when they occur, hawk nestlings may die from fratricide and/or starvation before fledging because of their smaller size. We are unaware of other accounts of mixed broods of raptors being fledged under natural conditions. However, in a similar instance where nonlethal predation and adoption was suspected, Black-breasted Buzzards (*Hamirostra melanosternon*) reared seven Australian Kestrels (*Falco cenchroides*) that varied in age by 6 wks, feeding them other kestrels they had captured (J. Cupper and L. Cupper 1981, Hawks in focus, Jaclin Enterprises, Mildura, Australia).—**James W. Watson, Michael Davison and Lora L. Leschner, Washington Department of Wildlife, 16018 Mill Creek Boulevard, Mill Creek, WA 98012 U.S.A.**

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BEHAVIOR OF A GROUP OF ZONE-TAILED HAWKS

The Zone-tailed Hawk (*Buteo albonotatus*) is a neotropical raptor that breeds north to the southwestern United States. In Texas the Zone-tailed Hawk breeds from late March to July (H. Oberholser and E. Kincaid 1974, The bird life of Texas, Univ. of Texas Press, Austin, TX U.S.A.), with most nests found in tall trees in narrow, steep-sided canyons (H.A. Snyder and R.L. Glinski 1988, pages 105–110 *in* R.L. Glinski, B.G. Pendleton, M.B. Moss, M.N. LeFranc, B.A. Millsap and S.W. Hoffman [EDS.], Proceedings of Southwest Raptor Management Symposium and Workshop, National Wildlife Federation, Washington, DC U.S.A.). The young remain near the nest for several weeks after fledging as the adults continue to feed them (Snyder and Glinski 1988).

Here we report on the behavior of a group of Zone-tailed Hawks observed by us at Madrid Falls, Big Bend Ranch State Natural Area, in Texas. The area is a steep canyon with abundant water running from natural springs and supports large cottonwood (*Populus* sp.), ash (*Fraxinus* sp.), and oak (*Quercus* sp.) trees. On 21 June 1991 three Zone-tailed Hawks dove (to within 10 m) and screamed at us and then at a mountain lion (*Felis concolor*) as we observed them between 1230–1430 H. Two of the hawks were adults and the third had the spotted breast of a juvenile (W.S. Clark and B.K. Wheeler 1987, Hawks, Houghton Mifflin Co., Boston, MA U.S.A.). We observed the hawks again on 8 August 1991 from 1000–1430 H. Of three birds seen on this occasion one was a juvenile with heavy spotting on the breast, one had few spots, and the third had no spots. Again the birds were quite aggressive, diving to within 1 m of us. The loudest and most aggressive hawk had the most spotting. A fourth hawk, an adult, flew into view carrying prey, and transferred it to another individual in the air. We observed two more prey transfers in the air, a third while the birds roosted in a *Yucca,* and a fourth on the ground. Three of the hawks, including one adult, were fed by the fourth hawk. We did not, however, observe the bird capturing prey as it would leave the area and come back with the prey. This observation supports F.M. Hiraldo, M. Delibes, and R. Rodriguez Estrella's (1989, *J. Raptor Res.* 23:103–106) assertion that one adult does most of the hunting while the other adult defends the brood.

Our observations raised several questions. The juvenile observed on 21 June could represent a record egg-laying date for Texas. With an incubation period of 35 days (I. Newton 1979, Population ecology of raptors, Buteo Books, Vermillion, SD U.S.A.) and 6–7 wk to fledging (Snyder and Glinski 1988) the latest possible egg date for the juvenile seen in June would be 5 April. However, the aggressive behavior and flying ability of the juvenile suggests that it was much further advanced. An egg date earlier than the record 29 March given by Oberholser and Kincaid (1974), perhaps early March, is very likely. The second juvenile could have been a clutch mate of the first observed on 21 June, or the pair may have produced two clutches for the year. Renesting, however, has not been documented for Zone-tailed Hawks.

The observed behavior differs somewhat from the only published information on postfledgling behavior. Hiraldo et al. (1989) reported a decrease in the time adults spent near the nest as the postfledgling period progressed, with a low of 0.2% by the fourth week. They also reported an increase in aggression between parents and young.

Another possibility is the presence of a helper in the observed group. We were unable to determine age of the juveniles by their plumage since no data are available on molting pattern of juveniles (R.S. Palmer 1988, Handbook of North American birds, Vol. 5, Yale Univ. Press, New Haven, CT U.S.A.). The juvenile observed on 21 June may have been raised the previous year. Although helpers have not been documented for Zone-tailed Hawks, they have been for other raptors (P.C. James and L.W. Oliphant 1986, *Condor* 88:533–534). The aggression first directed toward us and then at the mountain lion may have been due to the presence of eggs in a nearby nest.

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