White Ibis Biological Status Review Report

March 31, 2011

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
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Tallahassee, Florida 32399-1600

Biological Status Review Report for the White Ibis (*Eudocimus albus*) 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 white ibis was sought from September 17, 2010 to November 1, 2010. The three member Biological Review Group (BRG) met on November 3 - 4, 2010. Group members were James A. Rodgers (FWC lead), Peter C. Frederick (University of Florida), and Mike Cook (South Florida Water Management District) (Appendix 1). In accordance with rule 68A-27.0012, Florida Administrative Code (F.A.C.), the White Ibis BRG was charged with evaluating the biological status of the white ibis 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 (2003)* and *Guidelines for Using the IUCN Red List Categories and Criteria Version 8.1 (2010)*. 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 that the white ibis did not meet listing criteria. Based on the literature review, information received from the public, and the BRG findings, FWC staff recommends the white ibis not be listed as a Threatened species and that it be removed from the Species of Special Concern list.

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 also would like to thank Michelle VanDeventer who served as a data compiler on the species and assisted with writing an early draft of this report, and Caly Murphy and Pam Lister who assisted with logistic support and editing of the final report.

BIOLOGICAL INFORMATION

Taxonomic Classification – The white ibis (*Eudocimus albus*) is classified in the Family Threskiornithidae, along with other species of ibises and spoonbills (Heath et al. 2009). There has been some dispute as to whether or not the scarlet ibis (*E. ruber*) of South America is a conspecific color morph of the same species. However, the American Ornithologist Union currently regards these two ibises as separate species.

Geographic Range and Distribution – The range of the white ibis extends from the mid-Atlantic coast and southern Pacific coast of North America, south into northern South America (Kushlan and Bildstein 1992, Heath et al. 2009). The species can be found year round in Florida and throughout the Caribbean (Rodgers et al. 1996). White ibises occur throughout most of Florida with large nesting colonies in south Florida (Runde 1991, Kale et al. 1992, Rodgers et al. 1999, Florida Fish and Wildlife Conservation Commission 2003). White ibises prefer coastal marshes and wetlands, feeding in fresh, brackish and saltwater environments. They are generally nomadic, and flocks are often observed outside typical breeding areas in search of new sources of prey (Bildstein et al. 1990, Frederick and Ogden 1997, Frederick and Ogden 2001, Melvin et al. 1999, Crozier and Gawlik 2002, Bancroft et al. 2002, Cook and Kobza 2009). Population and colony sizes are dependent on movement in response to water levels and prey abundance (Gawlik 2002, Gawlik and Crozier 2007, Johnson et al. 2007, Lantz et al. 2010). Frederick et al. (1996), Hunter et al. (2006), and IUCN (2009) estimated the population size of white ibises in the southeastern United States to be at least 150,000 pairs.

Life History References – Rodgers et al. 1996, Epanchin et al. 2002, Crozier and Gawlik 2003, Dugger et al. 2005, Dorn et al. 2008, IUCN 2009, Adams and Frederick 2009, Heath et al. 2009).

BIOLOGICAL STATUS ASSESSMENT

Threats – Loss of coastal marsh and wetlands habitats are a primary threat to the white ibis population (Rodgers et al. 1996, Hunter et al. 2006, Heath et al. 2009). Nestlings can suffer from salt stress, and prey availability is a critical factor influencing breeding productivity, so access to adequate freshwater prey is critical during the nesting period (Bildstein et al. 1990, Frederick 1987, Adams and Frederick 2009, Herring et al. 2010). The species is highly sensitive to hydrologic alterations to their foraging and breeding areas (Frederick 1987, Bancroft et al. 2002, Gawlik 2002). Like other wading birds that rely on ephemeral wetland habitats, white ibises are also vulnerable to exposure to pesticides, heavy metals, and other persistent environmental contaminants (Beyer et al. 1997, Frederick et al. 2004, Heath and Frederick 2005, Rodgers 1997). Increased depredation and human disturbances at colony sites are also potential concerns (Heath et al. 2009).

Population Assessment – Runde (1991) noted a decrease in the white ibis population in Florida from >180,000 individuals during the late 1970s to about 65,000 during the late 1980s, but differences in survey methods among statewide surveys (Rodgers et al. 1999) make it difficult to draw meaningful conclusions from these numbers. Crozier and Gawlik (2003) estimated that the number of white ibis nests in the Everglades decreased by 87% since the 1930s. Unfortunately, the margin of error associated with aerial surveys of wading bird populations raises questions about their validity and usefulness in determining trends even for white-plumaged species of wading birds (Rodgers et al. 2005, Conroy et al. 2008, Green et al. 2008, Williams et al. 2008). Annual surveys of nesting activity in the Everglades region have indicated that numbers for wading birds can be highly variable from season to season (Gawlik 1999, Frederick and Ogden 2001). About 43,415 white ibis nests were counted in the Everglades in 2009, an estimate that was 101% greater than the average of the previous 9 years (Cook and Kobza 2009). The 3-year running averages for the number of nesting white ibises in the Everglades were 21,133 (2005-2007), 17,541 (2006-2008), and 23,953 (2007-2009), which

represents a substantial increase from 3-year averages during the late 1990s (Cook and Kobza 2009). In Hillsborough Bay, the white ibis breeding population ranged from 5,289-10,475 breeding pairs from 2005 through 2008 (unpublished data from Florida Coastal Islands Sanctuaries, Audubon of Florida). The species has increasingly been seen in urban and suburban environments, especially south Florida.

Biological Status Review for the white ibis—The review group concluded the white ibis did not meet listing criteria. See Table 1 for details.

Regional Application—The review group concluded there was no change in the recommendation for the white ibis. See Table 2 for details.

LISTING RECOMMENDATION

FWC staff recommends the white ibis not be listed as a Threatened species and that it be removed from the Species of Special Concern list.

SUMMARY OF THE INDEPENDENT REVIEW

Comments were received from 3 reviewers. The full text of peer reviews is available at MyFWC.com.

Evan M. Adams, University of Maine: Evans provided a lengthy dialogue on his concerns about potential impacts to the species (e.g., methyl mercury), the relatively short time period (i.e., 3 generations) used for the IUCN assessment, and the possibility that because ibis are known for large scale movements it might be easy to confound population growth with mass immigration from another site within or outside of Florida. However, he agreed with the findings of the BSR panel that the species should no longer be listed and stated "The statewide population assessment is based on the best data available… is fairly clear that populations are much higher than in the 90's and do not appear to be currently decreasing…"

Julie Heath, Boise State University: Heath provided a very lengthy review that discussed the reliability and lack of precision of the data on the population and trends for the species, the appropriateness of the IUCN protocol for a highly mobile species such as the white ibis, concerns about the interpretation of regional and historic data (especially use of peak nesting numbers), and risk of extinction assessment. In summary, she states "…a regional assessment of extinction risk based on a portion of the region (Everglades) that represents an unknown proportion of the global population may be unreliable. Further, the data used to estimate these risks are problematic and it is not clear how the data were used to address the question of population change in Florida. The details about the quantitative analysis of population size and changes should be evaluated carefully before the BSR moves forward with a decision." The BSR panel in follow-up emails discussed these points and believes Heath's comments are reasonable but similar to the issues we discussed during our regular panel meeting. For example, one of Heath's major points is that the number of ibis in Florida was 51,000 birds in 1991 (cited in Hunter et al. 2006) and not the circa 150,000 birds we used in the BSR. While this estimate was correct in 1991, the situation had changed markedly by the time of the Hunter et al. (2006) report. Since 2000, there has been a major increase in ibis nesting in the Everglades

and there has not been a reciprocal decrease in other major nesting areas within Florida. A second major concern expressed by Heath is that she believes the data are not accurate enough to estimate population size in Florida and elsewhere in the species' range. In response, the BSR panel does acknowledge the lack of specific population estimates for Cuba and some other parts of the range. However, we have reasonable evidence that the population in Cuba is quite small compared to the rest of the breeding area and we are able to estimate breeding frequency in much of the rest of the range. In addition, while the BSR panel is in agreement that population estimates and trends based solely on aerial estimates are problematical, the panel believes the data used in the BSR are *minimum estimates*. The very conservative nature of the data therefore argues that we can with confidence estimate a minimum population size for the species in Florida.

James A. Kushlan, Heron Specialist Group: Kushlan provided a lengthy review that discussed the nomadic behavior of this species and the problem of accurately surveying the population in Florida and elsewhere in the species' range. He also provided some additional information on the population trend in south Florida/Everglades that was incorporated into the revised BSR. In summary, Kushlan agreed with the findings of the BSR panel and stated the "…population data that do exist are sufficiently robust as to infer an order of magnitude for the Florida population which supports the Review Group's conclusion that the species does not merit listing."

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Table 1. Biological status review information findings for the white ibis in Florida.

Biological Status Review Information Findings				
	Species/taxon:	**White Ibis**		
	Date:	11/03/10		
	Assessors:	Rodgers, Frederick, Cook		
	Generation length:	11 years		
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]	Despite uncertainty in the precision of data generated from aerial surveys on both a statewide and regional scale, it is estimated the species increased about 2.2% per year from 1980 to 2006.	E	N	BBS data, SFWMD and ENP wading bird databases.
(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]	From 1980 to 2006, the species increased about 2.2% per year.	E	N	BBS data, SFWMD and ENP wading bird databases.
(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]	No indications the species population is decreasing or will decrease in the near future. Sea level rise may create more foraging habitat as estuarine habitats increase inland, especially in south Florida.	I	N	BBS data, SFWMD and ENP wading bird databases.
(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]	No indications the species population is decreasing or will decrease in the near future. Sea level rise may create more foraging habitat as estuarine habitats increase inland, especially in south Florida.	I	N	
[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	Entire state of Florida or about 58,700 $miles^2$.	E	N	See notes tab for EOO calculations.
(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	About 19,500 $miles^2$.	E	N	See notes tab for AOO calculations.
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations				

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				
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				
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	Despite uncertainty in the precision of data generated from aerial surveys on both a statewide and regional scale, estimated population about 40,000 nests in 2009 or about 90,000 mature birds total in S. Florida alone. Numerous other colonies and another 100,000 individuals in North and Central Florida. Estimated 300,000 individuals in the SE USA.	E	N	BBS data; SFWMD and ENP wading bird database.
(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 evidence of decline during the past 33 years. From 1980 to 2006, the species increased about 2.2% per year.	E	N	BBS data; SFWMD and ENP wading bird database.
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:	No evidence of decline during the past 33 years. From 1980 to 2006, the species increased about 2.2% per year.	E	N	BBS data; SFWMD and ENP wading bird database.
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	Estimated about 40,000 nests in 2009 or about 90,000 mature birds total in S. Florida alone. Numerous other colonies and another 100,000 individuals in North and Central Florida.	E	N	BBS data; SFWMD and ENP wading bird database.
(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	Minimum of 59 ibis colonies were located in the FWC 1999 statewide survey.		N	Rodgers et al. 1999.
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	None completed.		N	

Initial Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria/sub-criteria are met)
Does not meet any criteria.	None.
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)
Does not meet any criteria.	None.

Table 2. Biological status review information for the regional assessment for the white ibis.

1	Biological Status Review Information Regional Assessment	Species/taxon: White Ibis
2		Date: 11/03/10
3		Assessors: Rodgers, Frederick, Cook
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, breeds in Florida.
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	

Additional Notes - In our review of the status of the white ibis, the Biological Review Group made the following assumptions and conclusions:

- Generation time: age at first breeding is 2 years of age and maximum age of breeding is about 20 years of age (Heath et al. 2009, Frederick pers. comm.). The mid-point of first breeding until death: (20-2)/2=9 years, with generation time as 9+2=11 years of age. Thus, the time period for the species is 3x11 or 33 years. The beginning time for change/trend analysis is 1977.
- Extent of Occurrence (EOO): Species range is essentially the entire state of Florida (circa 140,513 km^2 or 54,252 $miles^2$) except for the western panhandle, which does not contain breeding colonies but is used as foraging habitat.
- Area of occupancy (AOO): based on the premise that wetland area makes up about 1/3 of a specified region of land area in Florida or about 46,838 km^2 or 18,084 $miles^2$; thus, the AOO exceeds 2,000 km^2 IUCN limit.

APPENDIX 1. Brief biographies of the White ibis Biological Review Group members.

Mark I. Cook has a M.S. in Ecology from the University of Durham, UK and Ph.D. in Ecology from Glasgow University, UK. He is a senior environmental scientist with the South Florida Water Management District. His expertise is in the behavioral ecology, conservation biology, habitat quality and reproductive success, and restoration ecology related to wading bird foraging and reproductive performance especially applied to hydrologic management and restoration issues in the Everglades. He has published numerous papers on the food ecology of wading birds.

Peter C. Frederick received a Ph.D. in Zoology from the University of North Carolina. He is Research Professor at the University of Florida. His expertise is in the areas of wetland ecology, ecotoxicology, and avian ecology of wading birds, especially with the wood stork, great egret and white ibis and the everglades. He has published numerous papers on waterbird ecology, pesticide contamination, population biology, and habitat requirements of wading birds in Florida.

James A. Rodgers received a M.S. from Louisiana State University and a Ph.D. from the University of South Florida. Since joining the FWC in 1980, he has worked on snail kites, double-crested cormorants, several species of wading birds including little blue herons and wood storks, development of buffer distances for waterbirds, pesticide contamination, and population genetics of birds. He was elected a Fellow of the American Ornithologist Union in 2009 and has published numerous papers on the breeding and nesting ecology of waterbirds.

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.**

Most information received by FWC staff was anecdotal and consisted of general observations of presence or absence of the species within Florida. Information from Ann Hodgson (Tampa Bay Sanctuaries, NAS) for the status of the species in the Tampa Bay region and from Dale Gawlik (South Florida Water Management District and Florida Atlantic University) for the status in south Florida was used in the review of the species by the BSR panel on November 3-4, 2010.