

**A Species Action Plan for the  
Everglades Mink  
*Neovison vison evergladensis***

**Final Draft  
November 1, 2013**



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Cover photograph courtesy of David Shindle, Conservancy of Southwest Florida

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**EXECUTIVE SUMMARY**

The Florida Fish and Wildlife Conservation Commission (FWC) convened a biological review group (BRG) of experts on the Everglades mink (*Neovison vison evergladensis*) to assess the biological status of the species using criteria specified in Rule 68A-27.001, Florida Administrative Code (F.A.C.). This rule includes a requirement for BRGs to follow the Guidelines for Application of the International Union for Conservation of Nature (IUCN) Red List Criteria at Regional Levels (Version 3.0) and Guidelines for Using the IUCN Red List Categories and Criteria (Version 8.1). The Everglades mink BRG concluded from the biological assessment that the Everglades mink (*N. v. evergladensis*) met criteria for listing. Triggering criteria include limited and declining extent of occurrence (EOO) and area of occupancy (AOO) as well as limited and declining population size which may be due to disease, pollutants, and hydrological manipulations. The goal of this plan is to improve the conservation status of the Everglades mink until it is secure within its historical range. Objectives of this plan attempt to increase the understanding of the Everglades mink's habitat requirements, population estimate, and threats to its survival through research and cooperation.

This plan focuses on identifying the AOO and EOO, determining the baseline population density, defining habitat requirements, and mitigating potential threats to the Everglades mink population. Geographic Information Systems can be used to map the findings and predict potential range expansion. Additionally, a critical objective is to confirm the phylogenetic subspecies designation as it relates to other Florida mink subpopulations to verify its Threatened status. Research actions may gather more information about the Everglades mink, but they must be combined with education about the species to enlist buy-in from the public, stakeholders, and land managers in support of Everglades mink conservation. The Everglades mink may inhabit both publically and privately owned lands; thus, the success of these actions require interagency and stakeholder cooperation and communication. The FWC developed this plan in collaboration with identified stakeholders. Any significant changes to this plan will be made with the continued involvement of stakeholders.

This plan details the actions necessary to improve the conservation status of the Everglades mink. A summary of this plan will be included in the Imperiled Species Management Plan (ISMP), in satisfaction of the management plan requirements in Chapter 68A-27, Florida Administrative Code, Rules Relating to Endangered or Threatened species. The ISMP will address comprehensive management needs for 60 of Florida's imperiled species and will include an implementation plan; rule recommendations; permitting standards and exempt activities; anticipated economic, ecological, and social impacts; projected costs of implementation and identification of funding sources; and a revision schedule. The imperiled species management planning process relies heavily on stakeholder input and partner support. This level of involvement and support is also critical to the successful implementation of the ISMP.

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**GLOSSARY OF TERMS AND ACRONYMS**

**AOO:** Area of Occupancy. The area within its extent of occurrence (see Extent of Occurrence), which is occupied by a taxon, excluding cases of vagrancy. This reflects the fact that a taxon will not usually occur throughout its extent of occurrence, which may contain unsuitable or unoccupied habitats (as defined by the IUCN).

**BCNP:** Big Cypress National Preserve

**BMPs:** Best Management Practices. Generally, BMPs represent methods, measures or practices that are developed, selected, or approved by various agencies to protect, enhance, and preserve natural resources including wildlife habitat. They include, but are not limited to, engineering, conservation, and management practices for mining, agriculture, silviculture, and other land uses that are designed to conserve water quality and quantity, soil and associated nutrients, and to simultaneously control nonpoint and point source pollution and other impacts to natural resources including aquatic and terrestrial wildlife habitat.

**BRG:** Biological Review Group, a group of taxa experts convened to assess the biological status of taxa using criteria specified in Chapter 68A-27, F.A.C., and following the protocols in the Guidelines for Application of the International Union for Conservation of Nature (IUCN) Red List Criteria at Regional Levels (Version 3.0) and Guidelines for Using the IUCN Red List Categories and Criteria (Version 8.1)

**BSR:** Biological status review report, the summary of the biological review group's findings. Includes a Florida Fish and Wildlife Conservation Commission (FWC) staff recommendation on whether or not the species status meets the listing criteria in Chapter 68A-27.001, Florida Administrative Code. These criteria, based on IUCN criteria and IUCN guidelines, are used to help decide if a species should be added or removed from the Florida Endangered and Threatened Species List. In addition, FWC staff may provide within the report a biologically justified opinion that differs from the criteria-based finding.

**CDV:** Canine Distemper Virus

**DEP:** Florida Department of Environmental Protection

**ENP:** Everglades National Park

**EOO:** Extent of Occurrence. The geographic area encompassing all observations of individuals of a species, including intervening areas of unoccupied habitat. Synonymous with range. See also Area of Occupancy (as defined by the IUCN).

**ESS:** Florida Fish and Wildlife Conservation Commission's Exotic Species Section

**F.A.C.:** Florida Administrative Code

## GLOSSARY OF TERMS AND ACRONYMS

FFS: Florida Forest Service, formerly the Florida Division of Forestry.

FSPSP: Fakahatchee Strand Preserve State Park

FWC: Florida Fish and Wildlife Conservation Commission, the state agency constitutionally mandated to protect and manage Florida's native fish and wildlife species.

GIS: Geographic Information System

IFAS: University of Florida's Institute of Food and Agricultural Sciences

ISMP: Imperiled Species Management Plan

IUCN: International Union for Conservation of Nature, a professional global conservation network.

MeHg: Methylmercury

NPS: National Park Service

Phylogenic: The evolutionary development of a species or a taxonomic group of organisms.

Population: The total number of individuals of the taxon. Population numbers are expressed as numbers of mature individuals only (as defined by the IUCN).

SCP: Species Conservation Planning, a section within the Florida Fish and Wildlife Conservation Commission's Division of Habitat and Species Conservation.

Take: As defined in Rule 68A-27.001(4), F.A.C. "To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct."

USFWS: United States Fish and Wildlife Service, the federal agency mandated to protect and manage the nation's native freshwater fish and wildlife resources.

WCA: Water Conservation Area

WMD: Water Management District

## INTRODUCTION

This plan is for the Everglades mink (*Neovison vison evergladensis*), a subspecies of the American mink (*N. vison*) in Florida.

### Biological Background

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). Currently, 4 subspecies of mink reside in Florida: *N. v. evergladensis*, *N. v. halilimnetes*, *N. v. lutensis*, and *N. v. vulvivaga*. 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 3 of the known populations of mink in Florida 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 considered a 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. North temperate populations of mink breed in early spring, but Everglades mink are believed to breed in autumn (specific months are not identified in the literature) 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 do females, and densities of adults vary from 0.1 to 0.7/km<sup>2</sup> (0.04 to 0.27/mi<sup>2</sup>). Densities are generally higher in coastal habitats because of smaller home ranges and greater intersexual overlap. Mink are typically solitary except during the breeding season (Larivière 1999). In Fakahatchee Strand Preserve State Park (FSPSP), Everglades mink have been observed together only during the months of February and March (M. Owen, FSPSP, personal communication).

In a year-long study of the Everglades mink in Everglades National Park (ENP), Smith (1980) observed animals primarily during the wet season but captured none. During a 2007-2009 study in both Big Cypress National Preserve (BCNP) and ENP, camera trapping, live trapping, and opportunistic surveys were conducted and only 2 Everglades mink were opportunistically observed one in May and one in January in BCNP (Pifer et al 2011). Generally, mink are known to be nocturnal and crepuscular but diurnal activity patterns have also been reported (Smith 1980, Eagle and Whitman 1987; M. Owen, FSPSP, personal communication). 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).

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. 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 and Zinn 1982, Humphrey 1992).

#### *Description*

Mink are larger than New World members of the genus *Mustela* with a total length (nose tip to last tail vertebra) >500 mm (19.9 in) and weighing between 630 g to 1,600 g (1.4 to 3.5 lbs) (Chapman and Felhamer 1982, Whitaker and Hamilton 1998). 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; [Figure 1](#)). There is slight sexual size dimorphism, with males being larger than females (Humphrey 1992, Larivière 1999).



Figure 1. Photograph of Everglades mink. Photograph by David Shindle, Conservancy of Southwest Florida.

#### *Geographic Range and Distribution*

Mink occur in at least 4 disjunct, peripheral populations in Florida: the coastal and inland locations of Escambia, Santa Rosa, and Okaloosa counties in the western panhandle (*N. v. vulvivaga*); the salt marshes of the Gulf coast of northern Florida, probably from Pasco County to

Bay County, although the pattern of distribution in the Panhandle counties is not known (*N. v. halilimnetes*); the salt marshes of the Atlantic coast from southern St. Johns County, Florida, northwards into Georgia and South Carolina (*N. v. lutensis*); and southern Florida freshwater marshes in the Everglades, Big Cypress Swamp, and Lake Okeechobee (*N. v. evergladensis*) (Smith 1980, Humphrey and Setzer 1989) (Figure 2). The Everglades mink is a disjunct population of the American mink that inhabits southern Florida and, in particular, the shallow freshwater marshes of the Everglades (5,662 km<sup>2</sup> [2,186 mi<sup>2</sup>]) and Big Cypress Swamp region (29.50 km<sup>2</sup> [1,139 mi<sup>2</sup>]) (Humphrey and Setzer 1989, Humphrey 1992).

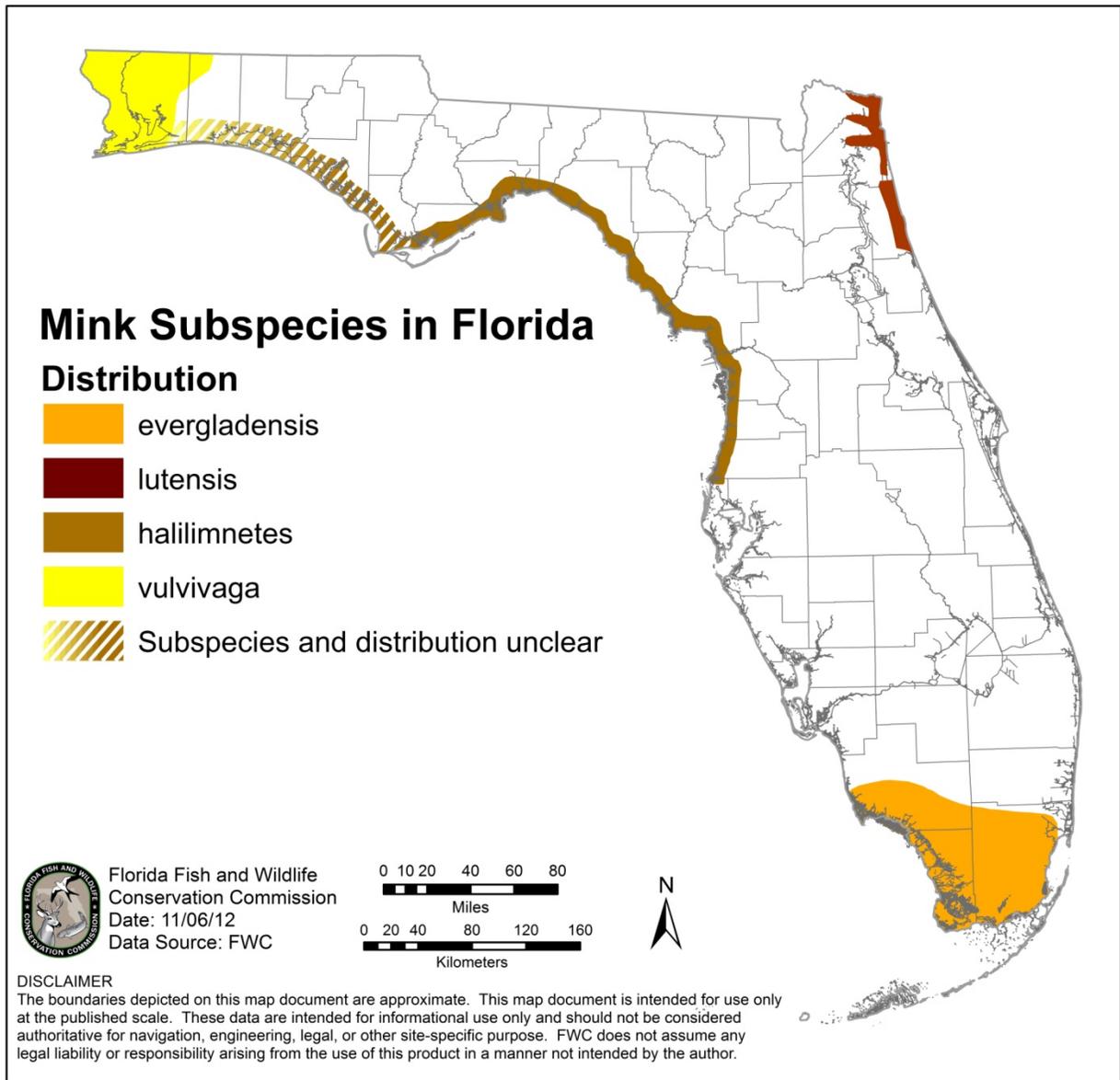


Figure 2. Geographic distribution of mink subspecies in Florida. *N. v. evergladensis*, *N. v. halilimnetes*, *N. v. lutensis*, and *N. v. vulvivaga* (Humphrey and Setzer, 1989; J. Gore and M. Tucker, Florida Fish and Wildlife Conservation Commission, personal communication.).

Most sightings and specimens have come from either Collier County or Miami-Dade County (Smith 1980), but the Everglades mink inhabits northern and eastern Monroe County as well (Humphrey 1992, Pifer et al. 2011). 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 FSPSP (D. Shindle, Conservancy of Southwest Florida, personal communication) and BCNP (Pifer et al. 2011). However, it is important to note that current knowledge of the distribution of Everglades mink is limited by the lack of systematic surveys across south Florida.

### **Conservation History**

In 1973, the Florida Game and Fresh Water Fish Commission (the predecessor to the Florida Fish and Wildlife Conservation Commission [FWC]) listed the Everglades mink as a Threatened species. 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*. The International Union for Conservation of Nature (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*.

In the 1930's, 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 about the occurrence of Everglades mink in the northern Everglades (Humphrey 1992). Recent sighting of the Everglades mink have occurred on publically owned property on FSPSP, which can be maintained in perpetuity to conserve its population and habitat.

The Millsap scores were established by FWC staff as a system of ranking taxa according to biological vulnerability (Millsap et al. 1990). The scores range from 0 to 70 with higher biological scores indicating greater vulnerability to extirpation. The FWC species ranking database gave a score of 29.7 to the Everglades mink (Millsap et al. 1990), which is the same ranking as the other Florida mink subspecies. Although a maximum score of 70 is possible, extremely rare and imperiled species score at best in the mid-40s and common species score in the 5 to 10 range. In addition, the Florida Committee on Rare and Endangered Plants and Animals included the Everglades mink in the 1992 edition of the Rare and Endangered Biota of Florida (Humphrey 1992).

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. Extensive systematic surveys have been limited, and some researchers have speculated that mink are locally common; several have noted that mink are more common in Big Cypress Swamp than in the Everglades (Allen and Neill 1952, Humphrey and Zinn 1982, Humphrey 1992, Pifer et al. 2011). Observations of mink have been too limited to make precise quantitative assessments about current population status or trends. No conservation actions specific to the mink have been undertaken, although much of the potential habitat available to the mink is in public ownership. As additional research is conducted

about the range and occupancy of the Everglades mink, lands under private and public ownership can be identified on [Figure 2](#) to assist with management.

### **Threats and Recommended Listing Status**

In 2010, FWC directed staff to evaluate the status of all species listed as Threatened or Species of Special Concern that had not undergone a status review in the past decade. A literature review was conducted by staff and information was solicited from the public on the status of the Everglades mink. The FWC assembled a biological review group (BRG) of experts on the Everglades mink to assess the biological status of the species using criteria specified in Chapter 68A-27, F.A.C. This rule includes a requirement for BRGs to follow 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). FWC staff developed a draft Biological Status Report (BSR) that included the BRG's findings and a preliminary listing recommendation from staff. FWC distributed the draft for peer review, and the reviewers' input was incorporated in a [final report](#).

The Everglades mink BRG concluded from the biological assessment that the Everglades mink (*N. v. evergladensis*) met criteria for listing. Criteria met include: 1) limited (<20,000 km<sup>2</sup>) and declining extent of occurrence (EEO) and area of occupancy (AOO) which may be affected by canine distemper and mercury pollution; 2) limited (<10,000 mature individuals and mature individuals residing in one subpopulation) and declining population size which may be due to disease, pollutants, and hydrological manipulations. No additional information was received during solicitation of information from the public. Based on the literature review and biological review findings, staff recommends listing the species as Threatened. The taxon was originally listed as a Threatened species under the genus name *Mustela*, but the BRG concurs with the current listing of the genus as *Neovison*.

BRG staff identified the following threats to the Everglades mink population: 1) changes to the natural water levels in the Everglades (Smith 1980); 2) the conversion of natural habitats to agriculture and urban areas and the potential impact of mercury since mink may be particularly sensitive to bioaccumulation (Yates et al. 2004); 3) disease, such as canine distemper virus (Cunningham et al. 2009); and 4) the introduction of invasive species, especially the Burmese python (*Python molurus bivittatus*).

Everglades mink may also face potential climate change impacts such as a projected decrease in wet season length and an increase in dry season interval (Aumen, et al., 2013, National Park Service, 2008, Obeysekera, et al., 2011) which may alter breeding chronology and young rearing. In addition, habitat losses could be experienced with the conversion of peatland to open water ecosystems as salt water encroaches on peatlands with an increase in sea level rise (Aumen, et al., 2013, Avery, 2011, Chambers, et al., 2012).

## CONSERVATION GOAL AND OBJECTIVES

### Goal

Conservation status of the Everglades mink is improved to the point that it is secure within its historical range.

### Objectives

I. Determine, maintain, and increase the extent of occurrence (EOO) and area of occupancy (AOO) of the Everglades mink within its historical and current range.

#### *Rationale*

The BSR indicates data deficiencies in current Everglades mink EOO and AOO information. Currently, the only known location of *N. v. evergladensis* is in FSPSP. It is essential to identify publically and privately owned lands occupied by *N. v. evergladensis* to determine the extent of its range to address the long term conservation of the species.

II. Determine and monitor the baseline population density, threats, and limiting factors of the Everglades mink within its current range.

#### *Rationale*

The BRG concluded, from inferred data, that the population size and trend is unknown, although this conclusion was inferred from limited data. The BRG suggested that the population may be declining (as a result of threats such as canine distemper), but the rate of a suspected decline is unknown. A population estimate will provide land managers with an idea of how and where to direct management actions.

In addition, the BSR identifies several factors that may lead to a decline in the Everglades mink population: Burmese python (and other exotic reptiles) population expansion and increase, mercury contamination, disease, and hydrological manipulations within current EOO and AOO. Research projects can investigate the extent of these and other potential threats and determine ways to mitigate them to protect and eventually improve the Everglades mink population.

III. Determine requirements and enhance quality of Everglades mink habitat.

#### *Rationale*

Habitat requirements and preferences of the Everglades mink are not well studied. Research projects investigating habitat requirements of the Everglades mink may assist biologist and land managers in creating beneficial practices to retain and improve the population of Everglades mink as well as direct future management actions.

IV. Confirm the Everglades minks' phylogenetic subspecies designation as it relates to other Florida mink.

#### *Rationale*

The Everglades mink population was considered a separate subspecies (*Mustela v. evergladensis*) based on a single road-killed specimen from Big Cypress Swamp (Hamilton

1948). A morphometric analysis of the 3 known populations of mink in Florida confirmed that they were distinct from each other, 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). The phylogenetic subspecies designation should be confirmed to determine whether the Everglades mink is a distinct subspecies and therefore confirm its listing status.

V. Protect and preserve the population of Everglades mink through rules, permitting, and education.

*Rationale*

Rules, permitting, and education provide a multifaceted approach to protecting the Everglades mink. For example, Chapter 68A-27, F.A.C. prohibits the intentional and incidental take of mink which is important to the increasing population of the Everglades mink. Additionally, FWC Law Enforcement officers, private land owners, and public land managers can be trained to identify the Everglades mink to assist with defining its EOO and AOO. When more detailed information is gained about the life history and behavior of the Everglades mink, then more extensive education can be conducted. Recommendations may be made to private land owners and public land managers about timing of prescribed burns, designing hydrologic restoration projects, and applying herbicides.

## CONSERVATION ACTIONS

The following sections describe the conservation actions that will make the greatest contribution toward achieving the conservation objectives. Actions are grouped by category (e.g., Habitat Conservation and Management, Population Management). The Conservation Action Table ([Table 1](#)) provides information on action priority, urgency, potential funding sources, likely effectiveness, identified partners, and leads for implementation.

### Habitat Conservation and Management

Few studies have been conducted about the habitat requirements for the Everglades mink. The [Monitoring and Research](#) section of this plan outlines the actions needed to improve our knowledge of Everglades mink habitat requirements and preferences. Once determined, public conservation lands, such as FSPSP, should be managed to preserve and enhance the existing habitat of the Everglades mink and reduce threats that may limit available habitat (such as hydrological modifications and degraded water quality). Private land owners should be educated about beneficial practices for preserving quality habitat for Everglades mink.

**Action 1** Develop and implement habitat management strategies based upon habitat utilization studies, identified threats, and limiting factors (also see [Population Management](#)).

**Action 2** Improve coordination between Land Use Planning staff and local biologists on projects that may impact the hydrological aspects of the watershed.

Proposed monitoring and research addressing AOO and EOO of the Everglades mink will improve the knowledge of Everglades mink habitat requirements. Threats and limiting factors identified in the [BSR](#) will be investigated. The results of this research will be used to create habitat management strategies. These strategies can be incorporated into the land management plan for each of the publically managed properties and updated as new information becomes available ([Action 1](#)).

While little is known about Everglades mink habitat requirements and preferences, it is believed that water quality and quantity are critical components of the life cycle of the Everglades mink. Everglades mink habitat has been severely altered and degraded through conversion of wetlands to citrus, alteration of surface water flows, and introduction of agricultural pollutants. Modification to the hydrologic regime in both privately and publically managed lands may alter the remaining habitat of the Everglades mink. Currently, Everglades mink are only known to occur on public lands, where it is difficult to directly address the larger ecosystem issues of pollutants and sheet flow. These are issues that need to be addressed by city, county, state, and federal governments. Stringent water quality standards need to be enforced for agricultural operations to prevent excessive pollutants from entering the Big Cypress Basin and Everglades physiographic regions. Infrastructure development on conservation lands that does not significantly alter historical hydrologic patterns or flow should not adversely affect mink habitat and ideally should enhance conditions for mink. Modifications that optimize conditions for mink could include placing culverts in appropriate locations to maintain or increase hydroperiod or minimum flow levels. It is important that local FWC biologists continue to be identified and consulted during planning, commenting, and review of projects that may affect potential sheet flow and hydroperiod within the AOO and EOO of the Everglades mink so they may continue to

submit biological recommendations (such as suggested survey techniques) or propose modifications ([Action 2](#)). Biological recommendations will be based on the results of the proposed research.

### **Population Management**

Density estimates of the Everglades mink are currently unknown. Research proposed in this plan (Actions [13](#) and [14](#)) will attempt to estimate the Everglades mink population. The proposed action provides suggestions to FWC's Exotic Species Section (ESS) in expanding the existing Burmese pythons control program to encompass the entire Everglades mink range. Possible increased predation by the Burmese python is an additional threat to already low population numbers.

**Action 3** Coordinate with FWC's ESS to continue systematic exotic reptile surveys and evaluate other effective methods of removal and control within the current range of the Everglades mink. Analyze stomach contents of each exotic reptile captured. Review the findings of new research.

In Florida, a variety of exotic reptiles have been released into the wild by pet owners unable or unwilling to care for them. Others have been released inadvertently as a result of damage from hurricanes. The concern over exotic reptiles in Florida is at an all-time high due to their increased prevalence. Burmese pythons have already been documented to consume several native species such as American alligators (National Park Service [NPS] 2012); white-tailed deer; and a variety of native wading birds, bobcat, and small mammals (Lotz 2006, NPS 2008). Burmese pythons may reach a length of 8 m (26 ft) (FWC 2013) and have a well-established breeding population in south Florida.

Both ENP and FWC currently conduct exotic reptile surveys on public lands in south Florida. Due to the potential threat Burmese pythons pose on suspected low populations of Everglades mink, FWC's ESS may expand their on-going survey efforts to incorporate exotic reptile surveys throughout the known range of the Everglades mink ([Action 3](#)).

Burmese pythons have been collected from the following locations near or in sites known to be occupied by Everglades mink: Water Conservation Areas (WCAs) (J. Eckles, FWC, personal communication), Collier-Seminole State Park (FWC 2013), PSSF (W. Muirhead, Florida Forest Service [FFS]), personal communication), Big Cypress National Preserve (K. Smith, FWC, personal communication), FSPSP (M. Owens, FSPSP, personal communication) and ENP (S. Snow, NPS, personal communication). Burmese pythons are a growing problem, spreading farther north and west in Florida (FWC 2013), and have significant potential to impact the extant Everglades mink population. It is critical that stomach contents continue to be analyzed to assess the impacts on native species such as the Everglades mink. Additional measures, beyond the microchipping and registration, can be taken to prevent the release of pythons into the wild ([Action 23](#)). Partnerships have already been established (i.e., the Southwest Florida Cooperative Invasive Species Management Area) or likely will be formed with state and federal agencies, Native American tribes, non-governmental organizations, and other stakeholders to control the python population once effective control methods are determined by proposed research.

## Monitoring and Research

Because of the lack of life history information on the Everglades mink, many actions have been identified for monitoring and research. Completing these actions will gather preliminary background research, refine the current and historic AOO and EOO, determine population size and trends, collect data on the impacts of identified threats and limiting factors, determine habitat preferences, and clarify taxonomic status. Priority actions for completion in the next 10 years within the monitoring and research section are [Actions 9 through 19](#). Other actions ([Actions 4 through 8](#)) should be completed in order to successfully and thoroughly complete [Actions 9 through 19](#).

### *Preliminary Background Research*

The use of Geographic Information System (GIS) technology to produce and define historical and current range maps of the Everglades mink will be essential. By mapping habitat community types, suitable habitat for the Everglades mink can be defined within its current and historical range. Biologists and researchers may identify potential habitat of the Everglades mink by using GIS technology and previously published literature, such as documented sightings, road-killed specimens, and historical range maps.

**Action 4** Conduct a review of scientific literature and agency records to compile a list of all locations and habitats where the Everglades mink has been documented.

**Action 5** Use GIS mapping of community types within the historical range of the species to identify the geographic location of potentially suitable habitat for the Everglades mink on public and private lands.

The Everglades mink has historically been trapped or documented in the Everglades and Big Cypress freshwater and brackish marshes within Collier, Miami-Dade, and possibly Monroe counties (Smith 1980, Humphrey 1992, Pifer et al. 2011). During the BSR, only 1 recent location of mink was reported as documented in FSPSP (D. Shindle, personal observation as reported in the [BSR](#)). Since 1971, however, FSPSP staff has made 153 sightings of mink, with 123 of these sightings occurring since 2002. Mink were documented in 4 separate locations within the park during 2012 (M. Owens, FSPSP, personal communication). In addition, Everglades mink have also been observed in BCNP in May 2007 and January 2008 (Pifer et al. 2011). ), while no sightings have been reported in the Lake Okeechobee or Everglades areas since the late 1980s and early 1990s (Humphrey 1992). Two subsequent studies reported trapping the Everglades mink in or near the FSPSP. One study documents that 4 mink were collected in 2004 and examined for canine distemper virus (Cunningham et al. 2009). A second study examined 5 specimens for the presence of parasitic helminth infections (Foster et al. 2007). Other sources of documented locations for Everglades mink might include published but out-of-print and unpublished reports from agencies such as the U.S. Fish and Wildlife Service (USFWS), FWC, Florida Department of Environmental Protection (DEP), and NPS. It is important to search and compile this documentation, if it exists, to establish a historical record of the range of the Everglades mink ([Action 4](#)). Contacting local people, including fishermen, naturalists, etc., in the area may be an additional method of gathering sightings of Everglades mink.

Generally, mink select habitat along streams, swamps, permanent ponds, and in both freshwater and brackish marshes in coastal and inland locations (Larivière 1999). Mink have also been documented to occupy manmade structures such as canals and associated levees. Using GIS technology and aerial photographs with representative habitat types, it is possible to identify the most likely locations where the Everglades mink could be found based on its preferred habitats. Additional shape file layers can indicate public and private land ownership, land use changes over time, and land cover types. The resulting maps would be used to prioritize locations for field surveys and trapping efforts in successive actions ([Action 5](#)).

*Survey and refine the EOO and AOO of the Everglades mink*

Everglades mink are geographically isolated from northern populations of mink and formerly ranged from Lake Okeechobee south through much of the Everglades (Allen and Neil 1952, Humphrey and Setzer 1989, Humphrey 1992), but have recently been found only in FSPSP (D. Shindle, personal communication) and Big Cypress National Preserve (Pifer et al. 2011). Everglades mink are difficult to detect and observations of Everglades mink have been too limited to make precise quantitative assessments about current EOO and AOO. Limited studies to determine the current geographical range or proportion of area occupied have been conducted (Humphrey and Zinn 1982, Smith 1980, Pifer et al. 2011). Few systematic surveys have been conducted; therefore, much of the Everglades mink life history and survey methodology has been inferred from mink studies outside of Florida. In many cases, general mink life history and survey information is taken from mink species outside the United States, where they are considered to be an invasive species. Determining the distribution and areas occupied by Everglades mink is critical to provide an accurate assessment of the conservation status of this species. Developing effective methodology is the first step in surveying their range, and understanding the life history may be a complicating factor in effectively implementing surveys. The following actions outline how to develop methodology to survey and monitor the EOO and AOO of the Everglades mink.

**Action 6** Seek expertise of trappers and mammalogists to identify techniques and protocols for documenting the presence of the Everglades mink.

**Action 7** Conduct pilot studies to evaluate the effectiveness of various survey techniques to document the presence of the Everglades mink.

**Action 8** Using the pilot studies results, develop a survey plan including sampling methodology, areas to be sampled, survey technique and protocols, and resource needs (staff requirements, equipment, facilities, and budget).

**Action 9** Implement the survey technique to determine the EOO and AOO beginning on FSPSP, and systematically sample additional areas on conservation lands within the historical range of the species or within areas where suitable habitat could support the species. Map the resulting data.

**Action 10** Use results of the EOO and AOO surveys in conjunction with radio tracking results ([Action 17](#)) to identify habitat preferences of the Everglades mink.

**Action 11** Develop and distribute a survey to landowners on parcels of private lands within the EOO and which contain potentially suitable habitat for the Everglades mink in order to solicit information about sightings of the species.

**Action 12** Record new locations of the Everglades mink as an ongoing effort to clarify and refine the EOO and AOO.

Trappers and mammalogists who have worked in south Florida can assist with developing monitoring and trapping methodologies, as they are familiar with the terrain and travel necessary to access the Everglades mink habitat. These individuals can provide valuable input to help select techniques that have a high probability of detecting the species ([Action 6](#)).

Prior to conducting surveys, a list of known habitats used by the Everglades mink should be compiled from the scientific literature. Identifying the type of habitat mink use will help focus surveys to those areas that have the greatest chance of detecting mink presence (see [Actions 13](#) and [14](#)).

Pilot studies evaluating different survey techniques to document the presence of the Everglades mink should be conducted ([Action 7](#)). A suite of techniques may be identified as having potential for detecting the elusive mammal, but until the technique is used under field conditions, it is difficult to evaluate its utility. Field testing can serve as a pilot test to estimate sample sizes necessary to produce the desired power of a test which may be applicable to [Actions 4 through 7](#) (Ratti and Garton 1999). Depending on the methods, seasonality may impact survey efforts and will need to be taken into account during pilot studies. Studies of coastal salt marsh mink have found that they are more active during the breeding season, and females remain visible while rearing kits (Waller 2010, C. Gorga, personal communication). Humphrey and Zinn (1982) found more mink activity at scent stations during the early wet season (autumn) and proposed that wet season olfactory cues may have shifted breeding season for Everglades mink to autumn. Understanding the relationship between breeding season, hydrology, and mink detections may be a significant factor in determining a technique for surveying mink across multiple habitats in south Florida.

Various methods exist for documenting the presence of Everglades mink. Challenges presented by the south Florida landscape within the historical range of this species make it necessary to evaluate the practical application and effectiveness of each technique in order to select those that seem most suited to sample remote wetlands that are difficult to access. Humphrey and Zinn (1982) employed scent post and track board technology to systematically sample for mink along transects through preferred habitats. Other methods include floating track boards with scent posts and track surveys along sections of stream bank (Pifer et al. 2011). In addition, camera traps combined with scent post attractants have been used to survey for the presence of various species occupying an area (Gonzalez-Estaban et al. 2004, E. Carlson, National Audubon Society, personal communication, Pifer et al. 2011, Marty Main, as cited in the [BSR](#)). Some individuals have been detected by finding road-killed specimens (Foster et al. 2007).

In addition to field testing various survey methodologies, information from the pilot survey will be used to estimate a budget, determine resources required by staff, identify necessary equipment

and supplies, and secure locations to implement each technique ([Action 8](#)). Requests for funding will be made to hire staff, purchase supplies and equipment, and obtain other resources. This information will be used to develop a survey plan.

Currently, FSPSP and BCNP are the only locations where the Everglades mink is known to occur (D. Shindle, personal communication; M. Owen, personal communication, Pifer et al. 2011). Of these two confirmed locations, Everglades mink occurrences appear to be most numerous in FSPSP (M. Owen, FSPSP, personal communication). Therefore to define the AOO, FSPSP will be systematically or randomly sampled, depending upon the technique and protocol developed for the survey ([Action 9](#)). Trapping or other survey activities should be conducted during a variety of seasons within the habitats preferred by the Everglades mink based on the GIS mapping of habitats within the AOO. Survey work should be conducted during both the summer rainy season and the typical drought of winter to ensure that preferred habitats are sampled when the mink is most likely to inhabit them. As survey activities are completed within the AOO in FSPSP, additional surveys will be planned and scheduled in locations within the EOO where the species has been historically documented to occur. Results of the survey will be mapped to identify the EOO and AOO of the Everglades mink. Additionally, land use alterations over time could also be mapped and consistently updated to indicate range contraction due to changes in habitat or other variables.

Results of the AOO and EOO surveys and radio tracking surveys will be used to identify habitat preference by mapping locations where the Everglades mink have been found and displaying those points on a GIS map ([Action 10](#)). Advanced GIS analyses can be used to overlay habitat layers to determine if Everglades mink locations correspond to a particular habitat type or landscape feature, spatial configuration, or habitat size. These chosen types and features can be used to help predict future locations of Everglades mink.

After the EOO and AOO have been determined, a survey distributed to private landowners soliciting information about sighting of Everglades mink may be helpful in uncovering additional locations of Everglades mink ([Action 11](#)). This action would expand upon the online public reporting site recently created for the observations of the Everglades mink by FWC. .

A database will be created and periodically updated using GIS shapefiles and maps of observed locations of the Everglades mink ([Action 12](#)). GIS will be used to build upon the EOO and AOO for the Everglades mink based upon documented locations in the survey and on the reporting website.

#### *Determining a Population Estimate*

To confirm or refute the Everglades mink's conservation status, an appropriate sampling design will need to be developed to estimate population size or trends. Habitat characteristics where the Everglades mink are known to occur make surveying them difficult. The Everglades mink may display seasonal habitat preferences as water levels fluctuate throughout the year, retreating from drying marshlands to long-hydroperiod swamp forests (Humphrey 1992). The following actions will guide the research necessary to developing an appropriate population estimate for the Everglades mink.

**Action 13** Develop and utilize survey techniques (e.g., track surveys, track plates, camera traps, etc.) to reliably detect Everglades mink presence in south Florida (strategies would overlap and be coordinated with [Action 9](#)).

**Action 14** Monitor population trends by conducting surveys at regular intervals to be defined based on need or detectability.

Habitats where the Everglades mink are known to occur make surveying them difficult. Various techniques (track surveys, camera traps, etc) should be tested to determine the most reliable and appropriate method to detect mink presence ([Action 13](#)). Statisticians and populations biologists will be consulted during the design phase of the study to ensure an adequate level of sampling occurs. Studies should be initiated in FSPSP where the Everglades mink are known to occur so that techniques can be tested and improved. These methodologies can then be employed throughout former known mink range to determine their distribution and occurrence in other areas. Surveys should then be completed on a regular basis to monitor population trends (Waller 2010) ([Action 14](#)).

Population density estimates can be conducted by implementing a number of different protocols. Bartoszewicz and Zalewski (2003) estimated mink density on the Slonsk Reserve in western Poland by using 2 different methods. The first method estimated population density by averaging the maximum number of mink live-trapped and radio-tracked with the number of animals surviving at the end of the trapping season. The second method incorporated a mark-recapture model based on live-trapping and subsequent radio tracking and resightings. A study on riverine systems in England compared the effectiveness of 2 different sign surveys for estimating relative abundance of mink; the first was a scat detection technique and the second was a track plate technique using floating mink rafts. The authors concluded that track plates on floating rafts yielded estimates that were more in line with the numbers of mink captured (Harrington et al. 2008).

Other methods for estimating population density that may be tried, but may have limited success, are using game or trail cameras as the basis for mark-recapture studies or using spotlight surveys in conjunction with occupancy modeling. With interagency and private land owner cooperation, trail cameras may be used (i.e., water management districts' [WMDs'] levees or private property) to increase the knowledge about range and distribution of the Everglades mink. In both cases, challenges may occur with indentifying individuals or determining the number and placement of cameras or transects needed to yield an adequate sample size. Camera traps or spotlight surveys may provide an economical way to sample a relatively large area if challenges can be addressed (Foster and Harmsen 2012, Waller 2010).

#### *Research on Everglades Mink Threats and Limiting Factors*

Research is proposed to investigate and reduce potential threats to the Everglades mink population. Threats such as disease, water quality degradation, and hydrologic alterations to the landscape were identified in the [BSR](#) and the potential for research is discussed in the actions below.

**Action 15** Design and implement a passive disease-monitoring protocol for the Everglades mink on all publically owned lands within the range of the Everglades mink. Monitor mortality and necropsy results from animals recovered during radio telemetry study to determine causes of mortality. Submit samples for necropsy to FWC veterinarians. In addition, samples can be collected when [Action 17](#) is implemented.

Commercially produced ranch mink are susceptible to a host of diseases, but little is known about diseases or parasites that afflict wild mink (Linscombe et al. 1982). However, canine distemper virus (CDV) has been documented in the Everglades mink (Cunningham et.al. 2009). A widespread epizootic event in 2004 may have resulted in a population decline. Anecdotal evidence suggests the population may have recovered from this event, but the implications of CDV and other diseases must be better understood because their role may affect the Everglades mink recovery and management.

Vehicle mortality will likely provide the greatest opportunity to passively collect mink specimens ([Action 15](#)). A protocol should be established with the FWC veterinarian so that mink carcasses are collected and stored properly and timely transfer of carcasses occurs to facilitate the best possible necropsy results. Coordination with FWC veterinarians, pathologists, and other relevant experts may be necessary. Necropsies should be performed on all mink carcasses collected to determine a cause of death. Carcasses should be collected, securely wrapped in a plastic bag with location, date, collector's information, and stored in a freezer until arrangements can be made to transfer the carcass for necropsy. Additionally, any carcasses collected during radio-telemetry or other studies can be necropsied. Causes of death should be monitored and important findings should be published in a peer reviewed journal.

**Action 16** Use existing water quality data collected within the EOO and AOO of the Everglades mink to identify and map locations of elevated levels of mercury or other toxicants that may be a threat to the Everglades mink. If no data have been collected within portions of the Everglades mink EOO and AOO, design and implement additional water quality surveys.

Water quality is a critical concern as mink spend much of their time in aquatic environments. Moreover, the Florida Everglades is considered to have extremely high mercury contamination in fish due to sulfate contamination (Corrales et al. 2011) and other pathways, and consistently exceeds the Florida advisory level of 1.5 parts per million. As of 2011, there is a "no consumption" advisory issued by the Florida Department of Health for certain fish species from the Everglades indicating a serious problem with methylmercury (MeHg) contamination in this area. As a semi-aquatic species, the Everglades mink is highly susceptible to MeHg contamination and bioaccumulation due to its propensity for aquatic environments and diet of a variety of Everglades fish species. Osowski et al (1995) found that coastal mink in Georgia, South Carolina, and North Carolina had mercury concentrations higher than reference populations of inland (or piedmont) mink, and in concentrations high enough to have sublethal effects on reproduction and growth. Therefore, existing water quality data collected by agencies, such as DEP and the WMDs, may be used to determine baseline contaminant levels and provide periodic comparisons of these levels. If areas within the Everglades mink AOO and EOO do not have water quality data, a study can be designed and implemented to collect needed data. Captured or road killed Everglades mink could be tested for mercury contamination, but it is

uncertain if an adequate number of Everglades mink could be caught. Additionally, these data would only give us specific contamination information about where the Everglades mink was trapped, not an indication of the potential toxicant contamination across the entire EOO and AOO of the Everglades mink.

A proposed strategy to decrease MeHg is to reduce sulfate entering the ecosystem. Discharges from the Everglades Agricultural Area canals are responsible for high sulfate concentrations in surface waters in the Everglades (Corrales et al. 2011). Creating a site-specific sulfate criterion for the Everglades region may be a way to combat the sulfate problem (Corrales et al. 2011). The U.S. Geological Survey (USGS) is conducting several projects termed “The Florida Everglades Project” in the Florida Everglades to determine how mercury is cycled through the Everglades ecosystem (USGS 2004). FWC could partner with USGS, WMDs, DEP, U.S. Environmental Protection Agency, the National Marine Fisheries Service, the Miccosukee Tribe of Indians, and Seminole Tribe of Florida to conduct research on mercury contamination in the Everglades and then determine its impact on the Everglades mink and its food source.

Finally, hydrological manipulations throughout the landscape can also be detrimental to Everglades mink populations due to their reliance on hydric habitats. Since the drainage of the Everglades began in 1880, its hydrology has been fundamentally altered. The Everglades ecosystem has experienced extensive changes in surface water flows, water tables, and soil subsidence (Sklar et al. 1999). The on-going Comprehensive Everglades Restoration Plan (CERP) is being conducted to restore sheet flow to the Everglades ecosystem. Alterations in hydrology have caused the loss of wetland soils and advances in the spread of exotic plant species such as Brazilian pepper (*Schinus terebinthifolius*), melaleuca (*Melaleuca quinquenervia*), and Old World climbing fern (*Lygodium microphyllum*) (Sklar et al. 1999). In some areas, such as northern WCA- 3A, natural hydroperiods have been shortened, wetland elevations have been lowered, and soil nutrients have increased (Sklar et al. 1999). In other areas, such as WCA-2A and southern WCA-3A, natural hydroperiods have been exceeded and prolonged periods of extreme high water levels have adversely impacted tree island and wet prairie communities (Sklar and Van der Valk 2002, Powers 2005).

These hydrological alterations have changed the landscape and habitat of native species that rely on certain hydrological requirements for foraging and reproduction. Thus, hydrological changes over time can greatly affect the survival of the Everglades mink. Efforts can be combined with DEP and WMDs to assess long-term hydrologic changes to south Florida and analyze how those may affect the Everglades mink survival and movement patterns.

Locations found with elevated levels of mercury or other toxicants should be mapped in GIS and continue to be updated with regular monitoring of these levels ([Action 16](#)). This information, along with research completed during research and monitoring actions, should improve FWC’s ability to incorporate current information and local expertise into commenting on projects that might affect water quality and quantity within the range of the mink.

#### *Determining Everglades Mink Habitat Preferences*

Surveys using radio-telemetry will lend insight into individual movements and habitat utilization of the Everglades mink to help manage public and privately owned lands as well as predict future

range expansion. The following actions detail how research will be conducted to determine the habitat requirements of the Everglades mink.

**Action 17** Develop a research plan including sampling methodology, scope, radio-tracking technique and protocol, and resource requirements (staff, equipment, facilities, and budget) to determine Everglades mink habitat requirements.

**Action 18** Conduct the radio-tracking data collection activities, data analysis, mapping, and analysis of habitat utilization of the Everglades mink.

Researching the habitat preferences of the Everglades mink can be conducted in coordination with Actions [10](#), [13](#), and [14](#) under the population density estimate and EOO and AOO research. Radio-tracking may be used to determine habitat requirements, although determining the full scope of radio-tracking project is needed ([Action 17](#)).

Everglades mink may be captured following methods used in Porteus et al. (2012), then fitted with radio transmitters to track their movements, evaluate habitat usage, establish home range sizes, monitor survival, and any other relevant life history information ([Action 19](#)). Use of peritoneal transmitters is recommended to reduce injury to mink (Zschille et al. 2010). A qualified wildlife veterinarian may be able to implant the transmitters either at a sterile facility or in the field. Radio tracking will be performed using portable receivers and hand-held antennas either on foot, aurally, or by vessel ([Action 20](#)).

A sufficient number of observations including seasonal and temporal variation of the Everglades mink should be collected to conduct statistical analyses. A sufficient number of observations per individual including temporal and seasonal variation will establish mink behavioral patterns and home ranges (White and Garrott 1990).

#### *Phylogenic Subspecies Determination*

When first described, the Everglades mink population was considered a separate subspecies (*Mustela v. evergladensis*) based on a single road-killed specimen from Big Cypress Swamp (Hamilton 1948). A morphometric analysis of the 3 known populations of mink in Florida confirmed that they were distinct from one another, 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). Genetic confirmation of the subspecies status of the Everglades mink is important to determining its Threatened subspecies designation. The following actions outline how to confirm the subspecies designation.

**Action 19** Collect and submit biological samples (hair, skin, muscle, etc.) from the Everglades mink to compare the taxonomic relatedness to *N. v. vison* and, if possible, *N. v. halilimnetes* and *N. v. lutensis*. Determine the validity of the subspecies designation. Samples can be obtained from specimens handled in [Action 18](#) and from road-killed individuals.

During the live-trapping and radio telemetry research in [Action 18](#), biological samples such as blood or hair follicles will be collected, labeled, and preserved for later microsatellite analysis

([Action 19](#)). But to date, genetic samples of other mink subspecies in Florida (*N. v. halilimnetes* and *N. v. lutensis*) are lacking and will not allow for microsatellite genetic comparisons with *N. v. evergladensis*. In conjunction with live-trapping of *N. v. evergladensis*, trapping of mink in coastal marshes of the Big Bend area (*N. v. halilimnetes*) and north of the St. John's River (*N. v. lutensis*) must be conducted to collect and compare genetics samples with those of *N. v. evergladensis*. If enough samples from the subspecies are obtained and compared, the results of genetics findings will be analyzed and results published in a peer-reviewed journal. Regardless of the outcome of microsatellite analysis, the subpopulation of the Everglades mink in south Florida will require protection given the numerous threats and uncertainty of the population estimate and range of the subspecies.

### **Rule and Permitting Intent**

The following action suggests that the Everglades mink status be retained as a Threatened species and outlines the recommended protections.

**Action 20** Clarify Rule 68A-12.004, F.A.C., regarding taxidermy of Everglades mink.

#### *Protections*

The BRG concluded that the Everglades mink met criteria for listing as described in Rule 68A-27(3), F.A.C. Therefore, FWC proposes to maintain the Everglades mink as a Threatened species on the Florida Endangered and Threatened Species List ([Action 20](#)). Findings from the BRG are included in the [BSR](#) information table and regional assessment table. Further phylogenetic analysis is needed to confirm its designation as a subspecies, the result of which has potential to affect its listing status in the future. The [Monitoring and Research](#) section of this plan includes several actions to identify the potential threats to the Everglades mink populations. If the results indicate these threats could be considered limiting factors to Everglades mink, then protection language should be developed to clarify what constitutes harm or harassment (e.g., through habitat modification and degradation, changes in hydrology, etc.). The intent of any protections should be to reverse the listing criteria identified during the development of the [BSR](#) and alleviate threats that are identified through [Monitoring and Research](#) actions or avoid new threats that may be identified during plan implementation. Protections should address direct or intentional take (scientific collecting) and incidental take (take that occurs during otherwise legal activities, such as land or infrastructure development).

Rule 68A-12.004, F.A.C., specifies provisions for "Possession or Sale of Birds or Mammals; Taxidermy Operations and Mounting Requirements." This rule prohibits the taxidermy of listed species without a permit, but includes a provision for the taxidermy of road-killed mink. Four subspecies of mink occur in Florida, and although the Everglades mink is geographically separated from the other subspecies, distinguishing individuals from any of these populations by sight is not possible. Therefore, current interpretation of this rule is that the listed Everglades mink may be taxidermied without a permit. To prevent harvest and possession of Everglades mink, the taxidermy rule should be clarified. Through rule change or internal interpretation, clarifications may need to address the similarity of appearance of all mink in Florida, geographic location, and the Threatened status of the Everglades mink ([Action 20](#)). Because mink are rare, road killed mink may represent a significant source of specimens for disease and contamination

studies; allowing these specimens to be taxidermied without a permit may impact FWC’s ability to effectively address conservation needs of the Everglades mink.

*Permitting Threshold and Guidelines*

Permitting for intentional and incidental take will be as specified in Chapter 68A-27, F.A.C., and no additional permitting guidelines are proposed. As the [Monitoring and Research](#) actions are implemented, information should be incorporated into developing permitting guidelines and thresholds. We recommend that one condition of any incidental take permit should be that if an Everglades mink is taken, the carcass and corresponding data should be provided to FWC to assist with research actions. As described in Chapter 68A-27, F.A.C., land managers should be exempt from incidental take permitting when conducting land management activities prescribed in the [Habitat and Conservation Management](#) section of this plan.

**Law Enforcement**

**Action 21** Coordinate with FWC’s Division of Law Enforcement to enforce Rules in Chapter 68A-27, F.A.C., relating to the Everglades mink’s Threatened species status.

Provide law enforcement officers with information developed in [Action 22](#) to improve knowledge about Everglades mink and the potential threats to the species. FWC’s law enforcement officers’ input may be needed in monitoring taxidermy and fur buyer operations to ensure that Everglades mink are not being illegally trafficked ([Action 21](#)). In addition, they now consider Burmese pythons and several other exotic reptiles as “conditional reptiles,” which are no longer allowed to be acquired for personal possession (FWC 2013). Reptile dealers, researchers, and public exhibitors may apply for permits for possession or importation. Each reptile purchased must have a license and a microchip. These restrictions should help prevent the public from obtaining some exotic reptiles that may impact native wildlife populations like those of the Everglades mink ([Action 3](#)).

**Incentives and Influencing**

No actions are currently recommended for incentives and influencing. [Action 2](#) describes partnerships that may develop as a result of suggested actions.

**Education and Outreach**

**Action 22** Create and disseminate educational materials about the Everglades mink to the public, landowners, cooperating agency staff, and law enforcement officers. Update the FWC website with research findings.

Due to the data-deficient nature of the Everglades mink life history and ecology, some research will need to be completed prior to creating the educational materials listed above. Information about the American mink and other mink subspecies in Florida could be incorporated while more specific research is being conducted on the Everglades mink.

Educational information about the Everglades mink may be included on the [FWC website](#). Information such as the species IUCN status, a physical description and photographs, life history and ecology information, major threats to the species, and its current EOO and AOO will be

described. As additional data are collected from research studies, new information will be posted on the webpage ([Action 22](#)).

Educational messages should be developed for several different audiences, including the general public, landowners, law enforcement and land managers. The methods of disseminating educational messages should take the audience into account and may include radio announcements, website information, and educational pamphlets. Field staff from partnering agencies (e.g., WMDs and DEP) may be trained to identify Everglades mink to gather more information about their geographic distribution.

Public radio announcements on local public radio stations may also disseminate quick facts about the species. These programs will include life history details about Everglades mink and suggestions about how to protect the Everglades mink (see [Appendix I](#) for more details).

### **Coordination with Other Entities**

**Action 23** Identify partnerships with other agencies across ecosystem boundaries to develop cooperative management plans to enhance habitat for the Everglades mink.

The Everglades mink EOO extends across the boundaries of federal and state governmental conservation lands. A variety of governmental agencies have regulatory oversight over wetlands, land management responsibilities for conservation lands, or administer programs providing landowner assistance to manage and protect wetlands on private lands. An essential part of this plan for the Everglades mink involves coordinating with the appropriate agencies to share information, resources, and management actions across ecosystem boundaries to enhance habitat for the mink ([Action 23](#)). Potential partners include USFWS, DEP, NPS, FFS, WMDs, the Miccosukee Tribe of Indians, the Seminole Tribe of Florida, and non-governmental organizations, such as The Nature Conservancy, the National Audubon Society.

Potential threats to the Everglades mink survival are linked to changes in the natural hydrology within the EOO, the presence of mercury and other contaminants in the environment, and invasive reptiles such as the Burmese python. It will be necessary to coordinate management and restoration activities with other agencies and local tribes to avoid negative impacts on the remaining population of the Everglades mink as much of the Everglades mink habitat falls within state, federal, or tribal boundaries. Cooperative management plans with partnering agencies and landowners can be developed to enhance habitat for the Everglades mink and conserve and improve the population.

**Table 1. Everglades Mink (*Neovison vison evergladensis*) Conservation Action Table**

NOTE: An explanation of acronyms used is below the table.

Objective(s) Addressed	Team Assigned Priority Level	Action Item Number	Action Items	Conservation Action Category	Ongoing, Expanded or New Effort?	Authority	Man Power	Estimated Cost To Implement	Funding Source(s)	Lead for Implementation: FWC Program(s) and/or Section(s)	External partners	Likely Effectiveness	Feasibility	Urgent?
3	3	1	Develop and implement habitat management strategies based upon habitat utilization studies, identified threats, and limiting factors.	Habitat Conservation & Mgmt, Population Mgmt	NEW	YES	YES	\$25-50k	Existing budget, grant, or unknown	WHM, SCP	DEP, USFWS, FFS, NPS, WMDs, County Governments, NGOs, Private land owners	High - important action to improving the population of EM based on land management actions and mitigating threats as defined by actions above.	May be feasible - feasibility of this action is based on the success of previous actions and is unknown at this time.	Yes, it is essential to increase the current knowledge of EM. Little is known about their movements, life history in south Florida, and habitat requirements.
2	4	2	Improve coordination between Land Use Planning staff and local biologists on projects that may impact the hydrological aspects of the watershed.	Habitat Conservation & Mgmt, Coordination with Other Entities	ONGOING	YES	YES	\$0-25k	Action item will not need funding	WHM, FWC's Environmental Commenting Section	USFWS, WMDs	Moderate - environmental commenting can assist in deterring projects that might change the hydrologic regime within the EM range and in turn limit EM expansion.	Feasible - FWC comments on most projects that may have impacts on wildlife.	No, FWC already has the opportunity to comment on most projects with potential to impact wildlife.
2	3	3	Coordinate with FWC's ESC to continue systematic exotic reptile surveys and evaluate other effective methods of removal within the current range of the Everglades mink. Analyze stomach contents of each exotic reptile captured. Review the findings of new research.	Population Mgmt, Monitoring & Research	ONGOING	YES	YES	\$25-50k	Existing budget, grant, or unknown	ESC, WHM, FWRI	USFWS, DEP, FFS, NPS, WMDs, County Governments, NGOs, hunters, private land owners	Moderate/High - likely to be effective and readily implemented. Uncertain about the extent of python affect on the EM population.	Feasible - python hunts and captures have already been implemented (although not specifically for EM). With enough resources, hunts could be expanded and python stomach contents analyzed.	Yes, Burmese pythons and other exotic reptiles have substantially impacted the populations of many native species in south Florida. Aquatic species are particularly susceptible to predation. The threat level should be examined and mitigated if possible.
1	1	4	Conduct a review of scientific literature and agency records to compile a list of all locations and habitats where the Everglades mink has been documented.	Monitoring & Research	EXPANDED	YES	YES	\$0-25k	Existing budget or unknown	FWRI, WHM, SCP	USFWS, DEP, FFS, NPS, WMDs, County Governments, NGOs	High - this action is the first step in the process of gathering information for the data deficient EM.	Highly feasible - takes staff time and effort, but few outside resources.	Yes, this is the starting point of the proposed research which is critical to improving the EM knowledge base.
1	2	5	Use GIS mapping of community types within the historic range of the species to identify the geographic location of potentially suitable habitat for the Everglades mink on public and private lands.	Monitoring & Research, Habitat Conservation & Mgmt	EXPANDED	YES	YES	\$0-25k	Existing budget or unknown	FWRI, WHM, SCP	USFWS, DEP, NPS, WMDs,	High - this action will provide a starting point for research actions outlined below and can be expanded as new information is obtained.	Highly feasible - an initial GIS map of range has been completed, and historical information can be gathered and easily added to the map.	Yes, this is the starting point of the proposed research which is critical to improving the EM knowledge base.
1	2	6	Seek expertise of trappers and mammalogists to identify techniques and protocols for documenting the presence of the Everglades mink.	Monitoring & Research, Coordination with Other Entities	NEW	YES	YES	\$0-25k	Existing budget or unknown	FWRI, WHM, SCP, HGM	Private land owners, small business owners (trappers), hunters, universities, TNC	Moderate/High - could provide useful information in designing and implementing EOO and AOO studies.	Feasible - depends on the cooperation of the trappers and mammalogists.	Yes, this is the starting point of the proposed research which is critical to improving the EM knowledge base.
1	1	7	Conduct pilot studies to evaluate the effectiveness of various survey techniques to document the presence of the Everglades mink.	Monitoring & Research	NEW	YES	YES	\$25-50k	Existing budget, grant, or unknown	FWRI, WHM, SCP	USFWS, DEP, FFS, NPS, WMDs	High - will be a critical component of defining initial EOO and AOO information. Can partner with David Shindle and expand on his on-going project.	Feasible - depends on available agency resources to complete effectively. Can use local expert knowledge to assist.	Yes, testing methodologies of various survey techniques is critical to determining the most effective methods. Only a few local experts and papers have discussed methods for identifying the presence of EM.
1	1	8	Using the pilot studies results, develop a survey plan including sampling methodology, areas to be sampled, survey technique and protocols, and resource needs (staff requirements, equipment, facilities, and budget).	Monitoring & Research	NEW	YES	YES	\$0-25k	Existing budget, grant, or unknown	FWRI, WHM, SCP	USFWS, DEP, FFS, NPS, WMDs	High - will be a critical component of defining initial EOO and AOO information as well as additional research objectives outlined below. Can partner with D. Shindle.	Feasible - depends on available agency resources to complete effectively. Will also depend on the success and results of the pilot study.	Yes, this action is critical to improving our knowledge of the EM and its habitat. Currently very little is know about its range and preferences.

**Table 1. Everglades Mink (*Neovison vison evergladensis*) Conservation Action Table**

Objective(s) Addressed	Team Assigned Priority Level	Action Item Number	Action Items	Conservation Action Category	Ongoing, Expanded or New Effort?	Authority	Man Power	Estimated Cost To Implement	Funding Source(s)	Lead for Implementation: FWC Program(s) and/or Section(s)	External partners	Likely Effectiveness	Feasibility	Urgent?
1	1	9	Implement the survey technique to determine the EOO and AOO beginning on FSPSP, and systematically sample additional areas on conservation lands within the historical range of the species or within areas where suitable habitat could support the species. Map the resulting data.	Monitoring & Research	NEW	YES	YES	\$50-100k	Existing budget, grant, or unknown	FWRI, WHM, SCP	DEP, USFWS, FFS, NPS, WMDs, County Governments, NGOs	High - will be a critical component of defining initial EOO and AOO information as well as additional research objectives outlined below. Can partner with D. Shindle.	Feasible - depends on cooperation of partnering agencies and other agency resources. Can expand on-going study of EM in Fakahatchee.	Yes, this action will be based on the success of the determining appropriate and effective sampling methodologies. Will be necessary to implement as soon as possible to gather more information about EM range and suitable habitat.
3	2	10	Use results of the EOO and AOO surveys in conjunction with radio tracking results (Action 17) to identify habitat preferences of the Everglades mink.	Habitat Conservation & Mgmt	NEW	YES	YES	\$0-25k	Existing budget	SCP, WHM	DEP, USFWS, FFS, NPS, WMDs, County Governments, NGOs, Private land owners	High - identifying habitat preferences will guide land managers with future management activities.	May be feasible - depends on the resulting data of the EOO and AOO research actions above.	Yes, it is essential to define EM preferred habitat to assist with land management recommendations.
1	4	11	Develop and distribute a survey to landowners on parcels of private land within the EOO which contain potentially suitable habitat for the Everglades mink to solicit information about sightings of the species.	Monitoring & Research, Education & Outreach, Coordination with Other Entities	NEW	YES	YES	\$0-25k	Existing budget	FWRI, WHM, SCP	USFWS, DEP, FFS, NPS, WMDs, County Governments, NGOs	Moderate - gathering private land owner information may be useful information. Its success depends on the willingness and knowledge of the landowners to provide that information.	Highly feasible - similar project already established by SCP. Reporting site for observations created on FWC website.	Yes, critical to defining current range of EM. Similar project being implemented.
1	4	12	Record new locations of the Everglades mink as an ongoing effort to clarify and refine the EOO and AOO.	Monitoring & Research	ONGOING	YES	YES	\$0-25k	Existing budget	FWRI, WHM, SCP	USFWS, DEP, FFS, NPS, WMDs, County Governments, NGOs	High - can be successful if agency partners and private land owners are aware of the project and educated about what to look for.	Highly feasible - project already established by SCP. Reporting site for observations created on FWC website.	Yes, critical to defining current range of EM. Already being implemented.
2	1	13	Develop and utilize survey techniques (e.g., track surveys, track plates, camera traps, etc.) to reliably detect Everglades mink presence in south Florida (strategies would overlap and be coordinated with Action 9).	Monitoring & Research	ONGOING	YES	YES	\$50-100k	Existing budget, grant, or unknown	FWRI, WHM, SCP	USFWS, DEP, FFS, NPS, WMDs, County Governments, NGOs	High - essential for gathering more information about EM range, habitat, and movements.	Feasible - depends on available resources, Would be time-consuming and may be expensive to implement, but is a critical component of expanding EM knowledge.	Yes, this research is essential to increase our knowledge of the species and determine if capturing EM is even possible. The results of this research will define other actions such as the genetic testing and subspecies designation confirmation.
2	2	14	Monitor population trends by conducting surveys at regular intervals to be defined based on need or detectability.	Monitoring & Research	EXPANDED	YES	YES	\$50-100k	Existing budget, grant, or unknown	FWRI, WHM, SCP	USFWS, DEP, FFS, NPS, WMDs, County Governments, NGOs	High - essential for gathering more information about EM range, habitat, and movements. Success will depend on finding an effective and reliable technique for monitoring.	May be feasible - uncertain of the feasibility at this time as it is dependent upon the results and success of Action 14.	Yes, it is critical to consistently monitor the population of EM. Their predicted low population numbers make them highly vulnerable to a variety of threats.
2	2	15	Design and implement a passive disease monitoring protocol for the Everglades mink on all publically-owned lands within the range of the Everglades mink. Monitor mortality and necropsy results from animals recovered during radio telemetry study to determine causes of mortality. Submit samples for necropsy to FWC veterinarian. In addition, samples can be collected when Action 17 is implemented.	Monitoring & Research, Population Mgmt	EXPANDED	YES	YES	\$0-25k	Existing budget, grant, or unknown	FWRI, Vet Staff, WHM	IFAS, DEP, WMDs, FFS, NPS, USFWS	High - impacts of disease can be detrimental to small populations of species, such as the EM. It is important to identify and determine unknown causes of death of EM to assist with its population management.	Feasible - passive disease monitoring has already been implemented. Local agencies continue to inform FWC if suspicious EM carcasses are found.	Yes, given that EM are assumed to have low population numbers, disease has the potential to impact the population significantly. It is urgent that we monitor the population of EM for disease-related deaths.

**Table 1. Everglades Mink (*Neovison vison evergladensis*) Conservation Action Table**

Objective(s) Addressed	Team Assigned Priority Level	Action Item Number	Action Items	Conservation Action Category	Ongoing, Expanded or New Effort?	Authority	Man Power	Estimated Cost To Implement	Funding Source(s)	Lead for Implementation: FWC Program(s) and/or Section(s)	External partners	Likely Effectiveness	Feasibility	Urgent?
2	3	16	Use existing water quality data collected within the EOO and AOO of the Everglades mink to identify and map locations of elevated levels of mercury or other toxicants that may be a threat to the Everglades mink. If no data have been collected within portions of the Everglades mink EOO and AOO, design and implement additional water quality surveys.	Monitoring & Research, Population Mgmt	NEW	YES	YES	\$25-50k	Existing budget, grant, or unknown	FWRI, DFFM, WHM	WMDs, DEP, FFS, NPS, USFWS	High - essential to identify and improve areas of poor water quality that may impact EM population and future expansion.	Feasible - most likely could expand on what is currently being done in most federal and state areas to determine water quality. If water quality is found to be poor in many areas, the feasibility of improving those conditions is unknown.	Yes, mink are indicator species of water quality. It is critical to their survival that acceptable water quality levels persist.
3	1	17	Develop a research plan including sampling methodology, scope, radio-tracking technique and protocol, and resource requirements (staff, equipment, facilities, and budget) to determine Everglades mink habitat requirements.	Monitoring & Research	EXPANDED	YES	YES	\$0-25k	Existing budget	FWRI, WHM, SCP	USFWS, DEP, NPS, WMDs, research institutions	High - this action will be the crux of monitoring and research plan for EM and may allow us to gather samples for genetic testing.	Feasible - FWC's SCP is in the early stages of developing EM research and monitoring ideas and with the necessary resources, would be feasible to implement.	Yes, it is essential to increase the current knowledge of EM. Little is known about their movements, life history in south Florida, and habitat requirements.
3	1	18	Conduct the radio-tracking data collection activities, data analysis, mapping, and analysis of habitat utilization of the Everglades mink.	Monitoring & Research	NEW	YES	YES	\$100k+	Existing budget, grant, or unknown	FWRI, WHM, SCP	USFWS, DEP, NPS, WMDs, research institutions	High - critical to learning more about EM movements and habitat preferences.	May be feasible - radio-tracking would be dependent on capturing EM which may be difficult. Much of this would depend on the capture success of EM which is unknown.	Yes, it is essential to increase the current knowledge of EM. Little is known about their movements, life history in south Florida, and habitat requirements.
4	1	19	Collect and submit biological samples (hair, skin, muscle, etc.) from the Everglades mink to compare the taxonomic relatedness to <i>N. v. vison</i> and if possible, <i>N. v. halilimnetes</i> , <i>N. v. lutensis</i> . Determine the validity of the subspecies designation. Samples can be obtained from specimens handled in Action 18 and from road-killed individuals.	Monitoring & Research	ONGOING	YES	YES	TBD	Existing budget, grant, or unknown	FWRI, WHM, SCP	Research institutions, DEP, USFWS, FFS, NPS, WMDs, County Governments, NGOs	High - this action is critical as validation of the subspecies status of the Everglades mink will define its listing status and future conservation direction.	Unknown feasibility - collecting genetic samples may be difficult if we are unable to capture live EM. Genetic samples can be obtained from road kills and passive monitoring, but there may only be occasional submissions.	Yes, genetic testing of captured specimens will confirm or refute the current subspecies status, which could impact listing status and future conservation efforts.
5	2	20	Clarify Rule 68A-12.004, F.A.C., regarding taxidermy of Everglades mink.	Protections & Permitting	NEW	YES	YES	\$0-25k	Existing budget	Legal, LE, SCP, HSC	Private business owners, hunters/trappers, private land owners	Moderate - clarifying the rule is necessary for completing the EM permitting and protection rules and language.	Highly feasible - need FWC Divisions and Legal to agree on how the EM taxidermy rule will read and be implemented.	Yes, it is important that this rule be clarified to determine the future protections and enforcement of the Everglades minks' Threatened status.
5	2	21	Coordinate with FWC LE to enforce Chapter 68A-27, F.A.C., rules relating to the Everglades mink's Threatened species status.	Protections & Permitting, Law Enforcement	NEW	YES	YES	\$0-25k	Action item will not need funding	WHM, LE, Legal	USFWS, DEP, FFS, NPS, WMDs, County Government	High - if the EM is to remain threatened, it will be the responsibility of LE to know how to recognize EM and enforce the F.A.C. as it pertains to EM.	Highly feasible - will require thorough communication and education of LE.	Yes, it is essential that the EM be protected until more information is obtained from above research actions.
5	4	22	Create and disseminate educational materials about the Everglades mink to the public, landowners, cooperating agency staff, and Law Enforcement. Update the FWC website with research findings.	Education & Outreach, Coordination with Other Entities	EXPANDED	YES	YES	\$0-25k	Existing budget	Education, WHM, SCP	NGOs, DEP, USFWS, FFS, NPS, WMDs, County Governments, private land owners	Moderate - developing educational materials will be important in educating the public, land owners, LE, and others about how to identify mink and what information they can gather and provide land managers.	Highly feasible - certainly feasible to create EM educational materials based upon basic life history information, but not enough is known about EM to identify habitat preferences and other information until more research is conducted.	No, basic educational materials can be created, but without much specific information about the EM, it may be difficult to have a complete picture of the species and its habitat.

**Table 1. Everglades Mink (*Neovison vison evergladensis*) Conservation Action Table**

Objective(s) Addressed	Team Assigned Priority Level	Action Item Number	Action Items	Conservation Action Category	Ongoing, Expanded or New Effort?	Authority	Man Power	Estimated Cost To Implement	Funding Source(s)	Lead for Implementation: FWC Program(s) and/or Section(s)	External partners	Likely Effectiveness	Feasibility	Urgent?
3	4	23	Identify partnerships with other agencies across ecosystem boundaries to develop cooperative management plans to enhance habitat for the Everglades mink.	Coordination with Other Entities, Habitat Conservation & Mgmt	NEW	YES	YES	\$0-25k	Existing budget	SCP, WHM	DEP, USFWS, FFS, NPS, WMDs, County Governments, NGOs, Private land owners	High - working across agencies boundaries will be essential to the project as the EM range will most likely encompass both publically and privately-owned lands.	Highly feasible - most state and federal agencies in south Florida already partner on many different projects, and partnering with these agencies on an EM project is highly feasible.	Yes, cooperation between partnering agencies is essential to the success of the EM recovery. EM are assumed to be present across a variety of public and private lands that would require close coordination to attain quality and thorough results.

**Acronyms used in this table:**

- AOO: Area of occupancy
- DEP: Florida Department of Environmental Protection
- EM: Everglades mink
- EOO: Extent of occurrence
- ESC: Exotic Species Coordination, a Section of the Florida Fish and Wildlife Conservation Commission's Habitat and Species Conservation Division
- F.A.C. Florida Administrative Code
- FFS: Florida Forest Service
- FSPSP: Fakahatchee Strand Preserve State Park
- FWC: Florida Fish and Wildlife Conservation Commission
- FWRI: Fish and Wildlife Research Institute, the research branch of the Florida Fish and Wildlife Conservation Commission
- GIS: Geographic Information System
- HGM: Hunting and Game Management, a Division of the Florida Fish and Wildlife Conservation Commission
- HSC: Habitat and Species Conservation, a Division of the Florida Fish and Wildlife Conservation Commission
- LE: Law enforcement
- NGO: Non-governmental organization(s)
- NPS: National Park Service
- SCP: Species Conservation Planning, a Section of the Florida Fish and Wildlife Conservation Commission's Division of Habitat and Species Conservation
- TBD: To be determined
- USFWS: United States Fish and Wildlife Service
- WHM: Wildlife and Habitat Management, a Section of the Florida Fish and Wildlife Conservation Commission's Division of Habitat and Species Conservation
- WMD: Water Management District(s)

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## APPENDICES

### Appendix 1. Recommended education/outreach to promote the Everglades mink.

The education and outreach plan can reach the following audiences:

General Public – Develop and maintain a web page on the [FWC's website](#) that contains life history, ecological, legal, beneficial practices, and permitting/protection information about the Everglades mink.

Educate private landowners particularly in the Florida Fish and Wildlife Conservation Commission's (FWC's) South and Southwest regions on beneficial practices in place to help prevent incidental take of the Everglades mink. Place beneficial practices and conservation guidelines on the [FWC's website](#). Provide information on the need for continued acquisition of habitat that may include the Everglades mink.

An educational module should be developed to provide FWC's law enforcement officers training on the life history, identification, behavioral, and protection information about a variety of Threatened and Endangered species, including the Everglades mink. Information provided will consist of identification techniques, protection status, habitat, and behavior of the Everglades mink to assist law enforcement officers with enforcement.

#### *Education about Exotic Reptiles*

FWC and its partners can prevent releases of exotic reptiles that may threaten the Everglades mink population by educating the public about responsible pet ownership and hunting opportunities to reduce the python population.

FWC and its zoological partners should continue to promote the Pet Amnesty Days, where owners can relinquish their exotic reptiles without question during several times throughout the year to prevent them from being released into the wild.

The [Python Permit Program](#) also allows hunters and nuisance trappers to capture Burmese pythons and other conditional reptiles on 4 of FWC's wildlife management areas/wildlife environmental areas in south Florida (Everglades and Francis S. Taylor, Holey Land, and Rotenberger wildlife management areas, and Southern Glades Wildlife and Environmental Area). FWC's education and outreach sections can work to inform Floridians of these opportunities.

#### *Beneficial Practices for Land Managers*

Beneficial practices are often used to minimize impacts to wildlife from a variety of activities, and the development and assessment of these practices specific to the Everglades mink has been outlined in previous sections: [Monitoring and Research](#) and [Rule and Permitting Intent](#). Impacts from land management activities, agriculture, and development could be minimized by the implementation of conservation guidelines if used in coordination with education and outreach efforts. FWC's Office of Community Relations can produce educational documents that can be included on the FWC website. Conservation guidelines pertaining to the protection and

preservation of wetlands and historical seasonal variation in depth and flow patterns will be critical to preserving mink habitat.

Beneficial practices and conservation guidelines should be created for land management actions taking place on publically and privately owned lands. Conservation guidelines developed for and used on public lands could be used as a standard for receiving funding on private lands. Private landowners voluntarily applying these practices may be better prepared for emerging programs such as payment for ecosystem services.

Once the specific habitat requirements and threats to the Everglades mink are better understood, existing guidelines can be evaluated to determine whether more specific guidelines might be advisable to help address the threats to the species. The [Water Quality/Quantity Best Management Practices \(BMPs\) for Florida Vegetable and Agronomic Crops](#) address a number of issues that are pertinent to managing the subpopulation of Everglades mink. These BMPs include protecting wetlands from being drained, establishing buffer zones around wetlands, controlling the application of pesticides and herbicides near wetlands, protecting land from practices that cause erosion, and other guidelines that ultimately prevent degradation of potential Everglades mink habitat. The [Silviculture BMPs](#) also list numerous management recommendations regarding commercial timber harvesting, tree planting, and road maintenance operations that contribute to the protection of wetlands. In the event that existing BMPs are not adequate to guide land management decision making and practices to protect habitat for the Everglades mink, then specific recommendations and guidelines may be developed for agency personnel managing lands within the EOO of the species.