Homosassa Shrew 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
Homosassa shrew
(*Sorex longirostris eionis*)
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 Homosassa shrew 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 Melissa Tucker (FWC lead), David Shindle (Conservancy of Southwest Florida), and Dan Pearson (Florida Park Service, Department of Environmental Protection) (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 Homosassa shrew 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 Homosassa shrew BRG concluded from the biological assessment that the Homosassa shrew does not meet any listing criteria. No information was received from the public during our information request period. After considering reviewers' comments about insufficient data, staff reviewed the BRG findings and the recommendations in the *Guidelines for Using the IUCN Red List Categories and Criteria (Version 8.1)* and recommends that the Homosassa shrew be maintained as a Species of Special Concern until more 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 drafted much of this report.

BIOLOGICAL INFORMATION

Taxonomic Classification – This report is for the Homosassa shrew, a subspecies of the southeastern shrew, in Florida. The Homosassa shrew has been designated as the subspecies *Sorex longirostris eionis* (Davis 1957 as cited in Jones *et al*. 1991).

Life History – The Homosassa shrew has been captured in palmetto thickets, longleaf pine sandhills, cypress swamps, bay swamps, slash pine and longleaf pine flatwoods, hydric hammocks, xeric hammocks, sand pine scrub, and clear-cuttings (as summarized in Jones *et al*. 1991).

Little is known about the life history, behavior, and biology of the Homosassa shrew. Summary information is provided for the species as a whole, *Sorex longirostris*.

Population densities of *Sorex longirostris* have been calculated at 30 shrews/ha and 44 shrews/ha, although French (1980a indicated that the 44 shrews/ha may over estimate density due to plot design and location. Few authors have captured ten or more shrews in one locality (French 1980a; see summary in French 1980b). The average density recorded for all *Sorex* sp. is 14 shrews per hectare (Smallwood and Smith 2001).

Pregnant females have been found from March through October and litter sizes ranged between one and six offspring (French 1980a). Based on French (1980b) most individuals don't breed during the first summer and only survive one winter. Average generation time is estimated at approximately nine months.

Geographic Range and Distribution – The Homosassa shrew was originally described as being restricted to only the type locality, in the mesic habitats associated with Homosassa Springs, Citrus County, Florida (Hall 1981 ; Davis 1957 as cited in Jones *et al*. 1991). A morphometric analysis of *Sorex longirostris* in Florida, however, has revealed that the Homosassa shrew has a much larger distribution and that it occurs in the northern two-thirds of peninsular Florida (Jones *et al*. 1991). Additional sampling of the Homosassa shrew throughout its range is necessary, though, to provide an exact estimate of its distribution and to accurately delimit the zone of intergradation with *S. l. longirostris* (which occurs in the Florida panhandle; Jones *et al*. 1991).

Population Status and Trend – No range wide surveys have been conducted. No site specific survey information within the assessment time frame has been provided. Herp array trapping data from K. Enge (pers comm.) provides single year data on shrew species as incidental non-target trap species. During seasonal drift fence/pitfall trapping in 1989, two sites within the range of the Homosassa shrew yielded two *S. longirostris* (and only two *Blarina* sp). During 1990, similar trapping across five watersheds in west central Florida yielded 41 *S. longirostris* captures, with similar numbers caught in each watershed (compared to 221 *Blarina* captures). Wolfe and Esher (1981) conclude that reported differences in relative abundance of *Sorex* and *Blarina* are due to trapping methods, and that actual abundance is roughly equal. However, in a multi-year study in Florida, Kale (1972) found that the densities of *Cryptotis parva* were 32/ha and *Blarina carolinensis* were 11/ha; no *S. longirostris* were captured. *S.*

longirostris eionis densities appear to be low across the range and less than either *Cryptotis* or *Blarina*.

According to Florida's Comprehensive Wildlife Conservation Strategy (FWC 2005), the Homosassa shrew can be found in the following types of habitat: hardwood swamp/mixed wetland forest, industrial/commercial pineland, and mixed hardwood-pine forest (all habitats that are in good condition but declining), natural pineland (which is in poor condition and declining), and disturbed/transitional habitat (the condition of which is unknown). No estimates of habitat loss within the assessment period have been made.

It is projected that the Homosassa shrew's native habitat will continue to be lost and degraded as the human population in Florida continues to grow and expand (FWC 2008; Zwick and Carr 2006). Although Cox and Kautz (2000) report that 62% of the Homosassa shrew's potential habitat is on managed lands, their study used a restricted geographic range for *S. l. eionis* that included only Citrus and Hernando Counties. A more comprehensive analysis that included the entire distribution of the Homosassa shrew revealed that only 30% of potential habitat was on conservation lands (M. Endries/FWC, unpublished data), the other 70% was vulnerable to degradation or conversion to other uses. While this is a smaller percentage of habitat on conservation lands than estimated by Cox and Kautz (2000), the total land area in conservation lands still exceeds the original range that was limited to Citrus and Hernando counties. In the next ten years, between 2010 and 2020, it is predicted that 2,164 mi^2 (5604 km^2)of land in Florida (4% of Florida's total land area) will undergo urban development and that 39.4% of the converted land will be native habitat (Zwick and Carr 2006). GIS analysis by FWRI staff, using FWC 2003 data layers combined with projected future development from Zwick and Carr indicate a 6% decline in available habitat by 2020, 13% loss by 2040, and 20.55% loss by 2060. These percentages may overestimate the total loss due to differences in the pixel sizes of the two data sets (M. Endries/FWC unpublished data, Zwick and Carr 2006).

Quantitative Analyses – A population viability analysis for the Homosassa shrew has not been published.

BIOLOGICAL STATUS ASSESSMENT

Threats – The threats to Homosassa shrews are believed to be similar to those for Sherman's short-tailed shrew and include habitat loss and habitat degradation due to increased urbanization and agricultural practices (Layne 1992). Development that leads to a reduction of cover, particularly in a loss of coarse woody debris, or a drying of soils would be detrimental to local shrew populations (Davis *et al*. 2010; Layne 1992). Layne (1992) suggested that since cats frequently prey on shrews, an increase in free-ranging cats in more developed areas would result in high shrew mortality rates, however, no data are available that indicates how much of a threat cats represent to shrew populations.

Population Assessment – Findings from the BRG are included in a Biological Status Review information table. The BRG found that the Homosassa shrew (*Sorex longirostris eionis*) did not meet the criteria to be listed as a Threatened species as evaluated in the findings table. While peer reviewers concurred with this assessment, they pointed out that there is limited

information available about the status of the Homosassa shrew, and the published analysis that is the basis for the expanded range does not use current methodologies.

LISTING RECOMMENDATION

After considering the BRG and peer reviewers comments, staff reviewed the BRG findings and the recommendations in the *Guidelines for Using the IUCN Red List Categories and Criteria (Version 8.1)* that caution "assessors should adopt a precautionary but realistic attitude, and … resist an evidentiary attitude to uncertainty when applying the criteria." Staff therefore recommends that the Homosassa shrew be maintained as a Species of Special Concern until more data can be collected to better evaluate the species.

SUMMARY OF THE INDEPENDENT REVIEW

Comments were received from 4 reviewers, Dr. Steven Castleberry (University of Georgia), Dr. Robert McCleery (University of Florida), Dr. Robert Rose (Old Dominion University, retired), and Dr. Jack Stout (University of Central Florida). Appropriate editorial changes recommended by the reviewers were made in the report. No changes were recommended that affect the findings, however, staff recommendations have changed based in part on reviewer comments. Two reviewers pointed out that there is little data available to evaluate the species and most pointed out that habitat associations are not fully understood or identified for *Sorex* in Florida. Two reviewers expressed concern that the status review relies on morphometric analysis of *Sorex longirostris* conducted on a very small sample size from Florida (Jones *et al*. 1991). Staff concurs, but more recent data is not available to include in the review. Two reviewers suggested additional literature, and another source has been incorporated into the review, relating to density of shrews in Florida. One reviewer suggested that the unpublished data from K. Enge include a more detailed explanation of the methods used. Staff considered this request, but the unpublished data only lists shrews as incidental captures and is included as an indication that across the range of *Sorex* in Florida, *Sorex* occurs at lower densities than *Blarina* and *Cryptotis*. Adding this information to the review would not alter the conclusions of the review group or the recommendation of staff. One reviewer indicated that the threat posed by cats may not be as great as indicated in the review and the Threats section has been edited accordingly.

Staff concur with the suggestions of reviewers regarding the need for additional research and analysis of *Sorex* taxonomy and habitat associations in Florida, and will consider these recommendations in the development of the management plan. All 4 reviewers concurred with the findings of the review group and with the initial staff recommendation to not list the Homosassa shrew as Threatened but also cited concerns about the limited data available to conduct the review. Peer reviews are available at MyFWC.com.

LITERATURE CITED

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Biological Status Review Information
Findings

Species/taxon: Homosassa Shrew (Sorex longirostris eionis)
Date: 11/03/10
Assessors: Melissa Tucker, David Shindle, Dan Pearson

Generation length: 9 months (use 10 year window for assessment)

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]	Does not apply - habitat loss has not ceased, and no estimated population size.		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]	No data on population size or potential reduction. Insufficient data on habitat loss in last 10 years.		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]	The 6% estimate of habitat loss (FWRI data & Zwick and Carr) does not meet criteria.	I, P	N	Zwick & Carr 2006
(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 data on population size or potential reduction. Insufficient data on habitat loss in last 10 years or in the future.		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	Range estimate based on range size in Jones is 8,044 sq miles - minimum size, but exceeds criteria. Estimate from range provided by FWRI is 35,246 km^2 - also over criteria. See Notes sheet (#1) for explanation of range.	E	N	Jones et al 1991

(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	Not enough data on habitat use and locations to determine AOO. Based on calculations by FWRI, maximum AOO is 9616 sq miles. No ability to determine if estimates are off by order of magnitude.	I	?	Endries, M/FWC unpublished data
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	No data available.	S	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	Projected decline of approximately 6% of the maximum area of occupancy based on FWRI data layers and Zwick and Carr	I, P	N	Zwick and Carr 2006, Endries, M/FWC unpublished data
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 data available.	S	N	
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	No density estimates for shrews exist from Florida. Based on minimum densities in published literature at other sites, and the maximum area of occupancy, the population is likely to be over 10,000 individuals. See notes sheet (#2) for density estimate information.	I, P	N	Smallwood and Smith 2001
(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	FWRI and Zwick and Carr - the projected habitat decline is only 6%, which is likely an overestimate based on data layers.	I, P	N	Zwick and Carr 2006, Endries, M/FWC unpublished data
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:	Projected decline of approximately 6% of the maximum area of occupancy based on FWRI data layers and Zwick and Carr	I, P	N	Zwick and Carr 2006, Endries, M/FWC unpublished data
a. Population structure in the form of EITHER	No data available.	S	N	
(i) No subpopulation estimated to contain more than 1000 mature individuals; OR				
(ii) All mature individuals are in one subpopulation	No data available.	S	N	
b. Extreme fluctuations in number of mature individuals	No data available.	S	N	
(D) Population Very Small or Restricted, EITHER				
(d)1. Population estimated to number fewer than 1,000 mature individuals; OR	No density estimates for shrews exist from Florida. Based on minimum densities in published literature at other sites, and the maximum area of occupancy, the population is likely to be over 10,000 individuals.	I, P	N	Zwick and Carr 2006, Endries, M/FWC unpublished data

(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	Range estimate based on range size in Jones is 8,044 sq miles - minimum size, but exceeds criteria. Estimate from range provided by FWRI is 35,246 km^2 - also over criteria. Not enough data on habitat use and locations to determine AOO. Based on calculations by FWRI, maximum AOO is 9616 sq miles. No ability to determine if estimates are off by order of magnitude. No data available on number of locations, but believed to be more than 5.	E, I	N	Jones et al 1991, Zwick and Carr 2006; Endries, M/FWC unpublished data
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	No PVA conducted.		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 (but close)
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 criteria	

1	Species/taxon:	Homosassa Shrew (Sorex longirostris eionis)
2	Biological Status Review Information Regional Assessment Date:	11/3-4/10
3	Assessors:	Melissa Tucker, David Shindle, Dan Pearson
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.	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 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	Does not meet criteria

Additional notes –

Assumptions:

1. Concurred that the expanded range as presented by Jones et al. 1991 was more accurate than the range presented by Cox and Kautz 2000. Jones et al. 1991 used seven cranial characteristics to analyze specimens from across the range of *S. longirostris*. They concluded that *S.l. eionis* was a valid subspecies, but that the range included most of peninsular Florida (as opposed to the restricted locality in Citrus and Hernando Counties).

2. Density estimates: as reported in cited literature, density estimates range from 14 to 44 shrews/hectare. No Florida specific density estimates have been provided, and the group consensus was that the reported densities were higher than actual densities. However, with no data available, we used the lowest reported estimate (14/ha) and applied this to area of occupancy, which led to a population greater than 10,000.

APPENDIX 1. Brief biographies of the Homosassa shrew Biological Review Group members.

Melissa Tucker has an M. S. in Ecology from the University of Georgia. She has worked as the Mammal Taxa Coordinator in FWC's Species Conservation Planning Section since 2007. Ms. Tucker has worked over 5 years on wildlife conservation issues, including planning and implementing conservation actions for mammals statewide, with an emphasis on small mammal species.

David Shindle has an M.S. in Wildlife Science from Texas A & M University. He has worked as a wildlife biologist for the Conservancy of Southwest Florida since 2005. Mr. Shindle has over 15 years experience in research and conservation of wildlife, with emphasis on the mammals of south Florida.

Daniel Pearson has an M.S. Wildlife Ecology and Conservation from University of Florida, Gainesville. Dan has worked as a biologist with the Florida Park Service for >20 years and has conducted surveys for several wildlife species including the Homosassa Shrew.

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.