

NORTHERN HARRIERS NESTING IN SAGEBRUSH STEPPE IN CENTRAL WYOMING

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Northern Harriers (*Circus cyaneus*) usually nest near water or wetlands in open, treeless habitats with dense vegetation. Here we describe two Northern Harrier nests ~800 m apart in another situation, sagebrush steppe on a mountain slope in central Wyoming. On 28 May 2002, we observed a male and a female harrier on the south slope of Crooks Mountain, ~16 km south-southwest of Jeffrey City, Fremont County, Wyoming. On a subsequent visit, on 20 July 2002, we located their nest (nest 1, 42.3676° N, 107.9186° W, elevation 2374 m) after a brief search of the area where a female harrier flushed from the sage as we drove a lightly traveled gravel road. On 8 August 2002 we located the second harrier nest (nest 2, 42.3632° N, 107.9110° W, elevation 2299 m) in a similar manner. Both nests were within 10 m of the centerline of the road. The females vocalized and circled within 100 m of each nest while we investigated. These were the only harriers we have observed during the breeding season in sagebrush steppe during 5 years of field research in central Wyoming. Each nest was constructed on the ground of dead sagebrush limbs, lined with grass, and partially covered by Big Sagebrush (*Artemisia tridentata*) bushes approximately 80 cm tall.

This habitat is within the Wyoming Basin physiogeographic region (Partners in Flight, www.partnersinflight.org/bcps/pifplans.htm), near the northern edge of the Red Desert in sagebrush steppe dominated by scattered sagebrush, scattered pines, and perennial bunch grasses. The nests were on public land administered by the Lander Office of the Bureau of Land Management. The area is grazed by domestic cattle, feral horses, and the native Elk (*Cervus canadensis*), Mule Deer (*Odocoileus hemionus*), and Pronghorn (*Antilocapra americana*). At an elevation of 2200–2400 m, the area has a cold desert climate with average annual precipitation of 25.7 cm (data for Jeffrey City Wyoming from 1964 to 2005, Western Regional Climate Center, www.wrcc.dri.edu).

From the apparent age of the nestlings when we found the nests, we estimate that the young in nest 1 hatched on 27 June 2002, those in nest 2 on 21 June 2002, 6 days earlier. Four young successfully fledged from nest 1. Of at least three young in nest 2, one died in the nest prior to fledging. When we found nest 2 on 8 August 2002, two recently fledged harriers flushed from the nest where it appeared they had been feeding from the body of the dead sibling. This behavior, nestlings and mothers cannibalizing dead nestlings, has been reported previously by Breckenridge (1935).

The death of the nestling in nest 2 was likely related to a seismic survey crew temporarily parking equipment within 5 m of the harrier nest for more than a week when the young were less than 3 weeks old. Although we found no published research on the effect of this type of disturbance on nesting Northern Harriers, human disturbance near nests of the harrier and other raptors has been studied. In a study of 21 Northern Harrier nests, Saunders (1986) reported that 75% of the pairs “tolerated” a blind near their nest, but the remaining 25% behaved erratically when the blind was occupied. White and Thrown (1985) found that even when successful, disturbed Ferruginous Hawk nests in Idaho’s sagebrush steppe fledged significantly fewer young than did undisturbed nests.

Between 1960 and 2015, 60 Northern Harriers, of which 45 were nestlings, were banded in Wyoming (Bird Banding Laboratory records). The dates on which the nestlings were banded ranged from 9 June to 29 July. We banded the four nestlings in nest 1 with U.S. Geological Survey bands on 20 July 2002, thus in the latter part

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of this interval. On a subsequent visit to nest 1 on 4 August 2002, we flushed three of four fledglings from the sagebrush surrounding the nest, recapturing, checking, and photographing them. When we discovered nest 2 on 8 August 2002, the nestlings were already too old to be captured by hand. In summary, the two nests on Crooks Mountain do not appear to be outside of the harrier's normal breeding season in Wyoming.

In general, Northern Harrier nests in North America are near water or in wetlands in open, treeless habitats, as well as uplands, in areas with dense low vegetation (Hamerstrom and Kopeny 1981, Apfelbaum and Seelbach 1983, Simmons and Smith 1985, Martin 1987, Sutherland 1987, Kantrud and Higgins 1992, Evrard and Bacon 1998, Smith et al. 2011). The two nests we report are not in accord with any of these general characteristics.

In a sample across North America, 17% of 428 Northern Harrier nests were in wet marshy meadows, 18% were in freshwater marshes, 26% were dry grasslands, and 8% were in cultivated fields or prairie rangeland (Apfelbaum and Seelbach 1983). Even in dry habitats, harrier nests, are located disproportionately near water, such as stock ponds, creeks, or rivers (Martin 1987). Both nests we report were far from any stream or wetland. The nearest nonseasonal water source, a small spring protected from livestock by a fence, was 1863 m south-southwest of nest 1 and 1492 m southwest of nest 2.

Northern Harriers typically nest on the ground in open habitats devoid of trees (Smith et al. 2011). In contrast, both nest sites on Crooks Mountain were in close association with scattered evergreen trees. Within 9–20 m of nest 1 were six scattered Limber Pines (*Pinus flexilis*) 3–6 m tall. Within 7–27 m of nest 2 were three Limber Pines of the same approximate heights. Limber Pine is the dominant tree on the south slope of Crooks Mountain, but treeless habitat is nearby.

Other observations of Northern Harriers nesting in sagebrush are few. In one example, R. Crandall (pers. comm.) located three harrier nests in Grand Teton National Park near Kelly, Wyoming, during 2014 and 2015. Although also associated with sagebrush, these nests were situated in habitat more typical for harrier nesting with less than 10% exposed ground and were situated closer to water, within 380, 1032, and 1057 m of the Snake River, on open flat ground with the closest trees 226 m away. The area is protected from grazing by domestic livestock.

Most reported harrier nests are built within patches of dense, often tall herbaceous vegetation in undisturbed areas (Evrard and Bacon 1998, Hamerstrom and Kopeny 1981). Around the nests on Crooks Mountain, however, vegetative cover was sparse: >70% of the surface was exposed ground (gravel or sand). Furthermore, the habitat around the two harrier nests at Crooks Mountain cannot be described as upland meadow or field, being situated in rolling hills (12% slope).

The two nests in sagebrush were ~800 m apart, close enough to represent a polygynous arrangement of two females and one male harrier. Simmons et al. (1986) reported, "no other raptor exhibits either the degree, or regularity of occurrence, of polygyny." They found the distance between seven harrier nests to vary widely, from 243 to 2400 m (median 430 m). Nests of polygynous harriers are closer together than those of the population at large (Saunders 1986), with the secondary polygynous female nesting closer to the harem's primary female than expected by chance (Simmons et al. 1986).

Hunting harriers use overgrazed pastures and other areas of short vegetation less than they do denser vegetation (Preston 1990). Bock et al. (1993) reported that Northern Harriers breeding in the shrubsteppe of the Intermountain West probably respond negatively to livestock grazing. These observations lend more credence to the idea that the harriers at these two central Wyoming nests were polygynous since they were situated close together in marginal habitat.

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