

## Migration Routes, Reproduction, and Lifespan of a Translocated Osprey

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**ABSTRACT.**—We monitored one female hack-released Osprey (*Pandion haliaetus*) across her lifespan and identified her migration routes over a 4-year period (2002–2006) using satellite radiotelemetry. We documented the recruitment of this bird into the breeding population and her lifetime reproductive success. This Osprey was raised at Big Muskego Lake in southeast Wisconsin, wintered at Lake Bayano in Panama (3,877 km south-southeast [163°] of Big Muskego Lake), and nested near St. Paul, Minnesota (4,183 km north-northwest [343°] of Lake Bayano and 446 km northwest [300°] of Big Muskego Lake). The lifespan of this female was 5 years, 5 months, and her lifetime reproductive success was three young over a period of 3 years, 2005–2007, as a breeder. Migration routes of this individual Osprey changed over her lifespan; these changes may have been influenced by weather. Received 22 February 2008. Accepted 17 June 2008.

Hacking (nestlings translocated, raised by humans, and subsequently released to the wild) of Ospreys (*Pandion haliaetus*) has been successful at reintroducing this species to locations that were previously unoccupied (Poole 1989, Poole et al. 2002), including the upper midwestern United States (Martell et al. 2002). Satellite radiotelemetry has been used to monitor migration routes of Ospreys breeding in Europe (e.g., Hake et al. 2001) as well as in North America (e.g., Martell et al. 2001). These studies did not report on the lifespan or lifetime reproductive success of Ospreys. We also know little about migration routes or about changes in migration patterns of translocated, hack-released Ospreys. We monitored the migration routes of a hack-released Osprey over a 4-year period, ascertained its lifespan, and documented its lifetime reproductive success.

### METHODS

Osprey nestlings (37 total, 5–7 annually, 1998–2003) were released at Big Muskego Lake

(42.89° N, 88.11° W), Waukesha County, Wisconsin, through hacking (Hammer and Hatcher 1983, Schaadt and Rymon 1983). The Big Muskego Lake area was a suburban landscape and part of the greater metropolitan Milwaukee area. Big Muskego Lake covered 914.59 ha with a maximum depth of 1.2 m; Bass Bay (adjoining Big Muskego Lake) covered 40.47 ha with a maximum depth of 7.0 m. The Big Muskego Lake area consisted of the city of Muskego (human population ~21,400, a human density of ~265/km<sup>2</sup>; U.S. Department of Commerce 2000) with suburban residential areas surrounded by agricultural land and natural habitat (e.g., marshes and grasslands). Osprey nestlings were banded with U.S. Geological Survey (USGS) lock-on aluminum leg bands anodized to a year-specific color. Solar-powered satellite radio transmitters (35 g Platform Transmitter Terminals [PTTs]; Microwave Telemetry, Columbia, MD, USA) were installed on two Osprey nestlings in 2002 and on one nestling in 2003. Satellite radiotelemetry tracking data were obtained from Service Argos (now CLS America, Largo, MD, USA); accuracy of locations was ≤1 km. Distances and directions were calculated from Global Positioning System (GPS) locations.

### RESULTS

We ascertained the migration routes of one hack-released Osprey over a 4-year period (51 months; 2002–2006), including its first 2 years of breeding, with satellite telemetry and monitored two additional Ospreys for ≤1 month until their PTTs stopped transmitting. The Osprey that we monitored for a 4-year period (a female; hereafter referred to as Osprey 2002A) hatched in northwestern Wisconsin (Sawyer County), was raised and released at Big Muskego Lake in southeast Wisconsin, wintered at Lake Bayano in Panama (9.14° N, 78.52° W; 3,877 km south-southeast [163°] of the Big Muskego Lake release site), and nested near St. Paul, Minnesota (44.79° N, 93.00° W; 4,183 km north-northwest [343°] of Lake Bayano and 446 km northwest [300°] of Big Muskego Lake; Fig. 1). Osprey 2002A remained in the localized area of Lake

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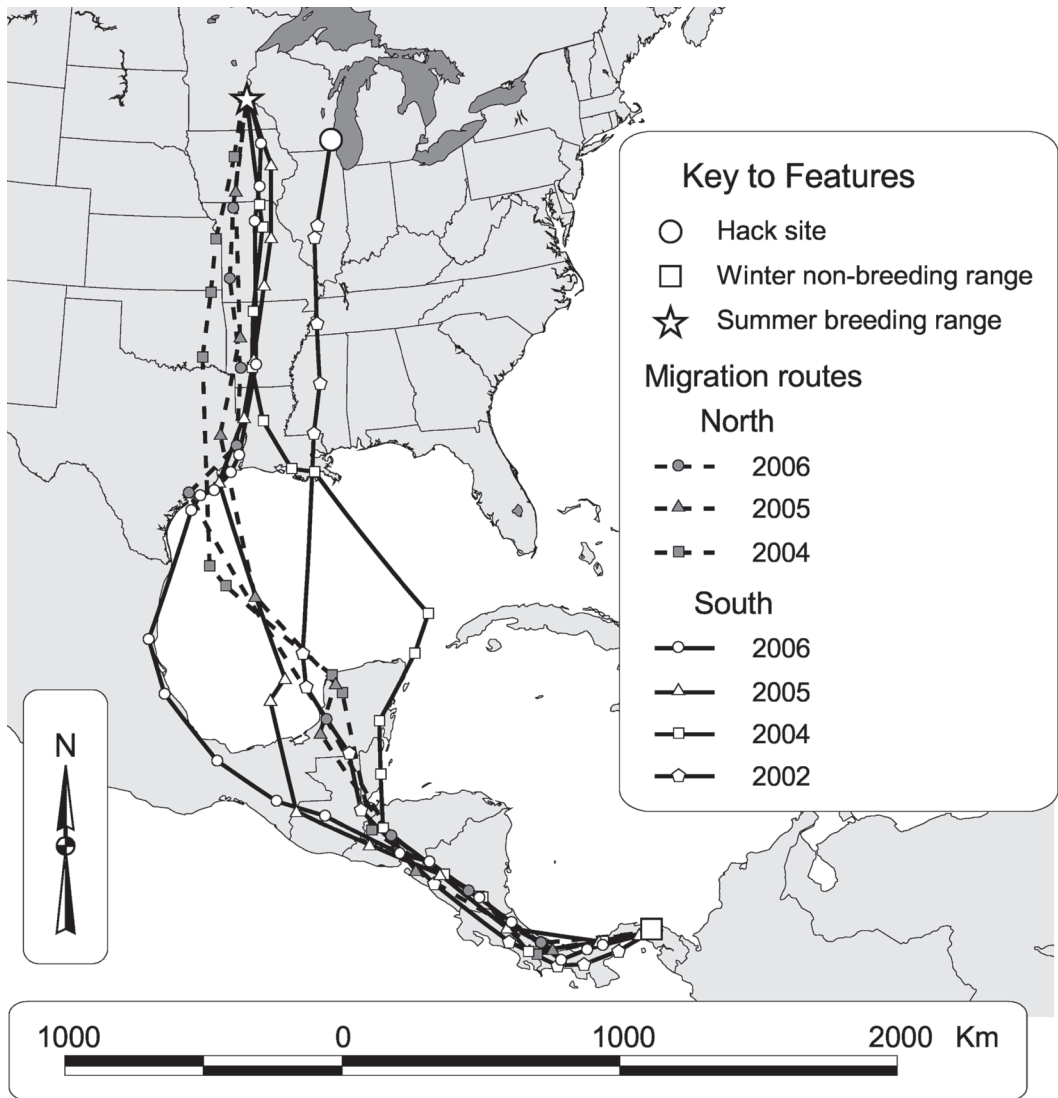


FIG. 1. Release site (Big Muskego Lake, Waukesha County, Wisconsin), winter non-breeding range (Lake Bayano area, Panama), summer breeding range (St. Paul area, Minnesota), and migration routes for translocated, hack-released, female Osprey 2002A based on satellite radiotelemetry.

Bayano for over 17 months (26 Oct 2002–6 Apr 2004) before returning as a 2-year-old; she remained in the same localized area for 5 months during each of the two subsequent winters. The nest location in Minnesota was a suburban landscape near Cottage Grove (human population ~30,600, a human density of ~347/km<sup>2</sup>; U.S. Department of Commerce 2000), a suburb of St. Paul. The nest was adjacent to a gravel pit and Moore Lake on Grey Cloud Island in the Mis-

issippi River; the greater area was surrounded by low-human density residential land use.

Osprey 2002A followed the Mississippi River for both fall and spring migration routes, crossed the Gulf of Mexico (except in fall 2006), and followed the Yucatan Peninsula and Central America to and from Panama (Fig. 1). Her initial fall migration lasted 44 days and subsequent fall migrations (2004–2006) averaged 23 days ( $n = 3$ , range: 22–24

days); spring migrations (2004–2006) averaged 17 days ( $n = 3$ , range: 16–19 days).

Osprey 2002A traveled directly south during her initial fall migration, east of the Mississippi River, to near New Orleans. She spent ~3 weeks during this migration at Coffeen Lake near Hillsboro, Illinois (13 Sep–5 Oct 2002) and 5 days at Ross R. Barnett Reservoir near Jackson, Mississippi (8–12 Oct 2002). She crossed the Gulf of Mexico on 14 October 2002 and was in the Yucatan Peninsula by 15 October 2002. Subsequent fall migrations from the St. Paul area were directly south but on the west side of the Mississippi River. These migrations crossed the Gulf of Mexico from near New Orleans in 2004 (16–17 Sep) and from the northeast coast of Texas in 2005 (23–25 Sep) to the Yucatan Peninsula. Osprey 2002A followed the Gulf of Mexico in 2006 south along the east coast of Texas and Mexico (19–24 Sep).

Spring migrations north from Panama followed a similar route over the Yucatan Peninsula, across the Gulf of Mexico (16–17 Apr 2004, 10 Apr 2005, 5 Apr 2006), to the northeast coast of Texas, and north to the St. Paul area on the west side of the Mississippi River. Spring migrations north through the United States were farther west than fall migrations south (Fig. 1).

Osprey 2002A was widely transient in Minnesota and northern Wisconsin for about 5 days in 2004 (23–27 Apr) before settling near St. Paul. Based on field observations, she apparently formed a pair bond in summer 2004 with a male that had lost his mate from the previous year. Osprey 2002A paired with this male in 2005–2007 and made nesting attempts each year. They successfully fledged three young in 2005, failed with young during the early nestling stage in 2006 (feeding behavior was observed but no young were present at banding time), and failed with advanced young in 2007 (1 young was raised to an advanced nestling stage but disappeared from the nest before fledging). Osprey 2002A was reported “found dead” on 3 November 2007 (near St. Paul, Minnesota) on a band encounter report through the USGS Bird Banding Laboratory (BBL); her age was 5 years, 5 months (65 months). Her remains were found on 17 December 2007 in the same urban location on the bank of the Mississippi River in the middle of St. Paul (~18 km northwest

[313°] of her nest site), and the satellite radio transmitter was recovered. The lifetime reproductive success of this female was 3 young over a period of 3 years as a breeder (mean = 1 young/year, range: 0–3).

## DISCUSSION

Martell et al. (2001) used satellite radiotelemetry to document migration routes of adult Ospreys that nested across North America. Ospreys nesting in Minnesota followed three different routes to Central or South America: (1) south through Texas and along the east coast of Mexico, (2) south along the Mississippi River and across the Gulf of Mexico, or (3) southeast to Florida and across the Caribbean Islands (Martell et al. 2001). All individual Ospreys from the upper Midwest followed the same routes south in different years and each individual Osprey wintered in the same location each year. Osprey 2002A initially followed the central migration route along the Mississippi River and across the Gulf of Mexico, and wintered in the same location each year. Osprey 2002A changed her southward migration route by crossing the Gulf of Mexico farther west in 2005 (near the location at which she arrived in the U.S. during her northward spring migrations). Hurricane Rita made landfall along the Texas-Louisiana border early on 24 September 2005 (U.S. Department of Commerce 2007), <24 hrs after Osprey 2002A passed through this area, and may have influenced this change. Osprey 2002A traveled southwest through Texas and along the east coast of Mexico in 2006.

Some individual raptors tend to select nesting habitat similar to that in which they were raised (Tordoff et al. 1998, Rosenfield et al. 2000, Kenward 2006). Both the release site at Big Muskego Lake and the nest site in the St. Paul, Minnesota area were comprised of similar suburban landscapes, and habitat specificity may have had a role in nest site selection for Osprey 2002A. This Osprey apparently was tolerant of urban landscapes because her remains were found in a highly developed area in St. Paul.

Lifespan estimates, and annual and lifetime reproductive success for Ospreys suggest that Osprey 2002A at least exceeded the average for these population metrics. Osprey 2002A (over 5 years of age) survived at least beyond

the 75th survivorship percentile for Ospreys based on life tables compiled by Henny and Wight (1969; the longevity record for Ospreys is 26 years, 2 months [USDI 2007]). Postupalsky (1989) reported that 22% of female breeders (i.e., those that laid eggs) did not produce young and mortality before recruitment into the breeding population prevented most individuals (70.5%) in his study from contributing fledglings to the next generation (Poole et al. 2002). Postupalsky (1989) also found that lifetime reproductive success ranged from 0 to 29 for female breeders with ~57% of all female breeders producing  $\leq 3$  young. Osprey 2002A reached approximately the 57th percentile of female breeding Ospreys for lifetime reproductive success. Average annual reproductive success for Osprey 2002A was about average for Ospreys (Poole et al. 2002) and was above estimates of average annual reproduction required to maintain a stable population (0.79 young/pair; Spitzer 1980, Postupalsky 1989; SP, unpubl. data).

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