Suwannee Cooter Biological Status Review Report

March 31, 2011

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
620 South Meridian Street
Tallahassee, Florida 32399-1600

Biological Status Review
for the
Suwannee Cooter
(*Pseudemys concinna suwanniensis*)
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 Suwannee cooter was sought from September 17 through November 1, 2010. The five-member Biological Review Group (BRG) met on November 9-10, 2010. Group members were Bill Turner (FWC lead), Chris Lechowicz (Sanibel-Captiva Conservation Foundation), Peter Meylan (Eckerd College), Paul Moler (independent consultant), and Travis Thomas (University of Florida) (Appendix 1). In accordance with rule 68A-27.0012, Florida Administrative Code (F.A.C.), the BRG was charged with evaluating the biological status of the Suwannee Cooter using criteria included in definitions in 68A-27.001, F.A.C., and following 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 reviewer's 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 Suwannee cooter did not meet any listing criteria. FWC staff recommends not listing the Suwannee cooter 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 gives special thanks to Dr. Dale Jackson for compiling the data used by the BRG and drafting the Biological Information section of this report.

BIOLOGICAL INFORMATION

Taxonomic Classification – The Suwannee cooter is treated here as a subspecies of the widely distributed river cooter, *Pseudemys concinna*, an arrangement followed by most major treatments through the mid-1990s (Crenshaw 1955, Conant 1975, Conant and Collins 1991, Ernst et al. 1994). Although Seidel (1994) suggested elevating the taxon to full species status as *P. suwanniensis* based largely on perceived disjunction from other river cooters, Jackson and

colleagues showed that Suwannee cooters were little differentiated from *P. concinna* immediately to the east or west (Jackson 1999, Jackson and Walker 1997). Thus, there exists little evidence to support species-level distinction of *suwanniensis*, and this was apparently accepted by Seidel, who once again listed *suwanniensis* as a subspecies (Seidel and Dreslik 1996).

Life History and Habitat Requirements – Unlike other species of *Pseudemys*, the river cooter, including the Suwannee cooter, is strictly a turtle of rivers and river-associated habitats. It inhabits blackwater, alluvial, and spring-fed rivers, and also survives in some impoundments (e.g., Lake Talquin [Ochlockonee River] and Lake Rousseau [Withlacoochee River]). Key habitat features are moderate current, ample aquatic vegetation for feeding, and appropriate surfaces for basking (Jackson 2006). The species is sufficiently salt-tolerant to venture into brackish to saline waters at river mouths (Carr 1952, Jackson and Walker 1997, Jackson 2006). Suwannee cooters feed principally on aquatic vegetation and algae (Allen 1938, Marchand 1942, Carr 1952, Lagueux et al. 1995, Bjorndal et al. 1997). Females grow larger than males, reaching a maximum size of nearly 17 inches carapace length and more than 22 lbs, establishing this as the largest member of the family Emydidae. Females require 10-15 years to mature, but life expectancy may exceed 30 years. The lengthy nesting season extends from late March to early August. Each adult female lays clutches of 8-27 eggs, 4 or more times per season. However, few nests survive predation (Jackson and Walker 1997).

Population Status and Trend – Insufficient baseline data exist to provide a definitive quantitative assessment of regional population status. Suwannee cooters have been harvested for food, which has reduced populations from historic numbers. Many lines of evidence indicate a downward trend in Suwannee cooter populations for much of the 20th century: the massive assemblages noted on the Suwannee River by Carr (1952) are no longer reported; comparative data across many decades at the Rainbow River point to substantial decline from harvest (Marchand 1942, Huestis and Meylan 2004); industrial pollution extirpated the Fenholloway River population in the second half of the century (Jackson and Ewert 1998, Jackson 1999); and the existence of large shell "middens" at multiple sites in the 1990s and 2000s confirm widespread, continuing harvest despite regulations (Jackson 2006, Heinrich et al. 2010). Viable populations, some at least moderately large (Jackson and Walker 1997, Kornilev et al. 2010, Johnston et al. *in press*), still exist in all rivers but one within the subspecies' historic range.

Geographic Range and Distribution – For this review, we follow Jackson and Walker (1997), who recognized the Suwannee cooter as comprising those populations occurring from the Tampa Bay region (Alafia River) northwestward to approximately the Ochlockonee River just west of Tallahassee. River cooters from the remainder of the Florida panhandle (Apalachicola River and westward) are referred to as *P. c. concinna*, although the Apalachicola region may represent a zone of intergradation (Jackson 2006). The species' occurrence in the Silver River, a tributary of the Atlantic Coast-draining Ocklawaha/St. Johns River drainage, is attributable to the translocation to (and escape from) the old Ross Allen Silver Springs Reptile Institute decades ago (Jackson 2006).

Quantitative Analyses – We know of no PVA models that have been developed to estimate the probability of extinction of the Suwannee cooter.

BIOLOGICAL STATUS ASSESSMENT

Threats – Not surprisingly given its size and catchability (via snorkeling and traps), the Suwannee cooter has a long history of harvest for meat (Carr 1940, 1952) that has continued to the present (Heinrich et al. 2010). Undoubtedly, this suppressed populations locally (Huestis and Meylan 2004, P. Meylan *pers. commun.*) and regionally (Jackson 2006, Heinrich et al. 2010). Although FWC rules have limited possession since the 1970s, there appear to have been periodic large harvests of Suwannee cooters for meat as attested to by piles of discarded shells observed throughout the Suwannee cooters' range during the 1970s to mid-2000s (Jackson 2006, Heinrich et al. 2010). Legal take of cooters was prohibited by rule changes enacted by FWC in 2009. Because rivers tend to be relatively stable and persistent systems compared to most Florida habitats, outright habitat destruction is not a major threat to this turtle. Nonetheless, human-generated impacts to the integrity of Florida's river systems, including their floodplains, affect Florida's riverine turtles (Jackson 2005). Chemical pollution (from industries such as pulp mills, and waste products from cities and agricultural activities) pose a potential threat to riverine turtle, though even a major chemical spill along one inhabited river would not endanger the species' statewide population. The Fenholloway River in Taylor County, from which Suwannee cooters were extirpated by pollution, serves as an example that river-wide extirpation is possible (Jackson 1999). Siltation from road crossings, borrow pits, or other situations can reduce the suitability of smaller streams, including reducing the amount of light available to support photosynthesis of Suwannee cooter food plants. Although the species inhabits impoundments within its range, the long-term impacts on the Suwannee cooter of converting flowing freshwater systems to still or slow-flowing systems is unstudied. Increasing pressure from water bottling companies that wish to tap Florida's springs threatens water levels, flow regimes, and floodplain communities in several rivers (e.g., Santa Fe River: Kornilev 2010). As for all turtles, predation, particularly by raccoons and fish crows, accounts for the loss of a majority of nests (> 90% along the Wakulla River) as well as some adult females (Jackson *pers. commun.*). Additional potential predators include wild hogs and invasive fire ants. Nest flooding following very heavy regional rains also destroys entire clutches in some years (Jackson and Walker 1997). No evidence to date has documented that Suwannee cooters suffer from epidemic diseases that might jeopardize populations. However, the occurrence of at least two instances of necrotic shell disease in the species elsewhere (Lovich et al. 1996, Garner et al. 1997) suggests the need to monitor Florida populations regularly. Although vehicle-induced mortality on roads is low because the species rarely wanders on land except to nest, mortality from boat strikes may be significant in some populations (G. Heinrich *pers. commun.*).

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

LISTING RECOMMENDATION

Staff recommends not listing the Suwannee cooter as a threatened species and removing it from the Species of Special Concern list because it did not meet any listing criteria.

SUMMARY OF THE INDEPENDENT REVIEW

The draft biological status review report was reviewed by two external experts: Anthony Lau (University of Florida) and Kenneth P. Wray (Florida State University). Both agreed with the findings of the BRG and supported staff's recommendation to delist the Suwannee cooter. One reviewer commented the continued protection of this species by FWC rule was necessary to ensure that the species does not become threatened. This reviewer also asked for clarification of one of the references to GIS polygons cited in the findings table. This refers to a personal communication from Dale Jackson about the area of the rivers that the Suwannee cooter inhabits. He estimated the area using GIS software by drawing polygons around the rivers to calculate their area. The findings table was updated to make this clear. The reviewer also pointed out that one of the citations listed as in press has been printed, so the citation information has been changed.

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Biological Status Review Information
Findings

Species/taxon: Suwannee cooter
Date: November 9-10, 2010
Assessors: Chris Lechowicz, Peter Meylan, Paul Moler, Bill Turner and Travis Thomas
Generation length: 20-25 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]	Although extirpation of one of the smaller populations from pollution (Fenholloway River) post-1950 is not reversible, other causes of decline have ceased, are understood, and are reversible	S	N	
(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]	Although extirpation of one of the smaller populations from pollution (Fenholloway River) post-1950 is not reversible, other causes of decline have ceased, are understood, and are reversible	I	N	
(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]	At least some expected recovery from past population declines as result of closure of legal take in 2009	I	N	
(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]	At least some expected recovery from past population declines as result of closure of legal take in 2009	P	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	ca. 29,000 km^2	E	N	D. Jackson pers. commun. (calculated using GIS)

(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	ca. 200 km^2	E	Y	D. Jackson pers. commun. (calculated using GIS)
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	≥12 river drainages as locations. Species has limited mobility over terrestrial habitat but may move through the gulf (saline tolerant and good swimmers), so is not severely fragmented.	I	N	
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	With strong enforcement of 2009 FWC rules prohibiting take, population likely to grow. Habitat quality likely to decline with increasing human population & land use changes	S	Y	
c. Extreme fluctuations in any of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals	No; extreme fluctuations unlikely in long-lived species; rivers relatively stable.	I	N	
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	No, likely >10,000	S	N	
(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 legal take as of 2009, but this will require strong enforcement and continued protection	I	N	
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:	With strong enforcement of 2009 FWC rules prohibiting take, population likely to grow.	P	N	
a. Population structure in the form of EITHER	No, numbers in several drainages probably exceed 1,000.	S	N	Jackson & Walker 1997, Huestis & Meylan 2004, Jackson 2006
(i) No subpopulation estimated to contain more than 1000 mature individuals; OR				
(ii) All mature individuals are in one subpopulation	Occurs in at least 12 independent drainages.	O	N	Jackson 2005, 2006
b. Extreme fluctuations in number of mature individuals	No; extreme fluctuations unlikely in long-lived species; rivers provide relatively stable habitat.	I	N	Jackson 2005, 2006
(D) Population Very Small or Restricted, EITHER				
(d)1. Population estimated to number fewer than 1,000 mature individuals; OR	Population likely more than 1,000 individuals. Thomas has about 1,000 marked in Suwannee.	S	N	Jackson & Walker 1997, Huestis & Meylan 2004, Jackson 2006, Thomas pers. commun. 2010

(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	ca. 200 km^2	E	N	D. Jackson pers. commun. (calculated using GIS)
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	No specific models	S	N	

Initial Finding (Meets at least one of the criteria/sub-criteria OR Does not meet any of the criteria/sub-criteria)	Reason (which criteria/sub-criteria are met)
Meets no criteria	
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/sub-criteria OR Does not meet any of the criteria/sub-criteria)	Reason (which criteria/sub-criteria are met)
Meets no criteria	

1	Species/taxon:	Suwannee cooter
2	Biological Status Review Information Date:	November 9- 10, 2010
3	Regional Assessment Assessors:	Chris Lechowicz, Peter Meylan, Paul Moler,
4		Bill Turner and Travis Thomas
5		
6		
7		
8	Initial finding	
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.	N
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.	N
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 regional 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

Notes from BRG meeting -- Calculation of generation time presented at the BSR group meeting

Generation length is defined as the average age of parents of the current cohort, which is greater than the age at first breeding and less than the age of the oldest breeding individual. We estimate generation length for the Suwannee Cooter as follows. Jackson & Walker (1997) estimated minimum age of maturity (from plastral annuli) of females at 10-13 yrs, with this possibly being an underestimate. Based on recapture of marked nesting females, Jackson (2003) estimated longevity to exceed 25 years. Even 30 years is a conservative estimate (D. Jackson, unpublished data). Male ages are unknown but probably similar. A fairly conservative estimate of generation length = (10 + 30) / 2 = 20. A range of 20-25 years is reasonable.

APPENDIX 1. Brief biographies of the Suwannee cooter Biological Review Group members.

Chris Lechowicz is the Interim Director of the Wildlife Habitat Management Program and staff herpetologist at the Sanibel-Captiva Conservation Foundation where he has worked since 2002. He has a B.S. in Zoology and Computer Science from Southern Illinois University at Carbondale and will complete his M.S. in Environmental Science from Florida Gulf Coast University in 2010. Chris's focus is on riverine turtles with a specialty on the Genus *Graptemys.* Chris is a member of the IUCN/SCC Tortoise and Freshwater Turtle Specialists Group as well as a board member of the Florida Turtle Conservation Trust.

Dr. Peter A. Meylan received his Ph.D. from the University of Florida. He is a Professor of Biology at Eckerd College in Saint Petersburg, FL. His research interests include the evolutionary history, ecology, and conservation biology of amphibians and reptiles, especially turtles. Current research includes 2 sea turtle projects: an investigation of the ecology and migrations of sea turtles of Bocas del Toro Province, Panama (funded by the Wildlife Conservation Society) and the Bermuda Turtle Project, which is a cooperative project with the Bermuda Aquarium and the Caribbean Conservation Corporation (as well as continuing to work with Florida freshwater turtles with the Eckerd Herpetology Club on the Rainbow River). He has many scientific articles on turtles and is the editor of a book on the biology and conservation of Florida turtles.

Paul E. Moler received his M.S. in Zoology from the University of Florida in 1970 and his B.A. in Biology from Emory University in 1967. He retired in 2006 after working for 29 years as a herpetologist with FWC, including serving as administrator of the Reptile and Amphibian Subsection of the Wildlife Research Section. He has conducted research on the systematics, ecology, reproduction, genetics, and conservation biology of a variety of herpetofaunal species in Florida, with primary emphasis on the biology and management of endangered and threatened species. He served as Chair for the Florida Committee on Rare and Endangered Plants and Animals in 1992–94, Chair of the Committee on Amphibians and Reptiles since 1986, and editor of the 1992 volume on amphibians and reptiles. Paul has more than 90 publications on amphibians and reptiles.

Travis Thomas received a Bachelor's Degree in 2008 from the University of Florida in Natural Resources Conservation. He is currently pursuing a Masters Degree in Wildlife Ecology and Conversation under the supervision of Dr. Perran Ross. His primary research focuses on the ecology and management of fauna in riparian systems. He was hired by FWC in 2008, and he has worked on numerous projects concerning reptile and amphibian ecology. He worked for three years in the Herpetology Dept. under Dr. Kenneth Krysko at the Florida Museum of Natural History. He has spent time as a volunteer on numerous projects in Kenya, Africa, under the supervision of Leigh Ecclestone and the Kenyan Wildlife Service. He has published several notes on the ecology and distribution of reptiles and is currently a co-author on a study of the ecology of M. temminckii in O'Leno State Park as well as the primary author on a study of the morphology of M. temminckii.

William M. Turner received his B.S. from Erskine College and M.S. in Biology from the University of South Alabama. From 2003 to 2007, he was the Herpetological Coordinator for the Wyoming Game and Fish Department. In Wyoming, he conducted statewide surveys for amphibians and reptiles, focusing on emerging amphibian diseases and the impacts of resource development native reptiles. Since 2007, he has been the Herp Taxa Coordinator for FWC in the Division of Habitat and Species Conservation. He has conducted research on native amphibians and reptiles in Florida, Alabama and Wyoming that has resulted in several published papers and reports.

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.

Yurii Kornilev (M.S., University of Florida) provided three-pages of comments and recommendations, supplemented by two recent publications (Kornilev et al. 2010, Johnston et al.; see Literature Cited) focusing on aspects of ecology of the Santa Fe River population of Suwannee Cooter. For the full set of comments, see supplemental materials for this review available at http://www.myFWC.com.