Red Rat Snake (Lower Keys Population) Biological Status Review Report

March 31, 2011

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

Biological Status Review Report
for the
Lower Keys Population of the Red Rat Snake
(*Pantherophis guttatus*)
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 Lower Keys population of the red rat snake was sought from September 17 through November 1, 2010. A 3-member Biological Review Group (BRG) met on November 19, 2010. Group members were Kevin Enge (FWC lead), Steve Johnson (University of Florida), and Paul Moler (independent consultant) (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 Lower Keys population of the red rat snake using criteria included in definitions in 68A-27.001, F.A.C., and following protocols in the *Guidelines for Application of the IUCN Red List Criteria at Regional Levels (Version 3.0)* and *Guidelines for Using the IUCN Red List Categories and Criteria (Version 8.1)*. Please visit http://myfwc.com/wildlifehabitats/imperiled/listing-action-petitions/ to view the listing process rule and the criteria found in the definitions.

In late 2010, staff developed the initial draft of this report which included BRG findings and a preliminary listing recommendation from staff. The draft was sent out for peer review and the 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 BRG found that the lower Keys population of the red rat snake did not meet any listing criteria. FWC staff recommends that the lower Keys population of the red rat snake not be listed as a Threatened species and that it be removed from the Species of Special Concern list.

This work was supported by a Conserve Wildlife Tag grant from the Wildlife Foundation of Florida. FWC staff gratefully acknowledges the assistance of the biological review group members and peer reviewers. Staff would also like to thank Dr. Joseph Mitchell who served as a data compiler for the species.

BIOLOGICAL INFORMATION

Taxonomic Classification – The so-called "rosy" rat snake (*Elaphe guttata rosacea*) from the Lower Keys was first described by Cope in 1888 as a new species, *Coluber rosaceus*, from a single preserved specimen (*see* Wright 1935). Neill (1949) and Dowling (1952) concluded that it should be considered a subspecies of the corn or red rat snake (*Elaphe guttata*) instead of its own species. On the basis of clinal variation from north to south in number of dorsal blotches and amount of black pigment, various researchers concluded that *E. guttata rosacea* should be placed in synonymy with its nominate race, *E. g. guttata* (Duellman and Schwartz 1958, Thomas 1974, Mitchell 1977; however, *see* Paulson 1968). The Lower Keys population exhibits a wide degree of variation in coloration, and many specimens are

indistinguishable from those in the Miami area (Mitchell 1977, Love 1978, Lazell 1989, Bartlett 2002). However, Christman (1980) considered the Lower Keys population to be noteworthy for its lighter dorsal color, absent or very narrow dorsal blotch borders, very high ventral and subcaudal scale counts, and more slender body. Using molecular data, Burbrink (2002) found that *Elaphe guttata* was comprised of 3 clades, which he elevated to species level, restricting *E. guttata* to populations east of the Mississippi River. Molecular data indicate that New World *Elaphe* are part of a clade outside of Old World species, and *Pantherophis* was resurrected for most North American species (Utiger et al. 2002); hence, the correct species name is now *Pantherophis guttatus*. We will refer to the species as the red rat snake, which is the name used by FWC in its imperiled species list, although the most recent common name is red cornsnake (Crother 2008).

Life History and Habitat Requirements – Information on the species has been summarized by Weaver et al. (1992) and Ernst and Ernst (2003). The red rat snake in the Lower Keys inhabits pine rockland, rockland hammock, mangrove forest, and a variety of disturbed habitats, including urban areas (Love 1978, Lazell 1989, Weaver et al. 1992). It is very adaptable and can be found in habitats altered by humans, sometimes in bushes, trees, walls, and buildings, but also hiding beneath a variety of debris, including logs, rocks, plywood, and paper plates (Love 1978, Lazell 1989, Weaver et al. 1992). It is a good climber but also can be found underground, burrowing into loose sand or using existing burrows (Weaver et al. 1992). In the Lower Keys, red rat snakes are probably active year round, moving primarily at night during warm weather, feeding on small mammals, birds, bird eggs, and lizards. In many urban situations in Florida, red rat snakes primarily prey on nonnative lizard species, such as the very abundant brown anole (*Anolis sagrei*) (Enge 1993), and this is also true in the Lower Keys (Love 1978, Wilson and Porras 1983). Red rat snakes lay 3–40 eggs per clutch, with an average of 14 eggs (*see* Ernst and Ernst 2003). Red rat snakes in the Lower Keys tend to attain smaller sizes than those on the Florida mainland, which may mean that their clutch sizes are proportionately smaller.

Population Status and Trend – Carr (1940) considered the red rat snake to be rare in the Lower Keys, but most authors consider it to be common or locally abundant (*see* Love 1978, Lazell 1989, Weaver et al. 1992). Most submitters of Florida Natural Areas Inventory (FNAI) records indicate that good or excellent populations exist or that snakes are seen regularly or frequently in the area. According to T. Crutchfield (*see* Appendix 2), "rosy" rat snakes are extraordinarily abundant and possibly more common now than 20 years ago. Lazell (1989) claimed it was the second most commonly encountered snake species after the black racer (*Coluber constrictor*), and it could be found in good numbers in urban areas where racers were rare or extirpated. There are few recent museum or FNAI records from the Lower Keys, but this might be because red rat snakes are so common and people have the perception that finding a specimen is not worth reporting. Because it is presently listed as a Species of Special Concern, live or dead specimens cannot legally be collected without a permit for deposition in a museum. Since 2000, there are records from Big Torch, Middle Torch, and Summerland keys. There are records from the 1990s for Boca Chica, Saddlebunch, and Sugarloaf keys.

Geographic Range and Distribution – The red rat snake occurs in every county in Florida and throughout the Keys. The population of interest is known from many localities in the Lower Keys and has been observed or collected on the following keys: Bahia Honda, Big Pine, Big Torch, Boca Chica, Cudjoe, Geiger, Johnston, Key Vaca, Key West, Indian, Little

Pine, Little Torch, Middle Torch, Ramrod, Saddlebunch, Stock Island, Sugarloaf, and Summerland (Weaver et al. 1992, museum records, Florida Natural Areas Inventory [FNAI] records) (Fig. 1). It was also found on the Marquesas Keys in 1917 and 1938 (Weaver et al. 1992, FNAI records).

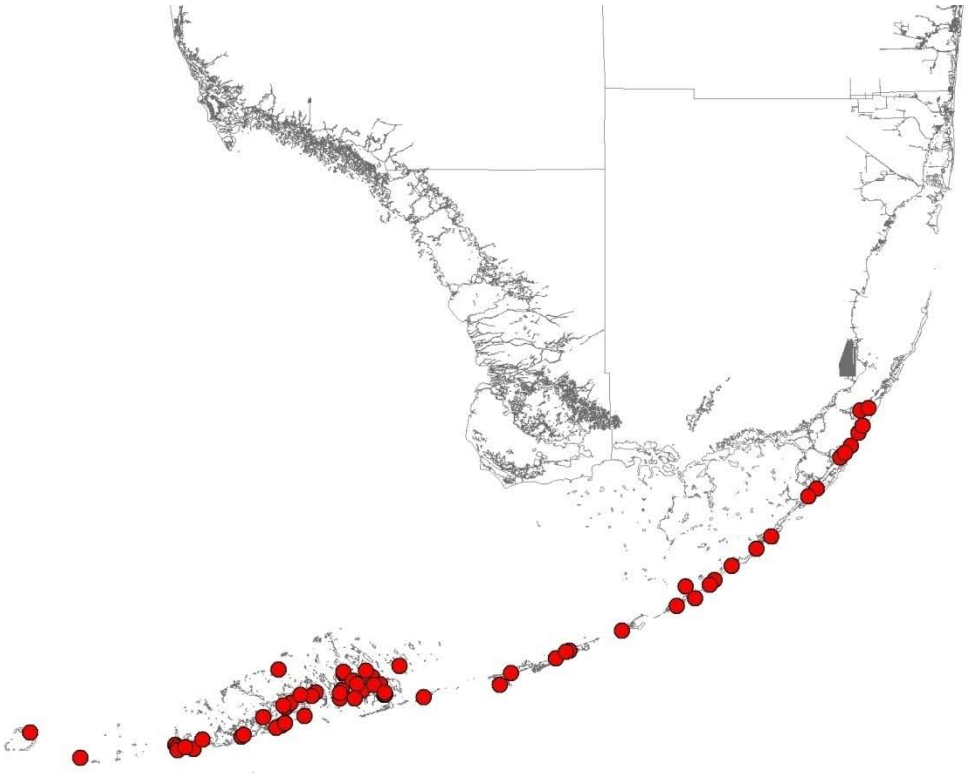

Fig. 1. Locality records from museum and FNAI for the red rat snake in the Florida Keys (the Lower Keys population consists of only the westernmost records).

Quantitative Analyses – Staff is not aware of a population viability analysis for the Lower Keys population of the red rat snake. However, staff believes it is unlikely that the red rat snake will become extinct in the Lower Keys within the next 100 years based upon the diverse habitats occupied, the amount of suitable habitat contained in conservation lands, and the species' adaptability to some habitat alteration. Sea-level rise due to climate change will flood some lands inhabited by this species, including part of the Lower Keys.

BIOLOGICAL STATUS ASSESSMENT

Threats – Enge et al. (2003) provided descriptions of the rockland habitats of South Florida, their threats, and their wildlife communities. The adaptable red rat snake inhabits almost every habitat in the Lower Keys, including rockland hammock, pine rockland, mangrove forest, and highly disturbed habitats. It is unknown to what extent clearing of trees and other types of human development have impacted populations, because this species is often found in edificarian situations, sheltering in old buildings and walls (Lazell 1989). Clearing of pine rockland and rockland hammock habitats has probably eliminated red rat snakes from some areas, but it is possible that populations are higher in some human-altered habitats than in the

former natural habitats. A possible reduction in warm-blooded prey in human-altered habitats may be compensated for by an abundance of nonnative lizard species, particularly brown anoles (Wilson and Porras 1983). Red rat snakes are intentionally killed by persons, and many are killed on roads by vehicles (K. Enge, FWC, pers. commun. 2010); many of the museum and FNAI records are road-killed specimens. Hurricanes strike South Florida about every 3 years (Gentry 1974), but associated seawater surges and short-term flooding of upland habitats in the Keys probably do not kill many individuals of this species, which is a good swimmer and readily climbs trees, potentially finding shelter in a variety of arboreal and terrestrial situations. However, effects of flooding on some of its primary prey species, lizards and small mammals, may impact snake populations until prey populations recover, although many of the lizard species appear adapted to periodic flooding (Bartlett 1997). In 2005, Hurricane Wilma (Category 3) passed just north of the Florida Keys, causing 2 storm surges. The second storm surge caused maximum storm tides 1.5–1.8 m (5–6 feet) above mean sea level in Key West (60% of the city was flooded) and 1.5–2.4 m (5–8 feet) between Boca Chica and Big Pine keys (Kasper n.d.). The Florida Keys have been hit with more intense hurricanes, such as the Labor Day Hurricane of 1935 (Category 5) and Hurricane Donna (Category 4) in 1960.

The red rat snake is the most heavily harvested snake species for the pet trade in Florida, with an average of >5,000 snakes collected annually in 1990–94, two-thirds of which were harvested south of Lake Okeechobee (Enge 2005). The Lower Keys population is listed as a Species of Special Concern and is protected from harvest, but some illegal harvest occurs (K. Enge, FWC, pers. commun. 2010). To most persons, the so-called Rosy Rat Snake is not as desirable as many of the other more colorful phenotypes, but some breeders produce them, although they may not advertise them as such because of their protected status (Tennant 1997).

Population Assessment – Findings from the BRG are included in Biological Status Review Information tables. The BRG found the Lower Keys population of the red rat snake did not meet any of the listing criteria.

LISTING RECOMMENDATION

Staff recommends that the Lower Keys population of the red rat snake not be listed as a Threatened species and that it be removed from the Species of Special Concern list.

SUMMARY OF THE INDEPENDENT REVIEW

Comments were received from 3 reviewers: Mr. Kenneth P. Wray (Florida State University), Mr. Robert T. Zappalorti (Herpetological Associates, Inc.), and Mr. Joseph Burgess (Florida Department of Environmental Protection). No changes were recommended that would affect the findings or staff recommendations. Although 2 of the reviewers thought the Lower Keys population should remain listed as a Species of Special Concern until more information is obtained on actual population size and trends, all 3 concurred with the BRG's finding that the Lower Keys population did not meet the criteria to be listed as Threatened. The reviews can be found at MyFWC.com.

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Biological Status Review Information
Findings

Species/taxon: Red Rat Snake, Lower Keys population
Date: 11/19/10
Assessors: Enge, Johnson, Moler

Generation length: 6 years

Criterion/Listing Measure	Data/Information	Data Type*	Sub-Criterion Met?	References
*Data Types - observed (O), estimated (E), inferred (I), suspected (S), or projected (P). Sub-Criterion met - yes (Y) or no (N).				
(A) Population Size Reduction, ANY of				
(a)1. An observed, estimated, inferred or suspected population size reduction of at least 50% over the last 10 years or 3 generations, whichever is longer, where the causes of the reduction are clearly reversible and understood and ceased[1]	Causes of reduction have not ceased (c)	S	N	
(a)2. An observed, estimated, inferred or suspected population size reduction of at least 30% over the last 10 years or 3 generations, whichever is longer, where the reduction or its causes may not have ceased or may not be understood or may not be reversible[1]	<30% population size reduction because of 8.1% decline in human population in Keys since 2000 and limits on development	S	N	Monroe County (1999), U.S. Census Bureau
(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]	<30% population size reduction because of projected 4.3% human population increase in Keys in next 20 years and limits on development	S	N	Monroe County (1999), Zwick and 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]	<30% population size reduction (*see* A2 and A3)	S	N	Monroe County (1999), Zwick and Carr (2006)
[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	137.3 km^2	E	Y	Monroe County (1999)
(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	136.5 km^2	E	Y	GIS analysis of potential habitat by B. Stys (FWC)

AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	Uncertain of number of locations	S	Uncertain	
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	Probably not declining	P	N	Monroe County (1999)
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		S	N	
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	>10,000 mature individuals	S	N	Love (1978), Lazell (1989), Weaver et al. (1992), FNAI records, GIS analysis of potential habitat by B. Stys (FWC)
(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	Probably not declining	S	N	
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:	Probably not declining	S	N	
a. Population structure in the form of EITHER		S	N	
(i) No subpopulation estimated to contain more than 1000 mature individuals; OR				
(ii) All mature individuals are in one subpopulation		I	N	
b. Extreme fluctuations in number of mature individuals		S	N	
(D) Population Very Small or Restricted, EITHER				
(d)1. Population estimated to number fewer than 1,000 mature individuals; OR	>10,000 mature individuals	S	N	See Criterion C
(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	136.5 km^2	E	N	
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	No PVA		N	

Initial Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria/sub-criteria are met)
Not Threatened	
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 OR Does not meet any of the criteria)	Reason (which criteria/sub-criteria are met)
Not Threatened	

1	Biological Status Review Information Regional Assessment	Species/taxon: Red Rat Snake, Lower Keys population
2		Date: 11/18/10
3		Assessors: Enge, Johnson, Moler
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.	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 regional population a sink? (Y/N/DK). If 2d is YES, go to line 14. If 2d is NO or DO NOT KNOW, go to line 15.	
14	If 2d is YES - Upgrade from initial finding (more imperiled)	
15	If 2d is NO or DO NOT KNOW - No change from initial finding	
16	If 2c is NO or DO NOT KNOW- Downgrade from initial finding (less imperiled)	
17	If 2b is NO or DO NOT KNOW - No change from initial finding	No change
18	2e. Are the conditions outside Florida deteriorating? (Y/N/DK). If 2e is YES or DO NOT KNOW, go to line 24. If 2e is NO go to line 19.	
19	2f. Are the conditions within Florida deteriorating? (Y/N/DK). If 2f is YES or DO NOT KNOW, go to line 23. If 2f is NO, go to line 20.	
20	2g. Can the breeding population rescue the Florida population should it decline? (Y/N/DK). If 2g is YES, go to line 21. If 2g is NO or DO NOT KNOW, go to line 22.	
21	If 2g is YES - Downgrade from initial finding (less imperiled)	
22	If 2g is NO or DO NOT KNOW - No change from initial finding	
23	If 2f is YES or DO NOT KNOW - No change from initial finding	
24	If 2e is YES or DO NOT KNOW - No change from initial finding	
25		
26	Final finding	

Additional notes – Generation length is defined as the average age of parents of the current cohort, which is greater than the age at first breeding and less than the age of the oldest breeding individual. Sexual maturity is often attained in 18 months, and snakes can live to be over 20 years old in captivity (Ernst and Ernst 2003). We infer a mean generation length of 6 years. Some specimens from the Lower Keys are not distinctive from those found elsewhere in the Keys or in the Miami area, and we are uncertain whether the population can be considered disjunct. Approximately 11.3 km (7 miles) of water separates Little Duck Key in the Lower Keys from Knight Key in the Middle Keys. The population may be occasionally augmented by snakes transported in agricultural and horticultural shipments (Tennant 1997), and by vehicles, such as motor homes. Another possible source of augmentation is the escape or release of pet red rat snakes, which is the most commonly kept native snake species. We are not convinced that the Lower Keys population should be considered separately from red rat snakes elsewhere in Florida.

Sub-criterion A2. – Actual estimates of red rat snake populations and trends do not exist, but we suspect that loss and degradation of habitat probably have resulted in some declines in populations within the past 18 years. Urbanization resulted in extensive destruction of rockland habitats in the past, but vigorous litigation has slowed the previous uncontrolled rate of growth in the Keys (Morgenstern 1997). The number of dwelling units (permanent and seasonal) that can be permitted in Monroe County has been controlled by the Rate of Growth Ordinance adopted by Monroe County in 1992, which was developed as a response to the inability of the road network to accommodate a large-scale hurricane evacuation in a timely fashion (http://www.monroecounty-fl.gov/pages/MonroeCoFL_Emergency/LMSplan/ch02.pdf). The Lower Keys contain 43% of the vacant, buildable lots in the Keys (Monroe County 1999). According to the U.S. Census Bureau, Monroe County's population decreased by 8.1% from 2000 through 2009. The red rat snake probably still occurs on all of the keys within its historic range, so the extent of occurrence has not declined. This prolific species is adaptable and often inhabits urban areas; anecdotal evidence suggests that it remains abundant (*see* Appendix 2). Despite its protected status, some exploitation of the red rat snake occurs in the Lower Keys for pets, although the extent is unknown (K. Enge, FWC, pers. commun. 2010). The ready availability of captive-produced red rat snakes in a wide variety of colors and patterns, including some "rosy rats," has probably decreased the demand for wild-caught snakes from the Keys, but some persons prefer wild-type phenotypes with locality data (Enge, pers. obs.). Occasionally, the red rat snake will hybridize with the yellow (eastern) rat snake (*Pantherophis obsoletus* or *alleghaniensis*), but such an occurrence is rare and unlikely to affect populations. Introduced species have probably been more beneficial than detrimental to red rat snake populations. Although domestic dogs and cats and some nonnative lizard species occasionally kill red rat snakes (Love 2000), the abundant populations of nonnative lizards, such as brown anoles and house geckos (*Hemidactylus* spp.) provide a food source in urban environments.

Sub-criterion A3. – Three generations from 2010 would be 2028. By the Year 2030, Monroe County's population is projected to increase by 4.3% (Zwick and Carr 2006). However, Monroe County's population has been decreasing, and according to the U.S. Census Bureau, the population in 2009 was only 73,165, not the 82,414 that was projected (Zwick and Carr 2006). Of the potential habitat identified using GIS analysis, 64.8% is protected in conservation lands,

preserves, or easements (B. Stys, FWC, pers. commun. 2010), and there are restrictions on clearing rockland habitat on private lands.

Sub-criterion B1. – The land area of the Lower Keys, not including offshore islands, is ca. 137.3 km^2 (53.0 mi^2) (Monroe County 1999). However, the Lower Keys population does not appear to be distinctive, and red rat snakes occur throughout the Keys and the entire state. A GIS estimate using 2003 FWC landcover classes of the total land area of the Florida Keys, which consists of ca. 1,700 islands, is 642 km^2 (248 mi^2) (B. Stys, FWC, pers. commun. 2010).

Sub-criterion B2. – A GIS analysis of potential habitat for the Lower Keys population identified 136.5 km^2 (52.7 mi^2) of potential habitat (B. Stys, FWC, pers. commun. 2010), which we will assume is equivalent to the area of occupancy. The predominant FWC 2003 land-cover classes that comprised most of the potential habitat were mangrove swamp (83.6 km^2; 32.3 mi^2), scrub mangrove (22.8 km^2; 8.8 mi^2), tropical hardwood hammock (15.7 km^2, 6.1 mi^2), pinelands (9.3 km^2; 3.6 mi^2), and low impact urban (4.5 km^2; 1.7 mi^2). Based upon future development and clearing of habitat, we project a continuing decline in area of occupancy, extent of habitat, and number of mature individuals. However, the population is not severely fragmented. Red rat snakes occur on at least 16 keys, not including the Marquesas, and although natural rockland habitats have been fragmented by development, snakes often inhabit altered habitats between these fragments. Many of these keys are separated by narrow channels that are sometimes <1 km wide, and "subpopulations" on these islands may experience demographic or genetic exchange (i.e., >1 migrant individual per year). We are uncertain if red rat snakes in the Lower Keys occur in $\leq$10 locations. A "location" is a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the taxon present. A storm surge of salt water from a severe hurricane (Category 3 or higher) could completely overwash most islands in the Lower Keys, except for Key West, which has a maximum elevation of ca. 6 m (18 feet). Most keys are generally <1.5 m (5 feet) above sea level, and the maximum storm tide from Hurricane Wilma (Category 3) in 2005 was 1.5–2.4 m (5–8 feet) above mean sea level (*see* Threats section). Because red rat snakes are good swimmers, excellent climbers, adaptable, prolific, and relatively large, they probably survive storm surges better than other reptile species. Assuming sufficient prey survives storm surges, red rat snakes populations probably would not be affected enough to be able to assign locations. We have no evidence that the red rat snake experiences extreme fluctuations.

Criterion C. – No data on population densities exist for the red rat snake, and we suspect that population density estimates for other species of rat snakes elsewhere in the U.S. (e.g., Fitch 1958, 1963; Stickel et al. 1980; Blouin-Demers and Weatherhead 2002) do not apply to red rat snakes in Florida, where they may be very common in some habitats. For example, a commercial collector has intensively hunted canals on a farm in Martin County since 2002, removing up to 1,000 red rat snakes annually (J. Watt, pers. commun. 2010). Approximately 75% of the snakes were adults (i.e., >76 cm; 30 inches total length). The farm is ca. 405 ha (1,000 acres) in size, which would yield a minimum density of 1.85 adult snakes/ha (0.75/acre). However, densities are obviously higher than this, because all snakes were not removed. This collector has hunted snakes on this farm since 1979, when it consisted of citrus groves, but he did not find red rat snakes here until the 1990s, when the farm was converted to sugar cane (it is now a vegetable farm and rock mine). Despite the harvest pressure, there has been no reduction

in numbers of red rat snakes harvested since the 1990s. On a good day, this collector has found 10–15 red rat snakes in the Keys under trash and in coconut palms (J. Watt, pers. commun. 2010), which agrees with T. Crutchfield's claim of 10–20 snakes per day (Appendix 2). We suspect that >10,000 red rat snakes occur in the Lower Keys.

APPENDIX 1. Brief biographies of the Red rat snake Biological Review Group members.

Kevin M. Enge received his M.S. in Wildlife Ecology and Conservation from the University of Florida and B.S. degrees in Wildlife and Biology from the University of Wisconsin–Stevens Point. He is currently an Associate Research Scientist in the Reptile and Amphibian Subsection of the Wildlife Research Section, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission (FWC). He has worked for FWC since 1989, serving as a nongame survey and monitoring biologist and the Herp. Taxa Coordinator. He has conducted numerous surveys of both native and exotic amphibians and reptiles, and he has published >60 scientific papers and 25 reports.

Steve A. Johnson received his Ph.D. from the University of Florida and M.S. and B.S. degrees from the University of Central Florida. He is an Assistant Professor of Urban Wildlife Ecology at the University of Florida, and he holds a teaching and extension position in the Department of Wildlife Ecology and Conservation, Gulf Coast Research and Education Center. His area of expertise is natural history and conservation of amphibians and reptiles, especially those using isolated wetlands, and he has >60 publications.

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

APPENDIX 2. Summary of letters and emails received during the solicitation of information from the public period of September 17 through November 1, 2010.

Letter and comments submitted by Tom Crutchfield:

From: Tom Crutchfield
Sent: Thursday, September 23, 2010 1:07 PM
To: Enge, Kevin
Subject: Public comment period for state-listed species

Kevin, I can tell you that the "rosacea" in the Lower Keys are extraordinarily abundant and are not in any way RARE by any stretch of the imagination. If anything, they're more common now than 20 years ago. One could easily collect 10–20 in a day, if really hunted…..thanks