

J. Raptor Res. 45(1):95–96

© 2011 The Raptor Research Foundation, Inc.

PARENTAL INFANTICIDE FOLLOWED BY CANNIBALISM IN GOLDEN EAGLES (*AQUILA CHRYSÆTOS*)

KEY WORDS: *Golden Eagle*; *Aquila chrysaetos*; *cannibalism*; *infanticide*; *Slovakia*; *Western Carpathians*.

Observations of parental infanticide in birds are rare (e.g., Aguilera 1990, Urrutia and Drummond 1990, Tortosa and Redonto 1992, Zieliński 2002); however, in some bird species parental infanticide evolved as an obligate behavioral strategy for brood reduction (St. Clair et al. 1995). We could not find published information on this behavior in diurnal raptors in a search of the scientific databases (i.e., ISI Web of Knowledge, SCOPUS, Zoological Record). Here, we report an observation of parental infanticide by an adult Golden Eagle (*Aquila chrysaetos*).

An occupied Golden Eagle nest in the L'ubochnianska Valley, the Veľká Fatra Mountains, Slovakia, was observed during the breeding period from 25 March to 6 August 2004 using an ARCO 1 camera system. The nest monitoring was a part of a nest-guarding program to prevent illegal nest robberies. The nest was situated on a limestone cliff approximately 35 m high and contained two nestlings. The camera (model: KPC 101CZ; type: charge coupled device [CCD] camera with built-in 16× zoom lens, 8× digital zoom; sensitivity: 1 Lux; horizontal resolution: 480 TV lines; manufacturer: KT&C Bldg., Seoul, Korea) was placed about 14 m from the nest and transmitted images to an observation blind with a monitor and a recorder approximately 1900 m from the nest.

On 25 May 2004, two rangers watched the nest from 04:22–20:58 H while the camera recorded activity at the nest. Based on our earlier observations of hatching, we estimated the ages of the nestlings as 11 d and 8 d. During the day, the older nestling frequently attacked the younger. The adult, which we presumed was the female, stayed on the nest for approximately 1 hr and 35 min before attacking the younger nestling. Around 20:00 H and after a period on the nest of watching and preening the nestlings, the adult used its bill to pick up the younger nestling by its back, and moved it from the nest cup to one side of the nest. After approximately 16 sec, the female again

grabbed the nestling by its neck and moved it from one side of the nest to the other while striking the nestling's head several times. After moving the nestling to another side of the nest one more time, the female started to tear flesh from the live younger nestling and feed it to the older nestling. After feeding the older nestling for 2–3 min, the female again picked up the younger nestling's body, moved it slightly, and resumed feeding the older nestling. At this point the younger nestling was shaking its wings and we assumed it was still alive. We did not observe the female eating the nestling. After removing approximately a quarter of the younger nestling's body during a 10-min-and-23-sec period, the female covered its remains with a branch and started to brood the remaining nestling. The female stayed on the nest until next morning. The remainder of the nesting period proceeded normally. No adult aggression was observed toward the older nestling, which was regularly fed and fledged on 2 August 2004. Although the adult birds were not individually marked, we assumed that this was the female based on her behavior on the nest, size dimorphism, and specific plumage features (Collopy 1984).

We propose two possible explanations for the infanticidal behavior we observed. The first is that the female was a behavioral deviant, and this event was an example of aberrant behavior. This explanation can be partly discounted due to long-term monitoring of breeding performance and behavior at this nest site. The nest was monitored every year by observers (1995–2001) and by a camera system (2002–2010) during approximately the same period as in 2004. The nest was occupied in all years. The incident in 2004 was the only case of parental infanticide we observed; however, two nestlings disappeared from the nest, one each in 1996 and 1999, for unknown reasons. The adult birds were not individually marked, but we believe that the same pair bred in the nest for the entire period, due to

specific plumage features that we documented using direct observations and video footage (M. Macek unpubl. data).

A second potential explanation is that the infanticide may have resulted from a low food supply. It is possible that the female killed the younger nestling to help ensure the survival of the older nestling. To examine this possibility, we estimated biomass of prey deliveries to the nest before the infanticide and compared that to biomass of prey delivered to typical nests (Collopy 1984). Mean biomasses of the prey delivered to the nest during the first week after hatching and the first 5 d of the second week, before the infanticide, were 994 ± 1325 (SD) g/d and 452 ± 313 g/d, respectively, which were lower than those reported by Collopy (1984) for the same periods (1258 and 776 g/d, respectively), suggesting that the nestlings may have experienced some food stress.

Infanticide and cannibalism were documented in Bald Eagles (*Haliaeetus leucocephalus*) in Virginia, U.S.A. (Markham and Watts 2007); in this case, a subadult male killed two nestlings on a nest in absence of their mother after the death of their father. Similar evidence of intraspecific predation of nestlings by intruding birds has been observed in other raptor species (e.g., Rosenfield and Papp 1988, Bortolotti et al. 1991, Webster et al. 1999). In general, direct observations of infanticide are fairly rare due to relative scarcity of such events and the difficulty of continuous monitoring of large numbers of raptor nests. Cannibalism linked with cainism (siblicide) in Golden Eagle was commonly observed in the Western Carpathian population of Golden Eagles (Group for Conservation and Research on the Golden Eagle in Slovakia unpubl. data). Similar cannibalism following natural nestling deaths has also been documented in other raptor species (e.g., Bortolotti et al. 1991, Dios 2003, Markham and Watts 2007).

A video recording of the event we describe is available on DVD from the authors and is published on the Internet site: www.oroalskalny.sk/en/infanticide.php. We are very grateful to Milan Fillo and Jana Fillová for guarding the nest and providing detailed notes of their observations. We would also like to thank Cheryl R. Dykstra, Carol L. McIntyre, Michael W. Collopy, Michael N. Kochert, Michael J. McGrady, Ján Korňan, and two anonymous referees for valuable comments to earlier versions of the paper. This contribution is the result of the project implementation: Centre of Excellence "Adaptive Forest Ecosystems," ITMS: 26220120006, supported by the Research and Development Operational Programme funded by the European

Regional Development Fund.—**Martin Korňan** (e-mail address: martin.kornan@gmail.com), Department of Forest Protection and Game Management, Faculty of Forestry, Technical University in Zvolen, T.G. Masaryka 20, 960 53 Zvolen, The Slovak Republic; and **Metod Macek**, State Nature Conservancy of the Slovak Republic, The Administration of the Veľká Fatra National Park, Čachovská rad 7, 038 61 Vrútky, The Slovak Republic.

LITERATURE CITED

- AGUILERA, E. 1990. Parental infanticide by White Spoonbills *Platalea leucorodia*. *Ibis* 132:124–125.
- BORTOLOTTI, G.R., K.L. WIEBE, AND W.M. IKO. 1991. Cannibalism of nestling American Kestrels by their parents and siblings. *Canadian Journal of Zoology* 69:1447–1453.
- COLLOPY, M.W. 1984. Parental care and feeding ecology of Golden Eagle nestling. *Auk* 101:753–760.
- DIOS, I.S.G. 2003. Siblicide and cannibalism in the Booted Eagle (*Hieraaetus pennatus*) in the Tietar Valley, central Spain. *Journal of Raptor Research* 37:261.
- MARKHAM, A.C. AND B.D. WATTS. 2007. Documentation of infanticide and cannibalism in Bald Eagles. *Journal of Raptor Research* 41:41–44.
- ROSENFELD, R.N. AND J.M. PAPP. 1988. Subadult intrusion and probable infanticide at a Cooper's Hawk nest. *Wilson Bulletin* 100:506–507.
- ST. CLAIR, C.C., J.R. WAAS, R.C. ST. CLAIR, AND P.T. BOAG. 1995. Unfit mothers? Maternal infanticide in Royal Penguins. *Animal Behaviour* 50:1177–1185.
- TORTOSA, F.S. AND T. REDONTO. 1992. Motives for parental infanticide in White Storks *Ciconia ciconia*. *Ornis Scandinavica* 23:185–189.
- URRUTIA, L.P. AND H. DRUMMOND. 1990. Brood reduction and parental infanticide in Heermann's Gull. *Auk* 107:772–774.
- WEBSTER, A., R. COOKE, G. JAMESON, AND R. WALLIS. 1999. Diet, roosts and breeding of Powerful Owl *Ninox strenua* in a disturbed, urban environment: a case for cannibalism? Or a case of infanticide? *Emu* 99:80–83.
- ZIELIŃSKI, P. 2002. Brood reduction and parental infanticide—are the White Stork *Ciconia ciconia* and the Black Stork *C. nigra* exceptional? *Acta Ornithologica* 37:113–119.

Received 5 November 2009; accepted 3 November 2010
Associate Editor: Carol L. McIntyre