Sherman's Short-tailed 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
Sherman's short-tailed shrew
(*Blarina carolinensis shermani*)
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 Sherman's short-tailed 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 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 Sherman's short-tailed 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/.

Sherman's short-tailed shrew BRG concluded from the biological assessment that Sherman's short-tailed shrew met listing criteria. No information was received from the public during the comment period. Based on the literature review and the BRG findings, staff recommends that the Sherman's short-tailed shrew be listed 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 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 – The taxonomy of Sherman's short-tailed shrew has been debated in literature as a potential subspecies of *Blarina brevicauda*, *Blarina carolinensis*, or as a separate species, *Blarina shermani* (Benedict *et al*. 2006; Layne 1992). The type specimen was originally described as *Blarina brevicauda shermani* by Hamilton (1955), although later analysis

re-classified Sherman's short-tailed shrew as a subspecies of *Blarina carolinensis* (McCay 2001). Recently, Benedict *et al*. (2006) compared Sherman's short-tailed shrew with the two other short-tailed shrews found in Florida, *Blarina carolinensis carolinensis* and *Blarina carolinensis peninsulae*. They found Sherman's short-tailed shrew to be significantly larger than either *B. c. carolinensis* or *B. c. peninsulae* in all analyzed measurements, the extent of the difference being of the same magnitude seen between other species within the genus *Blarina*. Furthermore, specimens of *shermani* appeared to be considerably smaller than those of *B. brevicauda* from Georgia, a result that suggested the population of Sherman's short-tailed shrews in southwestern Florida is not a relictual isolate of *B. brevicauda*. These results led Benedict *et al*. (2006) to designate Sherman's short-tailed shrew as a separate species, *Blarina shermani*. According to Benedict *et al*. (2006) this result should be confirmed with karyotypic and DNA sequencing information, methods which have reliably delineated the other *Blarina* species (Brant and Orti 2002; George *et al*. 1982).

Life History – Sherman's short-tailed shrew is larger than other *Blarina* species in Florida, while the adult winter pelage is darker than other *Blarina* populations in Florida and lacks any brownish coloration (Layne 1992).

There is virtually nothing known about the life history, behavior, and biology of Sherman's short-tailed shrew so this information is summarized using information on *Blarina carolinensis*.

B. carolinensis is a "habitat generalist," having been captured in a wide variety of localities including hardwood and pine forests, thickets, brushy areas, sedge fields, swamps, bogs, oldfields, tidal marshes, canebreaks, and bayheads. Short-tailed shrews in Florida are typically found in dense, herbaceous habitats or moist forests (Layne 1992). The type series of Sherman's short-tailed shrew was collected in mole (*Scalopus aquaticus*) runways and drainage ditches with dense grass (Hamilton 1955), but the type location itself has undergone intensive development leading to the loss of potential shrew habitat (Layne 1992).

Reproduction of *B. carolinensis* is bimodal and has been observed between March and November, litter sizes ranging between two and six (see summaries in Genoways and Choate 1998; McCay 2001; Moore 1946). *Blarina sp*. typically do not breed in the season they are born; average age of reproduction is 9 months (Whitaker and Hamilton 1998).

Average home range size of *B. carolinensis* has been calculated at 0.959 ha according to the minimum area method (Faust *et al*. 1971 as cited in McCay 2001) while population density has been calculated at between 1.3 and 17.0 individuals/hectare (see summary in Genoways and Choate 1998). Populations of *B. carolinensis* tend to fluctuate widely, both annually (with highs in June and November and lows in August and February in accordance with the reproductive cycle) and over multiple years (Genoways and Choate 1998).

Geographic Range and Distribution – Sherman's short-tailed shrew inhabits the southwestern coast of Florida from the vicinity of Royal Palm (based on the existence of a possible hybrid with *B. c. peninsulae*) to just north of Fort Myers (Benedict *et al*. 2006). The type series was collected in Lee County, 1 mile (1.6 km) north of the Edison Bridge crossing the

Caloosahatchee River, 0.25 miles (.4 km) east of U.S. Route 41 (Benedict *et al*. 2006). Additional attempts have been made to collect Sherman's short-tailed shrew at the type locality but no individuals have been caught, suggesting that the species is either very rare or has been extirpated from the area (Layne 1992). The potential hybrid with *B. c. peninsulae* was caught 4.5 miles (7.2 km) East of Royal Palm Hammock in Collier County, Florida (Benedict *et al*. 2006).

Population Status and Trend – No range-wide population surveys have been conducted. Very little information exists about the population of *B.c. shermani*. The subspecies was described by Hamilton (1955) from 27 individuals captured using snaptraps over 4000 trap nights at the type locality. No specimens have been caught at that locality since, although research efforts were made in 1956, 1982-1983, and 1984-1985 using a combination of pitfall and livetraps (Cox and Kautz, 2000; Layne 1992).

According to Florida's Comprehensive Wildlife Conservation Strategy (FWC 2005), Sherman's short-tailed shrew can be found in the following types of habitat: hardwood swamp/mixed wetland forest (which is in good condition but declining), mixed hardwood-pine forest (which is in good condition but declining), canals and ditches (which are in good condition and stable), and disturbed/transitional habitat (the condition of which is unknown). Potential habitat estimates provided in Cox and Kautz (2000) are not clearly explained, but indicate at least 52,065 hectares. As a part of the 2009 Wildlife Habitat Needs in Florida, Endries, FWC developed potential habitat maps for the Sherman's short tailed shrew. These maps were not published in the technical report, but the unpublished data estimates 235,472 hectares of potential habitat. The GIS methods, ranges (inclusion of counties north of Lee and Collier, to Manatee County), and habitats differ from the potential habitat maps produced by Cox and Kautz (2000). Based on the range maps of Endries, FWC unpublished data, only 32.8% of *B.c. shermani*'s potential habitat is on conservation lands, the other 67.2% is vulnerable to degradation or conversion to other uses. As the human population in Florida continues to grow and expand, Sherman's short-tailed shrew will likely lose habitat to urbanization and agriculture (FWC 2008; Zwick and Carr 2006); one estimate projects 9.75% of *B. c. shermani*'s current potential habitat will be lost by 2020, although this is likely an overestimate due to differences in the pixel size of GIS data layers (Endries, FWC unpublished data; Zwick and Carr 2006).

Quantitative Analyses – A population viability analysis has not been published for Sherman's short-tailed shrew.

BIOLOGICAL STATUS ASSESSMENT

Threats – The greatest threats to Sherman's short-tailed shrews are 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 can result in high shrew mortality rates, although no data have been collected to support this.

Layne (1992) suggests increased efforts to: (a) determine whether there is an extant population of *B. c. shermani* at the type locality; (b) find and preserve other populations of Sherman's short-tailed shrew; (c) obtain information on *B. c. shermani*'s distribution, ecology, life history, and habitat requirements; and (d) confirm *B. c. shermani*'s specific status using karyotypic and sequencing information. Future survey efforts should use pitfall traps as the most reliable method of catching shrews.

Population Assessment – Findings from the Biological Review Group are included in a Biological Status Review information findings table.

LISTING RECOMMENDATION

Based on the literature review, information received from the public and biological review findings, staff recommends listing the Sherman's short-tailed shrew (as *Blarina shermani*) as a Threatened species because it met listing criteria described in 68A-27.001, F.A.C.

SUMMARY OF THE INDEPENDENT REVIEW

Five reviewers were invited to comment on the draft report. Reviews were received from Dr. Bob McCleery (University of Florida) and Dr. Bob Rose (Old Dominion University, retired). Appropriate editorial changes recommended by the reviewers were made to the report. Both reviewers concurred with the staff recommendation. One reviewer stressed the importance of the use of pitfall traps in detecting shrews, and suggested that methods of early investigators should be included in the report. This information has been added to the Population Status and Trend section. Although one reviewer requested that staff make clear the decision to retain *B.c. shermani* as the scientific name, staff have recommended that the scientific name of *Blarina shermani* be used in state listing documents. This is found in the Listing Recommendation section. Peer reviews are available at MyFWC.com.

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Biological Status Review Information
Findings

Species/taxon: Sherman's short tailed shrew (B. carolinensis shermani)
Date: 11/03/10
Assessors: Melissa Tucker, Dan Pearson, David Shindle

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

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 population information is available. No confirmed specimens caught since 1950's. Habitat decline not measured, but not likely to be more than 50%.	I, S	N	Benedict et al 2006
(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 population information is available. No confirmed specimens caught since 1950's. Habitat decline not measured, but not likely to be more than 30%.	I, S	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]	No projection is available.		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]	No past decline documented; no projected decline available.		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	Based on Benedict's range map, the range is coastal 2/3 of Lee and Collier Counties, which is estimated at 2345 sq miles. See Notes (#1) sheet for explanation of other interpretations of range size.	E, I	Y	Benedict et al 2006

(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	Based on existing map provided by FWRI and calculations to correct for range based on Benedict et al 2006, the AOO is approximately 492sq miles. See Notes (#2) sheet for explanation.	I	Y	Benedict et al 2006, Endries, M/FWC unpublished data
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	Less than 10, because of restricted range - a single hurricane could flood primary habitat throughout entire range (1 location)	E	Y	Benedict et al 2006
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	Habitat loss due to development at type locality per Layne, 1992, although this precedes the review period window. Projected loss of habitat based on Zwick and Carr.	I, P	Y (iii)	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	Information in Genoways and Choate suggests that fluctuations occur, but no information is available on Florida populations.	E	?	Genoways and Choate 1998
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	Area of occupancy and density estimates yield a potential population greater than 10,000. See Notes sheet (#3) for explanation of density estimates.	I	N	Benedict et al 2006, Zwick and Carr 2006, Endries, M/FWC unpublished data, Whitaker and Hamilton 1998
(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	Based on Endries unpublished mapping product and Zwick and Carr, estimated at 9.75% over next 10 years. However, no data provided on the restricted range. 9.75% is probably an overestimate based on data layer differences.	I, P	N	Endries, M/FWC unpublished data, Zwick and Carr 2006.
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:	Continuing decline of individuals inferred from habitat loss as projected by Zwick and Carr.	I, P	Y	Zwick and Carr 2006
a. Population structure in the form of EITHER	No data on subpopulations.		N	
(i) No subpopulation estimated to contain more than 1000 mature individuals; OR				
(ii) All mature individuals are in one subpopulation	No data on subpopulations		N	
b. Extreme fluctuations in number of mature individuals	No data on fluctuations. See B(c).		N	
(D) Population Very Small or Restricted, EITHER				
(d)1. Population estimated to number fewer than 1,000 mature individuals; OR	Area of occupancy and density estimates yield a potential population greater than 10,000. See Notes sheet for explanation of density estimates.	I	N	Benedict et al 2006, Zwick and Carr 2006, Endries, M/FWC unpublished data, Whitaker and Hamilton 1998

(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	Based on existing map provided by FWRI and calculations to correct for range based on Benedict et al 2006, the AOO is approximately 492sq miles. See Notes sheet for explanation.	E, I	N	Benedict et al 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 OR Does not meet any of the criteria)	Reason (which criteria are met)
Meets at least one criteria.	**B(1), B(2), a, biii**
Is species/taxon endemic to Florida? (Y/N)	Y
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 are met)
Meets at least one criteria	**B(1), B(2), a, biii**

Additional notes

Assumptions:

1. Concurred that range as presented in Benedict *et al.* 2006 is more accurate than range supplied in Cox and Kautz 2000, which was based on the range map presented in Layne 1992. Benedict *et al.* 2006 used eight cranial characters to analyze *B.c. shermani*, *B.c. peninsulae*, and *B.c. carolinensis*. They concluded that *B.c. shermani* should be a separate species - *B. shermani* - and that *B.c. peninsulae* is a subspecies of *B. carolinensis*; the newly proposed range based on location of *B.c. peninsulae* specimens and the possible hybrids is greatly restricted over the original range proposed by Layne (1992). Layne's original range was not based on specimens, but type of habitat available.

2. Area of occupancy: mapping of potential habitat from Endries, FWC (unpublished data) was based on Layne's 1992 range, and this greatly overestimated the area of occupancy by extending the range north to Manatee County. We used county area for Lee and Collier counties and calculated the percentage of potential habitat throughout the suggested range, and then applied this percentage to the coastal 2/3 of Collier and Lee counties for an estimated range of 492 square miles.

3. Density estimates for *Blarina* range from 1.3 to 17.01 per hectare across multiple studies. No density estimates exist for *Blarina* in Florida, and the group concurred that the anticipated density is likely to be much lower than the lowest published density. However, without specific data, we used the lowest density estimate (1.3/hectare) which resulted in a population estimate greater than 10,000 individuals.

APPENDIX 1. Brief biographies of the Sherman's short-tailed shrew Biological Review Group members.

Melissa Tucker has a 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 a 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 a M.S. Wildlife Ecology and Conservation from University of Florida, Gainesville. Dan has worked as a biologist with the Florida Park Service for more than 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 solicitation for information period.