

We surmised that the passerine nestling was a kingbird (Tyrannidae), sparrow (Emberizidae), or a Horned Lark (*Eremophila alpestris*), presumably brought to the nest by one of the adult hawks as a prey item. The nestling was not feathered enough to have flown to the nest; there were no other nest structures on the power tower, and no nearby trees.

This nest was occupied by a six-year-old color-banded male for at least three years and an unbanded female (J.K. Schmutz pers. comm.). An experienced hunter may have easily captured the nestling from a tree or ground nest. We hypothesize that the nestling's small size, or the lack of a struggle, may have inhibited the adult hawk from tightly grasping and engaging the digital tendon locking mechanism during capture and transport. Nonlethal predation appears to be the best explanation for our observation. Other nonlethal predation by raptors has been reported recently in the literature (P.R. Stefanek et al. 1992, *J. Raptor Res.* 26:40-41), and we feel that these events may occur more frequently than the literature suggests. We consider brood parasitism unlikely, due to the disparity between the age of the nestling hawks and the passerine.

We wish to thank J.K. Schmutz for encouraging us to report this observation.—**Daniel N. Gossett, Raptor Research and Technical Assistance Center, Department of Biology, Boise State University, 1910 University Drive, Boise, ID 83725 U.S.A.; Jeffrey D. Smith, Department of Biology, University of Saskatchewan, Saskatoon, SK S7N 0W0 Canada.**

J. Raptor Res. 27(2):126-127

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BALD EAGLES REAR RED-TAILED HAWKS

Recently, Stefanek et al. (1992, *J. Raptor Res.* 26:40-41) reported an unusual incident of a nestling Red-tailed hawk (*Buteo jamaicensis*) and two nestling Bald Eagles (*Haliaeetus leucocephalus*) in an eagle's nest in Michigan. We report here on similar incidents of Bald Eagles rearing mixed-broods of eaglets and Red-tailed Hawks in northern Puget Sound of Washington state.

We first suspected mixed-broods in June during helicopter surveys when we counted young at eagle nests. Three mixed broods were confirmed in photographs taken from helicopters. Two instances of mixed-broods occurred on the same territory but at different nests in 1987 and 1990 when one hawk and one eaglet, and one hawk and two eaglets fledged, respectively. We did not determine whether adult eagles continued to feed the hawks after fledging. These eagle nests were about 300 m from a Red-tailed Hawk nest where two young fledged in 1989, and occasional heckling of adult eagles by adult hawks was observed (L. Gunther pers. comm.). A mixed-brood of these two species was observed on another territory in 1988 (one hawk and one eaglet with fledging success unknown).

Our interpretation of the photos taken, specifically the degree of feathering of nestlings' crowns and body contours, indicated that hawks were 29-35 d old (M.G. Moritsch 1983, Photographic guide for aging nestling Red-tailed Hawks, Bureau Land Manage., U.S. Dept. Interior, Boise, ID U.S.A.), while the eaglets were at least 56 d old (M.V. Stalmaster 1987, *The Bald Eagle*, Universe Books, New York, NY U.S.A.). The 4 wk age difference was similar to that noted by Stefanek et al. (1992) for a mixed-brood of these species. The reported range in duration of incubation for Red-tailed Hawks (28-34 d; P.A. Johnsgard 1990, *Hawks, eagles, and falcons of North America*, Smithsonian Institution Press, Washington, DC U.S.A.) is the same or less than that of Bald Eagles (34-38 d; J.S. Gerrard, 1988, pages 214-215 in R.S. Palmer [ED.], *Handbook of North American birds*, Vol. 4, Yale Univ. Press, New Haven, CT U.S.A.). The observed age difference, therefore, would require that adult hawks displaced eagles from nests late in incubation, and laid their own eggs. We concur with Stefanek et al. (1992) that this was unlikely. Aggression of territorial Red-tailed Hawks against Bald Eagles is not uncommon (P.V. LeDuc 1970, *Auk* 87:586), but Bald Eagles also have killed and/or permanently displaced Red-tailed Hawks and Osprey (*Pandion haliaetus*) from at least four territories in Puget Sound (J.W. Watson unpubl.).

We discounted other explanations for mixed broods, including the placement of nestling hawks in the eagle nests by humans. This was unlikely due to the difficulties in climbing the trees (old-growth firs) and without the knowledge of landowners that live nearby and monitor the nests. It was also unlikely that the hawks flew to the eagle nests; the hawks were unable to fly when first observed.

Nonlethal predation of downy hawks by eagles and their subsequent adoption by eagles is the explanation proposed by Stefanek et al. (1992). This also seems to be the most likely explanation for the mixed broods we observed. We suspect that mixed broods of hawks and eagles are unusual (e.g., 0.5% of 662 broods we observed from 1987-91), and

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.**

J. Raptor Res. 27(2):127

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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.

These observations were made during a project funded by the Expanded Research Area of the Texas Agricultural Experiment Station.—**Beth E. Wilson, Cade Coldren, Mary Coldren, Felipe Chavez-Ramirez and Tim Archer, Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77843 U.S.A.**