J. Raptor Res. 40(2):156–158
© 2006 The Raptor Research Foundation, Inc.

EVIDENCE OF NOCTURNAL MIGRATION BY OSPREY (*PANDION HALIAETUS*) IN NORTH AMERICA AND WESTERN EUROPE

ROBERT DECANDIDO[1,2]
Acopian Center, Hawk Mountain Sanctuary, 410 Summer Valley Road, Orwigsburg, PA 17961 U.S.A.

RICHARD O. BIERREGAARD, JR.
Biology Department, University of North Carolina at Charlotte, 9201 University City Boulevard, Charlotte, NC 28223 U.S.A.

MARK S. MARTELL
Audubon Minnesota, 2357 Ventura Drive #106, St. Paul, MN 55125 U.S.A.

KEITH L. BILDSTEIN
Acopian Center, Hawk Mountain Sanctuary, 410 Summer Valley Road, Orwigsburg, PA 17961 U.S.A.

KEY WORDS: *Osprey*; Pandion haliaetus; *nocturnal migration*; *satellite tracking*; *Atlantic Ocean*; *Caribbean Sea*; *New York City*; *urban*.

Throughout most of its near cosmopolitan range, the Osprey (*Pandion haliaetus*) is considered a complete migrant (Kerlinger 1989, Zalles and Bildstein 2000, Martell et al. 2001). It was generally assumed that Ospreys migrated nearly always by day, and indeed, until recently, direct observations of nocturnal migration have been few (Beaman and Galea 1974). However, evidence that the species migrates at night as well as during the day is mounting, particularly when it undertakes long-distance travel over water. Here, we summarize and discuss these observations, many of which are based on the movements of birds tracked by satellite.

Overland nighttime flights. We know of only two accounts of Ospreys migrating overland at night. At 2155 H on the night of 26 September 2004, one of us (R. DeCandido) watched an Osprey migrating over Manhattan Island, New York City. The bird, which was flying at 550–600 m, was seen from a 320-m high Observation Deck on the 86th floor of the Empire State Building (ESB) in downtown New York. The sky was clear at the time, the winds were northeast at 25–40 kph, and the barometer was rising. At 2246 H on the night of 26 October 2004, R. DeCandido observed another Osprey migrating over the ESB. The bird was estimated to be flying at 600 m. At the time, the sky was clear, winds were north at 25–40 kph, and the barometer was rising.

Overwater nighttime flights. Reports of Ospreys making landfall at dawn on the central Mediterranean archipelago of Malta indicate that individuals sometimes attempt to cross the Mediterranean Sea at night (Beaman and Galea 1974). In addition, R. Dennis (pers. comm.) reported that one satellite-tracked individual migrating between Scotland and Morocco flew over the Atlantic Ocean at night. On the other hand, three studies of satellite-tagged Ospreys migrating south from Europe presented no evidence of migration at night (Hake et al. 2001, Kjellen et al. 2001, Triay 2002).

Migration data from North America for southbound Ospreys indicate that nighttime flights are not unusual during overwater travel. From 2000–04, two of us (R. Bierregaard and M. Martell) tagged 10 Ospreys (seven adults and three juveniles), and collected data on 17 north or southbound migrations made by these birds between their breeding grounds in the eastern United States and wintering areas in South America. Five individuals left the North Carolina coast and flew south across the Atlantic to Florida, covering between 400 and 700 km of open water. All birds crossed 180–290 km of open water between Florida and Cuba. From Cuba, all but two crossed 560–960 km of the Caribbean Sea while traveling between Hispaniola or Puerto Rico and South America. Two birds flew 550–650 km over water between Cuba and Central America or Mexico.

In spring, two Ospreys on their northward migration flew directly from South America to Cuba, a nonstop flight of approximately 1000 km. Another northbound bird

[1] Present address: 1831 Fowler Avenue, The Bronx, New York, NY 10462 U.S.A.
[2] Email address: rdcny@earthlink.net

Table 1. Species of diurnal birds of prey in which night migration has been reported or assumed.

SPECIES	LOCATION	DISTANCE TRAVELED	TIME OF YEAR	REFERENCE
Honey-buzzard *Pernis apivorus*	Africa to Europe (Italy)	250–300 km	Spring, Autumn(?)	Agostini et al. 2005
Oriental Honey-buzzard *Pernis ptilorhynchus*	Eastern Asia (China to Japan)	600–900 km	Spring, Autumn	Higuchi pers. comm. Higuchi et al. 2005
Northern Harrier *Circus cyaneus*	Eastern North America (Cape May, New Jersey)	Unknown	Autumn	Russell 1991
Western Marsh-Harrier *Circus aeruginosus*	Africa to Europe (Malta/ Italy)	300 km	Spring	Beaman and Galea 1974, Panuccio et al. 2002
Levant Sparrowhawk *Accipiter brevipes*	Africa to Europe (Israel)	Unknown	Spring, Autumn(?)	Stark and Liechti 1993, Yosef 2003
Chinese Sparrowhawk *Accipiter soloensis*	Eastern Asia (Japan to Philippines to Borneo)	600–800 km	Autumn	McClure 1998
Grey-faced Buzzard *Butastur indicus*	Eastern Asia (Japan to Taiwan to Philippines)	600–800 km	Autumn	McClure 1998
Amur Falcon *Falco amurensis*	Asia to Africa (India to East/ Southern Africa)	1000–2000 km	Spring, Autumn	Cade 1982
Merlin *Falco columbarius*	Iceland to Britain and Continental Europe	400–800 km	Spring, Autumn	Williamson 1954
Peregrine Falcon *Falco peregrinus*	East. North America Southeast Asia (Vietnam to Borneo)	Unknown 800 km	Autumn	Cochran 1985, Ellis et al. 1990

leaving Mexico flew 790 km across the Gulf of Mexico toward the Florida Panhandle, but disappeared approximately 100 km west of the Florida coast.

Of five flights from North Carolina to Florida, two definitely included nighttime travel, two others probably did, and one did not. Of the eight trips between Florida and Cuba for which we could estimate flight timing, only one included nighttime flight. All three crossings between Central America and Cuba or Florida, and all 11 Caribbean crossings for which departure and arrival could be estimated, included nighttime flight.

We estimated ground speed for five birds traveling across open water, based on the most accurate locations (Location Classes 2 and 3) from the Service Argos, Inc., Largo, MD telemetry data. Calculated speeds ranged from 27–64 km/hr, with three flights between 40–56 km/hr. At 45 km/hr (the median speed), the Florida to Cuba crossing would take between 4 and 6 hr. The Cuba to Central America crossing, or the Caribbean crossing to South America would take between 12 and 21 hr. The South America to Cuba direct flight would take approximately 22 hr.

Any trip of more than 12 hr requires some nighttime flight unless the birds leave at dawn. We estimated departure time for 17 overwater crossings: no birds departed before daybreak, seven set out in the morning, and nine in the afternoon. Based on these data, there was no tendency by Ospreys to start overwater trips early in the day to reduce the need for nighttime flight.

Our observations lead us to conclude that Ospreys migrate at night more frequently than has been suspected. The paucity of earlier observations is most likely due to two factors. First, few raptor biologists regularly watch for nighttime migrants. Second, at high latitudes, Ospreys tend to be relatively uncommon broad-frontal migrants whose low numbers at any one place reduce the chances of observing nighttime movements. Currently, at least ten other species of diurnal birds of prey are known to migrate at night (Table 1). As greater numbers of raptors are tracked by satellite, we expect that the numbers of known nighttime migrants will increase substantially. In the words of Beaman and Galea (1974), "Nocturnal migration by raptors may thus be on a larger scale than is generally realized, if only as an involuntary consequence of adverse conditions encountered during a sea-crossing."

EVIDENCIA DE MIGRACIONES NOCTURNAS DE *PANDION HALIAETUS* EN NORTEAMÉRICA Y EUROPA DEL OESTE

RESUMEN.—Resumimos y discutimos observaciones recientes de migraciones nocturnas de *Pandion haliaetus*. En el otoño de 2004, desde la plataforma de observación (elevación 320 m) del edificio Empire State en la ciudad

de Nueva York se realizaron dos avistamientos nocturnos de individuos migrando hacia el sur. De igual forma, el monitoreo satelital ha revelado que *P. haliaetus* migra durante la noche de manera regular tanto en la temporada migratoria de otoño como en la de primavera, particularmente en vuelos largos que implican el cruce de cuerpos de agua. Encontramos que 15 individuos migraron hacia el sur durante la noche en otoño (1) de Carolina del Norte a Florida, (2) de Florida a Cuba y (3) de Cuba a Centroamérica/México o América del Sur. En la migración hacia el norte, dos individuos migraron durante la noche desde Sudamérica hacia Cuba. Algunos de los vuelos sobre agua representaron entre 12–22 horas de vuelo continuo. También proveemos información que muestra que al menos otras 10 especies de rapaces migran durante la noche de manera regular.

[Traducción del equipo editorial]

ACKNOWLEDGMENTS

We greatly appreciate information about night migrating Ospreys provided by Roy Dennis, Dawn K. Laing, and Pertti Saurola. We also thank Nicolantonio Agostini, Axel Bräunlich, Hiroyoshi Higuchi, Paul Kerlinger, Steve Moyes, Alan Poole, Jim Watson, and David R. Wells. Mark Kolakowski helped with autumn 2004 night migration counts at the Empire State Building. Deborah Allen provided logistical support. This is Hawk Mountain Sanctuary contribution to conservation science number 127.

LITERATURE CITED

AGOSTINI, N., M. PANUCCIO, AND B. MASSA. 2005. Flight behaviour of Honey Buzzards (*Pernis apivorus*) during spring migration over the sea. *Buteo* 14:3–9.

BEAMAN, M. AND C. GALEA. 1974. The visible migration of raptors over the Maltese Islands. *Ibis* 116:419–431.

CADE, T.J. 1982. The falcons of the world. Cornell University Press, Ithaca, NY U.S.A.

COCHRAN, W.W. 1985. Ocean migration of Peregrine Falcons: is the adult male pelagic? Pages 223–227 *in* M. Harwood [ED.], Proceedings of Hawk Migration Conference IV. Hawk Migration Association of North America, Rochester, NY U.S.A.

ELLIS, D.H., A.K. KEPLER, AND C.B. KEPLER. 1990. Evidence for a fall raptor migration pathway across the South China Sea. *J. Raptor Res.* 24:12–18.

HAKE, M., N. KJELLEN, AND T. ALERSTAM. 2001. Satellite tracking of Swedish Ospreys (*Pandion haliaetus*): autumn migration routes and orientation. *J. Avian Biol.* 32:47–56.

HIGUCHI, H., H.J. SHIU, H. NAKAMURA, A. UEMATSU, K. KUNO, M. SAEKI, M. HOTTA, K.I. TOKITA, E. MORIYA, E. MORISHITA, AND M. TAMURA. 2005. Migration of Honey Buzzards *Pernis apivorus* based on satellite tracking. *Ornithol. Sci.* 4:109–115.

KERLINGER, P. 1989. Flight strategies of migrating hawks. University of Chicago Press, Chicago and NY U.S.A.

KJELLEN, N., M. HAKE, AND T. ALERSTAM. 2001. Timing and speed of migration in male, female and juvenile Ospreys (*Pandion haliaetus*) between Sweden and Africa as revealed by field observations, radar and satellite tracking. *J. Avian Biol.* 32:57–67.

MARTELL, M.S., C.J. HENNY, P.E. NYE, AND M.J. SOLENSKY. 2001. Fall migration routes, timing and wintering sites of North American Ospreys as determined by satellite telemetry. *Condor* 103:715–724.

MCCLURE, H.E. 1998. Migration and survival of the birds of Asia, Rev. Ed. White Lotus Press, Bangkok, Thailand.

PANUCCIO, M., N. AGOSTINI, AND B. MASSA. 2002. Crossing the Tyrrhenian Sea: spring migration of Marsh Harriers (*Circus aeruginosus*), sex classes and relation to wind conditions. *Vogelwarte* 41:271–275.

RUSSELL, R.W. 1991. Nocturnal flight by migrant "diurnal" raptors. *J. Field Ornithol.* 62:505–508.

STARK, H. AND F. LIECHTI. 1993. Do Levant Sparrowhawks (*Accipiter brevipes*) also migrate at night? *Ibis* 135:233–236.

TRIAY, R. 2002. Satellite-tracking of three juvenile Ospreys born on the island of Minorca. *Ardeola* 49:249–257.

WILLIAMSON, K. 1954. The migration of the Iceland Merlin. *Br. Birds* 47:434–441.

YOSEF, R. 2003. Nocturnal arrival at a roost by migrating Levant Sparrowhawks. *J. Raptor Res.* 37:64–67.

ZALLES, J.I. and K.L. BILDSTEIN [EDS.] 2000. Raptor watch: a global directory of raptor migration sites. BirdLife Conservation Series 9. Birdlife International, Cambridge, U.K. and Kempton, PA U.S.A.

Received 4 May 2005; accepted 28 December 2005
Associate Editor: James W. Watson