Supplemental Information for the Florida Tree Snail

Biological Status Review Report

The following pages contain peer reviews received from selected peer reviewers, comments received during the public comment period, and the draft report that was reviewed before the final report was completed

March 31, 2011

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Peer review #1 Dr. Deborah Shaw

From: debshaw610@aol.com
To: Imperiled
Cc: Gruver, Brad; Nester, Lindsay
Subject: Tree Snail status comment
Date: Tuesday, January 18, 2011 5:44:59 PM
Attachments: LigStatusReview2011.docx

Thank you for the opportunity to comment on the status of the Florida Tree Snail. My comments are attached. Please feel free to contact me if you would like any further information.

Deborah A. Shaw, Ph.D.

Biological Status Review for the Florida Tree Snail (*Liguus fasciatus*) Shaw Comments

Thank you for the opportunity to comment on the status review of the Florida Tree Snail. While the Florida Fish and Wildlife Conservation Commission staff may have followed the criteria established to review the status of listed species, I do not agree with the decision to remove *Liguus fasciatus* from the State Species of Special Concern list. I believe that the members of the biological review group are not aware of significant, lethal impacts that exist for tree snail populations.

Florida Tree Snails are not uniformly distributed in the hardwood hammocks where they occur. They are disproportionately concentrated along road-generated edges of hammocks (Shaw dissertation, 1997). This concentration of tree snails along road edges leaves a large percentage of tree snail populations vulnerable to any roadside or utility corridor tree trimming maintenance activities (e.g., electric utility line clearance tree trimming; telephone/cable utility line clearance; city, county or state roadside tree trimming). To my knowledge, only one utility (Florida Keys Electric Cooperative - FKEC) is required by State and Federal permits to protect tree snails and other listed species during FKEC's annual right-of-way maintenance activities.

Every year thousands of tree snails are killed during the maintenance activities of utilities and road maintenance departments. The side-mounted mowers and saws used to trim tree branches that overhang roads indiscriminately kill invertebrates and small vertebrates that are caught in the branches being trimmed or they are killed when the branches are fed into chipper trucks. Line clearance tree trimming crews that are not required to remove tree snails prior to trimming or chipping, kill thousands of tree snails annually.

From 1993 – 2010, FKEC's biologists rescued and relocated approximately 49,875 *Liguus fasciatus*; 841 *Orthalicus floridensis*; and 28 *Orthalicus reses reses* during annual line clearance maintenance activities on North Key Largo. I was the biologist for FKEC from 1993 – 2008. After I retired in 2008 a new biologist was hired to protect the tree snails. The North Key Largo tree snail populations are largely located on State and Federal protected lands and yet had FKEC not been required to protect the tree snails, those numbered above would have been killed by routine utility maintenance activity.

Again, FKEC may be the only utility salvaging tree snails. If one considers the numbers of tree snails relocated by FKEC's biologists from one 11- mile long right-of-way, and multiplies those numbers by every city, county, and state roadside maintenance department and every phone or electric utility right-of-way maintenance crew working in tree snail habitat in South Florida, one realizes the magnitude of this unregulated and largely unknown threat to tree snail populations. The damage done by roadside and right-of-way vegetation maintenance is compounded by the fact that a large percentage of the tree snail population in concentrated along the roadside edges of the hammocks.

Adding these uncounted impacts on tree snail populations to the impacts of disease, freezing temperatures (e.g. Dec., 1989), chemical sprays, and habitat loss significantly increases the vulnerability of this species to potentially dangerous population fluctuations.

I would be happy to discuss my comments or elaborate on them if you have any questions. Please feel free to contact me by phone or email. Again, thank you for the opportunity to comment.

Deborah A. Shaw, Ph.D.

Shaw, Deborah A., (1997). Effects of Roads and Road Traffic on the Distribution of the Florida Tree Snail, (*Liguus fasciatus*) in Three Tropical Hardwood Hammocks on Key Largo in the Florida Keys; and Implications for the Bioaccumulation of Heavy Metals in the Hammock Food Web. Doctoral dissertation. University of California, Davis. 127 pp.

Peer review #2 from Dr. Kurt Auffenberg

From: Kurt Auffenberg
To: Imperiled
Subject: Peer review for Liguus fasciatus
Date: Thursday, January 20, 2011 2:50:32 PM

Dear Imperiled....

Not sure how I'm supposed to submit this... but....I guess the below can get cut and pasted into the report..

I completely concur with the Data/Information provided by the assessors.....and with their recommendation concerning the species' status in Florida.

They could add the species account provided in Rare and Endangered Biota of Florida Vol. 4. Invertebrates ... by Jane E. Deisler-Seno, pp. 134-140 to the Literature Cited section...

Thanks...Kurt

Peer review #3 from David Lysinger

From: David and Sandy Lysinger
To: Imperiled
Cc: Dennis J Olle; Cook, David; Nester, Lindsay; Gruver, Brad
Subject: Peer Review
Date: Sunday, January 16, 2011 4:48:31 PM
Attachments: Peer Review of BSR on Liguus fasciatus by D. L. Lysinger 1-16-2011.doc

Thank you again for the opportunity to review the Biological Status Review (BSR).

Attached is my feedback on the review. If you have questions, please contact me.

Please send a copy of the final BSR to me at this email address and mail a copy to:

David L. Lysinger

Peer Review on the Biological Status Review
for the Florida Tree Snail (*Liguus fasciatus*)

By David L. Lysinger
January 16, 2011

I adamantly disagree with the methodology of using only the genus and species levels for this review. It is of utmost importance that subspecies (geographical races) be a part of the Biological Status Review (BSR). Subspecies names are not only the language of *Liguus*, but also carry with them geographical locations and names important to the future study of *Liguus*. The *Guidelines for Using the IUCN Red List Categories and Criteria* (August 2010) 2.1.1 states, "The criteria may be applied to any taxonomic unit at or below the species level."

Some of our most representative protected creatures carry the subspecies taxon: *Odocoileus virginianus clavium*, the Key Deer, *Puma concolor coryi*, the Florida Panther and *Hemiargus thomasi bethunebakeri* the Miami Blue butterfly, which was given emergency endangered status less than a decade ago (2002). Therefore, the methodology of not using subspecies in this BSR has the potential of being an embarrassing double standard. The trinomial system (genus, species and subspecies) is the internationally accepted taxonomic standard and should be used in this and future reviews concerning the genus *Liguus*.

While I do not support the fundamental methodology of stopping at the species level for this review, I will comment on the BSR as presented.

(A) Population Size Reduction
"Footnote ¹ (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat" - In the next section (**B) Geographic Range** b Data/Information states, "Extent of tropical hardwood habitat in the Keys is continuing to decline." Why was this decline recognized in section (B), but not considered for section (A) (a)3 and (a)4? From habitat loss and destruction the following *Liguus* subspecies are already extinct: *L. f. crassus*, *L. f. dohertyi*, *L. f. farnumi*, *L. f. solidus*, *L. f. violafumosus* and *L. f. innominatus* believed to be extinct (Emmel Cotter, 1995). There are still morphologically distinct extremely vulnerable populations (subspecies) occurring along the Florida Keys, Cape Sable to Lossman's Key on Florida's southwest coast and in several remote parts of The Big Cypress National Preserve.

"Footnote ¹ (d) actual or potential levels of exploitation" - If *Liguus fasciatus* is removed from Florida's Threatened and Species of Special Concern list, rampant collecting would begin. Sadly, *Liguus* (collecting) has become big business for a few. The value of some subspecies has skyrocketed to $1,000 per specimen. (See the 2011 *Liguus* price list already posted on http://liguusdiscussionboard.yuku.com/topic/1015/t/Florida-Liguus-Prices-2011.html and copied on Page 4-5 of this document.) In the BSR Executive Summary under The Biological Status Assessment **Threats** section, it states, "Collection of tree snails posed a threat to the survival of rare color forms prior to a ban on collecting. In the early part of the 1900s collectors amassed collections of snails numbering in the thousands. (Emmel and Cotter 1995) If collection is allowed in the future, this threat could resurface." When the **S** Data Type, Criterion Not Met was

assigned to (A) (a)3 and (a)4, what consideration, if any, was given to the known potential levels of exploitation stated in the BSR Executive Summary?

(A) (a)3 and (a)4 are shown as **Criterion Not Met** by Data Type **S** (suspected), however, there is no documentation cited for this "suspicion." To my knowledge there is no recent published data providing actual numbers of *Liguus fasciatus,* so what source was used for this suspicion? In addition, it appears Footnote [1] was overlooked or discounted when rating (a)3 and (a)4. It is not reasonable or justifiable to rate (A) Population Size Reduction as Criterion Not Met knowing about the continuing habitat loss and destruction and the guaranteed exploitation by collectors. I suggest the **Criterion was Met** on **(A)** (a)3 and (a)4.

(C) Population Size and Trend
(a) Population size estimate to number fewer than 10,000 mature individuals - Data/Information "More than 10,000 mature individuals range wide." I do not question that there are more than 10,000 mature *fasciatus* range wide. However, how many vulnerable subspecies are represented? Of the 10,000 *fasciatus,* are 9,000 *L. f. castaneozonatus,* a common subspecies?

(E) Quantitative Analyses
How could (E) be rated Criterion Not Met when there is no quantitative analyses available? Without quantitative analyses, shouldn't *Liguus fasciatus* remain protected by keeping it on Florida's Threatened and Species of Special Concern list until an analysis is done?

Is species/taxon endemic to Florida? As reported in the BSR, the species *fasciatus* is not endemic to Florida. It also occurs/occurred throughout Cuba; however, all of the subspecies occurring in Florida are endemic to Florida. (There is an ongoing debate as to whether *L. f. pictus* was ever found in Cuba.)

Removing *Liguus fasciatus* from Florida's Threatened and Species of Special Concern list would ignore the management recommendations made in *A Summary of the Historical Distribution and Current Status of the Florida Tree Snail, Liguus fasciatus* (Emmel Cotter, 1995 p464-465).

"Management Recommendations:

> (a.) the following forms of the 58 types in the above list should have special State protection extended to their remaining natural colonies outside Everglades and Biscayne National Park: *alternatus, delicatus, dryas, elliottensis, fuscoflammellus, gloriasylvaticus, graphicus, innominatus, kennethi, lignumvitae, lucidovarious, luteus, matecumbensis, nebulosus, osmenti, pictus, simpsoni, subcrenatus, vacaensis, vonpaulseni.* Preferably, this should involve preservation of the remaining hammock areas, exclusion of pesticide spraying, and protection against collection until populations are built up to a sustainable level again.
> (b.) A coordinated State and federal policy needs to be developed and promulgated by the Commission about collecting policies in state and federal lands in Florida, and the value of these snails as a wonderful feature of Florida's tropical nongame wildlife. Then substantial publicity about existing legal protection of the remaining forms and colonies needs to be developed and promulgated to clarify the current misconceptions and confusion in the minds of

> *Liguus* collectors and indeed in staffs of the various state and federal agencies working in south Florida."

The *Guidelines for Using the IUCN Red List Categories and Criteria* (August 2010) 2.3 paragraph 3, "To list a particular taxon in any of the categories of threat, only one of the criteria, A, B, C, D, or E needs to be met. I suggest the **Criterion was Met** to keep *Liguus fasciatus* on Florida's Threatened and Species of Special Concern list. In (A) Footnote [1] (c) and (d) clearly allows a Criterion Met. It would be a travesty and tragedy to discontinue protection of *Liguus fasciatus*.

Copied from http://liguusdiscussionboard.yuku.com/topic/1015/t/Florida-Liguus-Prices-2011.html

Florida Liguus Prices, 2011		Lead	[-]
Registered Member 07/12/08 13:42:11 Moderator	**TAGS :** None This is my eighth list of prices for Florida *Liguus*, based on sales the previous two years. No one should think that all *castaneozonatus* are worth $40. Probably fewer than one in a hundred, as found in collections, would be of "exceptional" quality (size, beauty, data, condition, collection locality). There will be specimens even more highly valued; for example, paratypes, rare topotypes, extremely large, drop-dead gorgeous, etc. Subspecies (7) are highlighted. "Published forms" (60) include the author and date. The varieties *pallidulus* and *stearnsi* may be subspecies. The *solidus* of Say has been found to be a "mainland" variety and now, as a subspecies, represents most Florida *Liguus*. This is not a dealer's price list, just an estimate of market values. Suggestions are very welcome. While we still find ourselves in an economic slump, sales of exceptional specimens are holding. The very rare varieties continue to command the same or higher prices. Remember, the really rare items are mostly bought and sold privately and are seldom found on eBay, etc. Phil **Florida *Liguus fasciatus* Prices, 2011, the Values of Exceptional Specimens** ***lignumvitae*** Pilsbry 1912: 80. *delicatus* Simpson 1920: 80. *dohertyi* Pflueger 1934: 500. *pseudopictus* Simpson 1920: 80. *simpsoni* Pilsbry 1921: 80. *splendidus* Frampton 1932: 140. *subcrenatus* Pilsbry 1912: 80. ***matecumbensis*** Pilsbry 1912: 60. var. (prob. subsp.) ***pallidulus***: 400. This is the "*solidus*" of Simpson. ***pictus*** (Reeve 1842): 140. *crassus*: 1,000. *dryas* Pilsbry 1932: 80. *graphicus* Pilsbry 1912: 60. *innominatus* Pilsbry 1930: 80. *osmenti* Clench 1942: 90. var. *stearnsi*: not available. *vonpaulseni* Young 1960: 90. ***septentrionalis*** Pilsbry 1912: 100. ***solidulus*** Pilsbry 1912: 120. **Note.** The *luteus* of Simpson appears to be a junior synonym of the *solidus* of Say. See var. *pallidulus*. ***solidus*** (Say 1825): 70. (Key Vaca); 40. (other localities) *alternatus* Simpson 1920: 40. *archiejonesi* Cox 2007: 100. (Carnell H.); 50. (other localities) *aurantius* Clench 1929: 50. *barbouri* Clench 1929: 150. (PC 55, blue); 40. (other localities) *beardi* Jones 1979: 1,000.		

var. *borgiai*: 40.
var. *brickellensis*: 50.
var. *brunneus*: 40.
capensis Simpson 1920: 150.
castaneozonatus Pilsbry 1912: 40.
castaneus Simpson 1920: 40.
cingulatus Simpson 1920: 40.
clenchi Frampton 1932: 45.
deckerti Clench 1935: 90.
eburneus Simpson 1920: 40.
elegans Simpson 1920: 45.
elliottensis Pilsbry 1912: 40.
evergladesensis Jones 1979: 60.
farnumi Clench 1929: 600. (PC 7); 450. (PC8); 100. (other localities)
floridanus Clench 1929: 40.
framptoni Jones 1979: 150.
fuscoflammellus Frampton 1932: 80.
var. *fuscohortensis*: 80.
gloriasylvaticus Doe 1937: 40.
humesi Jones 1979: 80.
var. *johnsoni*: 40.
kennethi Jones 1979: 60.
var. *krulli*: 50.
lineolatus Simpson 1920: 40.
livingstoni Simpson 1920: 40.
lossmanicus Pilsbry 1912: 40.
lucidovarius Doe 1937: 100.
margaretae Jones 1979: 150.
marmoratus Pilsbry 1912: 80. (Key Vaca); 40. (other localities)
miamiensis Simpson 1920: 40.
var. *mitchelli*: 80.
mosieri Simpson 1920: 50.
nancyae Close 1995: 50.
nebulosus Doe 1937: 150.
ornatus Simpson 1920: 45.
var. *poweri*: 50.
var. *pseudoaurantius*: 40.
var. *pseudoornatus*: 40.
var. *pseudoroseatus*: 40.
var. *reedi*: 100.
roseatus Pilsbry 1912: 40.
solisoccasus deBoe 1933: 90.
testudineus Pilsbry 1912: 60.
vacaensis Simpson 1920: 65.
versicolor Simpson 1920: 40.
violafumosus Doe 1937: 800. (PC 28); 600. (PC 30)
walkeri Clench 1933: 40.
var. *winkelmani*: 120.
wintei Humes 1954: 60.
var. *wrighti*: 120.

Sinistral, subspecies *solidus*: 750.
Sinistral, other subspecies: 1,000.

A hybrid price traditionally follows the pricier of the presumed parents. For example, an exceptional *pictus* x *lossmanicus* hybrid would be worth about $140., the value of an exceptional *pictus*.

Other "pseudos" of the subspecies *solidus* are about equal in value to their siblings.

Phil

Copy of the Florida tree snail BSR draft report that was sent out for peer review

Biological Status Review for the Florida Tree Snail (*Liguus fasciatus)*

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 September 1, 2010. Public information on the status of the Florida tree snail was sought from September 17 to November 1, 2010. The members of the biological review group (BRG) met on November 9, 2010. Group members were Lindsay Nester (FWC lead), Steve Sparks (an independent consultant), and Deborah Jansen (National Park Service). In accordance with rule 68A-27.0012 Florida Administrative Code (F.A.C.), the BRG was charged with evaluating the biological status of the Florida tree snail using criteria included in definitions in 68A-27.001(3) 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://www.myfwc.com/WILDLIFEHABITATS/imperiledSpp_listingprocess.htm to view the listing process rule and the criteria found in the definitions. The BRG concluded from the biological assessment that the Florida tree snail does not meet criteria for listing, and FWC staff recommends removing it from the State Species of Special Concern list.

This work was supported by a Conserve Wildlife Tag grant from the Wildlife Foundation of Florida.

BIOLOGICAL INFORMATION

Life History References - Jones 1954, Tuskes 1981, Voss 1976

Taxonomy - According to current genetic information, the Florida tree snails are all thought to be one species *Liguus fasciatus* with many color varieties (Hillis 1995).

Population Status and Trend - Addison and Auffenberg 1996; Bennetts et al. 2000a, 2000b; Tuskes 1981

Geographic Range and Distribution - Emmel and Cotter 1995, Florida Natural Areas Inventory 2001, Smith 1997, Sparks undated

Quantitative Analyses - We are not aware of a population viability analysis for Florida tree snails.

BIOLOGICAL STATUS ASSESSMENT

Threats

The major threat to the Florida tree snail is habitat loss (Emmel and Cotter 1995). These snails have specific habitat requirements. They prefer smooth-barked trees in tropical hardwood hammocks. They also require leaf litter accumulation at the base of tree for egg disposition. In addition to habitat loss, disturbance can also threaten tree snails. Disturbance can result in changes to the microclimate making that area unsuitable habitat for tree snails (Florida Natural Areas Inventory 2001). Fire ants have been observed killing tree snails and breaching the seal of aestivating snails (Forys et al. 2003, Smith 1997). Unusually cold temperatures pose a risk to snails and eggs by direct freezing and by killing host trees (Emmel and Cotter 1995). Collection of tree snails posed a threat to the survival of rare color forms prior to a ban on collecting. In the early part of the 1900s collectors amassed collections of snails numbering into the thousands (Emmel and Cotter 1995). If collection is allowed in the future, this threat could resurface.

The Florida Keys' populations of tree snails may be subjected to a different array, or a heightened level, of threats than the peninsular populations. A major decline in the Florida tree snail on Key Largo in the 1970s and 1980s was attributed to the use of Dibrom and Baytex mosquito-control pesticides (Emmel and Cotter 1995). Hurricane storm surge poses another threat to the Keys populations (Emmel and Cotter 1995) that would not be felt by inland mainland populations.

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

LISTING RECOMMENDATION

Staff recommends removing the Florida tree snail from the State Species of Special Concern list because the species does not meet any of the criteria for listing as described in 68A-27.001(3) F.A.C.

SUMMARY OF THE INDEPENDENT REVIEW

This will be completed after the peer review.

LITERATURE CITED

Addison, D. S. and K. Auffenberg. 1996. The Distribution of *Liguus fasciatus* and *Orthalicus floridensis* in the Coastal Hammocks on the Southwest Coast of Florida. Malacological Review 26: 79-83.

Bennetts, R. E., S. A. Sparks, and D. Jansen. 2000a. Factors Influencing Movement Probabilities of Florida Tree Snails *Liguus fasciatus* (Muller) in Big Cypress National Preserve Following Hurricane Andrew. Malacologia 42(1-2): 31-37.

Bennetts, R. E., S. A. Sparks, and D. Jansen. 2000b. Host-tree selection by Florida tree snails, *Liguus fasciatus* (Muller, 1774), in Big Cypress National Preserve, Florida, USA. Nautilus 114: 112-116.

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Forys, E. A., C. R. Allen, and D. P. Wojcik . 2003. The Potential for Negative Impacts by Red Imported Fire Ants (*Solenopsis invicta)* on Listed Herpetofauna, Mammals, and Invertebrates in the Florida Keys. Final Report. Florida Fish and Wildlife Conservation Commission. Tallahassee, Florida, USA.

FWC Staff. 2010. Created from http://en.wikipedia.org/wiki/List_of_counties_in_Florida and http://dlis.dos.state.fl.us/library/flcollection/landWater.cfm

Hillis, D. M. 1995. Genetic Variation, Systematic and Reproduction of Florida Tree Snails (*Liguus* fasciatus). Game and Fresh Water Fish Comm. Nongame Wildlife Program Project Rep. 25pp +viii. Tallahassee, Fl.

Jones, A. L. 1954. How Florida Tree Snails live. Everglades Natural History Magazine 2: 59-62.

Smith, B. 1997. A Partial Survey of Florida Tree Snail (*Liguus fasciatus)* Distribution in Big Cypress National Preserve. Final Report submitted to the National Park Service at Big Cypress National Preserve.

Sparks, S. A. Personal Communication. November 9, 2010.

Sparks, S. A. Undated. Distribution of *Liguus fasciatus* within the Big Cypress National Preserve. Report submitted to the National Park Service at Big Cypress National Preserve.

Sparks, S. A. Unpublished data.

Tuskes, P. M. 1981. Population Structure and Biology of *Liguus* Tree Snails on Lignumviate Key, Florida. Nautilus 95: 162-169.

Voss, R. S. 1976. Observations on the ecology of the Florida tree snail *Liguus fasciatus* (Muller). Nautilus 90: 65-69.

Biological Status Review Information
Findings

Species/taxon: Florida tree snail (Liguus fasciatus)
Date: 11/09/10
Assessors: Lindsay Nester, Deborah Jansen, Steven Sparks

Generation length: average 4-5 yrs; used 15 years for 3 generations

Criterion/Listing Measure	Data/Information	Data Type*	Criterion Met?	References
*Data Types - observed (O), estimated (E), inferred (I), suspected (S), or projected (P). 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]	Reduction of 50% is not met.	S	N	Steven Sparks (pers. comm.)
(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]	Reduction of 30% is not met.	S	N	Steven Sparks (pers. comm.)
(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]	Projected reduction not suspected.	S	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]	Reduction of 30% is not met.	S	N	Steven Sparks (pers. comm.)
[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	EOO estimated 4968 mi2 based on county land areas.	E	Y	FWC staff 2010
(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	AOO estimated < 100 mi2	E	Y	Steven Sparks (unpub. data), FFWCC Florida Wildlife Legacy Initiative (2005)
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	Distribution doesn't meet IUCN definition of severely fragmented. Hammocks naturally separated with occasional dispersal. Hammocks and islands may be considered to be locations, and there are hundreds.	O	N	Emmel and Cotter (1995); Smith (1997); Sparks (undated)
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	Extent of tropical hardwood habitat in the Keys is continuing to decline.	P	Y	Steven Sparks (pers. obs.)
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.	O	N	Addison and Auffenberg (1996); Bennetts et al. (2000a, 2000b); Tuskes (1981)
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	More than 10,000 mature individuals rangewide.	O	N	Bennetts et al. (2000a, 2000b); Emmel and Cotter (1995); Smith (1997); Sparks (undated); Tuskes (1981)
(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	Not applicable			
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:	Not applicable			
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	More than 10,000 mature individuals rangewide.	O	N	Bennetts et al. (2000a, 2000b); Emmel and Cotter (1995); Smith (1997); Sparks (undated); Tuskes (1981)
(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 estimated > 60 mi2; estimated several hundred locations.	E	N	Steven Sparks (unpub. data), FFWCC Florida Wildlife Legacy Initiative (2005)
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	No quantitative analysis available.		N	

Initial Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria are met)
Did not meet any criteria	
Is species/taxon endemic to Florida? (Y/N)	No
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)
Did not meet any criteria	

1	Species/taxon:	Florida tree snail (Liguus fasciatus)
2	Biological Status Review Information Regional Assessment — Date:	11/9/10
3	Assessors:	Lindsay Nester, Deborah Jansen, Steven Sparks
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
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
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 any criteria

Appendix 1. Biological Review Group Members Biographies

Deborah Jansen received her B.S. in Biology from University of Wisconsin at Eau Claire and her M.S. in Wildlife from University of Wisconsin at Stevens Point. She has been a Wildlife Biologist for the National Park Service at Big Cypress National Preserve (BCNP) since 1988. She was co-investigator on a *Liguus* tree snail project in BCNP, examining the effects of Hurricane Andrew (1992) on host trees and snail survival and movements. That research led to the publication of two research articles and a full-color Florida tree snail brochure.

Lindsay Nester received her B.S. in Wildlife Biology from the State University of New York College of Environmental Science and Forestry and her M.S. in Ecology from the University of Florida. She is currently the Assistant Regional Biologist for the FWC's South Region. Her primary focus has been reptiles and birds, but she has gained invertebrate experience working on the Miami blue butterfly management plan and recovery.

Steve Sparks received his B.A. from Florida Atlantic University in 1978. He has lived in south Florida for over 50 years and been involved with Florida tree snails on an ongoing basis since 1975. He was a snail collector until the early 1980s and then a researcher on several projects in Big Cypress National Preserve (BCNP). In 1995 Mr. Sparks became a co-investigator in Everglades National Park (ENP). He and other project personnel are responsible for the preservation, maintenance, and monitoring of the snails within the more than 250 hammocks where the introductions occurred. He has recorded several thousand field hours with *Liguus* throughout its range, and given many presentations on the snails to schools and conservation organizations over the years.

Appendix 2. Summary of letters and emails received during the solicitation of information from the public.

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

Appendix 3. Information and comments received from the independent reviewers.