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BROODS OF FIVE FLEDGLINGS IN THE EURASIAN EAGLE-OWL (*BUBO BUBO*)

KEY WORDS: *Eurasian Eagle-Owl*; *Bubo bubo*; brood size, reproductive rate.

The breeding ecology of the Eurasian Eagle-Owl (*Bubo bubo*) has been subject to numerous studies in different areas of the western Palearctic (Mikkola 1983, del Hoyo et al. 1999, Marchesi et al. 2002, Penteriani et al. 2004) and therefore, the mean and ranges of its breeding parameters are relatively well known. Eagle-owls raise one brood per breeding attempt, although second and replacement

clutches have been recorded (Blondel and Badan 1976, Martínez et al. 2003, Ortego 2004, Karyakin 2009), consisting of one to six eggs (Mikkola 1983, del Hoyo et al. 1999). Brood size in eagle-owls varies gradually and inversely with latitude in the European populations (Donázar 1990). These reach the maximum reproductive values in southern Spain, where pairs raising three or four nestlings are

common (Marchesi et al. 2002). Broods of five fledglings are rarely reported. We have encountered only limited evidence in two publications in which the authors have reported a brood size ranging between one and five (Dalbeck and Heg 2006, Pazhenkov and Korzhev 2006). In this letter, we present the first two records of broods of five fledglings for eagle-owls in Spain, and report another case for Kazakhstan.

On 19 April 2007, we found an eagle-owl nest with a brood of five nestlings in Orihuela, province of Alicante, in southeastern Spain (38°18'N, 0°56'W). This was the first record of a brood of five nestlings in our study area after 6 yr of monitoring nests (2002–2008; $n = 114$ breeding attempts of 66 different pairs). The region where the nest was found is a mosaic dominated by intensive agriculture, Mediterranean shrubs, and Aleppo pine (*Pinus halepensis*) sparsely distributed. The nest was located in a small cave, 6 m away from the nestlings and contained abundant prey remains, mainly rabbits (*Oryctolagus cuniculus*), and pellets. The nestlings were age 30–40 d based on Penteriani et al. (2005). Although brood-switching has been recorded for this species (Penteriani and Delgado 2008), intrusion of one or more foreign young into another brood generally occurs when fledglings are capable of flight (>40 d old).

The second record was in San Bartolomé de la Torre, Huelva, southwestern Spain (37°27'N, 7°4'W). The nest was located in a typical Mediterranean habitat dominated by shrubs and sparse *Quercus* trees. This was the only record of a nest of five found in 12 yr of monitoring of eagle-owl reproduction in this area. On 21 February 2000, the eagle-owl nest contained five eggs. After 32 d, five chicks hatched. By 10 May, all nestlings had fledged successfully. Rabbits are abundant in this area and their remains were found in the nest and in the owls' pellets.

We also collected information on another brood of five fledglings, found during a scientific expedition in the spring of 1999 to eastern Kazakhstan (central Asia; 47°12'N, 79°24'E). Five fledglings, age 30–40 d, were found in a nest under a rock in a steppe habitat dominated by grasses and forbs. Most of the prey remains found near and in the nest were voles (Microtidae) and medium-sized mammals such as hedgehogs (*Hemiechinus auritus*) and rodents (*Citellus* sp., *Sciurus* sp., *Alactaga* sp., *Pygerethmus* sp.) and Rosy Starlings (*Sturnus roseus*; Navarro et al. 2003).

Reproduction is an expensive activity for individuals because it requires an investment of time and energy. Reproductive rate varies with factors such as food supply, population density, and air temperature (Stearns 1992). Lack (1947) proposed that clutch size in birds is limited to the maximum number of young that parents can feed. Therefore, maximum number of offspring is a trade-off between fitness and reproductive costs (Lack 1947), with the upper limit imposed by morphological and physiological constraints (Stearns 1992). Thus, large broods are associated with high prey availability, specifically in these cases rabbits and medium-sized rodents found in Spain

and Asian steppes, respectively (Cochet 1999, Penteriani et al. 2002).

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