

**A Species Action Plan for the
Osprey of Monroe County
*Pandion haliaetus***

September 26, 2018



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OSPREY OF MONROE COUNTY ACTION PLAN TEAM

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Cover photograph by Ricardo Zambrano

Recommended citation:

Florida Fish and Wildlife Conservation Commission. 2018. A species action plan for the osprey of Monroe County. Tallahassee, Florida.

EXECUTIVE SUMMARY

The Florida Fish and Wildlife Conservation Commission (FWC) developed this plan as a component of Florida's Imperiled Species Management Plan (FWC 2016). In 2017, the FWC convened a biological review group (BRG) to reassess the status of the osprey of Monroe County (*Pandion haliaetus*) using criteria specified in Rule 68A-27.001, Florida Administrative Code (F.A.C.). Based on recent research indicating that non-migratory ospreys in Monroe County are not genetically distinct from ospreys elsewhere in Florida (Dellinger et al. 2016), and because the osprey population elsewhere in Florida is stable or increasing (Sauer et al. 2017), the BRG concluded that the osprey of Monroe County does not meet state listing criteria. The findings are published in the 2017 [Biological Status Review report](#) (BSR, FWC 2017). Included in the BSR is the FWC staff recommendation to remove the osprey of Monroe County as a Species of Special Concern from Rule 68A-27.005, F.A.C.

Though ospreys in Monroe County do not meet state-listing criteria, non-migratory ospreys in this area remain vulnerable to declining water quality and hydrologic changes in the Everglades ecosystem. The goal of this plan is to maintain or improve the conservation status of non-migratory ospreys in Monroe County. Actions in this plan focus on improving the foraging and nesting habitat, and these efforts coincide with the multi-agency effort to restore the Everglades ecosystem. Although the osprey of Monroe County will no longer be listed as a Species of Special Concern, it will remain of conservation concern.

While actions in this plan focus on the specific threats and needs of non-migratory ospreys in Monroe and surrounding counties, they can be implemented in other areas of the state where ospreys occur and potentially benefit individuals in those areas as well.

Successful management of ospreys through the implementation of this plan requires the cooperation of local, state, and federal governmental agencies; non-governmental organizations; business and industrial interests; universities and researchers; and the public. The FWC developed this plan in collaboration with stakeholders, and its successful implementation requires cooperation and coordination with other agencies, organizations, private interests, and individuals.

This plan details the actions necessary to maintain the conservation status of the osprey in Monroe County. A summary of this plan is included in Florida's Imperiled Species Management Plan (FWC 2016), in satisfaction of the management plan requirements in Rule 68A-27, Florida Administrative Code, Rules Relating to Endangered or Threatened Species. Florida's ISMP addresses comprehensive management needs for Florida's imperiled species and includes an implementation plan; regulatory framework; relevant policies; anticipated economic, ecological, and social impacts; projected costs of implementation; and a revision schedule. Achieving the objectives of the ISMP depends heavily on stakeholder input and partner support.

TABLE OF CONTENTS

OSPREY OF MONROE COUNTY ACTION PLAN TEAM ii

EXECUTIVE SUMMARY iii

LIST OF TABLES v

LIST OF FIGURES vi

GLOSSARY OF TERMS AND ACRONYMS..... vii

INTRODUCTION 1

 Biological Background..... 1

 Conservation History..... 4

 Threats and Recommended Listing Status 4

CONSERVATION GOAL AND OBJECTIVES 7

CONSERVATION ACTIONS 8

 Habitat Conservation and Management 8

 Population Management..... 11

 Monitoring and Research 11

 Rule and Permitting Intent 12

 Law Enforcement 13

 Incentives and Influencing 13

 Education and Outreach 14

 Coordination with Other Entities 15

LITERATURE CITED 19

LIST OF TABLES

Table 1. Conservation action table..... 17

LIST OF FIGURES

Figure 1. Ventral view of osprey soaring over Curry Hammock. 1
 Figure 2. Dorsal view of osprey flying in Lower Florida Keys..... 1
 Figure 3. Osprey perched on boat lift in Key Largo eating a fish. 2
 Figure 4. Osprey nest on channel marker in Florida Bay 2
 Figure 5. Osprey of Monroe County..... 3
 Figure 6. Interspecific aggression between an osprey and a bald eagle 5
 Figure 7. Ropes and a flag are among the nest materials used on this platform nest 6
 Figure 8. Resident osprey in the Lower Keys..... 7
 Figure 9. Color-banded pre-fledged ospreys.. 8
 Figure 10. Conservation lands in south Florida. 8
 Figure 11. Osprey nest platform on utility pole in Florida Keys. 9
 Figure 12. Osprey nest on uninhabited island in Lower Keys..... 10
 Figure 13. Historical, current, and potential future flow for the Everglades Protection Area..... 11

GLOSSARY OF TERMS AND ACRONYMS

Active Nest: A nest that contains eggs or dependent (i.e., flightless) young. An adult in incubating position can be one indicator that a nest might be active.

Breeding Productivity: The number of fledged young produced by a pair or population, usually calculated annually or per breeding season. [Productivity = clutch size * nesting success (fledges per clutch) * number of clutches laid per breeding season].

BRG: Biological review group, a group of taxa experts convened to assess the biological status of taxa using criteria specified in Rule 68A-27.001, Florida Administrative Code, and following the protocols in the Guidelines for Application of the International Union for the 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 Rule 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.

CERP: Comprehensive Everglades Restoration Plan

CWCI: The CWCI is an FWC-led effort to improve collaboration within and among partner agencies, local governments, conservation groups, businesses, and other stakeholders on a host of issues related to coastal wildlife. The CWCI Coordinator works with regional partners to identify local focal issues, and the FWC's Coastal Team provides technical expertise and works to address issues of statewide scale.

DDT: Dichlorodiphenyltrichloroethane, a pesticide which impacted avian populations through reduced and contaminated prey.

DEP: Florida Department of Environmental Protection

Disturbance: Action which results in alteration of an osprey's normal behavior to such an extent that harm to the osprey, their nest, or young may occur.

F.A.C.: Florida Administrative Code

Fledgling: A young osprey that is capable of flight and that has left the nest, usually around 8 weeks of age. Fledglings may return to the nest for several weeks to be fed or to roost. Compare with Nestling.

F.S.: Florida Statutes

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

Inactive Nest: A nest that does not contain any egg or dependent (i.e., flightless) young in the nest.

ISMP: Florida's Imperiled Species Management Plan

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

IUCN Red List of Threatened Species: an objective global approach for evaluating the conservation status of plant and animal species, the goals of which are to: identify and document those species most in need of conservation attention if global extinction rates are to be reduced; and provide a global index of the state of change of biodiversity.

MBTA: Migratory Bird Treaty Act (16 U.S.C. 703–711), the federal statute that protects nearly all native birds, their eggs and nests. Specifically, the statute makes it unlawful to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention...for the protection of migratory birds...or any part, nest, or egg of any such bird."

Nest: A structure of sticks created, modified, or used by ospreys for reproduction, whether or not reproduction was successful. Some nests are in living trees, but others are built in snags, on manmade structures (such as utility poles, channel markers, or constructed nesting platforms), or on the ground.

Nestling: A young osprey that is incapable of flight and that is dependent on its parents. Once nestling fledges (i.e., leaves the nest by its own capability), it becomes a fledgling.

NPS: National Park Service

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

SFWMD: South Florida Water Management District

SSC: Species of Special Concern, as listed on the Florida Endangered and Threatened Species List.

Successful Nest: A nest that produces at least 1 fledgling during a single breeding season.

GLOSSARY OF TERMS AND ACRONYMS

Take: As defined in Chapter 68A-1.004, F.A.C. (General Prohibitions). "Taking, attempting to take, pursuing, hunting, molesting, capturing, or killing any wildlife or freshwater fish, or their nests or eggs by any means whether or not such actions result in obtaining possession of such wildlife or freshwater fish or their nests or eggs."

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

INTRODUCTION

The following is the plan for the non-migratory ospreys of Monroe County, Florida. This plan was developed through the cooperative efforts of Florida Fish and Wildlife Conservation Commission (FWC) staff, researchers, and stakeholders. This plan is a component of [Florida's Imperiled Species Management Plan](#) (ISMP), which fulfills rule requirements for species listed on the Florida Endangered and Threatened Species List. As per Rule 68A-27.0012, Florida Administrative Code (F.A.C.), any species listed, or removed from the list, are required to have a management plan to support the measures taken for the benefit of the species.

Biological Background

Taxonomic Classification

The only member of the family Pandionidae, the osprey is generally classified into 4 recognized subspecies (Bierregaard et al. 2016): *Pandion haliaetus carolinensis* (North America), *P.h. ridgwayi* (portions of Cuba, portions of the Bahamas, and the coast of southeastern Mexico and Belize), *P.h. leucocephalus* (Australia and southwestern Pacific), and *P.h. haliaetus* (Eurasia). Ospreys breeding in coastal southern Florida (Monroe and surrounding counties) are non-migratory residents (Martell et al. 2004). Genetic analysis indicates that resident ospreys in Monroe County are not a distinct subspecies, as was previously speculated (Dellinger et al. 2016).

Distinguishing Characteristics

The osprey is a relatively large raptor (1,400 to 2,000 g [3.1 to 4.4 lbs] with long, narrow wings (a 150- to 180-cm [4.9- to 5.9-ft] wingspan) and a diagnostic crook in the wing (Henny 1988, Bierregaard et al. 2016) (Figure 1). Most dorsal regions are chocolate-brown, while breast and belly are white (Henny 1988, Bierregaard et al. 2016) (Figure 2). The head is mostly white except for a blackish-brown stripe from the eyes extending to back and small black patches on the forehead and crown (Henny 1988, Bierregaard et al. 2016). Females and, occasionally, males have a speckled brown necklace on their breasts (Bierregaard et al. 2016). Some individuals in the Florida Keys are described as having completely white heads and breasts (Heintzelman 2003) and being slightly smaller, more



Figure 1. Ventral view of osprey soaring over Curry Hammock; note diagnostic crook in wings. Photograph by Robert Stalnaker.



Figure 2. Dorsal view of osprey flying in Lower Florida Keys. Photograph by Tom Wilmers.

like *P.h. ridgwayi* than *P.h. carolinensis*. Unlike other diurnal raptors, ospreys have zygodactyl feet in which the outer toe is reversible, and the underside of the toes are covered with spicules – both characteristics are important in catching and securing fish (Henny 1988).

Habitat

The osprey is found in temperate and subtropical areas that contain permanent fresh, brackish, or salt water for foraging (Henny 1988). Canals, ponds, lakes, bays and manmade impoundments are typically used. Ospreys prefer areas with clear, shallow waters (0.5 to 2 m [1.6 to 6.6 ft] deep) for hunting that is within 10 to 20 km (6.2 to 12.4 mi) of nest sites. In Monroe County, ospreys are found around shallow and open water (i.e., bays, ponds, and lakes) in Everglades National Park and throughout the mangroves and urban areas of the Keys.

Food

The osprey is unique among raptors in that it feeds almost exclusively on fish. Bierregaard et al. (2016) report that live fish make up 99% of prey items reported in all publications addressing ospreys' diet; ospreys rarely take small birds, mammals, and reptiles. Ospreys hunt by diving feet-first for their prey, usually in the top meter of water. They restrict their hunting habits to surface-schooling fish and those in the shallows. In Florida, Bierregaard et al. (2016) reports gizzard (*Dorosoma cepedianum*) and threadfin shad (*D. petenense*), sunfish (*Lepomis* spp.), crappies, speckled trout (*Cynoscion nebulosus*), and mullet (*Mugilidae*) are the primary species taken, with mullet listed as a particularly important species along the subtropical coasts (Poole 1989).



Figure 3. Osprey perched on boat lift in Key Largo eating a fish. Photograph by Bud Hartman.

Breeding

Ospreys breed densely where shallow waters are abundant — Florida Bay being one of those areas cited by Bierregaard et al. (2016). Historically, ospreys built large stick nests atop trees or on islands free from mammalian predators. In recent times, ospreys have begun to use manmade structures ranging from nesting platforms built specifically for their use to channel markers and light and cell phone towers (Figure 4). Ospreys in southern Florida breed from late November through March (Bass and Kushlan 1982), which is earlier than elsewhere in Florida.



Figure 4. Osprey nest on channel marker in Florida Bay. Photograph by Heather Henkel, U.S. Geological Survey.

Distribution and Population Status

Ospreys have a worldwide distribution and can be found in all parts of North America. Most ospreys that breed in the U.S. and Canada are migratory; the resident ospreys in southern Florida (including Monroe County) are exceptional. The geographic extent of non-migratory ospreys is unknown and has only been extensively studied in the Florida Bay, the southern Everglades, and the Florida Keys (Bass and Kushlan 1982, Kushlan and Bass 1983, Fleming et al. 1989, Poole 1989). Genetic analysis of ospreys throughout peninsular Florida determined that resident ospreys in Monroe County are not a distinct subspecies (Dellinger et al. 2016). Although concentrated in Monroe County, the range of non-migratory ospreys may extend farther north into southern Lee County and southern Miami-Dade County. The non-migratory behavior may be clinal, gradually decreasing farther north, and not spatially isolated from migratory ospreys occurring in the southern peninsula (FWC 2017; see Figure 5).

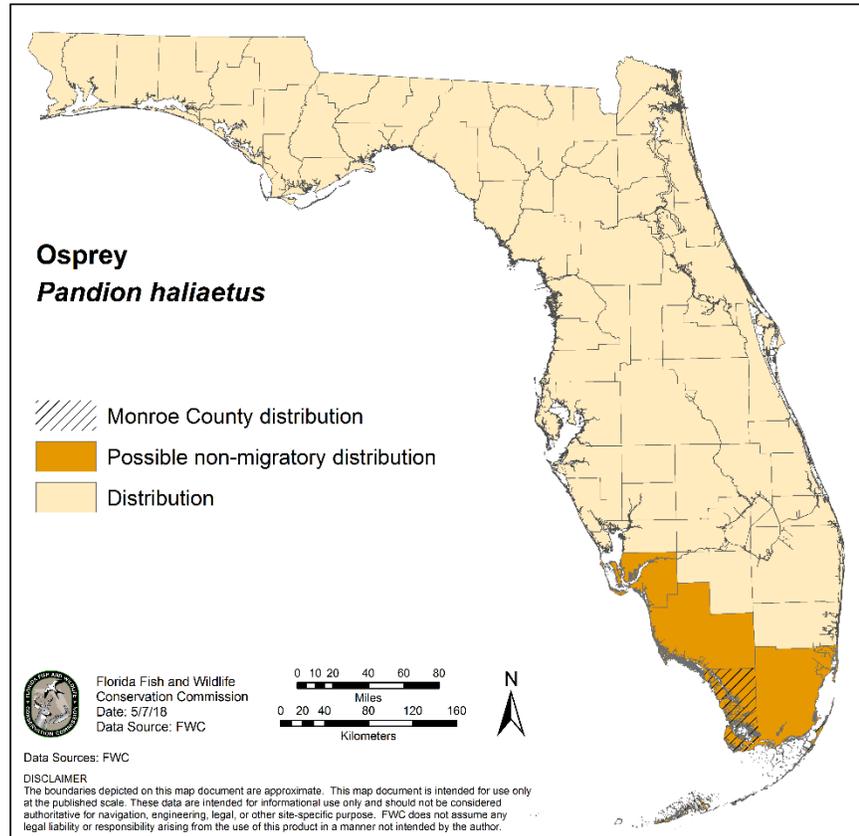


Figure 5. Osprey distribution in Florida, and the potential distribution of the non-migratory ospreys in the state.

The local and regional movement of non-migratory ospreys is poorly understood and is a recognized research priority by the scientific community (Bierregaard et al. 2016). In addition to resident birds, ospreys breeding at more northern latitudes also migrate through and sometimes winter in the Florida peninsula (Martell et al. 2004, Lott 2006). The Biological Status Review report (FWC 2017) concluded that non-migratory ospreys in Monroe County likely experiences, or could experience, significant immigration.

Bierregaard et al. (2016) estimated the osprey population in the U.S. (excluding Alaska) at approximately 16,000 to 19,000 breeding pairs, which is a significant increase from the estimate of 7,500 to 8,000 breeding pairs in the early 1980s (Poole 1989). Among the contiguous 48 states, Florida, Maine, Virginia, and Maryland have the largest number of ospreys (Houghton and Ryman 1997, Bierregaard et al. 2016). The Florida population was estimated at 2,500 to

3,000 pairs in 1994 (M. Westall, unpublished data cited in Houghton and Rymon 1997) and has likely surpassed that now. Ospreys are common in Florida where breeding pairs occur along both the Atlantic and Gulf of Mexico coasts and in the central lakes regions of the state (FWC 2003).

Conservation History

Osprey and other bird populations across the U.S. suffered a decline from the 1950s through the 1970s due to the effects of contaminant levels that caused thinning of eggshells and resulted in reduced hatching success. With a reduction in use of chemicals causing the effects (primarily dichlorodiphenyltrichloroethane [DDT] and DDT derivatives), populations recovered rapidly. Today, the osprey is a common and widespread breeding bird in Florida (though decline is documented in Monroe County); Florida may contain about 20% of the nesting population in the lower 48 states (Henry 1983).

The resident ospreys in Monroe County are known to have declined between 1973 and 2007 – roughly 56% over 27 years in Florida Bay (Kushlan and Bass 1983, S. Bass, Everglades National Park, unpublished data). The osprey of Monroe County was listed as a state-designated Species of Special Concern in 1987. Recent, comprehensive survey data are lacking, but count data in Florida Bay showed an increase from 60 pairs in 2007 to 88 pairs in 2017 (FWC 2017). The BSR conservatively estimates the 2017 county-wide population at 150-200 pairs and emphasized that additional monitoring is needed to assess population trend (FWC 2017).

Since the original Species Action Plan for the Osprey of Monroe County was published in 2013, research has determined that resident ospreys in Monroe County osprey are not genetically distinct from migratory osprey in Florida (Dellinger et al. 2016). This knowledge answers many actions identified in the original plan. This revision of the plan includes a focus on the unique threats facing ospreys in Monroe County and around Florida Bay. Because of the conclusive research on the genetics of the non-migratory ospreys in Monroe County, some actions in this revised version of this plan have been adapted, including combining some monitoring actions to streamline efforts.

Threats and Recommended Listing Status

Threats

Ospreys in Monroe County is primarily associated with the Florida Bay, southern Everglades, and the Florida Keys. Primary threats include possible limitations of food availability in portions of Florida Bay due to hypersalinity from lower freshwater inflow into the bay (McIvor et al. 1994). Food-stress issues have been shown to be a significant cause of mortality in pre-fledged ospreys in Florida Bay (Poole 1982); this can have a significant effect on the stability of the Monroe County population. Exposure to chemicals, heavy metals, and pesticides due to biomagnifications in prey items is another potential hazard. Because ospreys are obligate piscivores (they primarily eat fish), threats from recreational fishing include entanglement in monofilament leading to injury or death, injury by hooks, and ingestion of lead weights or plastics. These dangers not only threaten adults but also pose a potential risk to young birds if these materials are brought to the nest.

Adult ospreys are rarely attacked by other animals, but eggs and young are susceptible to a variety of predators (Poole 1989). Ogden (1975) noted interspecific territorial behavior by bald eagles (*Haliaeetus leucocephalus*) resulted in a decline in osprey nests and nesting success on keys in Florida Bay (Figure 6). Rehabilitation facilities report that direct persecution by shooting of individuals in Monroe County remains an issue, albeit rare (A. Barber, Florida Keys Wild Bird Center, personal communication 2013).



Figure 6. Interspecific aggression between an osprey and a bald eagle. Photograph by Bob Pelkey.

Resident ospreys do not face the many hazards encountered during migration as experienced by most of their North American counterparts, yet electrocution and collisions with vehicles, especially in the Keys, remains a threat (A. Barber personal communication, 2013). Because of their location and restricted range, Monroe County resident ospreys are vulnerable to hurricane and tropical weather events, although most nesting occurs several months after the hurricane season. However, occasional hurricane events may benefit osprey nesting habitat. Observational evidence suggests that in mangrove areas with limited nesting potential due to uniform canopy height, hurricanes have removed some trees, leaving others taller and more suitable for nest-building activities (M. Westall, The International Osprey Foundation, personal communication).

Habitat loss due to development in the Keys is a potential threat. Ospreys in the Florida Keys may now be widely dependent on manmade structures for nesting. Future development in Monroe County may further affect the availability of nesting habitat.

Climate change effects are potentially devastating to birds nesting in the Florida Keys, islands in Florida Bay, and surrounding lands. Modeling for potential impacts of sea level rise in southern Florida suggests that a substantial portion of the Florida Keys land mass will be inundated by the end of the century (Zhang et al. 2011). Hurricane frequency and severity are also projected to increase. Because ospreys in Monroe County nest during the early winter (several months after the season when tropical weather events occur), these events may not cause significant direct mortality of eggs and young. However, they could further decrease natural nest-site availability.

Ospreys are tolerant of human disturbance when desensitized (Rodgers and Schwikert 2003), and they also effectively exploit manmade nesting sites (e.g., Schreiber and Schreiber 1977; Figure 7). Human disturbance can be a problem in backcountry areas. Jet skis have been banned from use over large backcountry areas along the Florida Bay side of the Keys, but tolerance of jet skis has yet to be determined (Bierregaard et al. 2016).

Recommended Listing Status

Florida's ISMP identifies the need to re-assess all remaining Species of Special Concern by 2017. When the FWC evaluated the Monroe County osprey in 2010, further data on the genetics were required to re-assess the listing status. In 2016, Dellinger et al. concluded that the osprey of Monroe County was not a distinct subspecies. A Biological Review Group of experts on the osprey subsequently convened to assess the biological status of the species using criteria specified in Rule 68A-27.001, 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).



Figure 7. Ropes and a flag are among the nest materials used on this platform nest in Key Largo. Photograph by Bud Hartman.

In 2017, the BRG evaluated the osprey of Monroe County and documented their findings in a Biological Status Review Report. The report (FWC 2017) concluded that resident ospreys of Monroe County are not genetically distinct, and the Florida osprey population as a whole is stable or increasing. Therefore, the BSR states that the osprey of Monroe County does not meet state listing criteria, and FWC staff recommended removing the osprey of Monroe County from the Florida Endangered and Threatened Species List in Rule 68A-27.005, F.A.C.

CONSERVATION GOAL AND OBJECTIVES

Goal

The conservation status of non-migratory ospreys in Monroe County is maintained or improved.

Although ospreys in Monroe County are not a genetically distinct species, they are still impacted by alteration and loss of habitat. Like many species, the osprey will benefit from actions that maintain or improve hydrology of the Everglades and water quality in Florida Bay.

Objectives

I. Improve the quality and quantity of osprey nesting and foraging habitat in Monroe County.

Rationale

Protecting and improving habitat for existing and potential osprey breeding and foraging sites is essential for conserving resident ospreys in this area. Improving freshwater flows into the ecosystem is paramount not only for osprey in Monroe County but also for many imperiled species.

II. Maintain or increase the number of resident ospreys in Monroe County.

Rationale

Although resident ospreys of Monroe County are not genetically distinct from ospreys elsewhere in Florida, they do exhibit different breeding behavior than migratory ospreys. Non-migratory ospreys depend on the functioning ecosystem of Florida Bay to successfully reproduce. Past data indicated local decline, and current surveys are limited and insufficient to determine county-wide population trends. The actions to achieve this objective include management that minimizes threats and monitoring efforts to assess trends.



Figure 8. Resident osprey in the Lower Keys. Photograph by Tom Wilmers.

CONSERVATION ACTIONS

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



Figure 9. Color-banded pre-fledged ospreys. Photograph by Tim Dellinger.

Habitat Conservation and Management

This plan relies in part on the ability of public lands to support osprey nesting and foraging activities. Public lands provide a high level of security for wildlife because of statutory provisions for long-term management funding and for guiding habitat management on those lands (Chapters 259.105 and 259.032, Florida Statutes [F.S.]) (Figure 10). Florida Bay, the area most relevant to conservation of ospreys in Monroe County, is managed by the Everglades

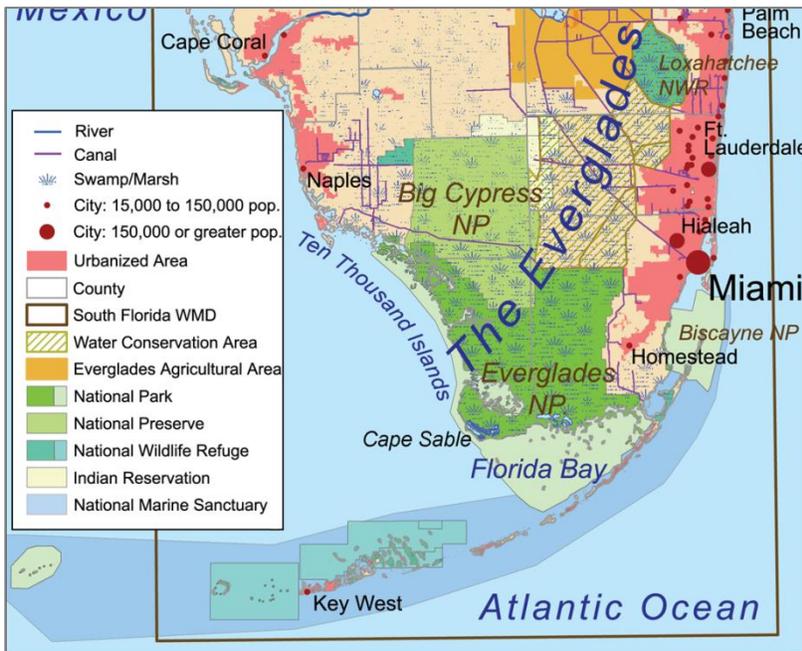


Figure 10. Conservation lands in south Florida.

National Park and the Florida Park Service. Waters surrounding the Florida Keys are almost entirely publicly owned, either as part of the National Marine Sanctuary or National Wildlife Refuge system. All lands under the mean high-water line are submerged sovereign lands owned by the State of Florida and managed by the Florida Department of Environmental Protection (DEP). The Florida Forever acquisition program has earmarked many privately owned lands in Monroe County as priorities for state purchase because of the sensitive habitats they contain.

Action 1 Work with cooperators to create and protect nesting structures.

Florida Bay contains hundreds of small mangrove islands that are largely free from human disturbance. Mangrove trees and the ground on these islands are potential nesting habitat for ospreys (Ogden 1977, Bass and Kushlan 1982). Ospreys also readily use manmade structures.

Manmade sites include those constructed specifically for osprey use, as well as structures intended for other purposes that are desirable to the ospreys. Manmade nesting sites have produced significantly more young (about twice as many) as natural sites (Poole 1989). Ospreys in Monroe County may have become largely dependent on manmade nesting sites, and it is imperative that these sites be maintained (FWC 2011). Continued efforts to construct and protect these structures to increase nesting opportunity may prove indispensable to sustaining viability of resident ospreys in this area. Ospreys have shown a tolerance for human activities, and public access does not likely play a significant role in nest failures (Rodgers and Schwikert 2003). When active nests are located on utility poles, cellular towers, and radio towers where regular maintenance is required, guidance should recommend the frequency and duration of visits or delaying maintenance to the non-breeding season if possible.



Figure 11. Osprey nest platform on utility pole in Florida Keys. Photograph by Allison Salas.

Ospreys nesting in remote areas, especially in the Lower Florida Keys backcountry, may not be as accustomed to disturbance as birds nesting in more populated areas. The location of these nest sites is too far away from the mainland keys to provide easily accessible artificial nest structures for these birds. Also, birds nesting on the edges of the islands in this region are routinely disturbed by boaters (T. Wilmers, U.S. Fish and Wildlife Service [USFWS], personal communication). Additional management, such as posting the nest sites to minimize disturbance, may be warranted.

Osprey nests are protected under the federal Migratory Bird Treaty Act and Florida law. Removal of an active nest may require a permit from the U.S. Fish and Wildlife Service. Removal of an inactive nest in Monroe County no longer requires a permit, however, FWC recommends replacing the removed nest with an artificial structure nearby when appropriate. FWC will work with partners to ensure that manmade nesting sites are available to ospreys that breed in the Florida Bay. The Osprey [Species Conservation Measures and Permitting Guidelines](#), outline guidance on artificial nesting structure construction and placement.

Action 2 Work with partners and agencies to prioritize important osprey breeding and foraging sites for land acquisition projects (i.e., Florida Forever) in Monroe, Miami-Dade, Collier, and Lee counties, especially where these lands are compatible with priorities for listed species.

Continued acquisition of public lands is a key strategy for conserving ospreys in Monroe County. Approximately 28% of Florida’s land area is publicly owned or protected under perpetual conservation easements. By the year 2060, it is estimated that an additional 7 million acres (2,800 ha) of land will be converted from rural and natural to urban uses (FWC 2008).



Figure 12. Osprey nest on uninhabited island in Lower Keys. Photograph by Tom Wilmers.

Acquisition and management of public lands plays a vital role for the conservation of many species and is a part of an overall action to conserve species in the state of Florida. Land acquisition projects should consider important osprey habitat when evaluating land to acquire.

Action 3 Work with partners to improve the water quality of Florida Bay.

The decline of the ospreys in the Florida Bay is likely a symptom of a larger issue. In 1987, the Florida Bay suffered from a significant algal bloom that clouded the waters and caused more than 40,000 ha (>100,000 ac) of seagrass to die. Through cooperative efforts from multiple state and federal agencies, water quality in the bay appears to have improved; however, there are still signs of distress. For example, in areas where seagrass has died off, soft sediments are exposed and can easily be disturbed during storms or high wind, which can diminish water clarity (South Florida Water Management District [SFWMD] 2002). Reduction in water clarity could result in decreased hunting success by ospreys in the region, and at the right time of year, could decrease nesting success.

Monumental efforts have been undertaken to improve the water quality in the Florida Bay through the [Comprehensive Everglades Restoration Plan](#) (CERP). The CERP provides a framework to restore, protect, and preserve the water resources of central and southern Florida, including the Everglades. Scientists from many agencies are still working to determine exactly how the Bay functions and what constitutes a restored Florida Bay. This plan will not detail all of the efforts taken; however, it is essential that the FWC remain engaged in these projects as they relate to wildlife species that inhabit the Keys and Florida Bay, including the osprey.

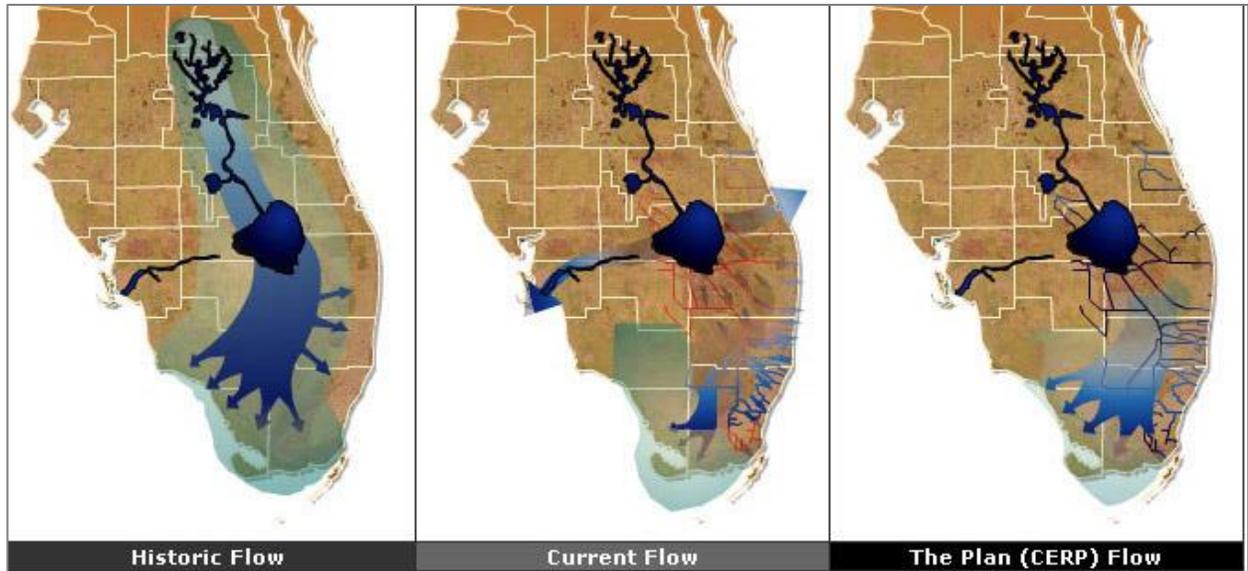


Figure 13. Historical, current, and potential future flow for the Everglades Protection Area. (Used with permission from the U.S. Army Corps of Engineers, Jacksonville District).

Population Management

There are no identified population management actions specific to the osprey of Monroe County.

Monitoring and Research

The decline in the Monroe County osprey population has been speculated to be the result of several potential factors influencing food supplies; thus, monitoring ospreys is critical in assessing on-going trends as well as for identifying research priorities regarding potential causes.

Action 4 Work with partners to conduct winter nesting surveys and monitor nests and juveniles in Monroe County.

A periodic survey of osprey nests is needed to assess the county-wide population size and trend; Bass and Kushlan (1982) suggest nest locations be maintained in a database. For surveys in remote areas in Florida Bay and the Keys, surveying by aircraft is a proven method of surveying large areas efficiently and less intrusively than surveys from the ground or boat (Fuller and Mosher 1987). This technique has been used successfully to determine the number of ospreys breeding in Everglades National Park (Bass and Kushlan 1982). Surveys should occur in January or February, and due to the survey habitat and low-altitude flights, a Lake amphibious aircraft is recommended. Unmanned aerial vehicles (e.g., drones) may be an alternative. Opportunistic winter surveys combined with other species surveys, (e.g., bald eagle), may be the best way to achieve monitoring.

Monitoring of osprey nests and juveniles is already occurring in some public areas in Monroe County by partners such as Audubon and Osprey Watch. Partnerships with NPS, USFWS, DEP as well other agencies and organizations and the public could help locate and monitor nests to determine outcomes. For example, in Rhode Island, a citizen science [network](#) locates and monitors osprey nests, an approach that could be used to gather information in more populated areas of Monroe County. Comprehensive monitoring for the statewide population is not feasible

or necessary based on current status, but monitoring can be accomplished through a subsample of nests located throughout Monroe County, similar to that conducted for previous research (e.g., Bowman et al. 1989).

For estimating productivity, recommended methods for monitoring a sample of nests include:

1. Check activity at the nest 1 to 4 times per month.
2. Check from a distance using binoculars or a spotting scope and use the same observation point to allow nesting ospreys to become habituated to the observer.
3. Observe the nest for 10 to 20 minutes to assess the nesting phase and to determine the nest contents; more time may be necessary around transition times. Keep a low profile and minimize loud noises during observation time; if the birds seem distressed, discontinue observation and leave the area.
4. Be sure to record important events, such as date of pair arrival, date of incubation and clutch hatching, number of nestlings (if possible), number of fledglings, fledgling date or failure date, and date chicks are last observed at the nest.
5. If participating in citizen science, data can be entered online at Osprey-Watch.org.

Action 5 Monitor heavy metal concentration in nestlings in the Florida Bay as needed, following events that may increase mercury concentration in the environment.

Rumbold et al. (2017) found mercury concentrations were higher in nestling feathers of osprey from Collier and Monroe counties than in ospreys sampled in central Florida. Mercury has been measured in tissues of juvenile and adult osprey from Florida Bay at levels that have the potential to result in reduced reproductive success (Lounsbury-Billie et al. 2008, Rumbold et al. 2017). However, further information is needed on the productivity of ospreys in Monroe County and on the impacts of mercury and other factors on productivity, particularly if future activities have the potential to result in increased concentrations of mercury. Continued monitoring of contaminant levels in young birds by universities or other research organizations may inform if additional management is needed to protect ospreys in affected areas.



Figure 14. Osprey nestlings being fed at nest site on Key Largo. Photograph by Bud Hartman.

Rule and Permitting Intent

A permit is no longer required to remove inactive osprey nests (those that do not contain eggs or flightless young) in Monroe County. FWC suggests construction of a new nesting structure at the site to replace the removed nest (see [Species Conservation Measures and Permitting Guidelines](#)).

Ospreys throughout the state are protected under FWC’s general prohibitions (Rule 68A-4.001 F.A.C.), making it unlawful to take, transport, store, serve, buy, sell or possess them unless specifically permitted. Take is defined as pursuing, hunting, molesting, capturing, or killing, or taking their nests or eggs by any means whether or not such actions result in obtaining possession of such wildlife (Rule 68A-1.004, F.A.C.). Osprey are also protected under the federal Migratory Bird

Treaty Act. Under the Act it is unlawful to pursue, hunt, take, capture, kill or sell migratory birds, including their feathers, eggs, and nests. A federal permit may be required to remove an active osprey nest in any part of the state.

Law Enforcement

There are no identified law enforcement actions specific to the osprey of Monroe County.

Incentives and Influencing

Action 6 Support projects that work to return the natural flow of water to the Everglades ecosystem and improve water quality in the Florida Bay.

In addition to influencing private landowners and local governments, the FWC should continue to work with agency partners to support the efforts to improve the water quality in the Florida Bay through the CERP (see [Action 3](#)). Protecting water quality in the Everglades and surrounding areas is critical to improving osprey habitat quality in the region.

Action 7 Encourage utilities to include osprey nest structures in Avian Protection Plans.



Figure 15. Active nest built on a disk above utility lines. Photograph by Tim Dellinger.

Ospreys commonly nest on power poles (Figure 15), communication towers, water navigation devices, lighting fixtures, outdoor billboards, and other manmade structures as well as in decaying or dead trees. These large nests sometimes render the structure inoperable or present a safety hazard. The FWC no longer requires a permit to remove a nest that is inactive, but recommends constructing a replacement nesting structure at the site after removal of an inactive nest. Replacement structures can be mutually beneficial in some cases in which an entity, such as a power company, could lure a persistent bird away from nesting on a utility structure by offering a more attractive alternative.

Action 8 Offer technical assistance to utility companies to minimize the impacts of transmission lines, communication towers, etc. on ospreys in Monroe County.

Power lines, poles and communication towers provide perch, roost and nest sites for ospreys ([Figure 15](#)). These structures are particularly beneficial in the Keys where there is a lack of natural habitat and ospreys nesting there may be largely dependent on artificial structures. However, these structures also can have adverse effects such as injury or death from collision or electrocution.

Collisions with power lines and guy wires pose a potential threat to many raptor species (Bale 1999, Erikson et al. 2005). Deem et al. (1998) reported power line collisions among the causes of trauma of free-ranging raptors admitted to the University of Florida Veterinary Medical Teaching Hospital between 1988 and 1994.

Electrocutions may pose a greater danger than collisions, especially for individuals that attempt to land or nest on double-crossarm power poles with transformers (Bierregaard et al. 2016). Harness and Wilson (2001) report larger raptor species, such as the osprey, are more susceptible to electrocution than smaller ones because a longer wingspan may reach the distance between conductive materials, and that juveniles may be the most at risk of electrocution because they are inexperienced flyers.



Figure 16. Osprey perching on a manmade structure on Key Largo. Photograph by Bud Hartman.

FWC maintains a [bird mortality website](#) where the public can submit details of deaths due to collisions or electrocutions from power lines. FWC can continue to monitor the website for reported osprey mortalities in Monroe County. This information, as well as data from utility companies on osprey deaths, can supplement survey data to determine where specific structures are a threat, so suitable structures can be erected nearby (e.g., Austin-Smith and Rhodenizer 1983). Utility companies may also install deterrents (e.g., spikes) on structures that pose the greatest electrocution threat, and bird diverters/markers on sections of power lines where collisions occur frequently. Lastly, information pertaining to injury or death related to transmission lines and communication towers should be solicited from facilities that rescue and rehabilitate wild birds in Monroe County. The FWC encourages these facilities to enter information on known causes of mortality in the [bird mortality website](#).

FWC recommends utility companies develop an Avian Protection Plan with specific guidance to reduce and report osprey mortalities. The [Avian Power Line Interaction Committee](#) has helpful guidance regarding the development of Avian Protection Plans and for techniques to reduce the potential for osprey mortality.

Education and Outreach

Action 9 Work with local partners (e.g., Audubon Society, USFWS, phone and power companies, Friends of the Everglades, DEP’s Coastal and Aquatic Managed Areas, SFWMD, Osprey-Watch) to increase awareness of water quality issues and practices beneficial to osprey among user groups of the Florida Bay.

Outreach should target organizations whose programs may impact Monroe County ospreys. These include local conservation organizations, land and aquatic area managers, local government (including planning, permitting, and natural resources staff), recreational group representatives, and relevant statewide or national organizations that have local programs in place. A key message for outreach is the importance of restoration of the Everglades for the osprey and other species that rely on the ecosystem. Outreach will be conducted through existing working groups and partnerships, as well as through new partnerships initiated by FWC or others.

Existing partnerships include the Coastal Wildlife Conservation Initiative (CWCI) and Osprey-Watch. The CWCI is an FWC-led effort to improve collaboration within and among partner

agencies, local governments, conservation groups, businesses, and other stakeholders on a host of issues related to coastal wildlife. The CWCI Coordinator works with regional partners to identify local focal issues, and the FWC's Coastal Team provides technical expertise and works to address matters of statewide scale. The Center for Conservation Biology created Osprey-Watch.org to engage citizen scientists and conservationists in collecting data on breeding ospreys. The program collects information on the health of aquatic habitat through osprey data, as ospreys are a top consumer within aquatic ecosystems and are very sensitive to both overfishing and environmental contaminants. Osprey-Watch utilizes an internet platform that allows observers across the globe to map their nests, log observations, upload photos, and interact within an observer forum. Because of its global focus and existing outreach efforts, Osprey-Watch is considered a key partner in the successful implementation of this plan.

Action 10 Update the FWC website on osprey to include responsible management of fishing equipment and osprey nest conservation guidelines.

Additional resources may be added to the [osprey species profile](#) on the FWC website, including a brief biological background, information on best practices for activities conducted near active nests, nest platform construction information, and resources for proper use and disposal of monofilament. The targeted audience includes users of Florida Bay, and statewide boaters, paddlers, anglers, other recreational users; tour operators; power and phone companies; agencies that manage navigational waterway markers; land and aquatic area managers; visitors to the area; and residents.

Coordination with Other Entities

Many of the actions in this plan involve coordination with other agencies, non-governmental organizations, and local governments; these actions are included in the sections where they are most relevant.

Action 11 Coordinate with partners to develop avoidance of adverse impacts to osprey when planning new developments, especially for offshore wind infrastructure.

It is recognized that wind turbines cause bird mortality, but the extent is largely unknown. There is also a scarcity of published data on the long-term effects of onshore and offshore wind farms on avian species as few studies have been conducted. Priority of this action may vary depending on trends within the renewable resource industry.

FWC will remain engaged in recommending guidelines for wind farm placement and will provide recommendations for proposals for wind farm facilities in Monroe, Lee, Collier, or Miami-Dade counties. Depending on the placement of such farms, ospreys could be particularly vulnerable. Due to foraging habits and low-level flight pattern, there is an increased risk of encountering a wind turbine, and mortality rates for the osprey could have severe detrimental effects on the viability of resident ospreys in south Florida. These needs will be considered when providing comments or recommendations for wind farm projects.

CONSERVATION ACTIONS

During the planning of new developments or infrastructure, opportunities for nesting platforms and habitat creation should be identified. Coordination among project management and appropriate agencies should result in improved conservation where development occurs.

Table 1. Osprey of Monroe County conservation action table.

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

Objective(s) Addressed	Team Assigned Priority Level	Action Number	Action	Conservation Action Category	Status	Implementation leads: FWC divisions or sections	External partners	Likely Effectiveness	Feasibility	Urgency: Is the action immediately critical to the species' survival?
1	2	1	Work with cooperators to install and protect nesting structures.	Habitat Conservation & Mgmt	NEW	HSC	USFWS, USDA	Very Likely	Practical. Relationships already Exist.	Urgent; all research agrees that artificial nest structures increase nestling survival.
1	4	2	Work with partners and agencies to prioritize important osprey breeding and foraging sites for land acquisition projects (i.e., Florida Forever) in Monroe, Miami-Dade, Collier, and Lee counties, especially where these lands are compatible with priorities for listed species.	Habitat Conservation & Mgmt	NEW	HSC	Univ. of Florida	Likely	Practical. Priority sites for land acquisition for the Florida Forever Project already include many sites that are good for Osprey Nesting.	Not urgent. Osprey will use suitable sites whether or Not urgent they are publicly owned. Sites that are publicly owned may be more beneficial to the species, but it is not a requirement.
1	2	3	Work with partners to improve the water quality of Florida Bay.	Habitat Conservation & Mgmt	EXPANDED	HSC	The Nature Conservancy, USFWS	Very Likely	Practical. Ongoing efforts already in place.	Urgent. The decline of the Monroe County birds is likely a symptom of the decline of the Everglades Ecosystem.
2	4	4	Work with partners to conduct winter nesting surveys, and monitor nests and juveniles in Monroe County.	Monitoring & Research	NEW	FWRI	USFWS, National Audubon Assn., Local Environmental Groups	Somewhat Likely	Somewhat Practical. Winter nesting programs for osprey have occurred in the past.	Not urgent, but it will be difficult to determine if the population is increasing without some type of population monitoring.
1	4	5	Monitor heavy metal concentration in nestlings in the Florida Bay as needed, following events that may increase mercury concentration in the environment.	Monitoring & Research	NEW	FWRI	Unknown	Somewhat Likely	Difficult. This research would need to be picked up by a university or interested party.	Not urgent. But the cause of the decline is Not urgent fully understood, and it is important understand the problem so it can be solved.
1	2	6	Support projects that work to return the natural flow of water to the Everglades ecosystem and improve water quality in the Florida Bay.	Incentives & Influencing	ONGOING	HSC	USFWS, SFWMD, SWFWMD, DEP	Very Likely	Practical. This work is ongoing.	Urgent. The decline of the Monroe County birds is likely a symptom of the decline of the Everglades Ecosystem.
2	2	7	Encourage utilities to include osprey nest structures in their Avian Protection Plan and offer technical assistance to stakeholders for removal of osprey nests.	Incentives & Influencing	ONGOING	HSC	Internal	Somewhat Likely	Practical. This move is already in progress.	Not urgent. But the work is already in progress and studies show that artificial nesting structures improve nest success.
2	4	8	Offer technical assistance to utility companies to minimize the impacts of transmission lines, communication towers, etc. on ospreys in Monroe County.	Incentives & Influencing	NEW	FWRI	Electrical Companies, Rehabilitation Centers.	Somewhat Likely	Practical. This information is already widely reported to our Bird Mortality Database by Wildlife Rehabilitators and Power Companies.	Not urgent. Ongoing efforts are already in place to retrofit problem electrical towers. However, monitoring the number and type of electrocutions is already ongoing and could be expanded rather easily.

Table 1. Osprey of Monroe County conservation action table.

Objective(s) Addressed	Team Assigned Priority Level	Action Number	Action	Conservation Action Category	Status	Implementation leads: FWC divisions or sections	External partners	Likely Effectiveness	Feasibility	Urgency: Is the action immediately critical to the species' survival?
2	5	9	Work with local partners (e.g., Audubon Society, USFWS, phone and power companies, Friends of the Everglades, DEP's Coastal and Aquatic Managed Areas, SFWMD, Osprey-Watch) to increase awareness of water quality issues and practices beneficial to osprey among user groups of the Florida Bay.	Education & Outreach	NEW	HSC	Audubon Society, USFWS, Phone and Power Companies, Friend of the Everglades, CAMA, SFWMD, Osprey Watch Group	Somewhat Likely	Practical. This work is ongoing.	Not urgent. But awareness increases interest and support for a species that may be seen as common.
2	5	10	Update the FWC website on osprey to include responsible management of fishing equipment and osprey nest conservation guidelines.	Education & Outreach	NEW	OIT	Internal	Somewhat Likely	Practical.	Not urgent. But awareness increases interest and support for a species that may be seen as common.
2	3	11	Coordinate with partners to develop avoidance of adverse impacts to osprey when planning new developments, especially for offshore wind infrastructure.	Coordination with Other Entities	NEW	HSC	Local and County Government	Somewhat Likely	Practical. FWC is already involved in environmental commentating for large-scale projects.	Urgent. Unknown effects from sources such as wind farms can have a devastating effect on the already declining local population of osprey.
1, 2	1	Complete	Determine the Monroe County (southern coastal) osprey population's taxonomy through genetic sampling.	Monitoring & Research	COMPLETE	FWRI	Virginia Commonwealth University College of William and Mary	Very Likely	Practical. Research in progress.	Not urgent, though this information will determine the if this population is a distinct subspecies.

Acronyms used in this table:

- CAMA: Coastal and Aquatic Management Areas
- DEP: Florida Department of Environmental Protection
- FWC: Florida Fish and Wildlife Conservation Commission
- FWRI: Fish and Wildlife Research Institute, the research branch of the Florida Fish and Wildlife Conservation Commission
- HSC: Habitat and Species Conservation, a Division of the Florida Fish and Wildlife Conservation Commission
- SFWMD: South Florida Water Management District
- SWFWMD: Southwest Florida Water Management District
- TBD: To be determined
- USDA: United States Department of Agriculture
- USFWS: United States Fish and Wildlife Service

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