Eastern Chipmunk 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
Eastern chipmunk
(*Tamias striatus*)
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 eastern chipmunk was sought from September 17 to November 1, 2010. The members of the Biological Review Group (BRG) met on November 3-4, 2010. Group members were Jeff Gore (FWC lead), Bob McCleery (University of Florida), and Jack Stout (Emeritus, University of Central 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 eastern chipmunk 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 eastern chipmunk BRG concluded from the biological assessment that the eastern chipmunk did not meet any of the listing criteria. However, concerns were expressed that the primary data available for making this evaluation were not recent and not available for the time window in which the assessment should be conducted for this species (the past 10 years). Therefore, staff recommends listing the species as a Species of Special Concern until more current data can be collected.

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 Karen Nutt who served as a data compiler on the species and who prepared the initial draft of this report.

BIOLOGICAL INFORMATION

Taxonomic Classification – This biological status report is for the eastern chipmunk (*Tamias striatus*) in Florida. Several subspecies of the eastern chipmunk have been named and the Florida population is typically included within *T. s. pipilans* (Snyder 1982; but see Jones and

Suttkus 1979). However, the subspecies are not disjunct and are separated only by clinal gradation (Snyder 1982; Whitaker and Hamilton 1998). Therefore, this report does not consider subspecies in the assessment of the status of the Florida population of the eastern chipmunk.

Life History – The eastern chipmunk is a small ground squirrel that weighs around 80 to 125g and has prominent black and white lateral stripes (Snyder 1982). It inhabits deciduous forests, particularly areas with abundant crevices for refuge and numerous observation posts (Snyder 1982). Habitat in Florida is hardwood or mixed hardwood-pine forests having oaks as the dominant species (Gore 1990). Eastern chipmunks occur unevenly across their range in Florida, and much of the apparently suitable deciduous forest habitat remains unoccupied (Gore 1990).

The eastern chipmunk lives in solitary and dispersed territories (Yahner 1978). Individuals are active during the day, mostly within 15m of the burrow system (Snyder 1982; Yahner 1978). Burrows are separated from each other by an average of 35m and core areas are intensely defended against conspecifics (Yahner 1978).

Density of eastern chipmunk populations varies both temporally and geographically and ranges from 0.3 to 37.6 individuals per hectare (Yerger 1953). Adult female breeding density is probably determined by the availability of food resources while male density seems to be dependent on female density (Galloway and Boonstra 1989). Clear-cutting of forests has no significant effect on eastern chipmunk population densities or age structure, but forest fragmentation does decrease chipmunk survival rates (Mahan and Yahner 1998; Nupp and Swihart 1998). Furthermore, in farmland woodlots, density decreases with increasing area and isolation of habitat (Reunanen and Grubb 2004).

Eastern chipmunk females breed once or twice a year in the spring and/or summer (Snyder 1982). Estrus lasts only a short period of time during which males intensively guard access to females (Yahner 1978). Litter size averages between 4 and 5 individuals and juveniles emerge at 5 to 7 weeks old at which time they are self-reliant (Snyder 1982; Yahner 1978). Most juveniles disperse to a new residence within two weeks of first emergence. Individuals usually become sexually mature after their first winter and average mean life expectancy is 1.3 years (Snyder 1982).

In the northern part of their range, eastern chipmunks spend most of their time from late fall to early spring underground in various degrees of torpor, but in favorable weather they sometimes appear above ground (Snyder 1982). This annual cycle of torpidity seems to be endogenous rather than determined by ambient temperature, and juveniles tend to delay its onset longer than do adults (as reviewed in Snyder 1982). It is unclear whether eastern chipmunks in the southern part of their range undergo this seasonal torpidity. Stevenson (1962) believed eastern chipmunks were inactive in winter in Florida, but Jones and Suttkus (1979) observed or collected individuals throughout the year. Food items (seeds, nuts, and acorns) for overwinter survival are cached in burrow systems (Snyder 1982).

Geographic Range and Distribution –The eastern chipmunk ranges from Lake Manitoba across eastern Canada and southward nearly to the Gulf of Mexico (Snyder 1982). It

is listed as a species of Least Concern by the IUCN because it is widespread, abundant, and subject to no major threats (Linzey and Hammerson 2008).

Along the southern edge of its range the eastern chipmunk occurs in a few parishes in Louisiana near the Mississippi River; throughout much of Mississippi, Alabama, and Georgia; and in a small portion of northwest Florida (Snyder 1982). The eastern chipmunk's historical range in Florida is unknown, but its current range is restricted to west of the Apalachicola River along the Alabama line (Gore 1990; Snyder 1982). The range mapped by Gore (1990) covers at most about 475 square miles within 3 areas encompassing portions of Escambia, Santa Rosa, Okaloosa, Walton, and Holmes counties and centered on the upper reaches of the Yellow, Blackwater, Escambia, and Choctawhatchee rivers. Chipmunks are not believed to occur throughout the mapped range (Gore 1990), and therefore, the area of occupancy is estimated to be less than 475 square miles.

Population Status and Trend – Gore (1990) found chipmunks over a larger area in northwest Florida than Stevenson (1962) reported earlier. However, the apparent increase was likely due to broader sampling effort rather than a real expansion of the extent of occurrence (Gore 1990). Chipmunk populations in Florida appear stable in number and distribution, but it is difficult to accurately quantify density and number of individuals in each population due to the chipmunk's secretive nature (Gore 1990).

Assuming the lowest reported density of 0.3 eastern chipmunks/hectare (Yerger 1953) occurs over the known Florida range of approximately 475 mi^2 (Gore 1990), the estimated number of chipmunks in Florida would be 36,900. Because eastern chipmunks in Florida have been found only in deciduous forests and primarily near streams (Stevenson 1962; Gore 1990), the actual area occupied and the population size are likely smaller. Nevertheless, the population is not known to be declining. More extensive sampling is needed to provide a better estimate of current population size and distribution of eastern chipmunks in Florida.

Quantitative Analyses – No population viability analysis has been conducted for the eastern chipmunk.

BIOLOGICAL STATUS ASSESSMENT

Threats – The greatest threat to eastern chipmunk populations in Florida is the destruction of habitat through the clearing of deciduous forests (Gore 1990). In Florida, this may be offset by the abandonment of planted pine forests and their succession into deciduous forests (Jones *et al*. 1992). The net effect of these two practices in Florida to chipmunk populations remains unknown (Jones *et al*. 1992).

Population Assessment – Findings from the BRG are included in a Biological Status Review Information Findings table and regional assessment table. The eastern chipmunk BRG concluded from the biological assessment that the eastern chipmunk (*Tamias striatus*) does not meet any of the listing criteria. However, the data available for the assessment is 20 years old. The time frame, based on generation length, for evaluating the chipmunk is the past 10 years or projecting trends into the future 10 years.

LISTING RECOMMENDATION

In the draft biological status report, staff recommended not listing the chipmunk. However, one of the two peer reviewers of the draft report pointed out that no recent data were available to conduct the assessment. The reviewer also noted that concluding no criteria were met in the absence of recent data was inconsistent with other species simultaneously undergoing status reviews (several species for which information does not exist are being recommended by staff for listing as species of special concern until data can be collected to properly evaluate the species). In consideration of the peer review, taking a precautionary approach and to be consistent among species evaluations, staff recommends listing the eastern chipmunk as a Species of Special Concern until more current data can be collected to properly conduct the biological status assessment.

SUMMARY OF THE INDEPENDENT REVIEW

Comments were received from 2 reviewers, Dr. Brad Bergstrom (Valdosta State University) and Dr. Holly Ober (University of Florida). Appropriate editorial changes recommended by the reviewers were made to the report. One reviewer concurred with the findings and staff recommendation. The other reviewer suggested that the area of occupancy may be smaller than noted in the table. Staff agrees that is possible, but the area listed already meets the criterion for small area of occupancy. The reviewer also took issue with the density estimates used to estimate population size. Staff agrees the density of Florida populations is unknown. However, the smallest published density was used to estimate population size and the density would have to be more than 70% smaller (or area occupied smaller) to trigger the population size criterion. Staff did not agree that is likely.

One reviewer believed that the lack of data regarding recent abundance and distribution of chipmunks is reason to maintain the current listing status. Furthermore, the reviewer indicated that climate change modeling, assessment of trends in forest cover, and quantitative surveys of chipmunk populations should be conducted to properly assess the listing status of this species. He concluded there was insufficient data to determine the listing status and suggested that the conservative approach would be to maintain the current status until more information is available. Staff agrees that data on chipmunk populations in Florida are old or absent and new information is needed. Although the Biological Review Group did not infer population declines from existing data, staff conservatively recommends retaining the eastern chipmunk on the FWC list of Species of Special Concern until more current data can be collected. Peer reviews are available at MyFWC.com.

LITERATURE CITED

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Biological Status Review Information
Findings

Species/taxon:	Eastern chipmunk (*Tamias striatus*)
Date:	4 Nov 2010
Assessors:	Jeff Gore, Bob McCleery, Jack Stout
Generation length:	Individuals usually become sexually mature after their first winter and average mean life expectancy is 1.3 years (Snyder 1982). Therefore, generation time is about **1 year**.

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]	No evidence to suggest Florida populations are declining, but clearing of deciduous forests may lead to decline.		N	Gore 1990
(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]	No evidence to suggest Florida populations are declining, but clearing of deciduous forests may lead to decline.		N	Gore 1990
(a)3. A population size reduction of at least 30% projected or suspected to be met within the next 10 years or 3 generations, whichever is longer (up to a maximum of 100 years) [1]	No evidence to suggest Florida populations are declining, but clearing of deciduous forests may lead to decline.		N	Gore 1990
(a)4. An observed, estimated, inferred, projected or suspected population size reduction of at least 30% over any 10 year or 3 generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased or may not be understood or may not be reversible.[1]	No evidence to suggest Florida populations are declining, but clearing of deciduous forests may lead to decline.		N	Gore 1990
[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	< 7,722 mi^2 (approximate area of rectangle that includes ranges of all 3 known subpopulations (occupied areas) is about 90 mi x 19 mi = 1710 mi^2)	E	Y	Gore 1990

(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	< 772 mi^2 (sum of polygons around each of 3 known occupied areas is <475 mi^2)	E	Y	Gore 1990
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	Severely fragmented.	O	Y	Gore 1990
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	Unknown, i.e. no data available to assess population change and no evidence of population decline. But clearing of deciduous forests (iii) might lead to decline.		N	Gore 1990
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 fluctuations.		N	Snyder 1982
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	Assuming lowest reported density of 0.3 chipmunks/hectare over 475 mi^2 of area occupied = 36,900 chipmunks in Florida	E	N	Yerger 1953; Gore 1990
(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	Even if pop size is much lower than estimated above, there is no evidence of continuing decline			
(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	No	E	N	
(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	AOO > 8mi^2 but species occurs in 3 subpopulations. However, no threat is apparent that would adversely impact all 3 within a short period of time.	O	N	Gore 1990
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	No PVA carried out.		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)
Does not meet any of the 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)
Does not meet any of the criteria.	

1	Species/taxon:	Eastern chipmunk (Tamias striatus)
2	Biological Status Review Information Regional Assessment Date:	11/4/10
3	Assessors:	Jeff Gore, Bob McCleery, Jack Stout
4		
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.	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.	Likely but don't know.
12	2c. Is the immigration expected to decrease? (Y/N/DK). If 2c is YES or DO NOT KNOW, go to line 13. If 2c is NO go to line 16.	
13	2d. Is the 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 from initial finding.
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 from initial finding.

Appendix 1. Brief biographies of the Eastern chipmunk Biological Review Group members.

Jeff Gore has a Ph.D. in Wildlife Biology from the University of Massachusetts. He has worked for FWC since 1986 and since 2004 has been the leader of the Terrestrial Mammal Research Subsection. Dr. Gore has over 25 years of experience working on conservation of wildlife species in Florida, particularly small mammals such as bats and beach mice.

Robert McCleery has a Ph.D. in Wildlife Science from Texas A & M University. He currently serves as an assistant professor in the Department of Wildlife Ecology and Conservation at the University of Florida. Dr. McCleery has over 15 years experience in research and conservation of wildlife and has worked extensively on the ecology of fox squirrels, Key Largo woodrats, Keys marsh rabbits, Florida Key deer and Indiana bats.

Jack Stout has a Ph.D. from Washington State University. He is currently a Professor Emeritus at the University of Central Florida. Dr. Stout has worked over 30 years on the ecology and conservation of wildlife habitats and species in Florida, including Florida mice and beach mice.

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.

No information about this species was received during the public information request period.