Everglades Mink 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
Everglades mink
(*Neovison vison evergladensis*)
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 Everglades mink was sought from September 17 to November 1, 2010. The members of the Biological Review Group (BRG) met on November 3-4, 2010. Group members were Jeff Gore (FWC lead), David Shindle (Conservancy of Southwest Florida), and Dan Pearson (Florida Park Service) (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 Everglades mink using criteria included in definitions in 68A-27.001, F.A.C., and following the protocols in the *Guidelines for Application of the IUCN Red List Criteria at Regional Levels (Version 3.0)* and *Guidelines for Using the IUCN Red List Categories and Criteria (Version 8.1)*. Please visit http://myfwc.com/wildlifehabitats/imperiled/listing-action-petitions/ to view the listing process rule and the criteria found in the definitions.

In late 2010, staff developed the initial draft of this report which included BRG findings and a preliminary listing recommendation from staff. The draft was sent out for peer review and the reviewers' input has been incorporated to create this final report. The draft report, peer reviews, and information received from the public are available as supplemental materials at http://myfwc.com/wildlifehabitats/imperiled/biological-status/.

The Everglades mink BRG concluded from the biological assessment that the Everglades mink (*Neovison vison evergladensis*) met listing criteria. No additional information was received during solicitation of information from the public. Based on the literature review and the biological review findings, staff recommends listing the Everglades mink as a Threatened species.

This work was supported by a Conserve Wildlife Tag grant from the Wildlife Foundation of Florida. FWC staff gratefully acknowledges the assistance of the biological review group members and peer reviewers. Staff would also like to thank Karen Nutt who served as a data compiler on the species and who prepared the initial draft of this report.

BIOLOGICAL INFORMATION

Taxonomic Classification – This biological status report is for the Everglades mink (*Neovison vison evergladensis*), a subspecies of the American mink (*N. vison*) in Florida. The American mink was formerly included in the genus *Mustela*, but biochemical, molecular, cytogenetic, and morphological evidence indicate that it should be elevated to the new genus

Neovison (Kurose et al. 2008; Reid and Helgen 2008). The taxon was originally listed by FWC as a Threatened species under the genus name *Mustela*, but in the most recent rule change in 2010 the genus name was updated to *Neovison.*

Mink occur in at least three disjunct, peripheral populations in Florida: the saltmarshes of the gulf coast of northern Florida probably from Pasco County to Franklin County; the saltmarshes of the Atlantic coast from southern St. Johns County, Florida northwards into Georgia and South Carolina; and southern Florida freshwater marshes in the Everglades, Big Cypress Swamp, and Lake Okeechobee (Humphrey and Setzer 1989; Smith 1980). In addition, specimens and observations from northwest Florida indicate that mink occur in saltmarsh habitat along most of northwest Florida (J. Gore, Florida Fish and Wildlife Conservation Commission, personal observation). When first described, the Everglades mink population was considered a separate subspecies (*Mustela vison evergladensis*) based on a single road-killed specimen from Big Cypress Swamp (Hamilton 1948). A morphometric analysis of the three known populations of mink confirmed that they were distinct, but *M. v. evergladensis* was subsumed as a disjunct population of *M. v. mink* (Humphrey and Setzer 1989). That conclusion has been criticized and subsequent authors have accepted *evergladensis* as a distinct subspecies pending additional study (Whitaker and Hamilton 1998). Regardless of whether the Everglades mink is a considered distinct subspecies, the best available evidence suggests that the mink in south Florida are geographically isolated from other populations of mink (Humphrey 1992).

Life History – Much of the behavior and ecology of the Everglades mink is unknown and the summary here is based largely on studies of mink outside Florida. Mink are larger than New World members of the genus *Mustela* with a longer body length (>500mm) and heavier weight (>500g) than the weasels (Larivière 1999). Pelage of the Everglades mink is uniformly dark brown but some individuals have a white chin spot and a few have a white chest patch (Humphrey 1992). There is slight sexual size dimorphism with males being larger than females (Humphrey 1992; Larivière 1999).

North temperate populations of mink breed in early spring, but Everglades mink breed in autumn in conjunction with the late wet season (Humphrey and Zinn 1982). Gestation for mink averages 51 days and average litter size is 4. Mink typically live and forage along streams, marshes, and other wetlands, but they can live in drier habitats if food is plentiful. Males have larger home ranges than females and densities of adults vary from 0.1-0.7/km^2. In general, Densities are generally higher in coastal habitats because of smaller home ranges and greater intersexual overlap. Mink are usually solitary, but pairs may occur during the breeding season (Larivière 1999).

In a year-long study of the Everglades mink in Everglades National Park, Smith (1980) observed animals primarily during the wet season, but captured none. The Everglades mink does not seem to avoid human activity and frequently makes use of man-made structures such as canals and levees (Smith 1980). Examination of digestive tracts from mink carcasses showed that mink fed on crayfish, snakes, fish, mammals, and birds (Smith 1980).

A study of the Everglades mink's response to conspecific scents suggests that habitat use may be seasonal and dependent on water levels in the marshes (Humphrey and Zinn 1982).

Spikerush marshes and salt marshes between the mangroves and freshwater habitats are used during the wet season while swamp forests are used during the dry season. Mating potentially occurs in autumn when water levels are high. As water levels recede, the Everglades mink may relocate to more permanent ponds and concentrated food sources, particularly in March and April when young are not yet weaned (Humphrey 1992; Humphrey and Zinn 1982).

Geographic Range and Distribution – The Everglades mink exists as a disjunct population of the American mink that inhabits southern Florida and in particular the shallow freshwater marshes of the Everglades (2186 mi^2) and Big Cypress Swamp region (1139 mi^2; Humphrey 1992; Humphrey and Setzer 1989). Most sightings and specimens have come from either Collier County or Dade County (Smith 1980), but the Everglades mink presumably inhabits northern and eastern Monroe County as well (Humphrey 1992). In the 1930s, Seminole Indians trapped mink extensively in the Everglades and Big Cypress Swamp and many others were collected near Lake Okeechobee (Allen and Neill 1952). Since that time, however, there have been no subsequent records of mink in the Lake Okeechobee area and also no information on the occurrence of mink in the northern Everglades (Humphrey 1992). Although the range of the Everglades mink formerly may have extended from Lake Okeechobee south through much of the Everglades (Allen and Neill 1952; Humphrey and Setzer 1989; Humphrey 1992), mink have recently been found only in and near Fakahatchee Strand (D. Shindle, personal observation). However, it is important to note that current knowledge of the distribution of Everglades mink is limited by the lack of recent systematic surveys across south Florida.

Population Status and Trend – The Everglades mink is difficult to detect and few museum specimens have been collected (Humphrey 1992). Consequently, population size and extent of occurrence are poorly known and trends can only be inferred from sparse data. Although no extensive systematic surveys have been conducted, some researchers have speculated that mink are locally common and several have noted that mink are more common in the Big Cypress Swamp than in the Everglades (Allen and Neill 1952; Humphrey and Zinn 1982; Humphrey 1992). Observations of mink have been too limited to make precise quantitative assessments about current population status or trends.

The IUCN currently lists *N. vison* as a species of Least Concern because it is widely distributed and is relatively common and secure across its range despite some local population declines (Reid and Helgen 2008). This assessment, however, applies to the entire species and not to the disjunct population that comprises *N. v. evergladensis.*

Quantitative Analyses – No population viability analysis has been conducted for the Everglades mink.

BIOLOGICAL STATUS ASSESSMENT

Threats – Changes to the natural water levels in the Everglades pose a potential threat to the Everglades mink (Smith 1980). Human disturbance and modifications to the wetlands that might impact mink include logging, drainage, road construction, canal construction, dike construction, control of hydroperiod, reapportionment of water to competing interests, and the introduction of fire into the forest (Humphrey 1992; Humphrey and Zinn 1982). Changes in

water levels within the marshes can lead to destruction of habitat and encroachment of exotic vegetation (Humphrey and Zinn 1982).

Conversion of natural habitats to agriculture and urban areas may impact mink populations by reducing habitat, changing water levels, and introducing pollution from pesticides, fertilizers, and heavy metals (Humphrey 1992). Because of their position in the food chain, mink serve as bio-indicators of pollution in aquatic environments (as summarized in Larivière 1999) and they may be particularly sensitive to bioaccumulation of mercury (Yates et al. 2004).

Cunningham et al. (2009) found four Everglades mink that had been infected by or exposed to canine distemper virus. They suspected the distemper epizootic was extensive and caused significant mortality, particularly within Fakahatchee Strand Preserve State Park. Anecdotal observations suggest that the mink population declined and subsequently recovered following the epizootic (Cunningham et al. 2009). An additional new threat to Everglades mink may be the introduction of invasive species, especially the Burmese python (*Python molurus bivittatus*).

Population Assessment – Findings from the Biological Review Group are included in a Biological Status Review information findings table and regional assessment table. The BRG concluded from the biological assessment that the Everglades mink met listing criteria as described in 68A-27.001, F.A.C.

LISTING RECOMMENDATION

Based on the literature review and the biological review findings, staff recommends listing the Everglades mink (*Neovison vison evergladensis*) as a Threatened species. The taxon was originally listed as a threatened species under the genus name *Mustela*, but the Biological Review Group concurs with the current listing of the genus as *Neovison.*

SUMMARY OF THE INDEPENDENT REVIEW

Comments were received from 3 reviewers: Dr. Martin Main (University of Florida), Dr. Mel Sunquist (University of Florida, emeritus), Mr. Terry Zinn (Wildflowers of Florida, Inc.). Appropriate editorial changes recommended by the reviewers were made. One reviewer suggested adding statements regarding the geographic isolation and fall breeding patterns of mink. Staff concurred and incorporated statements into the report. The same reviewer suggested that a conclusion in the findings table that mink were limited to Fakahatchee Strand was suspect given the few surveys elsewhere. Although the findings table noted the distribution was likely restricted to Fakahatchee Strand, the extent of occurrence criterion was evaluated using the estimated potential habitat for mink across all of south Florida. Nevertheless, staff also added a statement to the report reiterating the concern about the lack of survey data and limits to knowledge of mink distribution. The revisions did not change the findings or the staff recommendation and all reviewers concurred with the staff recommendation. Peer reviews are available at MyFWC.com.

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Biological Status Review Information
Findings

Species/taxon:	Everglades mink (*Neovison vison evergladensis*)
Date:	4 Nov 2010
Assessors:	Jeff Gore, David Shindle, and Dan Pearson
Generation length:	Approximate generation time estimated to be 3-5 years. Inferred from 1st reproduction in year one and maximum age of 10 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]	Unknown. However, there has been a documented outbreak of canine distemper that is believed to have caused a decline in the mink population. In other mustelids, canine distemper has contributed to extirpation of the species. Other potential impacts are mercury contamination and changes in hydrological regime and introduction of exotic species, particularly Burmese python.	I, S	N	Humphrey 1992; Humphrey and Zinn 1982; Smith 1980; Cunningham *et al*. 2009; Larivière 1999
(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]	Unknown. However, there has been a documented outbreak of canine distemper that is believed to have caused a decline in the mink population. In other mustelids, canine distemper has contributed to extirpation of the species. Other potential impacts are mercury contamination and changes in hydrological regime and introduction of exotic species, particularly Burmese python.	I, S	N	Humphrey 1992; Humphrey and Zinn 1982; Smith 1980; Cunningham *et al*. 2009; Larivière 1999

(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]	Unknown. However, there has been a documented outbreak of canine distemper that is believed to have caused a decline in the mink population. In other mustelids, canine distemper has contributed to extirpation of the species. Other potential impacts are mercury contamination and changes in hydrological regime and introduction of exotic species, particularly Burmese python.	I, S	N	Humphrey 1992; Humphrey and Zinn 1982; Smith 1980; Cunningham *et al*. 2009; Larivière 1999
(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]	Unknown. However, there has been a documented outbreak of canine distemper that is believed to have caused a decline in the mink population. In other mustelids, canine distemper has contributed to extirpation of the species. Other potential impacts are mercury contamination and changes in hydrological regime and introduction of exotic species, particularly Burmese python.	I, S	N	Humphrey 1992; Humphrey and Zinn 1982; Smith 1980; Cunningham *et al*. 2009; Larivière 1999
[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	Current evidence suggests taxon occurs only in Fakahatchee Strand. However, even a GIS analysis of all potential habitat results in EOO of only 2,921 mi^2.	E	Y	Humphrey 1992; Humphrey and Setzer 1989; Cox and Kautz 2000; M. Endries, FWC, unpublished data
(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	Unknown. All documented occurrences in the last 12 years have been in Fakahatchee Strand. However, current occurrence in Big Cypress National Preserve and Everglades National Park is unknown.	E, I	N	Mike Owen, Florida Park Service, pers. comm.; David Shindle, Conservancy of Southwest Florida, pers. obs.
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	One location, all mink affected by	I	Y	

	disease, pollutants, and hydrologic manipulations.			
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	Continuing decline in (i) extent of occurrence or (ii) area of occupancy. May also be a decline in (iii) quality of habitat and (v) number of individuals due to disease, pollutants, and hydrologic manipulations.	E, I, P	Y	Humphrey 1992; Humphrey and Zinn 1982; Smith 1980; Cunningham *et al*. 2009; Larivière 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	Fluctuations occur in (iv) number of individuals due to canine distemper but degree of fluctuation is unknown. In other mustelids, canine distemper has contributed to extirpation of the species.	E	N	Cunningham *et al*. 2009
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	Based upon reported densities of 0.1-0.7/km^2, estimate 759 to 5287 mink using GIS estimate of EOO	E	Y	Larivière 1999; M. Endries, FWC, unpublished data
(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	Continuing decline inferred but rate of decline unknown.	S	N	Humphrey 1992; Humphrey and Zinn 1982; Smith 1980; Cunningham *et al*. 2009; Larivière 1999
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:	Continuing decline in (i) extent of occurrence or (ii) area of occupancy. May also be a decline in (iii) quality of habitat and (v) number of individuals due to disease, pollutants, and hydrologic manipulations.	S	Y	Humphrey 1992; Humphrey and Zinn 1982; Smith 1980; Cunningham *et al*. 2009; Larivière 1999
a. Population structure in the form of EITHER	Unknown but may be < 1000	I	N	
(i) No subpopulation estimated to contain more than 1000 mature individuals; OR				
(ii) All mature individuals are in one subpopulation	Yes	S	Y	
b. Extreme fluctuations in number of mature individuals	Unknown. Fluctuations occur in number of individuals due to canine distemper but degree of fluctuation is unknown. In other mustelids, canine distemper has contributed to extirpation of the species.	I	N	Cunningham *et al*. 2009
(D) Population Very Small or Restricted, EITHER				

(d)1. Population estimated to number fewer than 1,000 mature individuals; OR	Unknown, but may be < 1000		N	
(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 not < 8 mi^2 but < five locations. Entire population may be impacted by disease (canine distemper). Mercury pollution may also be a contributing factor.	I	Y	Cunningham *et al*. 2009; Larivière 1999
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	**No PVA carried out.**		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)
Meets at least one of the criteria.	B1ab(i,ii); C2a(ii); D2
Is species/taxon endemic to Florida? (Y/N)	Y
If Yes, your initial finding is your final finding. Copy the initial finding and reason to the final finding space below. If No, complete the regional assessment sheet and copy the final finding from that sheet to the space below.	
Final Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria/sub-criteria are met)
Meets at least one of the criteria.	B1ab(i,ii); C2a(ii); D2

APPENDIX 1: Brief biographies of the Everglades mink Biological Review Group members

Jeff Gore has a Ph.D. in Wildlife Biology from the University of Massachusetts. He has worked for FWC since 1986 and since 2004 has been the leader of the Terrestrial Mammal Research Subsection. Dr. Gore has over 25 years of experience working on conservation of wildlife species in Florida, particularly small mammals such as bats and beach mice.

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

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

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

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