Short Communications

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First Documented Case of Long-distance Dispersal in the Egyptian Vulture (*Neophron percnopterus*)

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Natal-philopatry (i.e., dispersing near to, or returning to the birthplace for reproduction) is a widespread behavior among raptors (Newton 1979, Pearce 2007). Whether a species is natal-philopatric or not has implications for population genetics and population demography. For example, it may affect gene flow among different geographical areas, capacity for recolonizing vacated patches, persistence of (meta)populations, and breeding performance (e.g., Forero et al. 2002, Woodroffe 2003, Pearce 2007). Within the same species, differences in natal-philopatric behavior may appear among different subpopulations, sexes, and individuals (Newton 1979, Greenwood 1980, Newton and Marquiss 1983, Pärt 1995, Miller and Smallwood 1997, LaHaye et al. 2001, Zuberogoitia et al. 2009). Thus, a complete knowledge of a species' dispersion and philopatry is important for understanding its population dynamics and effecting conservation programs (Niebuhr 1993, Walter 2000, Gosling 2003, Hobson et al. 2004, Carrete et al. 2007, Soutullo et al. 2008). Despite its importance, available information on these subjects is limited, primarily because gathering longitudinal information on individuals is costly, and the spatial scale of dispersal is often too large to relocate dispersed individuals (Donázar 1993, Koenig et al. 1996, Forero et al. 1999, Forero et al. 2002). This is particularly true for scarce, long-lived, and long-distance migrant species that perform temporally and spatially prolonged dispersal before recruitment into the breeding population, such as the Egyptian Vulture (*Neophron percnopterus*; Donázar 1993).

The Egyptian Vulture is a medium-sized, cliff-nesting raptor whose breeding range extends over Eurasia and Africa (Donázar 2004). Due to the steady decline over large parts of its range during the twentieth century, the species is now listed as globally threatened, with about 27–37% of the estimated European population in Spain (BirdLife International 2004). Anthropogenic pressure such as poisoning, habitat destruction, a decrease in food availability, and threats during its migration and on its African wintering quarters, have been claimed as primary factors in the species' decline (Donázar 2004, Grande 2006, Grande et al. 2008). Most recent and sophisticated studies have highlighted the link between the species' social and philopatric behavior and its current population dynamics (Grande 2006, Carrete et al. 2007, Grande et al. 2008). According to them, natal dispersal distances are notably short, with a median distance of 19.7 km (range = 0–150 km, $N = 26$) and dispersers seem to recruit into territories near their natal area, thereby facilitating the replacement of dead mates and/or the recolonization of territories located within highly populated areas.

In the same way, Donázar (2004) argued that despite the fact that some Spanish regions are temporary settlement sites for juvenile birds from French populations, the probability that these individuals will effectively disperse and reproduce in these regions is low, due to the species' high rate of philopatry. Previously, Sará and Di Vittorio (2003) hypothesized that due to the species' pronounced philopatry and site-fidelity, in addition to its different migratory routes, which may correspond with different wintering grounds, the exchange of individuals among geographic areas may be quite infrequent. However, Grande (2006) found that population viability models and survival rates obtained through capture-recapture procedures in the Ebro Valley population (northeastern Spain) indicated that adult mortality rate was

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high and that population numbers were declining more slowly than expected; Grande suggested that immigration of adults from different populations might be responsible for the persistence of the population.

We here report the first documented case of long-distance effective dispersal and non-natal-philopatric behavior of an Egyptian Vulture from the Cantabrian (northern Spain) population.

METHODS AND RESULTS

During a long-term Egyptian Vulture monitoring project (Zuberogoitia et al. 2008) in Biscay (northern Spain; 2384 km^2; 43°13′N 02°41′W), we marked 66 nestlings and one adult using both steel leg bands (Aranzadi Ringing Office) and plastic leg bands with alphanumeric codes that can be read from a distance. Between 2000–08, 25 resightings of 15 individuals were reported. In general terms, the pattern of movements and dispersal showed by these individuals were similar to those previously described (Grande 2006, Carrete et al. 2007, Grande et al. 2008). Four adults (>4 yr old) were found in breeding territories close to their birthplaces (median distance = 23 km, range = 8–48 km), ten immature birds (<4 yr old) were observed near communal roosts and predictable food sources south of their natal areas during prebreeding dispersion and/or migration (median distance = 318.5 km, range = 145–781 km), and one bird was observed in active migration crossing the Strait of Gibraltar toward the African continent during the autumn migration. In contrast, two further records involved the same female (sexed according to field observations at the nest-site, M. Gallardo pers. comm.), banded in northern Spain in 2002, and nesting in France, 550 km northeast of its natal area in two consecutive years (2006 and 2007).

To our knowledge, this is the first empirical evidence of long-distance dispersion resulting in the recruitment of an individual as a breeder in a distant population.

DISCUSSION

The aggregation of unpaired Egyptian Vultures at communal roosts may encourage pair formation and mate replacement (Donázar et al. 1996). At these sites, which may hold up to 200 birds, individuals from a wide range may congregate. For example, Donázar (2004) mentions the presence of French Egyptian Vultures in Spanish communal roosts, and individuals from our study area have also frequently been observed at these sites, far from their natal areas. Moreover, the majority of the French population annually crosses the Iberian peninsula during migration to and from Africa. During these movements, individuals make several stopovers, gathering at communal roosts (Meyburg et al. 2004). It seems likely, therefore, that the individual dispersal reported here resulted from the pairing of the above female and a male of presumably French origins, to whose birthplace she had dispersed. This hypothesis is in agreement with the findings of several studies, wherein females are less natal-philopatric than males (see review in Greenwood 1980).

Given the age of this female when first recorded breeding in France (5 yr old), we assume that this was its first nest site. The bird bred there for the two following years, showing nest-site fidelity, until it was found dead in the nest in July 2007 (M. Gallardo pers. comm.).

Both social behavior and philopatry may be important factors in influencing nesting habitat selection for several species (Carrete et al. 2007, Zuberogoitia et al. 2009). However, it is difficult to disentangle the extent of each factor's influence.

Our finding provides an example in which social attraction has prevailed over natal-philopatry for one individual (the female), whereas, in the case of the male, we assumed that natal-philopatry prevailed, although we do not actually know whether the selected nest site was near his birthplace. If it was so, the combined effects of both social and philopatric behaviors in both members of a breeding pair influenced the pattern of dispersal and consequently the location of the breeding territory.

Considering that, from the perspective of management and conservation, the behavior of individuals in populations reduced to low numbers is relatively more important than that in larger populations (Gosling 2003) and that, as previously explained, some important ecological processes may operate at population level as a result of behavioral decisions made by individuals (Carrete et al. 2007), dispersal events such as the one we describe here, even if anecdotal, may play an important role in the species' population dynamics. However, as a caveat, we note that long-distance dispersal has often been underestimated and biased by the size of the study area (e.g., Koenig et al. 1996, Woodroffe 2003, Saurola and Francis 2004, Grande et al. 2008). In addition, the increasing numbers of raptor-marking projects, together with the sophistication of wildlife telemetry and genetic procedures, are revealing similar unexpected or poorly known behaviors in many raptor species (e.g., Arsenault et al. 2005, Cadahía et al. 2006, Le Gouar et al. 2006, Urios 2007). Moreover, it has been shown that natal-philopatry is less common in migratory species than in resident ones (Weatherhead and Forbes 1994). We suggest, therefore, that further research in broader study areas is needed to assess the actual extent and complexity of this ecological process.

PRIMER CASO DOCUMENTADO DE DISPERSIÓN DE LARGA DISTANCIA EN *NEOPHRON PERCNOPTERUS*

RESUMEN.—La filopatría y la capacidad de dispersión representan aspectos interrelacionados, variables y determinantes de las dinámicas poblacionales de una especie. No obstante, la información disponible sobre estos procesos es escasa para especies amenazadas como *Neophron percnopterus* debido a las dificultades logísticas que implican estos estudios. Esta especie es considerada altamente filopátrica, para la cual se han descrito distancias medias de dispersión de aproximadamente 20 km. Presentamos el primer caso documentado de dispersión efectiva a gran

distancia (550 km) que implica el movimiento de un individuo a una población distante. Una hembra, anillada como pichón en el norte de España, fue encontrada en Francia, 550 km al norte de su área natal, en dos años consecutivos (2006 y 2007). Esta hembra fue presumiblemente reclutada por la población reproductiva distante de su pareja. Proponemos que la tendencia de la especie de congregarse en dormideros comunales, donde se reúnen individuos de diferentes poblaciones, puede propiciar la formación de parejas de individuos originarios de distintas poblaciones. La combinación de la atracción social y la filopatría natal de ambos individuos parece haber determinado el patrón espacial de dispersión y la localización del territorio de asentamiento de la pareja.

[Traducción del equipo editorial]

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