Osprey Biological Status Review Report

March 31, 2011

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

Biological Status Review Report for the Osprey

(*Pandion haliaetus*)

(Monroe County population only)

March 31, 2011

EXECUTIVE SUMMARY

The Florida Fish and Wildlife Conservation Commission (FWC) directed staff to evaluate all species listed as Threatened or Species of Special Concern as of November 8, 2010 that had not undergone a status review in the past decade. Public information on the status of the osprey (Monroe County population only) was sought from September 17, 2010 to November 1, 2010. The three member Osprey Biological Review Group (BRG) met on November 3rd, 2010. Group members were Karl Miller (FWC lead), Sonny Bass (Everglades National Park), and John Ogden (Audubon of Florida) (Appendix 1). In accordance with rule 68A-27.0012, Florida Administrative Code (F.A.C.), the BRG was charged with evaluating the biological status of the osprey (Monroe County population only) using criteria included in definitions in 68A-27.001, F.A.C., and following the protocols in the *Guidelines for Application of the IUCN Red List Criteria at Regional Levels Version 3.0* and *Guidelines for Using the IUCN Red List Categories and Criteria (2004)*. Please visit http://myfwc.com/wildlifehabitats/imperiled/listing-action-petitions/ to view the listing process rule and the criteria found in the definitions.

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

The BRG concluded in their biological assessment that the osprey (Monroe County population only) when considered by itself, met at least one listing criterion. However, based on a literature review, information received from the public, and the BRG findings, staff concluded that further information is needed about the uniqueness of the southern coastal osprey population, including a clearer understanding of its geographic extent. Because the osprey is not constrained by county lines, rather than simply retaining the Monroe county listing designation, staff recommends listing the southern coastal osprey population as a Species of Special Concern until more information has been gathered about whether it is a distinct population and about its true geographic range.

This work was supported by a Conserve Wildlife Tag grant from the Wildlife Foundation of Florida. FWC staff gratefully acknowledges the assistance of the biological review group members and peer reviewers. Staff would also like to thank Michelle Van Deventer, who served as data compiler for the species and drafted part of an earlier version of this report.

BIOLOGICAL INFORMATION

Life History References – Poole (1989), Ogden (1996), Snyder (2001), Poole et al. (2002), Florida Fish and Wildlife Conservation Commission (2003), Martell et al. (2004).

Taxonomic Classification – There are generally four recognized subspecies of osprey (Poole et al. 2002): *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. haliaetus* (Eurasia), *P. h. leucocephalus* (Australia and southwestern Pacific; formerly *P. h. cristatus*). Osprey breeding in coastal southern Florida (i.e., Monroe and Dade counties) are believed to be non-migratory residents (Poole 1989, Ogden 1996, Houghton and Rymon 1997) and therefore a distinct subpopulation. Experts have suggested that osprey in coastal southern Florida are taxonomically affiliated with *P. h. ridgwayi* (J. Ogden, *personal communication*; S. Bass, *personal communication*) because of their physical similarities (e.g., smaller size, pale plumage), and their non-migratory status. However, genetic affinities have not been established through molecular techniques.

Geographic Range and Distribution – The osprey is widely distributed in North America and highly migratory at higher latitudes. Most North American osprey winter in South and Central America (Poole et al. 2002, Lott 2006), with the exception of the non-migratory, resident subpopulation in coastal southern Florida. Geographic extent of this resident subpopulation is unknown. Some have suggested that osprey nesting in peninsular Florida south of 29 degrees latitude are non-migratory residents (Poole 1989, Houghton and Rymon 1997). However, recent satellite telemetry documented that osprey breeding in Lake Istokpoga (Highlands County; approximately 27.25 degrees latitude) routinely migrate to South America (Martell et al. 2004). In Florida, non-migratory, resident osprey have been well documented and extensively studied only in Florida Bay, the southern Everglades, and the Florida Keys, which are primarily or entirely within Monroe County (Bass and Kushlan 1982, Kushlan and Bass 1983, Fleming et al. 1989, Poole 1989, Ogden 1996).

Limited telemetry data (M. Westall, *personal communication*) and anecdotal evidence suggest that at least some individuals may be non-migratory as far north as southern Miami-Dade County (Atlantic coast) and northern Collier County/southern Lee County (Gulf coast). Understanding the movements of presumed "resident" subpopulations is one of the highest research priorities for osprey in North America (Poole et al. 2002).

In addition to non-migratory breeders in southern coastal Florida and migratory breeders elsewhere in Florida, osprey breeding at more northern latitudes also migrate through, and sometimes winter in, the Florida peninsula (Martell et al. 2004, Lott 2006). Ospreys exhibit high fidelity to nesting sites and wintering areas (Martell et al. 2001).

Population Status and Trend – Poole et al. (2002) estimated the osprey population in the United States (excluding Alaska) at approximately 16,000 – 19,000 pairs, which is a significant increase from an estimate of 7,500 – 8,000 breeding pairs during the early 1980s (Poole 1989). Among the contiguous 48 states, Florida, Maine, Virginia, and Maryland have the largest osprey populations (Houghton and Rymon 1997, Poole et al. 2002). Florida's population was estimated at 2,500 – 3,000 pairs in 1994 (M. Westall, unpublished data cited in Houghton

and Rymon 1997) and has likely grown to 3,500 – 4,000 pairs. Ospreys are common in Florida where breeding pairs occur along both the Atlantic and Gulf of Mexico coasts, and in the central lakes region of the state (Florida Fish and Wildlife Conservation Commission 2003).

In contrast, the resident southern coastal osprey subpopulation has declined steadily since the early 1970s. The number of breeding pairs in Florida Bay declined 58% from 1973 to the early 1980s (Kushlan and Bass 1983). Most recently, osprey in Florida Bay declined from 136 pairs in 1980 (Kushland and Bass 1983) to 60 pairs in 2007 (S. Bass, *unpublished data*), a 56% decline over a 27-year period. Osprey are also declining in the lower Florida Keys (T. Wilmers, *personal communication*) but recent count data are not available. Because data accumulated over many decades show Florida Bay consistently accounts for 50-70% of the Monroe County population, the BRG conservatively estimated the county-wide population at 100 – 150 pairs (S. Bass, *unpublished data*).

Quantitative Analyses – We are not aware of a population viability analysis for osprey in Florida.

BIOLOGICAL STATUS ASSESSMENT

Threats – Use of persistent organochlorine pesticides, particularly DDT, from the late 1940s to early 1970s resulted in bioaccumulation in prey fish and transfer to ospreys. Sub-lethal effects included thinning of egg-shells, reduced breeding productivity and subsequent population declines. The osprey population has responded positively since the banning of these chemicals and is increasing throughout most of North America. Currently, there is concern regarding exposure to heavy metals, especially methyl mercury, due to biomagnification in prey items. Mercury has been measured in tissues of juvenile and adult ospreys from Florida Bay at levels associated with reduced reproductive success (Lounsbury-Billie et al. 2008). Osprey productivity is closely tied to prey abundance, and productivity declines have been associated with reduced fish supplies (Bowman et al. 1989, Fleming et al. 1989). Osprey in Florida Bay (Monroe County) have been declining during the last several decades, possibly because of food stress (Kushlan and Bass 1983, Bowman et al. 1989).

Other causes of mortality, both within and outside of Florida, are collisions with objects (Poole and Agler 1987, Deem et al. 1998), increased interspecific competition with bald eagles (Ogden 1975, Ewins 1997), nest predation by raccoons (Fleming et al. 1989, Ewins 1997), and losses resulting from adverse weather in breeding areas or along migration routes. Available information suggests the resident, southern coastal Florida osprey subpopulation is mostly contained within Monroe County where it is vulnerable to hurricane events both because of its location and its restricted range. However, the osprey subpopulation in Monroe County nests during the early winter, several months after the season when tropical weather events occur.

Ospreys have proven to be relatively tolerant of human disturbance when sensitized (Rodgers and Schwikert 2003) and also have been able to effectively exploit artificial nesting sites, such as channel markers, telephone poles, and nesting platforms (e.g., Schreiber and Schreiber 1977). Osprey in the Florida Keys now may be largely dependent on such artificial structures, and it is vital that they be retained.

Population Assessment – Please refer to the Biological Status Review Information Findings Table for the findings of the BRG. The BRG concluded that the osprey (Monroe County population only) met multiple criteria for listing, including Population Size Reduction (A2, A3, and A4), Population Size and Trend (C1 and C2), and Population Very Small or Restricted (D1) under the Population Assessment.

Regional Assessment of Subpopulations – Please refer to the Biological Status Review Information Table for the regional assessment of the BRG. There was no change from the initial finding.

The BRG concluded that multiple lines of evidence exist establishing two distinct subpopulations of osprey in Florida: one is a declining, winter-nesting, non-migratory subpopulation along the southernmost coast of Florida (primarily in Monroe County), while the other is a stable or increasing, late-winter-or-spring-nesting, migratory subpopulation. The demographic relationship between the southern coastal Florida population and other subpopulations in North America is unknown. Given that osprey in southern coastal Florida are non-migratory and have different breeding phenology from osprey farther north, the opportunity for mixing of these subpopulations may be very limited. The BRG also noted that the number of breeding pairs of osprey in Monroe County has been declining for decades, without any observed "rescue effect" of immigration from farther north, even though more northerly subpopulations are stable or increasing.

The demographic relationship between the southern coastal Florida subpopulation and subpopulations in the Caribbean is unknown; we are not aware of any evidence for immigration from Cuba or the Bahamas.

LISTING RECOMMENDATION

Although the BRG concluded in their biological assessment that the Monroe County osprey population, when considered by itself, met multiple listing criteria, staff concluded, based on the literature review, information received from the public, and the BRG findings, that further information is needed about the uniqueness of the southern coastal Florida osprey population, including a clearer understanding of its geographic extent. Because the osprey is not constrained by county lines, rather than simply retaining the Monroe county listing designation, staff recommends listing the southern coastal osprey population as a Species of Special Concern until more information has been gathered about whether it is a distinct population and about its true geographic range.

SUMMARY OF THE INDEPENDENT REVIEWS

Comments were received from 3 reviewers: Mr. Michael McMillian (Archbold Biological Station), Mr. Brian Millsap (U.S. Fish and Wildlife Service), and Mr. Steve Nesbitt (Florida Fish and Wildlife Conservation Commission, retired).

Two reviewers (McMillian and Nesbit) concurred with the staff recommendation to retain the southern coastal population of osprey as a Species of Special Concern until more

information has been gathered about its uniqueness and geographic extent. McMillian stated that "FWC is correctly taking a conservative stance in light of very little existing information concerning this possible subpopulation of ospreys." Nesbitt concluded that FWC's recommendation is "…a reasonable and biologically conservative conclusion at this time."

One reviewer (Millsap) commended the BRG for doing "…a thorough job compiling and evaluating the available biological information" and concluded that the staff recommendation "…seems appropriate if the intent is to be conservative in making changes to the state list." However, he also suggested that because of the gaps in the available data "…either course (to retain or delist pending additional confirmatory information) is equally supportable scientifically."

Appropriate editorial changes recommended by reviewers were made to the report. No changes were made that affected the findings or staff recommendations. The full text of peer reviews is available at MyFWC.com.

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Biological Status Review Information
Findings

Species/taxon: Osprey (Monroe County population only)
Date: 11/03/10
Assessors: Karl Miller, Sonny Bass, John Ogden

Generation length: 6-7 yrs

Criterion/Listing Measure	Data/Information	Data Type*	Sub-Criterion Met?*	References
*Data Types - observed (O), estimated (E), inferred (I), suspected (S), or projected (P). Sub-Criterion met - yes (Y) or no (N).				
(A)Population Size Reduction, ANY of				
(a)1. An observed, estimated, inferred or suspected population size reduction of at least 50% over the last 10 years or 3 generations, whichever is longer, where the causes of the reduction are clearly reversible and understood and ceased[1]	No evidence that reduction has ceased.		N	
(a)2. An observed, estimated, inferred or suspected population size reduction of at least 30% over the last 10 years or 3 generations, whichever is longer, where the reduction or its causes may not have ceased or may not be understood or may not be reversible[1]	Data from last four decades show Florida Bay consistently accounts for 50-70% of county-wide population. Counts of nesting pairs in Florida Bay declined from 136 in 1980 to 60 in 2007, a 56% decline over a 27-year period. Nesting pairs in lower Florida Keys also declining. Causes of decline not well understood and have not ceased.	O, E	Y (a)	Kushlan and Bass (1983); Fleming et al. (1989); S. Bass, unpublished data; T. Wilmers, personal communication.
(a)3. A population size reduction of at least 30% projected or suspected to be met within the next 10 years or 3 generations, whichever is longer (up to a maximum of 100 years) [1]	No evidence that reduction has ceased. Productivity in Florida Bay has fallen to lowest levels recorded for the region since the 1960s. Habitat quality (e.g., reduced fish supplies) in Florida Bay and the lower Everglades, a possible cause of decline, unlikely to improve in near term. Documented high levels of mercury in osprey associated with reduced reproductive success.	P	Y (b,c)	Kushlan and Bass (1983); Bowman et al. (1989); Fleming et al. (1989); Poole (1989); Lounsbury-Billie et al. (2008); S. Bass, unpublished data.
(a)4. An observed, estimated, inferred, projected or suspected population size reduction of at least 30% over any 10 year or 3 generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased or may not be understood or may not be reversible.[1]	Same as A2 and A3 above.	O, E, P	Y (a,b,c)	Same as A2 and A3 above.
[1] based on (and specifying) any of the following: (a) direct observation; (b) an index of abundance appropriate to the taxon; (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat; (d) actual or potential levels of exploitation; (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.				
(B)Geographic Range, EITHER				

(b)1. Extent of occurrence < 20,000 km^2 (7,722 mi^2) OR	Monroe County area, land and water combined, < 9,700 km^2	O	Y	FWC land cover map of Florida.
(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)			N	
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	Exist in limited number of "locations" where tropical weather events could severely impact all breeding individuals; however, mitigated by the fact that tropical storms occur several months prior to winter nesting season.		N	
b. Continuing decline, observed, inferred or projected in any of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent, and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals	See A3 above. Habitat quality (e.g., reduced fish supplies) in Florida Bay and the lower Everglades, a possible cause of decline, unlikely to improve in near term. Documented high levels of mercury in osprey associated with reduced reproductive success.	E, I, P	Y (ii,iii,v)	Kushlan and Bass (1983); Bowman et al. (1989); Poole (1989); Lounsbury-Billie et al. (2008); S. Bass, unpublished data.
c. Extreme fluctuations in any of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			N	
(C)Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	Total county population conservatively estimated at 100-150 pairs.	E, I	Y	S.Bass, unpublished data; T. Wilmers, personal communication.
(c)1. An estimated continuing decline of at least 10% in 10 years or 3 generations, whichever is longer (up to a maximum of 100 years in the future) OR	See A3 and B above. Habitat quality (e.g., reduced fish supplies) in Florida Bay and lower Everglades, unlikely to improve in near term. Documented high levels of mercury associated with reduced reproductive success.	P	Y	Kushlan and Bass (1983); Bowman et al. (1989); Fleming et al. (1989); Poole (1989); Lounsbury-Billie et al. (2008); S. Bass, unpublished data.
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:	See A3, Bb, and C1 above.	P	Y	
a. Population structure in the form of EITHER	Total county population conservatively estimated at 100-150 pairs.	E, I	Y	S.Bass, unpublished data; T. Wilmers, personal communication.
(i) No subpopulation estimated to contain more than 1000 mature individuals; OR				
(ii) All mature individuals are in one subpopulation			N	
b. Extreme fluctuations in number of mature individuals			N	
(D)Population Very Small or Restricted, EITHER				
(d)1. Population estimated to number fewer than 1,000 mature individuals; OR	Total county population conservatively estimated at 100-150 pairs.	E, I	Y	S.Bass, unpublished data; T. Wilmers, personal communication.
(d)2. Population with a very restricted area of occupancy (typically less than 20 km^2 [8 mi^2]) or number of locations (typically 5 or fewer) such that it is prone to the effects of human activities or stochastic events within a short time period in an uncertain future			N	

(E)Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years			N	

Initial Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria/sub-criteria are met)
Meets multiple criteria.	A2, A3, A4, C1, C2a, D1
Is species/taxon endemic to Florida? (Y/N)	N
If Yes, your initial finding is your final finding. Copy the initial finding and reason to the final finding space below. If No, complete the regional assessment sheet and copy the final finding from that sheet to the space below.	
Final Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria/sub-criteria are met)
Meets multiple criteria.	A2, A3, A4, C1, C2a, D1

1	Biological Status Review Information Regional Assessment	Species/taxon:	Osprey (Monroe County population only)
2		Date:	11/03/10
3		Assessors:	Karl Miller, Sonny Bass, and
4			John Ogden
5			
6			
7			
8	Initial finding		Meets multiple criteria
9			
10	2a. Is the species/taxon a non-breeding visitor? (Y/N/DK). If 2a is YES, go to line 18. If 2a is NO or DO NOT KNOW, go to line 11.		No
11	2b. Does the Florida population experience any significant immigration of propagules capable of reproducing in Florida? (Y/N/DK). If 2b is YES, go to line 12. If 2b is NO or DO NOT KNOW, go to line 17.		Do not know (Suspect no because a) different nesting phenology and non-migratory status, and b) subpopulation continues to decline without any rescue effect)
12	2c. Is the immigration expected to decrease? (Y/N/DK). If 2c is YES or DO NOT KNOW, go to line 13. If 2c is NO go to line 16.		
13	2d. Is the regional population a sink? (Y/N/DK). If 2d is YES, go to line 14. If 2d is NO or DO NOT KNOW, go to line 15.		
14	If 2d is YES - Upgrade from initial finding (more imperiled)		
15	If 2d is NO or DO NOT KNOW - No change from initial finding		
16	If 2c is NO or DO NOT KNOW- Downgrade from initial finding (less imperiled)		
17	If 2b is NO or DO NOT KNOW - No change from initial finding		No change
18	2e. Are the conditions outside Florida deteriorating? (Y/N/DK). If 2e is YES or DO NOT KNOW, go to line 24. If 2e is NO go to line 19.		
19	2f. Are the conditions within Florida deteriorating? (Y/N/DK). If 2f is YES or DO NOT KNOW, go to line 23. If 2f is NO, go to line 20.		
20	2g. Can the breeding population rescue the Florida population should it decline? (Y/N/DK). If 2g is YES, go to line 21. If 2g is NO or DO NOT KNOW, go to line 22.		
21	If 2g is YES - Downgrade from initial finding (less imperiled)		
22	If 2g is NO or DO NOT KNOW - No change from initial finding		
23	If 2f is YES or DO NOT KNOW - No change from initial finding		
24	If 2e is YES or DO NOT KNOW - No change from initial finding		
25			
26	Final finding		Meets multiple criteria

APPENDIX 1. Brief biographies of the Osprey Biological Review Group members.

Karl E. Miller received his Ph.D. from the University of Florida and is currently the Upland Nongame Bird Leader for FWC's Fish and Wildlife Research Institute. Miller has more than 15 years experience implementing research and monitoring projects for imperiled birds and mammals in Florida, with more than 50 articles or book chapters published in scientific journals or popular magazines. Miller's expertise is focused on the population ecology and community ecology of raptors, woodpeckers, and songbirds.

Oron "Sonny" Bass is Supervisory Wildlife Biologist at the Daniel Beard Research Center in Everglades National Park, where he has led research and monitoring projects on imperiled birds and mammals for the past three decades. Bass's expertise includes the conservation biology of bald eagles, ospreys, Cape Sable seaside sparrows, and Florida panthers, especially in relation to habitat quality and water management issues in the Everglades.

John C. Ogden received his M.S. degree in Biological Sciences from Florida State University. He has served as research ecologist with the Everglades National Park and National Audubon Society, environmental scientist with the South Florida Water Management District working on the Everglades restoration, and most recently as research director with Audubon of Florida. His expertise is in the ecology of wading birds. He has served on the USFWS recovery teams for the wood stork, California condor, and American crocodile, and has published over 100 technical papers.

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

Information was received from Mike McMillian on the status of osprey nesting on the interior lakes in south-central Florida. "Based on a literature review and speaking with Osprey researchers around the world it appears that Lake Istokpoga and Blue Cypress Lakes support the largest populations of nesting Ospreys in the world." McMillian reported that osprey numbers on Lake Istokpoga peaked at >300 nesting pairs during 2004-2005 and subsequently dropped to ca. 250 nesting pairs, while osprey numbers on Blue Cypress seem to fluctuate between 250 and 325 nesting pairs. In contrast, his monitoring data indicate that ospreys are steadily declining on Lake Arbuckle. McMillian also reported that he believes that the number of nesting ospreys appears to be artificially high in the presence of hydrilla, and when hydrilla is removed "…the number of ospreys drops to something more natural."