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OSPREY POLYGyny IN WYOMING

JOHN D. BERRY

Kiewit Mining Group Inc., P.O. Box 3049, Sheridan, WY 82801 U.S.A.

CHARLES J. HENNY

National Biological Service, Forest and Rangeland Ecosystem Science Center, Northwest Research Station, 3080 S.E. Clearwater Drive, Corvallis, OR 97333 U.S.A.

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Polygyny, a mating system in which a male mates with two or more females (Oring 1982), has been reported for ospreys (*Pandion haliaetus*) on several occasions (Fernandez and Fernandez 1977, Cramp and Simmons 1980, Poole 1989), and at least 10 other raptor species (Newton 1979). The generally low rate of polygyny in osprey may be related to male participation in incubation, whereas the rate is higher in species where only females incubate. Here we report polygynous osprey nesting near Sheridan, Wyoming, and the history of nesting activity that preceded

intensive observations in 1994. Observations took place on lands of the Big Horn Mine in Sheridan County, Wyoming from 1989-94. The Tongue River and Big Goose Creek flow through the mining area and several reservoirs are present which support fish populations.

During the late summer of 1989, nest building (sticks present on power poles) occurred on mine property, but no birds were seen carrying sticks. Ospreys were not suspected at that time because there was no record of ospreys nesting in the vicinity. In retrospect, we are confident that ospreys carried the sticks to the power poles in 1989. In 1990 and 1991, a pair of ospreys nested in the area and fledged three young each year; in spring of 1992 a trio

et of the owls was dominated by mice (*Peromyscus* spp.) distributed on the area than (1985) concluded that in Nevada, long-eared owls most abundant rodent, and when their preferred prey in the area. Maser et al. in Oregon selected pocket were the most common and White (1984) simply preyed more on kangaroo western harvest mouse (*Reithrodontomys*) could not conclude if this prey or energy yield. Long-eared owls show that small birds, and several prey of these owls (Stork 1984, Thurnow and Marti et al. 1986, Bull et al. 1986) could be found of scorpions. This may be in records of long-eared owls of southwestern United Mexico, Marti et al. (1986) long-eared owls was dominated by *gnathus*, and *Chaetodipus*) stated that deer mice were read small mammals. Stork mice were the most abundant owl pellets from the oak

ing evidence that in arid heteromyids are the dominant Stophlet 1959, Maser et al. 1985, Marti et al. prefer mammalian prey, tunistic.

descubrí un sitio de desmonte 12 individuos de la escurrimiento en el Barry Condado de Maricopa, en un racimo de arboles el borde del interfluvio. ctaron aproximadamente análisis de las egagrópilas más común era *Dipodomys* (15%). Otras categorías *Peromyscus*, un ave y un porte de depredación de

traducción de Ivan Lazo)

ere collected and observed of all owls found on The study was supported University of Arizona. I Helen Ulmschneider and gestions on earlier drafts

Table 1. Comparison of activities at nests 1 and 2 on 4 May 1994 (483 minutes of continuous observation).

CATEGORY	NEST 1	NEST 2
Copulation by same δ	Yes	Yes
Percentage incubation by δ	30.6%	1.2%
Percentage incubation by φ	69.4%	98.8%
Incubation events (mean time)		
by δ	3 (49 min)	3 (2 min)
Incubation events (mean time)		
by φ	4 (83 min)	5 (95 min)

appeared (one male and two females). Field identification of individual osprey was aided by noting head-marking patterns (Bretagnolle et al. 1994). The male participated in building both nests in 1992, although nest 2 remained a disorganized accumulation of sticks. Three ospreys (one male and two females) were again in the area in 1993 (another osprey was observed once early in the breeding season). Nest 2 became well-defined in 1993, but no copulation was observed with the female. She was observed sitting low in the nest on 10 May and 13 May, but if eggs were laid at nest 2, the nesting attempt failed early.

The curious activities of the trio in 1992 and 1993 led to 32.5 hr of observation between 6 April and 7 August 1994. Both nests were simultaneously observed. Female A arrived at nest 1 on 6 April 1994, and the male arrived on 15 April. Two more ospreys arrived on 18 April and all four birds were observed circling over nest 2 on that day. The male and female B were observed at nest 2 on 28 April. One male was seen tending both nests on 2 May. On that day the male was incubating at nest 2 while female B was eating a fish nearby. Female B then took over incubation and the male sat on the nest edge. After 20 min, the male flew to nest 1 and took over incubating and female A flew away. The two sites were monitored on 4 May continuously from 0700–1600 H except for a break from 1115–1212 H (Table 1). The male copulated with both females on that day and incubated eggs at both nests.

During the incubation period (2 May through 8 June), 12.8 hr of observations were made. The male was observed incubating at nest 2 only six times, but was incubating eleven times at nest 1. The male was last observed incubating at nest 2 on 16 May, while he was observed incubating at nest 1 on 16, 19, and 24 May. This male also brought fish to nest 1 twice, but was not observed bringing fish to nest 2. Female B left nest 2 unattended on at least three occasions, while female A was not observed away from nest 1. The male seemed to prefer female A or nest 1 after mid-May. The male was frequently observed after 16 May flying near nest 2 while female B was incubating/brooding. Although female B called (food begging) to the male, he did not vocalize or approach her.

Observations were made of each nest for portions of 14

d (11.2 hr of observation) between 9 June and 7 August when all young had fledged. The male was not observed at nest 2 during this time, but was consistently seen at nest 1. After eggs hatched, the male was observed bringing six fish back to female A at nest 1 and none to female B at nest 2. Female B left nest 2 unattended on 17 documented occasions during the brood rearing period. Eleven of the flights lasted 5 min or less. These short flights generally followed the rivers near the nest. She appeared to make frequent short flights rather than infrequent extended flights. When observations began on 17 June, female B was wet and feeding fish to her young at nest 2. Being wet implies that she caught the fish. In contrast, female A at nest 1 was not observed leaving the nest unattended or bringing fish to the nest before the young had fledged. One young fledged from nest 2 on or before 3 August and three young fledged from nest 1 between 5 August and 7 August 1994.

The participation of a male at nest 2 changed from assisting in nest building in 1992 to part-time nest attendance early in the 1994 nesting cycle. The male tended both females early in the 1994 nesting cycle, but by mid-incubation chose female A and did not assist female B. Female B was forced to leave the nest unattended to fish for herself during late incubation and early brooding after the male stopped attending her. The frequent, short flights away from the nest may have been her approach to obtaining food while minimizing the time the nest was left unattended. An apparent brood reduction to a single young provides some evidence that she had difficulty, but nevertheless was a successful nester. The addition of another nesting female into the male's territory did not affect the ability of the pair at nest 1 to successfully produce young (13 young in 5 yr).

Polygyny occurring in Massachusetts during the early 1970s was thought to be associated with an excess of female ospreys. Spitzer (1980) believed that the distorted sex ratio resulted from long-distance dispersing of females from more productive areas (see Henny, *in* Palmer [1988] and Poole [1989] for a discussion of sex-related dispersal) in association with low production in Massachusetts. Also in Massachusetts, Poole (1989) documented only three cases of polygyny (all secondary females failed) out of 190 monogamous pairs between 1980 and 1986. In all three cases, both nests were within sight of each other. Poole (1989) pointed out that few males ever find undefended nests close to their own, which accounts for the absence of trios in most populations. Pioneering ospreys are filling unoccupied portions of Wyoming. It follows that there may be more females than males in newly occupied regions. The polygyny documented in the study area may be the result of a shortage of males in the area related to recent range expansion and the closeness of the two nest sites.

RESUMEN.—*Pandion haliaetus* entraron por primera vez a nuestro sitio de estudio cerca de Sheridan, Wyoming, a

fines del verano de 1989. Una pareja produjo tres juveniles en 1990 y tres en 1991. Un trío (dos hembras y un macho) apareció en 1992, con las hembras ocupando sitios de nidificación adyacentes. El macho participó en la construcción de ambos nidos. Tres juveniles y un pollo fueron producidos por el trío en 1994, aunque el macho abandonó un nido a media incubación. Dispersión diferencial sexo-relacionada puede ocurrir distorsionando la razón de sexo y la resultante poligenia.

[Traducción de Ivan Lazo]

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