Snowy Plover 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 Snowy Plover (*Charadrius alexandrinus*) 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 snowy plover 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 Nancy J. Douglass (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 Snowy Plover BRG was charged with evaluating the biological status of the snowy plover 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 snowy plover met at least one listing criterion. Based on the literature review and the BRG findings, staff recommends that the snowy plover 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 and drafted much of this report.

BIOLOGICAL INFORMATION

Life History References – Butcher et al. 2007; Elliot-Smith et al. 2004; Funk et al. 2007; Gorman and Haig 2002; Himes et al. 2006; Küpper et al. 2009; Page et al. 2009; U.S. Shorebird Conservation Plan 2004; FWC 2003.

Taxonomic Classification – The most recent genetic and phenotypic findings indicate that the snowy plover of the Americas and the European Kentish plover are distinct species (Küpper et al. 2009). However, as of this report, the American Ornithologists' Union (1998)

continues to treat these birds as members of the same species (*Charadruis alexandrinus).* The subspecies classification of the two North American populations of snowy plover is also a matter of debate and the subject of recent research. The Florida population of snowy plover has historically been listed as *C. a. tenuirostris* (Cuban snowy plover), but genetic evidence supports their inclusion in *C. a. nivosus* (western snowy plover) (Funk et al. 2007; Page et al. 2009).

Population Status and Trend – The entire North American breeding population of snowy plovers is estimated at less than 18,000 individuals (Page et al. 2009). Gorman and Haig (2002) generated maps of breeding and wintering snowy plovers for the eastern U.S., Caribbean, and Bahamas based on a variety of databases, field data, and published accounts. They concluded that although data on historic abundance and trends are limited, there was evidence for regional population declines and range contractions. Butcher et al. (2007) assessed the U.S. population of snowy plovers as having a decline of at least 2.28% per year. The U.S. Shorebird Conservation Plan (2004) categorizes snowy plovers as "highly imperiled" based on evidence the species is experiencing significant population declines ($p<0.10$). In Florida, Himes et al. (2006) found that while overall numbers of breeding snowy plovers in the state were relatively stable between 2002 and 2006, the number of pairs in southwest Florida decreased by 25% during that time.

Geographic Range and Distribution – Snowy plovers occur on Florida's narrow fringe of sandy beaches along the Gulf of Mexico coast. Within Florida, the breeding population is disjunct: one group occurs in Northwest Florida from Franklin County west and the other occurs from Pasco to Collier Counties in Southwest Florida. Their historical abundance and distribution in the state has not been well documented prior to the past few decades, and breeding and wintering records for the species in Florida are incomplete. Himes et al. (2006) determined that the majority of the state's breeding population (79.7%) is located in the Northwest region, and that over half (59.9%) of Florida's breeding pairs occurred on just nine sites. In the Southwest, the total number of sites supporting breeding snowy plovers was relatively consistent from 2002 to 2006, but site locations were highly variable (Himes et al. 2006). Reviews of historical data indicate strong site fidelity in stable habitat areas, but that local populations may shift in order to adjust to coastal dynamics at less stable breeding sites.

Quantitative Analysis - There has not been a comprehensive population viability analysis on the Cuban snowy plover or the Florida population of snowy plovers. A population viability analysis conducted for the Pacific coast population of the western snowy plover (*C. a. nivosus*) concluded that productivity of at least 1.0 fledglings per breeding male per year would result in a stable population (Nur et al. 1999).

BIOLOGICAL STATUS ASSESSMENT

Threats – The U.S. Shorebird Conservation Plan (Brown et al. 2001) lists the North American population of the snowy plover as "Highly Imperiled" due to high risk factors such as beach habitat loss. Audubon's Watchlist has identified the snowy plover as a species of conservation concern due to increasingly fragmented breeding ranges, disappearance from historic breeding locations, and a variety of threats ranging from shoreline development to human disturbance (Butcher et al. 2007).

Snowy plovers are less versatile than other beach-nesting bird species and have not adapted to alternative or artificial nesting habitats such as dredge spoil islands. Breeding occurs primarily on open sandy beaches. The simple nests consist of a small, well-camouflaged scrape on the ground, making this species extremely vulnerable to disturbance and predation. Habitat loss during the past decades has been extremely high for beach-obligate species such as the snowy plover. The American Bird Conservancy (2007) lists development, recreation, pollution, global warming, coastal engineering projects and invasive species as threats to coastal habitats. Recreational activity, shoreline hardening, mechanical raking, beach driving, and increased presence of domestic cats and dogs are all examples of human-induced negative impacts to coastal habitats critical to snowy plovers (Defeo et al. 2009). Their specific breeding behavior means that in addition to being vulnerable to the aforementioned direct threats, they are also susceptible to more subtle impacts and combination effects. For example, repeated flushing off nests and eggs by human recreational disturbance can result in thermal stress for developing eggs and chicks, or expose the location of eggs or chicks to predators. In order to fledge successfully, chicks must achieve rapid weight gain and growth, but exclusion from prey-rich beach areas, or increased avoidance behavior and reduced foraging time in response to disturbances, may extend the time needed for chicks to fledge (Pruner and Johnson 2010). Mechanical raking, an activity that is relatively common on Florida's beaches, can result in direct take of nests or young, separate young from adults, and/or diminish prey abundance on wintering and breeding beaches (Dugan et al. 2003). Researchers involved in regional monitoring of snowy plover breeding sites in Florida also convey alarm about the threat presented by the presence of dogs on beaches. Ordinances that allow dogs and weak enforcement of pet prohibitions can result in dogs flushing adults at greater distances and a slower return to nests than what is observed with disturbance by humans alone (Faillace 2010; Pruner and Johnson 2010). This is consistent with observations in California, where the presence of leashed and unleashed dogs has a deleterious effect on snowy plover breeding productivity, and the disturbance is common even on beaches where such activity is prohibited (Lafferty et al. 2006; Rhulen et al. 2003; USFWS 2007) presumably due to lack of enforcement.

In Florida, major threats to snowy plovers include habitat degradation, human related disturbance, and increased predator pressures throughout its range. Non-native vegetation, dune and shoreline stabilization, and human related activities such as beach driving all degrade existing habitat. Sea level rise and the consequential "coastal squeeze" (habitat and species unable to migrate inland due to structures) further limit the amount of available habitat and will likely exacerbate these threats in the future. Himes et al. (2006) found that 68% of sites in Florida that contained suitable habitat for snowy plovers experienced high levels of human disturbance. Yasué and Dearden (2009) offer an overview of the direct, indirect, and cumulative impacts that increasing human activity and beach tourism have on populations of beach-obligate shorebirds such as plovers. The susceptibility of this species to human disturbance and development is underscored by population declines in southwest Florida. While most snowy plovers nest on public lands, these lands are generally managed for recreational use. Historically, limited public support for curtailing recreational use and a lack of regulatory infrastructure to protect beach-nesting birds from incompatible beach management practices have contributed to continued loss of suitable habitat and poor reproductive success (Wilson and Colwell 2010). Concerns have also been raised regarding the effect of beach replenishment projects on snowy plovers. It is unknown whether or not observed declines in abundance or total

absence of the species is the result of sand renourishment impacts on substrate quality, prey abundance or other physical alterations to the habitat (Himes et al. 2006; Lott 2009; Nordstrom 2005).

Animals such as rats, raccoons, opossums, crows and coyotes, which are known predators of adult snowy plovers and eggs/chicks, respond positively to increased human presence and development. Predation from growing colonies of gulls can also be an issue for this species (Hunter et al. 2006). In Tampa Bay, for example, laughing gull colonies have increased from approximately 10,000 pairs to over 30,000 pairs since 2006 (Burney 2009). Ghost crabs are a major predator of eggs and chicks. Observations of numerous foot injuries suggest they may also prey upon adults and possibly seriously limit productivity (Pruner and Johnson 2010). Additional emerging threats which are poorly understood but have generated concern are invasive species such as fire ants and carnivorous lizards.

With the majority of the breeding pairs occurring at relatively few sites in the Northwest region, the population is left more vulnerable to environmental perturbations such as hurricanes and oil spills. Impacts to snowy plovers from the 2010 oil spill and ongoing clean-up efforts have not been assessed.

Population Assessment – Findings from the Biological Review Group are included in the Biological Status Review Information Findings tables.

LISTING RECOMMENDATION

Staff recommends that the snowy plover be listed as a Threatened species because the species met listing criteria as described in 68A-27.001, F.A.C., – limited geographic range combined with population declines and vulnerability to stochastic events; and limited population size combined with population decline.

SUMMARY OF THE INDEPENDENT REVIEW

Comments were received from 4 reviewers, Stefani Melvin (U. S. Forest Service), Raya Pruner (Florida Department of Environmental Protection), Brad Smith (The Nature Conservancy), and Jim Watkins (U.S. Fish and Wildlife Service). Appropriate editorial changes recommended by the reviewers were made to the report. One reviewer questioned the rationale for listing a species that was not geographically isolated. The BRG did conduct a regional assessment for this species and determined that available information indicates limited exchange with populations outside the state. Therefore it was concluded that genetic interchange was not sufficient to warrant changing the status finding. This reviewer also urged addressing habitat degradation, climate change, and the phenomenon of “coastal squeeze” in greater detail. These additional threats, however, did not result in changes to the findings or staff recommendations. All reviewers concurred with the staff recommendations. Peer reviews are available at MyFWC.com.

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Biological Status Review Information
Findings

Species/taxon: Snowy Plover / *Charadrius alexandrinus*
Date: 11/03/10
Assessors: Nancy Douglass, Beth Forys, Gary Sprandel

Generation length: ~ 3 years (Page et al. 2009/BNA Acct)

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]	Estimates from 1989 (at least 334 breeding adults), 2002 (at least 426 breeding adults), 2006 (at least 444 breeding adults), but surveys varied in methodology and effort making direct comparisons problematic. An estimate on size reduction cannot be inferred. Estimates are from pairs.	Estimated	NO	Gore and Chase 1989; Lamonte et al. 2006; Himes et al. 2006.
(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]	See (a)1.	Estimated	NO	See above.
(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]	Quality of habitat is declining, productivity data is highly variant and appears to be below rates required for stability (panhandle = 2008 - 2010/avg 0.7 = 0.48 - 0.89 fledge/pair; southwest 2002 - 2010/avg 0.34; range 0.13 - 0.85 fledge/pair; Sanibel = 2003 - 2010 avg. 1.01; range 0.33 - 1.63 fledge/female), but cannot infer a projected 30% of decline.	Inferred/projected	NO	Forys 2010; Unpublished data from Raya Pruner (2008 - 2010), Brad Smith (2003 - 2010), Beth Forys (2002 - 2010).
(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]	See above.	Inferred/projected	NO	See above.

[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	Linear miles of statewide coastline = 2,276 miles x 1 mile width (beach range) = 2,276 sq miles. Generous overestimate which includes Atlantic coast and unsuitable habitat. Excessive estimate of beach width.	Estimated	YES	Fernald and Purdum, 1992.
(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	Combining total beach/surf zone and coastal strand habitats = 73.7 sq miles. Actual area of occupancy is less; this represents potential occupancy.	Estimated	YES	FWC 2005 "Florida's Wildlife Legacy Initiative"
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	Less than 10 locations. Two major breeding areas - panhandle and southwest, each of which consists of 2 - 4 locations that could be impacted by a single oil spill or hurricane/tropical storm.	Observed/Estimated	YES	Himes et al. 2006; 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	(iii) Quality of habitat is declining due to increased beach recreational pressures and associated management, 59% of beaches are eroded; intense human population growth in the southwest region (particularly in the 1970s) has already resulted in decline in quality of habitat in that region. (v). Productivity data appears to be below rates required for stability (panhandle = 2008 - 2010/avg 0.7 = 0.48 - 0.89 fledge/pair; southwest 2002 - 2010/avg 0.34; range 0.13 - 0.85 fledge/pair; Sanibel = 2003 - 2010 avg. 1.01; range 0.33 - 1.63 fledge/female). We are projecting the number of mature individuals will decline based on the presented productivity rates.	Observed/Inferred/Projected	YES - iii, v	FWC 2008; Fernald and Purdum, 1992; American Bird Conservancy 2007 Threatened Habitats; DEP 2010; Clark 1993; FDEP 2010; Lafferty et al. 2006; Rhulen et al. 2003; Forys 2010; unpublished data from Raya Pruner (2008 - 2010), Brad Smith (2003 - 2010), Beth Forys (2002 - 2010). USFWS 2007
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	No data to support this conclusion	None	NO	none
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	Most accurate estimate considered to be AT LEAST 444 breeding adults. Other surveys estimate at least 334 - 426 breeding adults.	Estimated	YES	Himes et al. 2006; Lamonte et al. 2006; Gore and Chase 1989

(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	No data to support this conclusion	None	NO	none
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:	A continuing decline is inferred and projected based on productivity rates. Productivity data appears to be below rates required for stability (panhandle = 2008 - 2010/avg 0.7 = 0.48 - 0.89 fledge/pair; southwest 2002 - 2010/avg 0.34; range 0.13 - 0.85 fledge/pair; Sanibel = 2003 - 2010 avg. 1.01; range 0.33 - 1.63 fledge/female). We are projecting the number of mature individuals will decline based on the presented productivity rates.	Inferred/projected	YES	Forys 2010; Unpublished data from Raya Pruner (2008 - 2010), Brad Smith (2003 - 2010), Beth Forys (2002 - 2010).
a. Population structure in the form of EITHER	Florida population of breeding adults estimated to be at least 444.	Estimated	YES	Himes et al. 2006
(i) No subpopulation estimated to contain more than 1000 mature individuals; OR				
(ii) All mature individuals are in one subpopulation	All breeding adults considered to be in one subpopulation of approximately 444 adults.	Estimated	YES	Himes et al. 2006
b. Extreme fluctuations in number of mature individuals	No data to support this conclusion	None	NO	none
(D) Population Very Small or Restricted, EITHER				
(d)1. Population estimated to number fewer than 1,000 mature individuals; OR	Florida population of breeding adults estimated to be at least 444.	Estimated	YES	Himes et al. 2006
(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	No data to support this conclusion	None	NO	None
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	Not available	None	NO	None

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	B1(a) and (b)iii, v; B2(a) and (b)iii, v; C2(a)(i); C2(a)(ii); D1

Is species/taxon endemic to Florida? (Y/N)	NO
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)
No Change - Meets the Criteria	B1(a) and (b)iii,v; B2(a) and (b)iii, v; C2(a)(i); C2(a)(ii); D1

1	Species/taxon:	Snowy Plover / Charadrius alexandrinus
2	Biological Status Review Information Regional Assessment Date:	11/3/10
3	Assessors:	Nancy Douglass, Beth Forys, Gary Sprandel
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.	DO NOT KNOW
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 Snowy plover Biological Review Group members.

Nancy J. Douglass received her B.S. in Wildlife and Fisheries Biology from the University of Vermont and her Masters of Environmental Management from Duke University. She has over 23 years of experience working in the wildlife profession, 20 of which have been with the Florida Fish and Wildlife Conservation Commission as a regional biologist. Her area of expertise is nongame wildlife but she is most recognized for her expertise in seabird and shorebird conservation.

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 B. 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.