Tricolored 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 Tricolored Heron (*Egretta tricolor*) 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 tricolored heron was sought from September 17, 2010 to November 1, 2010. A three member Biological Review Group (BRG) met on November 3 - 4, 2010. Group members were James A. Rodgers (FWC lead), Mark I. Cook (South Florida Water Management District), and Peter Frederick (University of Florida). In accordance with rule 68A-27.0012, Florida Administrative Code (F.A.C.), the Tricolored Heron BRG was charged with evaluating the biological status of the tricolored 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 Biological Review Group concluded from the biological assessment that the tricolored heron met the listing population size criterion A2, A3, and A4. Based on the literature review, information received from the public, and the BRG findings, FWC staff recommends listing the tricolored 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 – Previously referred to as the Louisiana heron, tricolored herons (*Egretta tricolor*) are members of the Family Ardeidae, which include other herons, egrets, and bitterns (Frederick 1997). Three subspecies are generally recognized: *E. t. tricolor* (South America, Trinidad and Tobago), *E. t. occidentalis* (southwest USA and northwest Mexico), and *E. t. ruficollis* (eastern USA, Mexico, Central America). Previously, the species was placed in the monotypic genus *Hydranassa*.

Geographic Range and Distribution – The breeding range for the tricolored heron in the U.S. extends along the Atlantic and Gulf of Mexico coasts, into the southeastern coastal plain and throughout the Caribbean (Frederick 1997). Breeding also occurs along both coasts of Mexico and the coastal areas of South America. The species occurs throughout most of Florida in both freshwater and estuarine habitats (Runde 1991, Kale et al. 1992, Rodgers et al. 1996, Mikuska et al. 1998, Rodgers et al. 1999, Florida Fish and Wildlife Conservation Commission 2003).

Life History References – Rodgers et al. 1996, Frederick 1997, Smith 1997, Strong et al. 1997, Gawlik 2002, Dugger et al. 2005, Hoyer et al. 2005, Gawlik and Crozier 2007, IUCN 2010, Lantz et al. 2010.

BIOLOGICAL STATUS ASSESSMENT

Threats – Tricolored heron populations suffered huge losses during the plume trade of the late 1800s and early 1900s (Rodgers et al. 1996, Frederick 1997, Kushlan 2002, Hunter 2006). Current threats to the species are not well understood, but coastal development, recreational disturbance at foraging and breeding sites, environmental degradation, human disturbance, and increased pressure from predators are primary concerns (Kushlan et al. 2002, Stolen 2003, Rodgers and Schwikert 2003). Like other wading birds that depend on fragile estuaries and wetlands for foraging and breeding, tricolored herons are at risk of exposure to persistent contaminants such as heavy metals and pesticides (Rodgers 1997, Spalding et al. 1997). Other potential threats to tricolored heron populations are alterations to the hydrology of foraging areas, reduced prey abundance, and oil spill impacts to critical breeding, foraging and roosting sites. The North American Waterbird Conservation Plan ranks the tricolored heron in the "High Concern" category for conservation status (Kushlan et al. 2002).

Population Assessment – Once considered one of the most common herons in the state, Runde (1991) determined that the tricolored heron population experienced a decrease from 35,000 individuals in the late 1970s to 16,000 birds in the late 1980s. Unfortunately, aerial surveys of wading bird populations have been shown to include error rates that raise questions about their validity and usefulness in determining trends, particularly for small, dark-plumaged species that nest beneath the nesting canopy as do tricolored herons (Rodgers et al. 2005, Frederick et al. 2006, Conroy et al. 2008, Green et al. 2008). Annual surveys of colonial waterbirds in the Everglades region and elsewhere in Florida and the range of the species indicate that nesting numbers for wading birds can be highly variable from season to season (Ogden 1994, Gawlik 1999, Frederick and Ogden 2001, Cook and Kobza 2009). About 1,144 pairs of tricolored herons nested in the three Water Conservation Areas and mainland Everglades National Park in 2009 (Cook and Kobza 2009). This compares to 1,723 nesting pairs in the area during the 1999 nesting season and an estimated 10,000-15,000 pairs in the 1930s (Ogden 1994, Gawlik 1999).

Biological Status Review—The BRG concluded the tricolored heron met the population size reduction criterion A2, A3, and A4. See Table 1 for details.

Regional Application – The BRG concluded there was no change in the recommendation for the tricolored heron. See Table 2 for details.

LISTING RECOMMENDATION

Staff recommends listing the tricolored heron as a Threatened species.

SUMMARY OF THE INDEPENDENT REVIEW

This report was sent to 3 potential independent reviewers. Comments were received from 2 reviewers. The full text of peer reviews is available at MyFWC.com.

Larry Bryan, Savannah River Ecology Laboratory, University of Georgia: Bryan agreed with the findings of the BSR panel and stated "In my opinion, acknowledging the difficulty of surveying for this species given its cryptic coloration and nesting habits (e.g., understory), I thought the review group utilized the best available data in evaluating the status of this species and correctly classified it as State Threatened…I also thought the assumptions made by the group…within the Tables were accurate…Acknowledgement of the potential impacts of sea level rise/climate change was also important and appropriate."

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

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

Biological Status Review Information Findings		
	Species/taxon:	Tricolored Heron
	Date:	11/04/10
	Assessors:	Rodgers, Cook, Frederick
	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. Numbers appear to show a slow decline from 1974 via BBS routes. In southern estuarine regions of the ENP there has been a decline. In Tampa Bay a slight increase. Everglades total numbers may be 2,500-3,000 nests (=5,000-6,000 individuals).	O	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]	FWC 1999 survey indicated a tendency of smaller colonies in last 3 decades. Analysis of ENP/Everglades data indicates decrease of 1.4%/year and a possibility of nearly 50% reduction in 3 generations time period.	E	Y	Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis. BNA account. FWC 1978-79 and 1989-90 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]	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 throughout Florida and discharge to estuarine habitats, both of which will increase salinity and probably result in reduced quality of foraging sites.	I	Y	
(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 indicates a tendency of smaller colonies in last 3 decades. Analysis of BBS data indicates a decrease of 1.4%/year and a possibility of 50% reduction in 3 generations.	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 $miles^2$.	O	N	See EOO on notes tab.
(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	Probably >10,000 $miles^2$.	O	N	See AOO on 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	There are probably at least 10,000 individuals in Florida but may not be much more.	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 10,000 individuals.	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	See B criterion.	E	N	Unpublished databases of the SFWMD, ENP, NAS, P. Frederick/Everglades, FWC 1999 statewide survey, BBS trend analysis.
(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 criterion.	A2, A3, A4
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)
Meets at least one criterion.	A2, A3, A4

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

1	Biological Status Review Information Regional Assessment	Species/taxon: Tricolored Heron
2		Date: 11/4/10
3		Assessors: Rodgers, Cook, Frederick
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.	No. 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 is not adequate to offset the decrease currently occurring in some areas of Florida (see criterion A2) as indicated by the steady decline in the total 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 its review of the status of the tricolored heron, 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 about 18 years. Maximum age probably is about 25 years of age. Calculation of generation time was based on the mid-point of onset of breeding to maximum age at death: (22-2)/2=10 year, with generation time as 10+2=12 years of age. Therefore, the time period for evaluation of change/trend analysis is 3x12=36 years or begins at 1974.
- Extent of occurrence (EOO): This is mostly the entire state of Florida (total about 140,513 km^2 or 54,252 $miles^2$) except for the western panhandle and extreme north-central region of state (i.e., Columbia, Clay, and Union counties and adjacent regions) where few colonies are known or located. In summary, the EOO is larger than the 20,000 km^2 delineation.
- Area of occupancy (AOO): Using the general premise that area of wetland typically makes up about 1/3 the total land area, the AOO is at least 16,000 km^2 or 10,000 $miles^2$.
- Quality and status of wading bird survey data: Tricolored 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 (2005) 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 species presence.

APPENDIX 1. Brief biographies of the Tricolored 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. 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 in Florida. Information from Ann Hodgson (Florida Coastal Islands Sanctuaries, National Audubon Society) 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.