

Atlantic salt marsh snake

(*Nerodia clarkii taeniata*)

**5-Year Review:
Summary and Evaluation**

**U.S. Fish and Wildlife Service
Southeast Region
Jacksonville Ecological Services Field Office
Jacksonville, Florida**

5-YEAR REVIEW

Atlantic salt marsh snake (*Nerodia clarkii taeniata*)

I. GENERAL INFORMATION

A. Methodology used to complete the review: The U.S. Fish and Wildlife Service's Jacksonville Field Office completed this review. All literature and documents used for this review are on file at the Jacksonville Field Office and are cited in the Literature Cited section. Public notice of this review was given in the Federal Register on April 26, 2007, with a 60-day public comment period. No public comments were received for this review. None of this review was contracted to outside parties. Comments and suggestions regarding the review were received from peer reviews from outside the Service (see Appendix A).

B. Reviewers

Lead Regional Office - Southeast Region: Kelly Bibb, 404-679-7132

Lead Field Office - Jacksonville, FL: Bill Brooks, 904-232-2580 ext. 120

Cooperating Field Offices - Vero Beach, FL, Ecological Services: Marilyn Knight, 772-562-3909 ext. 297;

Cooperating Refuges - Merritt Island NWR, FL, Refuges, Mike Legare, 321-867-0667; **Pelican Island NWR, FL, Refuges,** Paul Tritaik, 772-562-3909 ext.244.

Peer Reviewers - Dr. Kevin Enge (Florida Fish and Wildlife Conservation Commission), Dr. Witt Gibbon (Savannah River Ecology Laboratory), Dr. Chris Parkinson (University of Central Florida), Charles Dutoit (Florida Park Service, Florida Department of Environmental Protection).

C. Background

- 1. FR Notice citation announcing initiation of this review:** 72 FR 20866, April 26, 2007
- 2. Species status:** Unknown (2007 Recovery Data Call). To date, there has not been a comprehensive population survey of this subspecies. The threats that affect the Atlantic salt marsh snake (ASMS) appear to be continuing at the same levels. The conclusion is that the overall population status is unknown.
- 3. Recovery achieved:** 1 (=0-25% recovery objectives achieved) (2007 Recovery Data Call)
- 4. Listing history:**

Original listing:

FR notice: 42 FR 60743

Date listed: November 29, 1977

Entity listed: subspecies

Classification: Threatened

5. **Associated rulemakings:** None

6. **Review history:**

The Service conducted five-year reviews for the ASMS in 1987 (52 FR 25523) and 1991 (56 FR 56882). In these reviews, the status of many species was simultaneously evaluated with no in-depth assessment of the five factors as they pertain to the individual species. The notices stated that the Service was seeking any new or additional information reflecting the necessity of a change in the status of the species under review. The notices indicated that if significant data were available warranting a change in a species' classification, the Service would propose a rule to modify the species' status. No change in the ASMS's listing classification was found to be warranted.

Final Recovery Plan - 1993.

Recovery Data Call - 2007, 2006, 2005, 2004, 2003, 2002, 2001, 2000, 1999, and 1998.

7. **Species' Recovery Priority Number at start of review (48 FR 43098):**
12 (a subspecies with moderate degree of threat and low recovery potential)

8. **Recovery Plan**

Name of plan: Atlantic Salt Marsh Snake Recovery Plan.

Date issued: December 15, 1993.

II. REVIEW ANALYSIS

A. **Application of the 1996 Distinct Population Segment (DPS) policy:**

1. **Is the species under review listed as a DPS?** No. The Atlantic salt marsh snake (*Nerodia clarkii taeniata*) (ASMS) is one of three subspecies of salt marsh snake.
2. **Is there relevant new information regarding application of the DPS policy that would lead you to consider listing this species as a DPS in accordance with the 1996 policy?** No.

B. **Recovery Criteria**

1. **Does the species have a final, approved recovery plan containing objective measurable criteria?** Yes. The ASMS has an approved final recovery plan (December 15, 1993) with objective measurable criteria.
2. **Adequacy of recovery criteria:**
 - a. **Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?** Yes. The criteria are based upon the current knowledge of the species, which can be found in the ASMS Recovery Plan (1993) and South Florida Multi-Species Recovery Plan (MSRP) (1999). However, the knowledge base for this subspecies is more than ten years old and is incomplete and needs to be updated. To date, there has not been a comprehensive population survey of the ASMS. Until such a survey is completed, we will not know the current status of this subspecies.
 - b. **Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)?** Yes. The recovery criteria for the ASMS address the three relevant listing factors: the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A); the inadequacy of existing regulatory mechanisms (Factor D); and other natural or manmade factors affecting its continued existence (Factor E). The recovery criteria are based upon minimizing habitat loss and having secure/discrete/dispersed populations to address Factor A; providing adequate habitat protection to address Factor D; and monitoring genetic introgression to ensure ecological isolating mechanisms exist between salt marsh snake races and adjacent fresh water snake species to address Factor E.
3. **List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information. For threats-related recovery criteria, please note which of the 5 listing factors are addressed by that criterion. If any of the 5-listing factors are not relevant to this species, please note that here.**

Delisting the ASMS can be considered if the following conditions are met:

- (1) If there is no evidence of significant genetic introgression (genetic exchange limited to a very narrow hybrid zone) from the Florida banded water snake (*Nerodia fasciata pictiventris*) into adjacent populations of the ASMS.
- (2) Maintain adequate habitat protection and maintain habitat loss at or

below current levels for the next 5 years.

- (3) Establish self-sustaining populations of 100-200 adult snakes at each of 10 secure, discrete sites dispersed throughout Volusia County. These numerical goals are subject to revision as more information becomes available on the biology of the ASMS.
- (4) These populations should be monitored for at least 5 years before considering delisting.

Until a genetic assessment, comprehensive survey, and taxonomic assessment have been conducted, it will not be possible to determine the genetic introgression with the Florida banded water snake (*Nerodia fasciata pictiventris*) (needed to determine criterion 1), losses of habitat within the range (needed to determine criterion 2), or range and population locations (needed for criterion 3). A comprehensive assessment of the ASMS has not been conducted. Therefore, at this time, we cannot determine if any of the recovery criteria are being met.

There is a study underway to identify current locations of ASMS populations. This project has collected over 150 genetic samples from snakes from salt marsh habitats in Brevard and Volusia Counties. There are plans to also collect additional samples in Volusia County and also in southern Flagler County. These genetic samples have not been analyzed (K. Sims, pers. comm., 2007). The rates of salt marsh habitat loss in Volusia County are not available. A preliminary GIS assessment indicates that approximately 2,000 of 14,000 acres of salt marsh habitat (14%) have been lost in Volusia County since 1990 (L. White, USFWS, pers. comm., 2007), see discussion in Section C.1.e.

C. Updated Information and Current Species Status

1. Biology and Habitat

- a. **Abundance, population trends, demographic features, or demographic trends:** To date, there has not been a comprehensive population survey of the ASMS. There are no population or demographic trends available. There have been only a few surveys and they have been limited in scope to determine presence and to collect genetic samples (P. Moler, pers. comm., 2007, C. Dutoit, FDEP, pers. comm., 2007). At the time of listing, the ASMS was thought to include salt marsh snakes as far south as Indian River County (Service 1977). Its distribution may actually be much more restricted, limited to the brackish, coastal marshes of Volusia County (Service 1993). Therefore, the distribution of ASMS is likely smaller than thought at the time of listing (1977).

There are no population size estimates for the ASMS. The demographic recovery criterion (Service 1993) requires the establishment of self-sustaining populations of 100-200 adult snakes at each of 10 secure, discrete sites dispersed throughout Volusia County. This criterion also indicates that these numerical goals are subject to revision as more information on the biology of the ASMS becomes available. The Florida Fish and Wildlife Conservation Commission recently funded a risk assessment of rare and imperiled wildlife in Florida (Root and Barnes 2006). Since there is little known about the ASMS ecology and demographics, the risk assessment model used information from other species within the genus of *Nerodia*. Root and Barnes (2006) concluded that the probability of extinction in the next 100 years was zero, but the probability of decline was high (e.g., 39% probability of a 50% decline). Fecundity and juvenile survival were determined as the most influential parameters on population growth.

- b. Genetics, genetic variation, or trends in genetic variation:** Lawson *et al.* (1991) found no genetic introgression between the salt marsh snake complex and adjacent freshwater snakes. However, the ASMS does hybridize with a closely related freshwater species, the Florida banded water snake (Kochman 1977, Dunson 1979, Lawson *et al.* 1991). Wetland alterations from upland development adjacent to salt marshes from ditching, diking and impounding, can promote hybridization, by creating fresh water habitats in close proximity to salt marsh habitats. These alterations to the ASMS habitat disrupt the reproductive isolating mechanisms between the Florida banded water snake and the ASMS as the natural transitional boundary between salt water and fresh water habitats are eliminated. However, to date there has not been a comprehensive genetic survey of the ASMS. Therefore, the extent of the genetic swamping of ASMS populations from hybridization with the Florida banded water snake cannot be determined. Also the area of intergradations with the mangrove water snake (*Nerodia clarkii compressicauda*) cannot be determined until there is a genetic assessment. The salt marshes of Brevard County may represent the area of intergradation between the ASMS and mangrove water snake subspecies (Service 1993, 1999).
- c. Taxonomic classification or changes in nomenclature:** The ASMS recovery plan (Service 1993) contains a detailed taxonomic classification description. The ASMS has a complex taxonomic history, having been known under various combinations of generic,

specific, and subspecific names. Lawson *et al.* (1991) conducted an extensive electrophoretic analysis and found no genetic introgression between the salt marsh snake complex and the adjacent freshwater snakes and concluded that the salt marsh snake warranted recognition as a separate species, *N. clarkii*. At the subspecific level, the ASMS has alternately been treated as a separate subspecies or synonymized with the mangrove water snake. At present, three subspecies of the salt marsh snake are recognized, the Atlantic salt marsh snake, the Gulf salt marsh snake (*N. clarkii clarkii*), and the mangrove water snake (*N. clarkii compressicauda*) (Lawson *et al.* 1991). The subspecies that the Service listed as threatened is the Atlantic salt marsh snake, *Nerodia fasciata taeniata* (now *N. clarkii taeniata*).

In 2001, Karl *et al.* (2001) submitted a contract report to the Florida Fish and Wildlife Conservation Commission (FWC) and concluded that *N. clarkia* does not differ significantly from *N. fasciata*. Karl *et al.* (2001) concluded that the salt marsh snake complex has only two valid subspecies, *clarkii* and *compressicauda*, which does not agree with the results obtained by Lawson *et al.* (1991). However, the FWC cautioned against accepting all the conclusions (Enge, FWC, peer review comments, 2007). According to the FWC, this report remains unpublished, as the author needs to address reviewer concerns pertaining to methodology, collection localities and interpretation of results. Regardless, the Karl *et al.* (2001) report underscores the need for a rigorous taxonomic assessment of the salt marsh snake complex.

The nomenclature of the common name is being updated. The Society for the Study of Amphibians and Reptiles' Committee on Standard English and Scientific Names (Crother 2000) spells "saltmarsh" as a compound word and indicated that it is used as an adjective, similar to "freshwater." Further, the Committee will soon publish an update and will list the common name as "Atlantic saltmarsh watersnake," (Crother, pers. comm., 2007). Gibbons and Dorcas (2004), in *North American Watersnakes: A Natural History*, use "Atlantic salt marsh snake."

The taxonomic status of the ASMS will remain controversial until a thorough, rigorous systematic assessment is conducted. The Endangered Species Act (ESA) defines the term species as including "...any subspecies of fish or wildlife or plants, and any distinct population or segment of any species or vertebrate fish or wildlife, which interbreeds when mature." Final resolution of the taxonomic status of the ASMS will provide further insight into proper management, but continued protection under the ESA is

justified whether it remains a distinct subspecies or is designated as a distinct population. Regardless of its taxonomic status, the ASMS is a relict of historical and/or ecological processes unique to Florida and should be preserved (Kochman 1992).

- d. **Spatial distribution, trends in spatial distribution or historic range:** An issue with listing of a subspecies is that the distribution and intergradation with another subspecies is difficult to define. Until comprehensive surveys and a taxonomic assessment have been conducted, it will not be possible to determine the distributional limit of the ASMS. The Recovery Plan (Service 1993) and MSRP (1999) indicate the ASMS's range may be more restricted than thought at the time of listing (1977). The zone of intergradation appears to coincide with the increasing dominance of mangroves swamps in Brevard County (Service 1993, Blihovde 1996, Service 1999). Thus, the brackish, coastal marshes of Volusia County, from the Halifax River south to the northern portions of the Indian River are where the ASMS likely occurs (Service 1993 and 1999).

An ongoing research project has collected over 150 genetic samples from salt marsh snakes from Volusia, Brevard and St. Lucie Counties, however species identifications have yet to be determined. Hite (2001) reported trapping five specimens within the Tomoka Basin State Parks in northern Volusia County. The Recovery Plan (1993) identified ASMS populations in southern Volusia County from the estuarine island north of Ponce Inlet, the mainland shoreline east of New Smyrna Beach airport, two localities from the salt marshes of New Smyrna Beach, and an island in the Indian River east of Edgewater. ASMS in the northern area of Volusia County (Tomoka Basin State Parks and Halifax River) are likely isolated from populations in southern Volusia by the Ormond Beach-Daytona Beach metropolitan area. There is very limited salt marsh habitat in this ten-mile stretch of the Halifax River. There has been one specimen collected from salt marsh near the Flagler and Volusia County line. It is not known if a population exists near this area or to the north in Flagler County.

- e. **Habitat ecosystem conditions:** Habitat destruction for residential, commercial, and industrial construction, and habitat degradation due to ditching, diking, stormwater impoundments on adjacent uplands, and historic mosquito ditching in the salt marsh, have affected the ASMS and its habitat. The loss of salt marsh habitat from upland construction projects appears to have slowed in the 1990s (Service 1999). Cox et al. (1994) conducted a GIS analysis

of appropriate ASMS habitat in Volusia County and concluded that it consisted of approximately 11,700 acres, of which 3,500 acres (30%) was within the Canaveral National Seashore. A recent analysis by Florida Natural Areas Inventory (2007) found 9,132 acres of habitat of which 2,349 acres (26%) was protected within publicly managed lands. Root and Barnes (2006) determined that 48% of the ASMS potential habitat was on public lands, however, this included northern Brevard County as part of the ASMS range. A recent Service GIS assessment of ASMS habitat in Volusia County, using St. Johns River Water Management District Land Use and Cover data from 1990, 1995, 2000, and 2004, indicates a decline in salt marsh habitat (L. White, USFWS, pers. comm., 2007). The total extent of salt marsh declined from 13,764 acres in 1990 to 11,423 acres in 2004 (L. White, USFWS, pers. comm., 2007).

Through existing local, State, and Federal regulatory mechanisms, coastal construction projects are required to avoid, minimize, and mitigate for salt marsh impacts either on site or within the known range of the ASMS. Salt marshes are being protected through the management of public lands and sovereign submerged lands for wildlife and water conservation at Tomoka State Park, Bulow Creek State Park and Tomoka Marsh Aquatic Preserve in the northern part of Volusia County and Merritt Island National Wildlife Refuge, Canaveral National Seashore, and Mosquito Lagoon Aquatic Preserve in southern Volusia County. Development is minimized in the Mosquito Lagoon area south of Ponce Inlet because much of the area is publicly owned and future development pressure in this area is limited.

Salt marsh restoration projects important to the ASMS recovery are underway in Volusia County. The salt marsh systems within Tomoka River/Bulow Creek in northern Volusia County and the Mosquito Lagoon in southern Volusia County have extensive dragline-dug ditches and a large impoundments created in the 1950s and 1960s. The St. Johns River Water Management District, East Volusia Mosquito Control District, Canaveral National Seashore, Merritt Island National Wildlife Refuge, Tomoka State Park, Bulow Creek State Park, Mosquito Lagoon Aquatic Preserve, Volusia County, and others are working cooperatively to restore and enhance hundreds of acres of disturbed salt marsh by restoring marsh elevations, returning tidal flow to impoundment areas, and backfilling ditches with spoil material and scraping dikes down to marsh elevations. These restoration efforts are ongoing and will likely prove to be significant for the recovery of the ASMS.

2. Five-Factor Analysis

- a. Present or threatened destruction, modification, or curtailment of its habitat or range:** The ASMS is a salt marsh-dependent species. At the time of listing, the ASMS was thought to include salt marsh snakes as far south as Indian River County (Service 1977). However, it is now believed to be more restricted, occurring only in the brackish, coastal marshes of Volusia County. If this is the case, then given its highly restricted distribution, the ASMS's vulnerability to habitat destruction and modification is even greater than believed at the time of listing.

The loss of salt marsh habitat from upland construction projects appears to have slowed in the 1990s (Service 1999), a preliminary GIS analysis of the Volusia County salt marshes suggests that 2,000 acres (14%) have been lost since listing (L. White, USFWS, pers. comm., 2007). On a positive note, most of the habitat where the ASMS likely occurs is publicly owned and/or sovereign submerged lands of the State of Florida, and thus future development in these areas will likely be limited. There is also a major initiative underway in Volusia County to restore all the disturbed salt marsh systems that were dragline ditched during the 1950s and 1960s. To date, over 1,000 acres of disturbed salt marsh areas within the Mosquito Lagoon and Tomoka River/Bulow Creek areas have been restored and enhanced and are likely improving the habitat conditions for the ASMS. Overall, however, loss and modification of salt marsh habitat continues to be a threat to ASMS recovery. An overall assessment of rates of loss, restoration, conversion, fragmentation, and creation of salt marsh wetlands of value to ASMS has not been compiled. It is not known whether the current habitat base will support a population at levels sufficient to prevent extinction in the long term.

- b. Overutilization for commercial, recreational, scientific, or educational purposes:** Not known as a threat at the time of listing or at present.
- c. Disease or predation:** Not known as a threat at the time of listing or at present.
- d. Inadequacy of existing regulatory mechanisms:** Atlantic salt marsh snakes and/or their habitat are protected by the following regulatory mechanisms:

Federal

The Clean Water Act – Section 404 regulates the discharge of dredged or fill materials into wetlands.

National Wildlife Refuge System Administration Act of 1966 – individuals and habitat on national wildlife refuges.

State

Chapter 68A-27.004, Florida Administrative Code – individuals throughout range.

Chapter 68A-15.004, Florida Administrative Code - individuals and habitat on State wildlife management areas.

The Clean Water Act regulates dredge and fill activities that would adversely affect wetlands. Section 404 of Clean Water Act regulates the discharge of dredged or fill materials into wetlands. Discharges are commonly associated with projects to create dry land for development sites, water-control projects, and land clearing. The U.S. Army Corps of Engineers and the Environmental Protection Agency share the responsibility for implementing the permitting program under Section 404 of the Clean Water Act.

The National Wildlife Refuge System Administration Act (NWRAA) represents organic legislation that set up the administration of a national network of lands and water for the conservation, management, and restoration of fish, wildlife, and plant resources and their habitats for the benefit of the American people. Amendment of the NWRAA in 1997 required the refuge system to ensure that the biological integrity, diversity, and environmental health of refuges be maintained. Intergrades between ASMS and mangrove water snakes occur on Merritt Island National Wildlife Refuge (Hebrard and Lee 1981). If the ASMS's distribution extends south into the Merritt Island National Wildlife Refuge, it would be protected under this Act.

The ASMS is listed in the State of Florida as a threatened species. Florida State Law (Chapter 68A-27.004, Florida Administrative Code) prohibits taking of individuals of state-listed threatened species, or parts thereof, except as authorized; however, the statute does not prohibit destruction or modification of habitat occupied

by threatened species. On State wildlife management areas, regulations protect individual ASMSs. Wildlife management area regulations prohibit destruction or modification of habitat, except for management and restoration activities

At present, we are unable to determine whether habitat protection and regulatory mechanisms are adequately protecting the ASMS and its habitat, because there have been no comprehensive surveys to determine how the ASMS is faring.

- e. **Other natural or manmade factors affecting its continued existence:** The extent of the genetic swamping of the ASMS populations from hybridization with the Florida banded water snake cannot be determined until there is a genetic assessment. The extent of genetic introgression associated with the local breakdown of the reproductive isolation between the ASMS and the adjacent freshwater species has not yet been examined.

D. Synthesis

As reported in the Recovery Plan (1993) and MSRP (1999), the ASMS may be restricted to the salt marshes of Volusia County from the Halifax River to the northern portions of the Indian River. The loss of salt marsh habitat from upland construction projects appears to have slowed as regulations to protect wetlands are being implemented. Thirty percent of the salt marsh habitat where the ASMS likely occurs is publicly owned, and thus, future development in these areas will likely be limited. An initiative to restore the salt marsh systems that were dragline ditched during the 1950s and 1960s is underway within the Mosquito Lagoon and Tomoka River/Bulow Creek areas of Volusia County. To date, over 1,000 acres of disturbed salt marsh areas have been restored and enhanced and are likely improving the habitat conditions for the ASMS. Also, conservation land acquisitions are targeting habitat that will add to, connect and buffer public lands of known ASMS occurrences.

The current status of the ASMS is unknown. Until a comprehensive survey, genetic assessment, and taxonomic assessment can be conducted, it will not be possible to determine the distributional limit of the ASMS and its current status. Habitat loss and modification are known to impact the ASMS, but the significance of the threat cannot be quantified. Likewise, the adequacy of existing regulatory mechanisms cannot be determined until the habitat base is shown to be either sufficient or insufficient to minimize risk of extinction in all or a significant portion of the ASMS's range. Natural or manmade factors affecting the ASMS's continued existence, specifically the extent of genetic introgression associated with the local breakdown of the reproductive isolation between the ASMS and the adjacent freshwater species, has not yet been examined. Utilization of the species for commercial, recreational, scientific, or educational purposes, as well as

disease and predation, are not known or considered to be a threat to recovery.

Based on the analysis of the ASMS and its habitat presented above with the current wetland protection regulations in place, that loss of salt marsh habitat has slowed, major salt marsh restoration efforts are underway, and habitat targeted for acquisition and protection, we continue to believe the ASMS is not presently in danger of extinction throughout all or a significant portion of its range. The population is likely to become in danger of extinction in the foreseeable future if habitat conditions or the extent of habitats are not sufficient to sustain this population. Therefore, the Service recommends that the ASMS remains classified as threatened.

III. RESULTS

- A. **Recommended Classification:** No change is needed.
- B. **New Recovery Priority Number:** No change.

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

Conduct a comprehensive distribution survey.

Conduct a comprehensive genetic survey.

Conduct a taxonomic assessment.

Conduct a GIS analysis of ASMS habitat.

Assess habitat fragmentation impacts.

Continue restoration of disturbed salt marsh areas in Mosquito Lagoon, Northern Indian River Lagoon and Tomoka River/Bulow Creek areas.

Continue exotic plant programs within ASMS habitat.

Identify, prioritize, and acquire ASMS essential habitats. The 1,100 acre impoundment north of Tomoka Basin and south of Bulow Creek between the eastern boundary of Bulow Creek State Park and the western shoreline of the upper Halifax River should be targeted for acquisition. The dikes of this impoundment have been breached in several locations and the impoundment now contains salt marsh, brackish ponds and upland islands.

Examine the breakdown of natural barriers to hybridization.

V. REFERENCES

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U.S. Fish and Wildlife Service. 1999. South Florida Multi-Species Recovery Plan. Atlanta, Georgia

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of Atlantic Salt Marsh Snake (*Nerodia clarkii taeniata*)

Current Classification: Threatened

Recommendation resulting from the 5-Year Review: No change

Review Conducted By: Bill Brooks

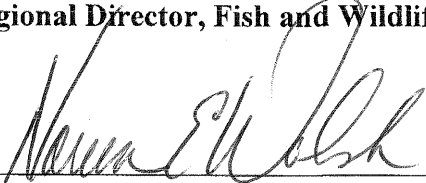
FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve  Date 3/3/08

REGIONAL OFFICE APPROVAL:

Lead Regional Director, Fish and Wildlife Service

Approve  Date 3/24/08

APPENDIX A

Summary of peer review for the 5-year review of Atlantic Salt Marsh Snake (*Nerodia clarkii taeniata*)

A. Peer Review Method: See B. below.

B. Peer Review Charge: On September 13, 2007, the following letter and Guidance for Peer Reviewers of Five-Year Status Reviews were sent via e-mail to potential reviewers requesting comments on the 5-year review. Requests were sent to Dr. Paul Moler (retired - Florida Fish and Wildlife Conservation Commission), Dr. Kevin Enge (Florida Fish and Wildlife Conservation Commission), Dr. Witt Gibbon (Savannah River Ecology Laboratory), Dr. Chris Parkinson (University of Central Florida), Charles Dutoit (Florida Park Service, Florida Department of Environmental Protection), Dr. Paul Haydt (St. Johns River Water Management District), John Stiner (Canaveral National Seashore), and Rebecca Bolt (Dynamac Corporation).

*We request your assistance in serving as a peer reviewer of the U.S. Fish and Wildlife Service (Service) 5-year status review of the threatened Atlantic salt marsh snake (*Nerodia clarkia taeniata*). The 5-year review is required by section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 et seq.). A 5-year review is a periodic process conducted to ensure the listing classification of a species as threatened or endangered on the Federal List of Endangered and Threatened Wildlife and Plants is accurate. The initiation of the 5-year review for the Atlantic salt marsh snake was announced in the Federal Register on April 26, 2007, and the public comment period closed on June 25, 2007. No public comments were received for this status review.*

The enclosed draft of the status review has been prepared by the Service pursuant to the Act. In keeping with Service directives for maintaining a high level of scientific integrity in the official documents our agency produces, we are seeking your assistance as a peer reviewer for this draft. Guidance for peer reviewers is enclosed with this letter. If you are able to assist us, we request your comments be received in this office on or before October 15, 2007. Please send your comments to Bill Brooks at the address on this letter. You may fax your comments to (904)232-2404 or send comments by e-mail to Billy_Brooks@fws.gov.

We appreciate your assistance in helping to ensure our decisions continue to be based on the best available science. If you have any questions or need additional information, please contact Bill Brooks at (904) 232-2580 extension 120. Thank you for your assistance.

Sincerely yours,

*David L. Hankla
Field Supervisor*

Enclosures

Guidance for Peer Reviewers of Five-Year Status Reviews
U.S. Fish and Wildlife Service, North Florida Ecological Services Office

September 13, 2007

As a peer reviewer, you are asked to adhere to the following guidance to ensure your review complies with Service policy.

Peer reviewers should:

- 1. Review all materials provided by the Service.*
- 2. Identify, review, and provide other relevant data apparently not used by the Service.*
- 3. Not provide recommendations on the Endangered Species Act (ESA) classification (e.g., endangered, threatened) of the species.*
- 4. Provide written comments on:*
 - Validity of any models, data, or analyses used or relied on in the review.*
 - Adequacy of the data (e.g., are the data sufficient to support the biological conclusions reached). If data are inadequate, identify additional data or studies that are needed to adequately justify biological conclusions.*
 - Oversights, omissions, and inconsistencies.*
 - Reasonableness of judgments made from the scientific evidence.*
 - Scientific uncertainties by ensuring that they are clearly identified and characterized, and that potential implications of uncertainties for the technical conclusions drawn are clear.*
 - Strengths and limitation of the overall product.*
- 5. Keep in mind the requirement that we must use the best available scientific data in determining the species' status. This does not mean we must have statistically significant data on population trends or data from all known populations.*

All peer reviews and comments will be public documents, and portions may be incorporated verbatim into our final decision document with appropriate credit given to the author of the review.

Questions regarding this guidance, the peer review process, or other aspects of the Service's recovery planning process should be referred to Bill Brooks, U.S. Fish and Wildlife Service, at 904-232-2580 extension 120, email: billy_brooks@fws.gov.

C. Summary of Peer Review Comments/Report – A summary of peer review comments is provided below. The complete set of comments is available at the North Florida Ecological Services Field Office, U.S. Fish and Wildlife Service, 6620 Southpoint Drive South, Suite 310 Jacksonville, Florida, 32216.

The Service accepted all minor edits from peer reviewers. Overall, the reviewers agreed the draft document adequately characterized the known information on the status and threats of the listed species. The following discussion is limited to the use of additional information that was provided.

Dr. Kevin M. Enge, Florida Fish and Wildlife Conservation Commission, Wildlife Research Laboratory, Gainesville, Florida: Dr. Enge provided several relevant publications that were missing from the review. We reviewed these documents and incorporated the findings and his comments into the review. This included three recent studies regarding ASMS habitat. Findings from these studies were incorporated into section **C.1.e. Habitat ecosystem conditions**. Dr. Enge's comments and findings from a risk assessment study were incorporated into section **C.1.a. Abundance, population trends, demographic features, or demographic trends**. The findings from a recent unpublished study funded by the Florida Fish and Wildlife Conservation Commission does not agree with the current taxonomic description of the salt marsh snake group. However, he cautioned against accepting all the conclusions until the author addresses reviewers concerns on methodology, collection localities and interpretation of results and publishes the report. This information was incorporated into the discussion under **C.1.c. Taxonomic classification or changes in nomenclature**. This discussion outlines the controversy and uncertainty of the taxonomy and highlights the need for a thorough and rigorous systematic assessment. Dr. Enge also commented on the common name nomenclature. This comment was also incorporated into section **C.1.c.**, however, an additional change in the common name is proposed. The Service plans to wait until the name change has been published and is utilized in the literature before we propose a change to the name of the listed species.

Dr. Christopher L. Parkinson, University of Central Florida, Department of Biology, Orlando, Florida: Dr. Parkinson surveyed the academic literature, as the draft review did not provide any new data regarding the ASMS. Dr. Parkinson found a recent paper on *Nerodia clarkii compressicauda* that suggested population subdivision due to habitat fragmentation is occurring at a high rate. He suggests this is also an area of research that needs to be conducted for the ASMS. We incorporated this recommendation into the **IV. RECOMMENDATIONS FOR FUTURE ACTIONS** section. Dr. Parkinson wholeheartedly agrees that there is a need for demographic, genetic and habitat assessments.

Dr. Whitfield Gibbons, Savannah River Ecology Laboratory, University of Georgia, Aiken, South Carolina: Dr. Gibbons reviewed the materials and points out that the major limitation to preparing this review is the lack of availability of any recent, in-depth population field studies or analyses of the species. Our discussions in the review attempt to highlight this and the need for rigorous assessment. Dr. Gibbons concurs with the need for a thorough survey of the current distribution, assessment of habitat and that a genetic survey could lead to an updated taxonomic assessment. Dr. Gibbons provided an additional reference that was incorporated into the review, cited and added to the **V. Reference** section.

Charles DuToit, Tomoka Basin State Parks, Florida Department of Environmental Protection, Ormond Beach, Florida: Mr. Dutoit provided several editorial comments that were incorporated into the review. He assisted with nomenclature of the public managed lands in Volusia County that have and manage ASMS habitat. He also provided a future action recommendation about an acquisition opportunity that would help to close a notable gap in the habitat corridor of public lands in northern Volusia County. This action was added to section **IV**.

RECOMMENDATIONS FOR FUTURE ACTIONS of the review.

D. Response to Peer Review – The Service agreed with all comments and suggestions provided by the peer reviewers. The draft five-year review was modified in accordance with the reviewers' suggestions.