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Robert K. Murphy*

John T. Ensign†

*u.s. Fish and Wildlife Service

†Montana Department of Fish, Wildlife, and Parks

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Raptor Nesting Chronology in Northwestern North Dakota

ROBERT K. MURPHY and JOHN T. ENSIGN

U.S. Fish and Wildlife Service, Des Lacs National Wildlife Refuge Complex,
8315 Hwy. 8, Kenmare, ND 58746 (RKM)

Montana Department of Fish, Wildlife, and Parks, 204 Ryan Drive, Glendive, MT
59330 (JTE)

ABSTRACT—Nesting chronology of raptors is sparsely documented in North Dakota. During 1981-94, we determined hatching dates at 298 nest attempts by eight species of raptors on and within 10 km of Lostwood National Wildlife Refuge, northwestern North Dakota. Mean hatching dates for most common species were 17 April for great horned owl (*Bubo virginianus*)(SD = 8.4 days, $n = 70$ nests), 1 June for red-tailed hawk (*Buteo jamaicensis*)(7.3, 99), 19 June for northern harrier (*Circus cyaneus*)(11.1, 37), 24 June for Cooper's hawk (*Accipiter cooperii*)(4.6, 19), and 27 June for Swainson's hawk (*B. swainsoni*)(6.8, 45). For six of eight species examined, egg or nestling dates were earlier or later than previously recorded in North Dakota. Overall, a relatively late chronology was suggested.

Key words: *Accipiter cooperii*, *Buteo jamaicensis*, *B. swainsoni*, *Bubo virginianus*, *Circus cyaneus*, eggs, nesting chronology, North Dakota.

Resource managers must be cognizant of raptor (Falconiformes and Strigiformes) nesting chronology to avoid negative impacts caused by ill-timed human activity near nests (Grier and Fyfe 1987, Postovit and Postovit 1987) and for optimally timing surveys of breeding raptors (Call 1978). Other than general breeding season dates and scattered chronology records in Stewart (1975) and a few accounts of individual species (e.g., Hammond and Henry 1949, Allen et al. 1986, Sutherland 1987), almost no nesting chronology data are published for North Dakota especially the northwestern part of the state. Our objective is to summarize nesting chronology for eight species of raptors in northwestern North Dakota during 1981-94.

STUDY AREA AND METHODS

We recorded hatching dates of raptors nesting on and within 10 km of 108-km² Lostwood National Wildlife Refuge (LNWR), in Burke and Mountrail counties (48°37'N; 102°27'W). The area is in the rolling to hilly Missouri Coteau physiographic region with about 20% of the land covered by wetlands (Murphy 1993). The LNWR is composed mainly of mixed grass prairie, and surrounding lands are small grain fields, haylands, and grazed and idle prairie. Quaking aspen (*Populus tremuloides*) tree clumps developed in the last 50-60 years and transformed much of the area to aspen parkland (Murphy 1993).

During 1983-90, we annually censused breeding raptors, except northern harriers (*Circus cyaneus*) and short-eared owls (*Asio flammeus*), on and within 1 km of LNWR and on an adjacent 93-km² township in 1986 and 1987 (Murphy 1993). After hatching was presumed to have occurred, we visited nests of censused raptors, although nests with unusually late hatch dates were observed at or near hatching. Excluding late nests, ages of nestlings of censused raptors were determined by primary remige measurement (Petersen and Thompson 1977, Schmutz 1977) and overall plumage development (Moritsch 1985, Palmer 1988), and hatching dates were determined by backdating. We assigned a mean hatching date to each nest that had more than one nestling. To augment low sample sizes, we located additional ferruginous hawk (*Buteo regalis*), Cooper's hawk (*Accipiter cooperii*), and long-eared owl (*A. otus*) nests on the study area in 1994.

During routine nest searches (Kruse and Bowen 1996) in 1981-89, nests of northern harriers and short-eared owls were located annually on LNWR. During 1981-90, additional nests of harriers were found incidentally on LNWR, and during 1994, those of short-eared owls were found. We first visited most northern harrier and short-eared owl nests during incubation; the hatching date for a given nest was projected from an estimated mean incubation stage (Westerkov 1950). We verified these dates by observing hatching eggs or neonate young at subsequent nest visits and, for northern harriers, also by later primary remige measurement of nestlings (Scharf and Balfour 1971, Hamerstrom 1986:112). Hatching dates were from nests in which eggs hatched, with the exception of five northern harrier nests and one short-eared owl nest. We define nest attempt as a nest in which one or more eggs are laid.

RESULTS AND DISCUSSION

Hatching dates were determined for 298 nest attempts by eight species of raptors (Table 1). The raptor nesting season spanned more than half a year, from initiation of the earliest great horned owl (*Bubo virginianus*)

nest at the end of February through fledging at the latest Swainson's hawk (*B. swainsoni*) nest in early September.

Great horned owl eggs hatched mainly in mid-April (Table 1), earlier than those of other raptor species. The range of great horned owl hatching dates, however, covered more than five weeks. An extreme (late) egg date of 10 May is five days later than previously recorded in North Dakota (Stewart 1975:156). The egg was pipping and another had hatched less than 24 hr earlier. This likely represented a re-nesting, i.e., recycling, effort following destruction of another nest 500 m away by a 4 April blizzard. Renesting has been noted previously in great horned owls (Morrison and Walton 1980).

Most eggs of red-tailed hawks (*B. jamaicensis*) hatched in late May and early June (Table 1). Two red-tailed hawk nests had single eggs on 26 June 1990; both eggs hatched about 29 June and one of the nests contained a nestling near fledging age on 9 August. These egg and nestling dates are 15 and 18 days later than previously recorded in North Dakota (Stewart 1975:94). Red-tailed hawks in the LNWR area hatched eggs in their nests later than expected based on latitude. The chronology resembled that observed farther north (Luttich et al. 1971, Adamcik et al. 1979). This was partly due to spring blizzards that apparently contributed to failed early nest attempts; the mean hatching date for eggs in red-tailed hawk nests was later during two years with late April or May blizzards (Murphy 1993:71).

Swainson's and Cooper's hawks in the LNWR area hatched their eggs mainly in late June (Table 1). Swainson's hawks nested as late or later than conspecifics in prairie Canada, based on egg date ranges in Bent (1937) and Schmutz et al. (1980). Our late estimated hatching date of 20 July for Swainson's hawk was based on a 28 July observation of two nestlings about 6 and 10 days old. One of these young was still in its nest 20 August and had recently fledged when observed 7 September; these dates are later than previously noted in North Dakota (Stewart 1975:92).

Hatching dates among nests of Cooper's hawks appeared to vary less than for other species, but this may have been an artifact of lower sample size (Table 1). Cooper's hawks in northwestern North Dakota apparently nest later than elsewhere in the state (Stewart 1975:90) and up to a month later than in other northern tier states (summarized in Palmer 1988). Our late egg date of 2 July (nest contained a whole egg, a pipping egg, and two young less than two days old) is the latest for the state by more than a month (Stewart 1975:90).

Hatching of eggs in nests of northern harriers occurred over more than seven weeks, a longer period than observed for other raptors except short-eared owls (Table 1). Our mean of 19 June is close to a 23 June mean for 19 harrier nests 110 km southeast of LNWR, calculated from Tables 26 and 27 in Sutherland (1987). The extreme (late) egg date of 5 July we recorded was

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