Limpkin 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 Limpkin
(*Aramus guarauna*)
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 limpkin 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 Martin J. Folk (FWC lead), Stephen A. Nesbitt (retired biologist, FWC), and Marilyn G. Spalding (Emeritus Faculty at the University of Florida) (Appendix 1). In accordance with rule 68A-27.0012, Florida Administrative Code (F.A.C.), the Limpkin BRG was charged with evaluating the biological status of the limpkin 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 that the limpkin did not meet listing criteria. FWC staff recommends not listing the limpkin as a Threatened species and removing it 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 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 – Kale et al. 1992, Armistead 2001, Hipes et al. 2001, Bryan 2002, Florida Fish and Wildlife Conservation Commission 2003, Fain et al. 2007, IUCN 2009.

Taxonomic Classification – Limpkins (*Aramus guarauna*) are the only extant species belonging to the family Aramidae, within the order Gruiformes, which also includes the cranes and rails. There are four recognized subspecies of limpkins; the Florida, Cuba and Bahamas limpkin populations are members of the subspecies *A. g. pictus*.

Population Status and Trend – Wetlands International (2006) estimated the global population of limpkins at >1,000,000 and relatively stable. Population estimates for the subspecies *A. g. pictus* throughout its range are not well documented (Bryan 2002). Hunter et al. (2006) estimated the Florida population of limpkins to be between 4,000 – 6,000 pairs. Analysis of historic counts revealed significant regional declines in the northern part of the state, which is consistent with a range contraction in the southeastern U.S. over the past one hundred years (Kennedy 2009). For example, a once stable and abundant population of limpkins on the Wakulla River in north Florida experienced a severe decline during the 1990s with eventual disappearance from the area (Bryan 2002, NeSmith and Jue 2002, Kennedy 2009). The species was also extirpated from the Okefenokee Swamp area on the Florida-Georgia border by the 1950s (Kennedy 2009). It is possible that apparent increases in limpkin populations in central Florida are balancing recent losses observed in north Florida, and that the statewide population has been stable overall in recent years (Kennedy 2009). Cox et al. (1994) calculated an approximate area of 1,981 km^2 (489,356 acres) of potential limpkin habitat in Florida, with an estimated 49% of that habitat occurring in conservation areas.

Geographic Range and Distribution – In the continental U.S., limpkins occur only in the state of Florida, where they are resident breeders. Their range extends south through the Caribbean, Central America, and most of South America east of the Andes. Globally the IUCN (2009) regards the limpkin as "Least Concern" due to its extremely large range and large, stable population. Limpkins inhabit freshwater wetlands that support an ample supply of their preferred prey, the apple snail. Mature males tend to be territorial, although behavior can be somewhat nomadic as individuals search for new prey sources. Banding studies have indicated that females may be partially migratory. Limpkins are solitary nesters, with nest site selection and characteristics highly variable. However, in expansive marsh habitats nests have been reported to be clumped as if loosely colonial (Bryan 2002).

Quantitative Analyses – A population viability analysis on the Florida population of limpkins has not been conducted.

BIOLOGICAL STATUS ASSESSMENT

Threats – In Florida, limpkins were once hunted to the point of near extirpation but have benefitted from conservation measures and hunting regulations enacted since the early 1900s. Limpkins are largely dependent on healthy populations of their staple prey item, apple snails in the genus *Pomacea*. Loss of wetland habitats due to drainage for agriculture and development, along with hydrologic alterations that impact prey availability, are primary threats to the limpkin population in Florida. Invasive exotic plants such as water hyacinth (*Eichhornia crassipes)* and hydrilla (*Hydrilla verticillata*) may adversely affect habitat quality for apple snails and therefore limpkins (Bryan 2002). The direct and indirect impacts of nutrient and chemical pollution are also a concern, as with all wading bird species that forage and breed in wetland habitats (Crozier and Gawlik 2002, Bryan 2002).

The Biological Review Group felt that the limpkin was "on the edge" of meeting several listing criteria. They also concurred that there are a number of areas where more information is needed regarding limpkins in Florida. A state-wide monitoring program would allow a more refined understanding of limpkin numbers and distribution. Priority topics for future research

include: the relationship between the limpkin and its prey (especially native and exotic apple snails); the effects of water quality, hydrology, and invasive aquatic plants on survivorship, productivity, and movements of limpkins; age structure and other basic demographic characteristics of the population; limpkin movements within and beyond the state; and diseases impacting the population. Personal observations by D. C. Bryan suggest that females and juveniles assemble in south Florida during the non-breeding season. These areas may be critical to the population and should be identified. Predictive models should be developed for determining the impacts of habitat development and other habitat degradation caused by humans. Future monitoring and research will not only provide a better understanding of the basic biology of the species that will allow appropriate management practices, but will facilitate a more informed recommendation regarding its listing status in the future.

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

LISTING RECOMMENDATION

FWC staff recommends not listing the limpkin as a Threatened species and removing it from the Species of Special Concern list because the species does not meet any of the listing criteria as described in 68A-27.001, F.A.C.

SUMMARY OF THE INDEPENDENT REVIEW

Comments were received from 3 reviewers: Dana C. Bryan, (Florida Department of Environmental Protection), Dr. Sammy King, (Louisiana Cooperative Fish and Wildlife Research Unit), and Katy NeSmith (Florida Natural Areas Inventory). Appropriate editorial changes recommended by the reviewers were made to the report. Reviewers commented on the limitations of the data that were available and emphasized the need for future research. No changes were recommended that would affect the findings or staff recommendations. One reviewer questioned a range decline reported in the literature, but even assuming the range decline none of the criteria were met. All reviewers concurred with the staff recommendation. Peer reviews are available at MyFWC.com.

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Biological Status Review Information
Findings

Species/taxon:	Limpkin
Date:	11/03/10
Assessors:	Marty Folk, Steve Nesbitt, Marilyn Spalding.
	Adam Kent as facilitator.
Generation length:	5 years (3 generations is 15 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]	Kennedy reports, using Christmas Bird Count data, no significant changes in state-wide numbers of limpkins 1970-2007.	E	N	Kennedy 2009
(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]				
(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]				
(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]				
[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				
(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	1,981 square km	I	Y	Cox et al. 1994
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	Limpkins occur over most of Florida (Bryan 2002) and are not limited to ≤ 10 locations (Cox et al. 1994)	I	N	Bryan 2002, Cox et al. 1994
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	Area of occupancy - declining in North Florida (Kennedy); quality of some habitat (especially spring run) may be declining (NeSmith and Jue). Many unknowns.	E, S	Y	Kennedy 2009, NeSmith and Jue 2002

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	Resolution of current data not sufficient to regard fluctuations as extreme	S	N	
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	4,000-6,000 pairs (Hunter et al.); 3,000-6,000 territories on conservation lands (Cox et al.).	I	On the edge	Hunter et al 2006, Cox et al. 1994
(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		E	N	Kennedy 2009
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:		E	N	Kennedy 2009
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		I	N	Hunter et al 2006, Cox et al. 1994
(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		I	N	Cox et al. 1994
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years				Quantitative analysis not available

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 qualify to be listed with current information	
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)
Does not qualify with current information	

1	Species/taxon:	Limpkin
2	Date:	11/3-4/10
3	Biological Status Review Information Regional Assessment Assessors:	Marty Folk, Steve Nesbitt, Marilyn Spalding.
4		Adam Kent as facilitator.
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.	DK
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

Additional notes:

Limpkins generally begin breeding in their first year; one adult was tracked to at least 12 years of age based on banding data, but little data exists as to average life span of breeding adults (Bryan 2002). We estimated the generation time for the limpkin as 5 years.

Criterion A: Kennedy (2009) reported no significant changes in state-wide numbers of limpkins 1970-2007. We looked at Fig. 4 in Kennedy (2009) for our time range of interest (3 generations, 15 years) and saw no evidence of population reduction large enough to meet the threshold for Criterion A.

Criterion B: Cox et al. (1994) inferred an area of occupancy of 1,981 square km, which is just under the threshold of 2,000. However, to meet this overall criterion, an additional 2 of 3 sub-criteria must be met. We found only 1 to be met; thus the limpkin did not meet the overall criterion B. The widespread distribution of the limpkin and the fact it is not restricted to $\leq$10 locations did not allow it to meet Criterion B.2.a. Criterion B.2.c. necessitates that there be extreme fluctuation in at least 1 of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals. The group discussed fluctuations and did not interpret them to be extreme, given the current resolution of data available.

Criterion C: The limpkin population has been inferred at 4,000-6,000 pairs by Hunter et al. 2006. The middle of this range would give a population of 10,000 individuals, right on the threshold for this criterion. To meet the overall criterion for population size and trend, an additional subcriterion C.1 or C.2 must be met. We found neither to apply.

Criterion D: The limpkin did not meet the thresholds for a very small or restricted population.

Criterion E: There has been no quantitative assessment of the limpkin population in Florida. Regional Assessment: The limpkin occurs outside of Florida with the closest birds in the Bahamas and Cuba. It is not known if there is significant immigration of propagules capable of reproducing in Florida, so the finding remains unchanged.

APPENDIX 1. Brief biographies of the Limpkin Biological Review Group members.

Martin J. Folk has a M.S. in Zoology from Southern Illinois University. He has worked for the Florida Fish and Wildlife Conservation Commission for 19 years, primarily on whooping and sandhill cranes. He oversees research on cranes in Florida and supervises a team of biologists. Marty is a member of the International Whooping Crane Recovery Team and is the newsletter editor for the Whooping Crane Conservation Association.

Stephen A. Nesbitt has a M.S. degree in Wildlife Ecology from Oklahoma State University. He has worked as a professional wildlife biologist since 1963 and from 1974 – 2006 with the Florida Fish and Wildlife Conservation Commission. Nesbitt has published over 120 scientific papers on various species in the field of wildlife ecology and population biology, including 70 papers on sandhill cranes.

Marilyn G. Spalding has a B.A. degree in biology from the University of Miami and a DVM degree from the University of Florida. She is emeritus faculty in the Department of Infectious Disease and Pathology at the University of Florida, specializing on the diseases of wild birds, particularly water birds. She was elected to the Council of the Wildlife Disease Association in 1996. In 1997 she was awarded the C. E. Cornelius Young Investigator Award by the College of Veterinary Medicine at UF. She acts as the consulting veterinarian to the FWC in its efforts to re-introduce the whooping crane to Florida and has published over 70 scientific papers, several review chapters and a book, most dealing with diseases of wild birds.

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

Email from Diane Erdely, 10/5/10, resides in the community of Solivita on Polk/Osceola County line: Limpkin often seen around the lakes here. Breed on the property. Several broods have been seen in the development and just outside. At one point this summer, there was a flock of 10 wandering around the area.

Email from Dana Bryan
Limpkin status for FWC listing – Dana C. Bryan 10-4-10 FDEP/FPS
To my knowledge, no one has published any population estimate or assessment of Limpkins in Florida. Historically, the population is greatly reduced by loss of habitat, chiefly from the drainage of wetlands for agriculture. However, there have been population strongholds, especially in south Florida, so I suspect the Species of Special Concern was based more on the thought that the Limpkin was a specialist on apple-snails, and thus was somewhat vulnerable. My accounts for the *Birds of North America* and the *Handbook of the Birds of the World* details their diet specificity, and there is validity to the concern – while they readily eat bivalves as well, I don't think they breed anywhere in Florida except where there is a healthy apple-snail population. I can provide PDFs of those publications on request.

I also report in those publications that the breeding bird surveys and Christmas counts note a population decline or contraction in the northern part of their range, but the analysis should be updated. Also, they are not a species that tends to be found in driving BBS routes, so the numbers contributing to those analyses are small.
I continue to be concerned about the Limpkin for a few reasons. The population at Wakulla Springs, which was a northern stronghold, disappeared following an apple-snail disappearance in the late 1990s. They have not returned to breed to date. If the serious decline in Snail Kite reproduction in the Everglades and Francis S. Taylor Wildlife Management Area (WMA) reflects low apple snail availability, the Limpkins certainly have suffered similarly. Water management practices in Lake Okeechobee have reportedly also decimated apple-snail populations over the last decade or so, and the Limpkin stronghold, especially in the southwestern quadrant, is probably greatly reduced. I used to get reports from FWC's Jim Rodgers about the Limpkin abundance there, but don't have "eyes on the ground" any more.

I note in FWC's *Endangered and Threatened Species Management and Conservation Plan FY 2008-2009 Progress Report* that the populations were reported to be declining in the J.W. Corbett Wildlife Management Area in Palm Beach County and in the Jones/Hungryland Wildlife and Environmental Area in Martin and Palm Beach Counties.

These scattered reports are of concern to me because I rarely can find anyone to report on Limpkin numbers. I fear that because their habitat is so widespread in south Florida, no one will notice if populations disappear from certain locations, or if numbers gradually decrease across the range. The fact that Limpkins readily move in drought and flood, makes population trends all the more difficult to discern.

Having said all that, it is also apparent that Limpkins have easily accommodated to the larger exotic apple-snails, especially *Paludosa insularum*. As such, populations have been reported to me in new places in central, north, and panhandle Florida. I'm not sure this gives me hope for the Limpkin in the long run, however. I think it is still too early to tell whether the exotic apple-snail will become a permanent resident in new habitats (thus supporting a larger Limpkin population and range), or will simply boom and bust, and perhaps just replace the native apple-snail in the same habitats.