Little Blue Heron 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 Little Blue Heron
(*Egretta caerulea*)
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 little blue heron was sought from September 17, 2010 to November 1, 2010. A three member Biological Review Group met on November 3–4, 2010. Group members were James A. Rodgers (FWC lead), Peter C. Frederick (University of Florida), and Mark Cook (South Florida Water Management District) (Appendix 1). In accordance with rule 68A-27.0012, Florida Administrative Code, (F.A.C.), the Little Blue Heron Biological Review Group was charged with evaluating the biological status of the little blue heron 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 little blue heron met the population size reduction criteria A2, A3, and A4 for listing. Based on the literature review, information received from the public, and the BRG findings, FWC staff recommends listing the little blue heron 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 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 – Little blue herons (*Egretta caerulea*) are members of the Family Ardeidae, along with egrets, bitterns and other herons. Despite the species' large range, no subspecies are formally recognized. Previously the species was placed in the monotypic genus *Florida*.

Geographic Range and Distribution – The breeding range of the little blue heron extends along the Atlantic coast from southern Maine to Florida, with larger populations from South Carolina southward (Rodgers and Smith 1995). The species occurs both interior and along the coasts in the Southeast U.S., along the Gulf of Mexico coast from Florida to Texas and into Mexico, and interior throughout the Mississippi River Valley. Breeding also occurs from southern California through Baja California along the Pacific coast, and into the West Indies, Central America and northern South America. The species is widely distributed throughout Florida but generally is less common in colonies compared to other species of herons (Rodgers et al. 1996). Little blue herons tend to be found most frequently in freshwater habitats compared to other heron species (Rodgers et al. 1996, Smith 1997). There is an influx of migrant little blue herons into Florida during the winter (Mikuska et al. 1998)

Life History References – Kale et al. 1992, Rodgers and Smith 1995, Rodgers et al. 1996, Dugger et al. 2005, Hoyer et al. 2006, IUCN 2009, Lantz et al. 2010.

BIOLOGICAL STATUS ASSESSMENT

Threats – Similar to other colonial waterbirds, little blue heron populations suffered tremendous losses from egg and plume hunting prior to regulations enacted in the early 1900s (Rodgers et al. 1996). Current threats to the species are not well understood, but coastal development, disturbance at foraging and breeding sites, environmental degradation of foraging habitat and reduced prey availability, and impacts of predators are concerns. Additional threats include exposure to pesticides, heavy metals and other contaminants at the local level, adverse weather events at nesting colony locations, parasitic infection, and alteration to the hydrology of wetland habitats (Rodgers and Smith 1995, Rodgers et al. 1996, Spalding et al. 1997, Spahn and Sherry 1999, Hunter et al. 2006). The impact of climate change (sea level rise and lower rainfall) is uncertain but would result in more marine habitat but less freshwater and estuarine (i.e., less freshwater discharge) habitat along regions of both coasts. Competition for nesting habitat with cattle egrets has also been suggested as a potential contributor to reduced productivity in little blue herons in the past (Rodgers and Smith 1995, Rodgers et al. 1996, Hunter et al. 2006). Despite having a widespread distribution, the little blue heron was one of fourteen species identified as a regional priority species in need of Critical Recovery or Immediate Management in the 2006 Southeast U.S. Waterbird Conservation Plan (Hunter et al. 2006).

Population Assessment – Little blue heron populations gradually increased through the 20th century as a result of increased protection measures and hunting prohibitions. Runde (1991) documented a possible decline in the Florida population from >20,000 individuals in the late 1970s to <17,000 birds in the late 1980s while Rodgers et al. (1999) found a decrease in number of breeding colonies and smaller colonies in 1999. However, because of its dark plumage and tendency to nest under the nesting canopy of trees, it is difficult to survey for little blue herons during aerial surveys (Rodgers et al. 2005, Frederick et al. 2006, Conroy et al. 2008). Although there has not been a statewide survey for this species since 1999, wading birds are monitored and surveyed regularly in south Florida and the Everglades region (Cook and Kobza 2009, Lantz et al. 2010). The largest colonies of little blue herons were identified in Water Conservation Areas 2 and 3 as supporting >2,000 nesting pairs in 2009 (Cook and Kobza 2009). There are indications that the species has exhibited a slow but steady decline since the latter 1990s,

especially in south Florida (Florida Fish and Wildlife Conservation Commission 2003). See Table 1 for complete details for the status of the little blue heron.

Biological Status Review for the little blue heron—The review group concluded the little blue heron met the population size reduction criteria A2, A3, and A4. See Table 1 for details.

Regional Application—The review group concluded there was no change in the status finding for the little blue heron. See Table 2 for details.

LISTING RECOMMENDATION

Staff recommends listing the little blue heron as a Threatened species.

SUMMARY OF THE INDEPENDENT REVIEW

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

Michael Cheek, South Florida Water Management District: Cheek provided minor grammatical suggestions and several comments on the data used in the BSR and interpretation of these information sources. Most of these comments were incorporated into the revised BSR, including the additional data sources. In summary, Cheek supported the findings of the BSR panel and stated "Overall…LBHE…status review appears to have defensible logic and solid reasoning for their respective proposed listing recommendation."

Jaime A. Collazo, North Carolina State University: Collazo recommended the FWC should monitor the status of the species in future years, especially in regards to climate change issues in Florida. In summary, he supported the findings of the BSR panel and stated "I concur with the assessment and recommendation by the panel of experts. There is evidence to list the LBH as a State Threatened Species."

Dale Gawlik, Florida Atlantic University: Gawlik provided a short discussion on the difficulty of assessing wetland loss and determining the quantity of habitat used by the species in Florida. However, he did support the findings of the BSR panel and stated "…the document includes all the relevant sources for which I am familiar. The reasoning behind the recommendation also seems justified given the data."

LITERATURE CITED

Conroy, M. J., J. T. Peterson, O. L. Bass, C. J. Fonnesbeck, J. E. Howell, C. T. Moore, and J. P. Runde. 2008. Sources of variation in detection of wading birds from aerial surveys in the Florida Everglades. Auk 125: 731-743.

Cook, M. I., and M. Kobza (Editors). 2009. South Florida Wading Bird Report, Volume 15. South Florida Water Management District, Everglades Division. West Palm Beach, Florida.

Dugger, B. D., S. L. Melvin, and R. S. Finger. 2005. Abundance and community composition of waterbirds using the channelized Kissimmee River floodplain, Florida. Southeastern Naturalist 4: 435-446.

Florida Fish and Wildlife Conservation Commission. 2003. Florida's breeding bird atlas: A collaborative study of Florida's birdlife. http://www.myfwc.com/bba/.

Frederick, P. C., J. A. Heath, R. Bennetts, and H. Hafner. 2006. Estimating nests not present at the time of breeding surveys: an important consideration in assessing nesting populations. Journal of Field Ornithology 77: 212-219.

Hoyer, M. V., S. K. Notestein, T. K. Frazer, and D. E. Canfield, Jr. 2006. A comparison between aquatic birds of lakes and coastal rivers in Florida. Hydrobiologia 567: 5-18.

Hunter, W. C., W. Golder, S. L. Melvin, and J. A. Wheeler. 2006. Southeast United States regional waterbird conservation plan. U.S. Fish and Wildlife Service, Atlanta, Georgia.

IUCN. 2009. International Union for Conservation of Nature and Natural Resources. IUCN Red List of Threatened Species. http://www.iucnredlist.org/apps/redlist/details/144662/0.

Kale, H. W., II, B. Pranty, B. M. Stith, and C. W. Biggs. 1992. The atlas of the breeding birds of Florida. Final report. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.

Lantz, S. M., D. E. Gawlik, and M. I. Cook. 2010. The effects of water depth and submerged aquatic vegetation on the selection of foraging habitat and foraging success of wading birds. Condor 112: 460-469.

Mikuska, T., J. A. Kushlan, and S. Hartley. 1998. Key areas for wintering North American herons. Colonial Waterbirds 21: 125-134.

Rodgers, J. A., Jr., H. W. Kale, II, and H. T. Smith (Editors). 1996. Little Blue Heron. Pages 413-420 *in* Rare and Endangered Biota of Florida, Volume V. Birds. University Press of Florida, Gainesville, Florida.

Rodgers, J. A., Jr., P. S. Kubilis, S. A. Nesbitt, M. F. Delany, R. K. Felix, Jr., J. Swain, K. T. Bowman, and J. B. Dodge. 1999. Atlas of breeding sites for colonial waterbirds in Florida during 1999. Final report. Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida.

Rodgers, J. A., Jr., P. S. Kubilis, and S. A. Nesbitt. 2005. Accuracy of aerial surveys of waterbird colonies. Waterbirds 28: 230-237.

Rodgers, J. A., Jr., and H. T. Smith. 1995. Little Blue Heron (*Egretta caerulea*), The Birds of North America Online (A. Poole, editor). Ithaca: Cornell Lab of Ornithology, Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/145.

Runde, D. E. 1991. Trends in wading bird nesting populations in Florida 1976-1978 and 1986-1989. Final report, Nongame Wildlife Program. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.

Smith, J. P. 1997. Nesting season food habits of four species of herons and egrets at Lake Okeechobee, Florida. Colonial Waterbirds 20: 198-220.

Spahn, S. A., and T. W. Sherry. 1999. Cadmium and lead exposure associated with reduced growth rates, poorer fledging success of little blue heron chicks (*Egretta caerulea*) in south Louisiana wetlands. Archives of Environmental Contamination and Toxicology 37: 377-384.

Spalding, M. G., C. K. Steible, S. F. Sundlof, and D. J. Forrester. 1997. Metal and organochlorine contaminants in tissues of nestling wading birds (Ciconiiformes) from southern Florida. Florida Field Naturalist 25: 42-50.

Table 1. Biological status review information findings for the little blue heron in Florida.

Biological Status Review Information Findings	Species/taxon:	Little Blue Heron
	Date:	11/04/10
	Assessors:	Rodgers, Frederick, Cook
	Generation length:	12 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]	Since 1974, numbers have fluctuated among years. Numbers appear to show a slow decline from 1974 in south Florida but the decline is not as great as 50%.	E	N	Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis.
(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]	Based on the BBS data and trends in the everglades, there has been at least a 30% decline since 1974. Based on c, a decline in quality of habitat.	E	Y	Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis.
(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]	2010 to 2046 time period: expect continued slow decline referred to in A2 above. In addition, two major threats are sea level rise (=reduction in freshwater marsh habitat along coasts) and reduced freshwater discharge into coastal estuaries that will reduce primary estuarine foraging habitat. Less rainfall will have impacts on freshwater habitats through Florida and discharge to estuarine habitats, both which will increase salinity and probably result in reduced quality of foraging sites. Based on c, a decline in quality of habitat.	I	Y	Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis.

(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]	FWC 1999 survey indicated a tendency to nest in smaller and fewer colonies since 1978-79 survey. Analysis indicates about a 37% decline over 3 generations or 1.1%/year decrease and a possibility of 50% reduction in next 3 generation time period. Based on c, a decline in quality of habitat.	I	Y	Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis.
[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	Probably >45,000 $miles^2$.	E	N	See EOO in notes tab.
(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	Probably >10,000 $miles^2$.	E	N	See AOO in notes tab.
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	Average 2000-3000 birds in Everglades, but data for 3 generations are lacking elsewhere in state. We don't know what the statewide population currently is but it probably is between 5,000 (all of south Florida, including the everglades) and 15,000 individuals.	I	N	Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis.
(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	Minimum colony numbers and relative sizes indicate at least 5,000 individuals in south Florida.	E	N	Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis.
(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 number of nesting colonies in 1999 was about 60 sites widely distributed around state.	E	N	FWC 1999 statewide survey data.
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	Not available for species on statewide basis. BBS and ENP/Everglades trend analysis indicate a downward trend.		N	Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis.

Initial Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria/sub-criteria are met)
Meets at least one of the criteria.	A2c, A3c, A4c
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)
Meets at least one of the criteria.	A2c, A3c, A4c

Table 2. Biological status review information for the regional assessment for the little blue heron.

1	Biological Status Review Information Regional Assessment	Species/taxon: Little Blue Heron
2		Date: 11/4/10
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, breeding species 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. Though little information is available for parameters regarding movement into Florida, we suspect it occurs or can occur albeit at some low rate. We also suspect that any rescue effect of the Florida population from outside state regions will not be adequate to offset the decrease currently occurring in Florida (see criterion A2) as indicated by the steady decline in the Florida population. We also infer that the out of state populations may not be adequate to reverse the current decline.
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 - In our review of the status of the little blue heron status, the Biological Review Group made the following assumptions and conclusions:

- Generation time: Most birds breed at 2 years of age. Maximum known age of a recovered banded bird was 14 years old. Maximum age probably is about 22-25 years old and birds breed up to maximum age. Generation time is based on the mid-point of beginning breeding to maximum age at death: (22-2)/2=10 years, with generation time as 10+2=12 years of age. Therefore, the time period for evaluation of a change/trend analysis is 3x12=36 years or the beginning time is 1974.
- Extent of occurrence (EOO): The species mostly occurs throughout the entire state of Florida (total 95,000 km^2 or 59,000 $miles^2$) except for extreme western panhandle and north-central region of state (i.e., Columbia, Clay and Union counties and adjacent region) where few colonies are known or located. In summary, the EOO is still larger than the 2,000 km^2 minimum area of concern.
- Area of occupancy (AOO): Using the general presence of wetlands typically makes up about 1/3 the total land area, the AOO is at least 25,000 km^2 or 15,000 $miles^2$.
- Quality and status of wading bird survey data: Little blue herons are dark-plumaged species that tend to nest under the tree canopy making them difficult to detect during aerial surveys using fixed wing aircraft, which is the primary method to survey wading birds over a large area such as the entire state. Rodgers et al. (2006) found the probability of detecting any of the dark-plumaged day herons within a colony was <50%. Only ground counts (typical of surveys in the Everglades and Florida Bay) will result in accurate nest counts. Breeding Bird Survey (BBS) surveys may not accurately detect wading birds if the routes do not occur in wetlands to sufficiently detect these species. These short comings may result in undercount of actual presence of the species.

APPENDIX 1. Brief biographies of the Little blue heron 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 in West Palm Beach. His expertise is 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 foraging 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 in Florida. Information from Ann Hodgson (Tampa Bay Sanctuaries, NAS) on the status of the species in the Tampa Bay region was used in the review of the species by the BSR panel on November 3-4, 2010.