteria found in the definitions.

In late 2010, staff developed the initial draft of this report which included BRG findings and a preliminary listing recommendation from staff. The draft was sent out for peer review and the reviewers' input has been incorporated to create this final report. The draft report, peer reviews, and information received from the public are available as supplemental materials at http://myfwc.com/wildlifehabitats/imperiled/biological-status/.

The BRG concluded from the biological assessment findings that the least tern met at least one listing criterion. Based on the literature review and BRG findings FWC staff recommends the least tern be listed as a Threatened species.

This work was supported by a Conserve Wildlife Tag grant from the Wildlife Foundation of Florida. FWC staff gratefully acknowledges the assistance of the biological review group members and peer reviewers. Staff would also like to thank Michelle VanDeventer who served as a data compiler on the species.

BIOLOGICAL INFORMATION

Life History References – BirdLife International 2010; Butcher et al. 2007; FWC 2003; Rodgers et al. 1996; Thompson et al. 1997; Thompson et al. 1992.

Taxonomic Classification – Least terns (*Sternula antillarum*, formerly *Sterna antillarum*) are the smallest members of the Sternidae family in North America. Terns belong to the suborder Lari, along with gulls, skimmers, and skuas. There are currently three recognized subspecies of least tern that breed in North America, although this classification scheme has been disputed (Whittier et al. 2006; Thompson et al. 1992). The nominate subspecies *S. a. antillarum*

breeds along the Atlantic, Gulf of Mexico, and Caribbean coasts, *S. a. athalassos* breeds in the interior U.S., and *S. a. brownii* breeds on the Pacific coast of North America.

Population Status and Trend - The global population for the least tern is estimated at 65,000 – 70,000 individuals (BirdLife International 2010). In the early 1980s, the population of the subspecies *S. a. antillarum* was estimated at 21,300 pairs along the east coast of the U.S., but survey methods were not comprehensive and did not include a significant rooftop-nesting segment of the population (Clapp et al. 1983; Fisk 1978). Historically, the breeding range for least terns in Florida has included all coastlines and some interior locations. Gore et al. (2007) estimated the Florida population of breeding least terns at 12,562 pairs, based on surveys from 1998 – 2000. The species is entirely limited to rooftop colonies in some regions (Gore et al. 2007; Zambrano et al. 1997). Rooftops are currently estimated to support over 80% of the breeding population, which represents a significant shift from the late 1970s when it was estimated that only 21% of the state's least terns nested on rooftops (Fisk 1978; Zambrano and Warraich 2010).

Geographic Range and Distribution – The species has a very large range, breeding along sandy coasts and inland rivers of the U.S. and Mexico, and the northern coasts of Central and South America (BirdLife International 2010). Least terns are a migratory species, wintering in Central and South America and moving north to breeding grounds during the summer months.

Quantitative Analyses – A population viability analysis has not been conducted for the Florida least tern population.

BIOLOGICAL STATUS ASSESSMENT

Threats – Habitat loss during the past decades has been extremely high for beach-nesting species such as the least tern. The American Bird Conservancy (2007) lists development, recreation, pollution, global warming, coastal engineering projects and invasive species as threats to coastal habitats. Least terns have been categorized as a "red" species of highest conservation concern by the National Audubon Society's Watchlist due to the number of threats the species faces throughout its range and declining population trends (Butcher et al. 2007). The Southeast U.S. Regional Waterbird Conservation Plan lists chronic recreational disturbances, elevated predator numbers, declining populations, and continued movement away from natural nesting habitats as concerns for the species (Hunter et al. 2006).

Human-induced negative impacts to roosting and breeding least terns on their natural beach habitats include recreational activity, shoreline hardening, mechanical raking, oiling of adults or breeding areas following spills, response to oil spill events, and increased presence of domestic animals (Defeo et al. 2009). Recreational disturbance has an overwhelming influence on the nesting success of least terns. The documented increase in visitation numbers in areas with historical nesting sites as well as the steady increase in vessel registrations in Florida can both be viewed as a proxy for the level of recreational pressure on these places. Predation of eggs and chicks by hawks, crows, gulls, herons, raccoons, feral hogs, cats and coyotes can be severe for some colonies (Brunton 1999; Erwin et al. 2001; Forys et al. 2005; O'Connell and Beck 2003). The direct impacts of beach driving and roadkill, including destruction of eggs, and mortality of adults and chicks have been well documented in the western panhandle and northeast Florida. Additional emerging threats which are poorly understood but have generated

concern are invasive species such as fire ants and carnivorous lizards (Hooper-Bui et al. 2004). Colonies on beaches are also vulnerable to tidal overwash during extreme weather or tides. There has been a decrease in the number of nesting attempts and success of least terns nesting on beaches, and many have switched to nesting on gravel rooftops.

Gravel rooftop nesting has benefited least terns in response to degraded beach habitats and increasing disturbance on Florida beaches, but rooftop colonies are also subject to a wide range of threats. Chicks often fall and perish from rooftops without appropriate ledge barriers when there is no one to monitor and re-roof them. Flooding and washout of nests and chicks has been observed during intense rainfall events. Most rooftop breeding locations are on privately owned buildings and the retail and other business operations do not view the flocks of birds, and their droppings, favorably. Colonies may be disturbed by rooftop work or other machinery maintenance. Most rooftops lack adequate shelter for chicks from the sun and/or predators, and catastrophic events such as building fires can and have occurred. The future of rooftop nesting itself is precarious as buildings convert aging gravel rooftops to newer, modified plastic surfaces (DeVries and Forys 2004).

Given our current economic climate, it is important to note that the current productivity of the least tern in the state is highly dependent on continuation of intense management and partnerships throughout the state, which are vulnerable to reductions in funding.

Population Assessment – The BRG concluded that the least tern meets listing criteria as described in 68A-27.001, F.A.C. Findings from the BRG are included in Biological Status Review Information Findings Tables.

LISTING RECOMMENDATION

Staff recommends that the least tern be listed as a Threatened species. The recommendation is based on estimated population declines due to low reproductive success, decrease in available nesting sites, increased predation, vulnerability to stochastic events and high probability of extinction within the next 100 years.

SUMMARY OF THE INDEPENDENT REVIEW

Comments were received from 5 reviewers, Monique Borboen (Audubon of Florida), Chuck Hunter (U. S. Fish and Wildlife Service), Patty Kelly (U.S. Fish and Wildlife Service), Marianne Korosy (PhD Candidate, University of Central Florida), and Julie Wraithmell (Audubon of Florida). All reviewers concurred with the staff recommendations. Peer reviews are available at MyFWC.com.

Appropriate editorial changes recommended by the reviewers were made to the report. One reviewer recommended adding beach driving as an historical and ongoing threat to the least tern and adding feral hogs and cats as predators. Additionally, the reviewer asked that the dependence of this species on intensive management, and the vulnerability of that management to funding reductions, be acknowledged in the BSR. Staff concurred, and added mention of these threats as well as increasing visitation of people to the state and disturbance to nesting

birds. These additional threats, however, did not result in changes to the findings or staff recommendations.

Three reviewers commented that although the results were appropriate, if we separated out our analyses by nesting substrate type (natural vs. rooftop) it would show the paucity of suitable natural nesting sites, a concern for the future. Kelly stated, "Consider redoing with just beach nesting locations unless you intend to achieve conservation of the species with the use of rooftops. Our general support of "recovery or conservation" is by protecting species habitat in the wild or within its native habitat or ecosystem and rooftops would not necessarily meet that description." Borboen stated, "….would the extent of occurrence be different if only natural nesting sites had been considered? I would have liked to see beach, rooftop and phosphate mines colonies mentioned separately to account for the dependence of least tern on man-made sites….this wouldn't change the conclusion of the panel…" Wraithmell stated, "While I understand why gravel rooftops were considered as functional nesting habitat for the purposes of determining occupancy, I caution the agency against considering these areas as true habitat, and am concerned that the imperiled species process may not provide adequate consideration for the influence of artificial conditions in its assessment of species." These suggestions do not change the findings or staff recommendations, but are very important for staff to consider in the development of the management plan for this species.

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Biological Status Review Information
Findings

Species/taxon: Least Tern /*Sternula antillarum*
Date: 11/4/2010
Assessors: Janell Brush, Gary Sprandel, Elizabeth Forys

Generation length: 9.63 (Massey et al. 1992)

Criterion/Listing Measure	Data/Information	Data Type*	Sub-Criterion Met?	References
*Data Types - observed (O), estimated (E), inferred (I), suspected (S), or projected (P). Sub-Criterion met - yes (Y) or no (N).				
(A) Population Size Reduction, ANY of				
(a)1. An observed, estimated, inferred or suspected population size reduction of at least 50% over the last 10 years or 3 generations, whichever is longer, where the causes of the reduction are clearly reversible and understood and ceased[1]	No data to support this conclusion as causes of decline are not well understood.	None.	NO	Gore et al. 2007; Zambrano and Warraich 2010
(a)2. An observed, estimated, inferred or suspected population size reduction of at least 30% over the last 10 years or 3 generations, whichever is longer, where the reduction or its causes may not have ceased or may not be understood or may not be reversible[1]	We calculated a 70% decline in number of nesting individuals on rooftops based on Gore et al. 2007 (estimated # pairs on rooftops) and Zambrano and Warraich 2010 (observed # pairs on rooftops). Rooftops represent nesting substrate for 80% of the breeding population according to Gore et al. 2007. A 23% decline in the number of occupied rooftops over a 10 year period (Zambrano 2010). Research has found that gravel rooftops are being phased out (DeVries and Forys 2004) and 27% of suitable gravel rooftops during Gore's research were lost by 2010 (Zambrano and Warraich 2010).	Observed/ Estimated	YES – c	DeVries and Forys 2004; Gore et al. 2007; Zambrano and Warraich 2010
(a)3. A population size reduction of at least 30% projected or suspected to be met within the next 10 years or 3 generations, whichever is longer (up to a maximum of 100 years) [1]	b: Documented population decline over previous 10 years, causes not well understood but expected to continue. c: see above (A2). e: Competition and predation with increased populations of gulls and crows is a concern. Increased populations of Cooper's hawks.	Estimated/ Suspected/ Projected	YES - bce	DeVries and Forys 2004; Forys et al. 2005; Burney 2009; Unpublished Data: E. Forys, M. Borboen, FWC, A. Hodgson;
(a)4. An observed, estimated, inferred, projected or suspected population size reduction of at least 30% over any 10 year or 3 generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased or may not be understood or may not be reversible.[1]	Average ground colony productivity from 2002 - 2010 in southwest Florida 0.10 fledges/pair (SD ±0.06) indicates future population decline. Observed rooftop productivity in 2003 was 0.23 fledges/pair in Pinellas County for 36 occupied rooftops. In 2008, only one chick fledged from rooftops (total pairs = 562; 0.002 fledges/pair). We project a population reduction of at least 30% over the next 3 generations.	Observed/ Projected	YES - b	Forys 2010

[1] based on (and specifying) any of the following: (a) direct observation; (b) an index of abundance appropriate to the taxon; (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat; (d) actual or potential levels of exploitation; (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

(B) Geographic Range, EITHER				
(b)1. Extent of occurrence < 20,000 km^2 (7,722 mi^2) OR	Data do not support an extent of occurrence below 20,000 sq. km. due to interior nesting colonies.	Estimated	NO	Burney 2009
(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	143 rooftop colonies + 76 ground colonies in 2010 = 217 total colonies recorded colony sites. 217 x 4 sq km = 868 sq km conservatively estimated from current available data. 868 sq km is an overestimate because no overlap of squares were considered in the estimate.	Estimated	YES	Carreker 1985; FWC Unpublished Data; Zambrano and Warraich 2010
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	Colonies are dispersed throughout the state and estimated to be greater than 10 locations.	Estimated	NO	Burney 2009
b. Continuing decline, observed, inferred or projected in any of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent, and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals	We calculated a 70% decline in number of nesting individuals on rooftops based on Gore et al. 2007 (estimated # pairs on rooftops) and Zambrano 2010 (observed # pairs on rooftops). Rooftops represent nesting substrate for 80% of the breeding population according to Gore et al. 2007. A 23% decline in the number of occupied rooftops over a 10 year period (Zambrano and Warraich 2010). Research has found that gravel rooftops are being phased out (DeVries and Forys 2004) and 27% of suitable gravel rooftops during Gore's research were lost by 2010 (Zambrano and Warraich 2010).	Observed/ Estimated	YES - iii, iv, v	DeVries and Forys 2004; Gore et al. 2007; Zambrano and Warraich 2010
c. Extreme fluctuations in any of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals	Data do not indicate extreme fluctuations	Estimated	NO	Gore et al. 2007; Zambrano and Warraich 2010
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	Estimated to be 6,278 breeding adults on rooftops, but uncertainty regarding breeding adults at ground colonies.	Estimated	NO	Forys 2010; Zambrano and Warraich 2010
(c)1. An estimated continuing decline of at least 10% in 10 years or 3 generations, whichever is longer (up to a maximum of 100 years in the future) OR				
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:				
a. Population structure in the form of EITHER				
(i) No subpopulation estimated to contain more than 1000 mature individuals; OR				

(ii) All mature individuals are in one subpopulation				
b. Extreme fluctuations in number of mature individuals				
(D) Population Very Small or Restricted, EITHER				
(d)1. Population estimated to number fewer than 1,000 mature individuals; OR	Data do not support	Estimated	NO	See Above
(d)2. Population with a very restricted area of occupancy (typically less than 20 km^2 [8 mi^2]) or number of locations (typically 5 or fewer) such that it is prone to the effects of human activities or stochastic events within a short time period in an uncertain future	Data do not support	Estimated	NO	See Above
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	Created Vortex model using BNA survival rates and current productivity rates (southwest = 0.10 fledges/pair; northeast = 0.16 fledges/pair) from several regions shows 100% chance of extinction in 100 years if productivity rates continue. Panhandle productivity is unknown, but believed to be at a rate lower than what is required to compensate for low productivity in other regions.	Inferred	YES	Forys 2010; Zambrano and Warraich 2010; Thompson et al. 1997; Unpublished data, M. Borboen

Initial Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria/sub-criteria are met)
Yes, meets more than one criterion	A2c; A3b, c, e; A4b; E1
Is species/taxon endemic to Florida? (Y/N)	N
If Yes, your initial finding is your final finding. Copy the initial finding and reason to the final finding space below. If No, complete the regional assessment sheet and copy the final finding from that sheet to the space below.	
Final Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria/sub-criteria are met)
Species meets the criteria	A2c; A3b, c, e; A4b; E1

1	Species/taxon:	Least Tern /Sternula antillarum
2	Biological Status Review Information Regional Assessment Date:	11/4/10
3	Assessors:	Janell Brush, Gary Sprandel, Beth Forys
4		
5		
6		
7		
8	Initial finding	Supporting Information
9		
10	2a. Is the species/taxon a non-breeding visitor? (Y/N/DK). If 2a is YES, go to line 18. If 2a is NO or DO NOT KNOW, go to line 11.	NO
11	2b. Does the Florida population experience any significant immigration of propagules capable of reproducing in Florida? (Y/N/DK). If 2b is YES, go to line 12. If 2b is NO or DO NOT KNOW, go to line 17.	NO/DO NOT KNOW (banding data do not indicate immigration, no new colonies or growth of colonies to indicate immigration)
12	2c. Is the immigration expected to decrease? (Y/N/DK). If 2c is YES or DO NOT KNOW, go to line 13. If 2c is NO go to line 16.	
13	2d. Is the Florida population a sink? (Y/N/DK). If 2d is YES, go to line 14. If 2d is NO or DO NOT KNOW, go to line 15.	
14	If 2d is YES - Upgrade from initial finding (more imperiled)	
15	If 2d is NO or DO NOT KNOW - No change from initial finding	
16	If 2c is NO or DO NOT KNOW- Downgrade from initial finding (less imperiled)	
17	If 2b is NO or DO NOT KNOW - No change from initial finding	NO CHANGE
18	2e. Are the conditions outside Florida deteriorating? (Y/N/DK). If 2e is YES or DO NOT KNOW, go to line 24. If 2e is NO go to line 19.	
19	2f. Are the conditions within Florida deteriorating? (Y/N/DK). If 2f is YES or DO NOT KNOW, go to line 23. If 2f is NO, go to line 20.	
20	2g. Can the breeding population rescue the Florida population should it decline? (Y/N/DK). If 2g is YES, go to line 21. If 2g is NO or DO NOT KNOW, go to line 22.	
21	If 2g is YES - Downgrade from initial finding (less imperiled)	
22	If 2g is NO or DO NOT KNOW - No change from initial finding	
23	If 2f is YES or DO NOT KNOW - No change from initial finding	
24	If 2e is YES or DO NOT KNOW - No change from initial finding	
25		
26	Final finding	NO CHANGE

APPENDIX 1. Brief biographies of the members of the Least tern Biological Review Group members

Janell M. Brush received her M.S. in Wildlife Ecology and Conservation from the University of Florida. Janell has managed avian research projects in Florida for over 10 years and joined the FWC in 2006. She is the project leader for two State Wildlife Grant funded coastal waterbird projects in Florida. Janell has experience working on research projects involving many different species of shorebirds and seabirds.

Elizabeth A. Forys received a M.S. in Environmental Science/Ecology from the University of Virginia and a Ph.D. in Wildlife Ecology and Conservation from the University of Florida. She is currently a professor at Eckerd College in St. Petersburg, Florida. She has over 30 publications on endangered species theory and management and 8 specifically on shorebirds and seabirds including American oystercatchers, black skimmer, least terns, and snowy plovers in Florida. For the past 10 years Beth has helped coordinate a project that monitors, maps, and protects beach and roof-top nesting birds throughout west-central Florida.

Gary L. Sprandel has a B.S. degree in Computer Science from Colorado State University with coursework in wildlife biology. He has worked as a geoprocessor for the Kentucky Department of Fish and Wildlife Resources since 2005 on a variety of projects including the State Wildlife Action Plan, public hunting area mapping, survey databases, habitat mapping, and species distribution mapping. From 1992-2005 Gary worked for the FWC as a database manager on many projects including data collection and analysis for wintering shorebird surveys, support of breeding shorebird and seabird surveys, and species and site ranking databases. Gary has over a dozen published papers on Florida's bird life.

APPENDIX 2. Summary of letters and emails received during the solicitation of information from the public period of September 17, 2010 through November 1, 2010.

Email from Ann Hodgson, Gulf Coast Ecosystem Science Coordinator, Audubon of Florida, Florida Coastal Islands Sanctuaries, Tampa, Florida, dated October 29, 2010. Dr. Hodgson provided a copy of the following report:

Hodgson, A. and A. Paul. 2010. Twenty-Five Years after Basis I: An Update on the Current Status and Recent Trends in Bird Colonial Waterbird Populations of Tampa Bay, in: Cooper, S.T. (ed.). 2010. Proceedings, Tampa Bay Area Scientific Information Symposium, BASIS 5: 20-23 October 2009. St. Petersburg, FL. 538 pp.

The average number of Least Tern nesting pairs in the Tampa Bay Region from 2000-2009 was 116 (SD 24.62-207.68). A downward trend was reported with most natural habitat lost and 80% of nesting occurring on rooftops. Human disturbance has become the most significant cause of nesting failure annually, accompanied by anthropogenically-induced predator population increases and urban development affecting the number and ecological integrity of estuarine and palustrine wetland foraging sites. Progressive urbanization threatens to further reduce the ecological integrity of the Tampa Bay ecosystem. More protective regulations, more enforcement, and heightened public cooperation will all be needed to protect the spectacular, charismatic bird populations of Tampa Bay.