

# OSPREY MIGRATION THROUGH CUBA

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## Abstract

We used recovery records of Ospreys (*Pandion haliaetus*) banded in Canada and the United States in 1931-1998, satellite telemetry data from 92 Ospreys tracked in 1995-1999, and visual observations of individual migrants, to document the extent to which North American breeding populations of Ospreys travel through Cuba while migrating into and across the Caribbean basin. Ninety-one of 33,484 Ospreys banded in Canada and the United States between 1931 and 1998 were recovered in Cuba. All recoveries were of birds banded east of the Mississippi River, even though 19% of all banded Ospreys had been banded west of the Mississippi River. Almost half of all recovered birds had been shot. Between 1995 and 1999, 7 Minnesota and 19 East Coast Ospreys were tracked through Cuba on autumn migration. Four were recorded in Cuba in successive years; two were recorded on the island in three years. Tracking data suggest that three individuals wintered in Cuba, and that three birds died on the island. Most Ospreys appear to enter northcentral Cuba, particularly Matanzas and Villa Clara provinces, from Florida via the Straits of Florida. Most apparently then travel southeast across the island into southeastern Cuba. Ospreys were sighted migrating along the slopes of and through mountain passes in the Sierra Maestra and Nipe-Sagua-Baracoa mountains of easternmost Cuba in autumn 1996 and 1998. Our data suggest that as many as 90% of all Ospreys nesting on the Eastern Seaboard of the United States pass through Cuba on autumn migration. The extent to which Ospreys refuel in Cuba before continuing south across the Caribbean Sea remains an unanswered question. This, together with the fact that shooting apparently remains an important threat to Ospreys on the island, suggests considerable potential for both migration science and conservation education involving this species in Cuba.

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## Introduction

Ospreys (*Pandion haliaetus*) are complete, essentially solitary, and often long-distance migrants throughout most of their cosmopolitan range (Cramp and Simmons 1980, Palmer 1988, Kerlinger 1989, Poole 1989). Although regularly reported at traditional raptor migration watchsites along significant migration corridors and bottlenecks (Zalles and Bildstein 2000), many Ospreys engage in broad-frontal movements, including extensive over-water travel (Cramp and Simmons 1980, Palmer 1988, Poole 1989). Western European breeding populations of Ospreys, for example, regularly cross the Mediterranean Sea en route to wintering areas in Africa (Kjellén et

al. in press), and eastern North American Ospreys regularly cross the Caribbean Sea en route to Central and South America (Kennedy 1973, Poole and Agler 1987, Santana and Temple 1987).

Because Ospreys often migrate across broad fronts and are rarely counted in large numbers at most migration watchsites, detailed studies of Osprey migration based on visual counts have yet to be performed (Zalles and Bildstein 2000). On the other hand, Ospreys have been banded extensively during the breeding season, particularly in the United States and in northern Europe (Poole 1989). This, and the fact that Ospreys are relatively large-bodied birds whose carcasses are more likely to be found than are those of smaller species, has resulted in several studies of migratory geography based on banding recoveries (Worth 1936, Henny and Van Velzen 1972, Kennedy 1973, Österlöf 1977, Santana and Temple 1987, Poole and Agler 1987). More recently, satellite telemetry data have begun to contribute substantially to our knowledge of Osprey migration (Kjellén et al. 1997, Martell et al 1998, Kjellén et al. in press).

Many Ospreys, particularly those breeding in western North America, migrate overland between North America and South America via the Mesoamerican Land Corridor; others, including many that breed in eastern North America, migrate across the Caribbean Sea (Poole and Agler 1987, Palmer 1988, Hoffman and Darrow 1992, Zalles and Bildstein 2000).

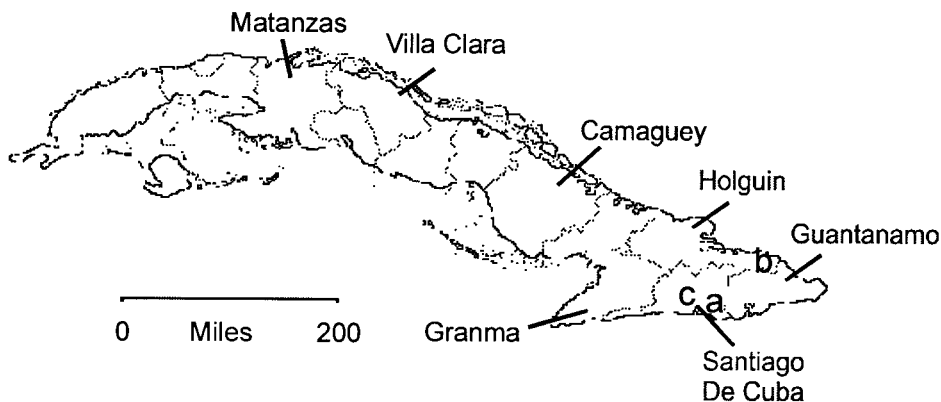
Both nonmigratory (*Pandion haliaetus ridgwayi*) and migratory (*P. h. carolinensis*) Ospreys occur in Cuba (Brown and Amadon 1968), with *P. h. ridgwayi* being particularly common in Oriente (aka Santiago de Cuba) province (Garrido and Montaña 1975). Reports of migrating Ospreys stopping over in Cuba date at least as far back as Gundlach (1893), who reported seeing the species in the Zapata Swamp in southcentral Cuba, as well as along the mouths of rivers and coastal lagoons. More recently, Garrido and Montaña (1975) characterized *P. h. carolinensis* as a “frequent winter [mid-August through mid-May] visitor to the cays and coastlines of Cuba.” Banding recoveries suggest that Cuba serves as a major stopover site for eastern North American populations of the species (Worth 1936, Henny and Van Velzen 1972, Kennedy 1973, Santana and Temple 1987, Poole and Agler 1987).

Here we (1) report the first visual observations of Osprey migration in Cuba, the largest island in the Caribbean Sea, (2) summarize banding recoveries for Ospreys from the island from 1931 through 1998, (3) describe the behavior of satellite-telemetered migratory Ospreys passing over Cuba, (4) and discuss the importance of Cuba in Osprey conservation.

## Methods

The first author sporadically watched for and noted the passage of Ospreys migrating through several mountain passes in the east-west-oriented Sierra Maestra and Nipe-Sagua-Baracoa mountains on the Toldo High Plateau, Holguin province, easternmost Cuba, while working in the region for 28 days in the autumns of 1996 and 1998 (Figure 1).

We obtained band-recovery records (cause of recovery and location) for all Ospreys banded in North America between 1931 and 1998 as adults and nestlings, and recovered (found dead or injured) in Cuba, from the USGS Bird Banding Laboratory in Patuxent Maryland. A total of 91 recoveries was available from the 33,484 Ospreys banded in Canada and the United States during this period.



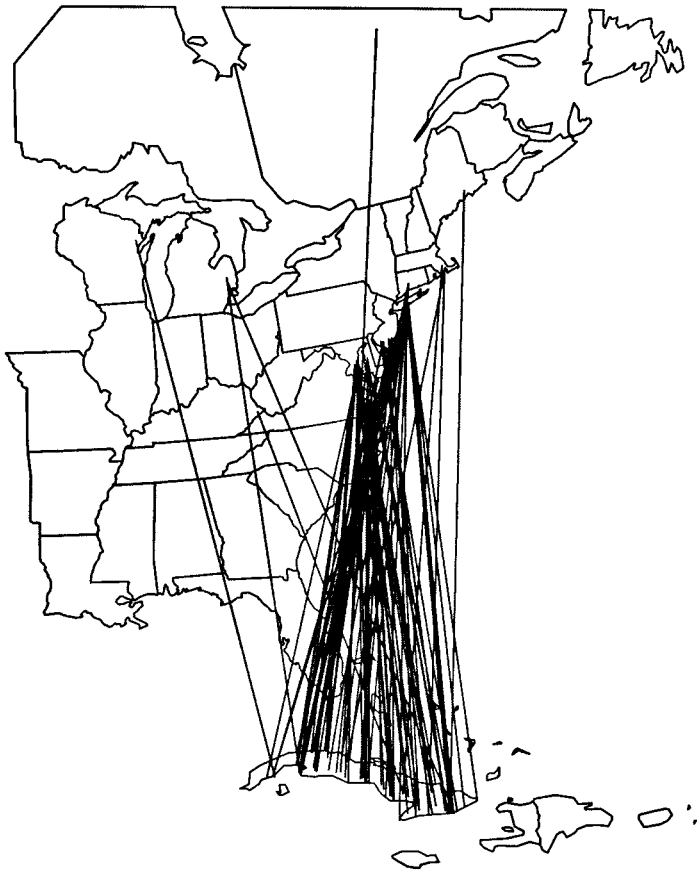
**Figure 1.** Map depicting locations of observations of visible migration in Cuba in 1996 (a. Sierra Maestra range), 1998 (b. Nipe-Sagua-Baracoa), and 1990 (c. La Luisa); and provinces mentioned in the text.

Between 1995 and 1999, 63 adult and 7 juvenile ospreys from the central and eastern United States (i.e., Florida, South Carolina, New Jersey, New York, Maine, and Minnesota) and 22 from the western United States (Oregon and Washington) were fitted with 30-gram (approximately 2% of the bird's body mass) satellite-tracked radio (PTTs or platform transmitter terminals) from Microwave Telemetry. PTTs were attached in a backpack style (Kenward 1987), using Teflon ribbon (Balley Mills). See Martell et al. (1998) and Martell et al. (in prep.) for details. Bird locations were determined using NOAA satellites and on-board tracking equipment operated by Service ARGOS Inc. Data points from Cuba were analyzed using ArcView GIS (ESRI Inc.), and were chosen based on "location class" as determined by Service ARGOS (1996).

## Results

### *Visual observations*

Ospreys were observed migrating along the slopes of and through mountain passes in the Sierra Maestra and Nipe-Sagua-Baracoa mountains of easternmost Cuba on single days in autumn 1996 and 1998. At 16:00 on 8 November 1996, 13 southbound Ospreys were seen crossing the largely east-west Sierra Maestra range in Santiago de Cuba during 15 min of observations (Figure 1). At 14:35 on 14 September 1998, 37 individuals were seen flying south through the Nipe-Sagua-Baracoa Mountains, on the Toldo High Plateau, approximately 17 km southeast of Moa, Holguín province during 19 min of observations (Figure 1). The Sierra Maestra observation was made approximately 130 km southwest of the Nipe-Sagua-Baracoa observation. On both occasions, many of the birds were flying in loose flocks of 2-4 individuals. In addition to these two observations, there is an additional sight record of seven eastbound migrants on 29 September 1990, at La Luisa in Tercer Frente municipality, 30 km northwest of the city of Santiago de Cuba (Luis Omar Melián, personal communication) (Figure 1).



**Figure 2.** Map depicting banding locations and recoveries of 91 Ospreys banded in Canada and the United States and recovered in Cuba, 1931-1998.

***Band recoveries***

Ninety-one of 33,484 Ospreys banded in Canada and United States between 1931 and 1998 were recovered in Cuba. All 91 recoveries were from birds that had been banded east of the Mississippi River, even though 19% of all Ospreys banded during the period had been banded west of the Mississippi River, a significant difference ( $\chi^2 = 21.4$ ,  $df = 1$ ,  $P < 0.01$ ) (Figure 2). Almost half of all recoveries were of birds that had been “shot.” The second most common recovery category was “found dead” (Table 1). Although birds were recovered throughout the island, most recoveries occurred in central and eastern Cuba (Table 2, Figure 2). Recoveries included 28 birds banded in Maryland, and 14 each banded in New York and Virginia (Table 3, Figure 2). Although more than half (55%) of all recoveries were made within 4 years of banding, 13% were of birds in their 15<sup>th</sup> or higher calendar year (Figure 3).

***Satellite tracking***

Between 1995 and 1999 seven Minnesota, 21 East Coast, and no Western Ospreys were tracked through Cuba on autumn migration (Figures 4, 5, 6). Four birds were

**Table 1.** Causes of recoveries of 91 Ospreys banded in Canada and the United States and recovered in Cuba, 1931-1998.

Cause	Number recovered	Percent of total
Shot	43	47%
Found dead	17	19%
No information	12	13%
Caught due to injury	7	8%
Caught by hand	5	5%
Struck wires or tower	4	4%
Entangled in fishing line	1	1%
Caught in trap	1	1%
Caught due to disease	1	1%

**Table 2.** Recovery locations of 91 Ospreys banded in Canada and the United States and recovered in Cuba, 1931-1998.

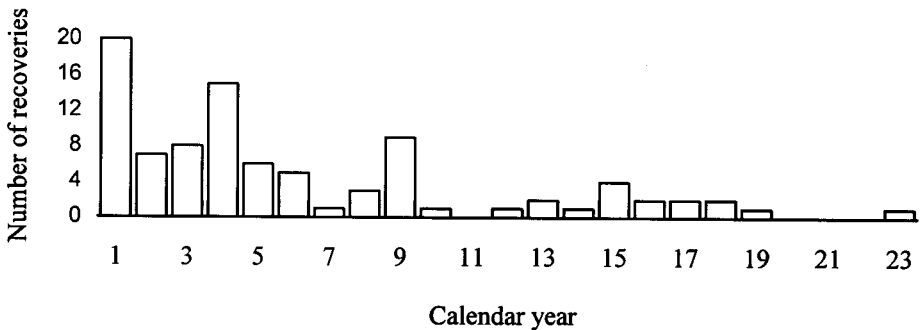
Recovery location (province)	Number of recoveries
Camagüey	9
Ciego de Ávila	3
Cienfuegos	1
Ciudad Havana	1
Granma	5
Guantánamo	9
Holguín	2
La Havana	10
Las Tunas	3
Matanzas	14
Pinar del Río	4
Sancti Spiritus	14
Santa Clara	5
Santiago de Cuba	8
Unknown province	3

recorded in Cuba in two successive years; two birds were recorded in three years. Six other East Coast Ospreys were tracked through the Caribbean, but were not recorded in Cuba (possibly because transmitter programming resulted in temporal gaps in information regarding routes taken by these birds). Overall, 22% of the Minnesota and 92% of the East Coast Ospreys tracked traveled through Cuba. Two other East Coast birds (8% of those tracked) wintered in Florida; while the other Minnesota Ospreys flew through Central America or over the Gulf of Mexico when moving into the Caribbean and South America on migration (M. Martell, C. Henny, P. Nye, and M. Solensky in prep). Seven birds (one bird in two successive years) were recorded in Cuba during spring migration.

In autumn, most Ospreys apparently fly south across the Straits of Florida from the Florida peninsula, and enter northcentral Cuba, particularly via Matanzas and Villa Clara provinces (Figures 1 and 6). Most Ospreys then travel southeast into the

**Table 3.** Banding locations of 91 Ospreys banded in Canada and the United States and recovered in Cuba, 1931-1998.

Banding location	Number of recoveries	Numbers banded
<b>Canada</b>		
Ontario	1	367
Quebec	1	208
<b>United States</b>		
Connecticut	6	1114
Delaware	1	735
Kentucky	1	151
Maine	2	205
Maryland	28	8335
Massachusetts	4	1977
Michigan	2	2164
New Jersey	11	2706
New York	14	534
North Carolina	5	1454
Virginia	14	3323
Wisconsin	1	1738

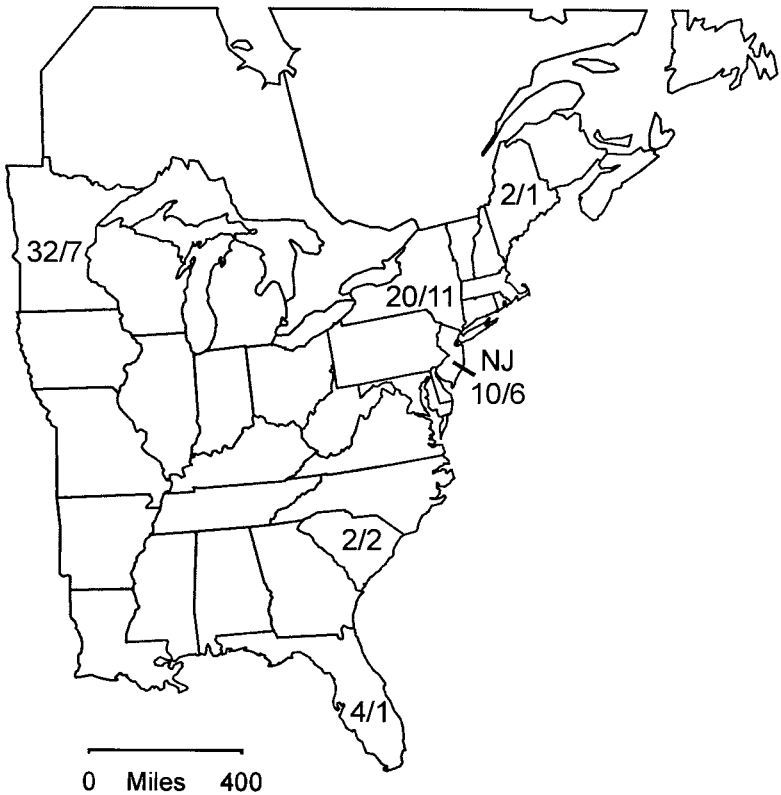


**Figure 3.** Years between banding and recovery of 91 Ospreys banded in Canada and the United States and recovered in Cuba, 1931-1998.

easternmost provinces of Holguin, Granma, Santiago de Cuba, and Guantánamo (Figures 1 and 6). Individual Ospreys, which arrived in Cuba as early as 15 August and as late as 20 October, spent between 2 and 23 days on the island (mean = 6.5 days, SD = 5.24,  $n = 23$ ).

In spring, seven individuals (one bird was tracked in two successive years) migrated through Cuba. Individuals, which arrived in Cuba as early as 11 March and as late as 11 April, spent between 2 and 10 days on the island (mean = 6 days, SD = 3.16,  $n = 4$ ).

Our satellite data suggest that three birds wintered in Cuba, and that three individuals died on the island.

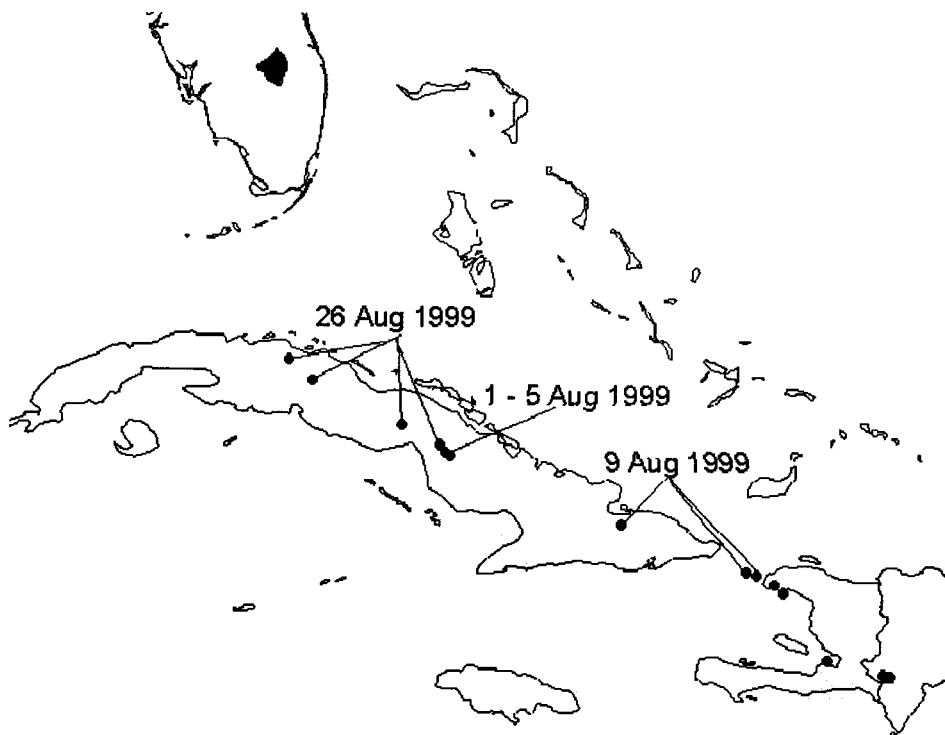


**Figure 4.** Map depicting states in the central and eastern United States where 70 Ospreys were fitted with satellite telemetry units and numbers of those birds that were located by satellite in Cuba, 1996-1999.

### Discussion

Taken as a whole, our visual observations, analyses of banding returns, and satellite tracking work confirm earlier suggestions (Worth 1936, Henny and Van Velzen 1972, Kennedy 1973, Santana and Temple 1987, Poole and Agler 1987) regarding the importance of Cuba as a stopover site for trans-Caribbean migrating Ospreys. Easternmost Cuba, in particular, appears to be an important congregating area for southbound migrants, while moving on a route that includes Hispaniola (Poole and Agler 1987).

Our satellite telemetry data indicate that more than 90% of the Ospreys nesting on the Eastern Seaboard of the United States, and close to 25% of Ospreys nesting as far west as Minnesota, likely travel through Cuba on autumn migration. While there are fewer data available for spring migration, an unpublished analysis (M. Martell, C. Henny, P. Nye, M. Solensky in prep.) indicates that individual Ospreys retrace their autumn migration route north in spring. This makes Cuba an important point twice a year for migrating Ospreys.



**Figure 5.** Map depicting autumn-migration data points of a New Jersey-nesting female Osprey satellite tracked in Cuba in autumn 1999.

The amount of time Ospreys spend in Cuba also is significant. Satellite telemetry data indicate that individuals travel approximately 690 km while flying over the island. East Coast and Midwest Ospreys travel approximately 225 km per day during autumn migration (M. Martell, C. Henny, P. Nye, and M. Solensky in prep.). Thus it should take about three days for an Osprey to fly across the island on migration. Eleven (48%) of the birds we tracked flew across Cuba in  $\leq$  four days. However, seven individuals (30%) took  $\geq$  eight days to make the journey. A variety of factors can affect the timing of an individual bird's migration, and our data do not indicate how Ospreys behave on migration. Nevertheless, it seems reasonable to suggest that Cuba is an important feeding resource for most, if not all of the birds that spent at least four days on the island.

Although the species is frequently referred to as a generally solitary migrant (Palmer 1988, Poole 1989), our observations suggest regular small-group flocking along seemingly important concentration points in easternmost Cuba. The simplest explanation for such flocking is a combination of the species tendency to (1) concentrate at peninsulas and along the tips of islands when doing so allows the birds to shorten overwater journeys (Henny and Van Velzen 1972, Melotti and Spagnesi 1979), (2) fuel its migration at least in part by feeding en route (Kerlinger 1989, Finlayson 1992), and (3) feed socially on the wintering grounds (Prevost 1982, Boshoff and





**Figure 6.** Map depicting data points of 16 satellite-tracked North American Ospreys migrating through Cuba, autumn 1996-1999.

Palmer 1983). By the time North American breeders reach the Greater Antilles these three tactics acting together probably result in considerable flocking.

Our analysis of banding recoveries (Table 1) suggests that shooting remains a principal threat to Ospreys in Cuba (Poole and Agler 1987, Santana and Temple 1987). Illegal shooting of raptors is common in Cuba (Wotzkow 1994), and the talons of Ospreys are sometimes used as spurs on roosters used in cockfights on the island.

Our observations, together with the fact that concentrations of raptors at traditional migration hotspots and bottlenecks provides conservationists with unparalleled opportunities to monitor raptor populations, and to introduce the public to these charismatic birds (Zalles and Bildstein 2000), suggests that there is considerable potential for both migration science and conservation education involving migrating Ospreys in Cuba. The role that stopping over in Cuba plays in helping Ospreys fuel trans-Caribbean flights of, in some instances, >800 km merits particular attention.

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