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FREQUENCY OF NEST USE BY GOLDEN EAGLES IN SOUTHWESTERN IDAHO

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ABSTRACT.—We studied nest use by Golden Eagles (*Aquila chrysaetos*) from 1966 to 2011 to assess nest reuse within territories, ascertain the length of time that elapses between uses of nests, and test the hypotheses that reproductive success and adult turnover influence nest switching. Golden Eagles used 454 nests in 66 territories and used individual nests 1 to 26 times during 45 continuous years of observation. Time between reuse ranged from 1 to 39 yr. Distances between nearest adjacent alternative nests within territories ranged between <1 and 1822 m, and distances between 90% of adjacent nests were <500 m. Of all nests used, 21% fell or disintegrated, and 31% were newly constructed during the study. Nest switching was not associated with the previous year's nesting success, but eagles tended to change nests after turnover of at least one member of the pair. Five of 42 nests used in 1971 and monitored continuously through 2011 were used only once and 21 were used >5 times. Two nests were unused for 21 and 27 yr after 1971 before being used every 1 to 3 yr thereafter. Eagles used 43% of the nests in series of consecutive years (range 3 to 20 consecutive nestings). Protecting unused nests for a proposed 10 yr after the last known use would not have protected 34% of all 300 nests that were reused during the study and 49% of 37 reused nests monitored consistently for 41 yr. The 102 nests that would not have received protection were in 56 of the 66 territories.

KEY WORDS: *Golden Eagle*; Aquila chrysaetos; *alternative nests*; *Idaho*; *nesting*; *nest reuse*; *nesting success*; *turnover*.

FRECUENCIA DEL USO DE NIDOS DE *AQUILA CHRYSAETOS* EN EL SUDOESTE DE IDAHO

RESUMEN.—Estudiamos el uso de nidos por parte de *Aquila chrysaetos* desde 1966 hasta 2011 para evaluar la reutilización de nidos dentro de territorios, determinar el lapso de tiempo que transcurre entre la utilización de nidos y probar la hipótesis de que el éxito reproductivo y el recambio de adultos influencian el cambio del nido. Las águilas utilizaron 454 nidos en 66 territorios y utilizaron nidos individuales de 1 a 26 veces durante 45 años continuos de observación. El tiempo transcurrido entre reutilizaciones varió de 1 a 39 años. Las distancias entre los nidos alternativos adyacentes más cercanos dentro de los territorios osciló entre <1 y 1822 m, y las distancias entre el 90% de los nidos adyacentes fueron de <500 m. De todos los nidos utilizados, el 21% se cayó o desintegró, mientras que el 31% fue construido desde cero durante el estudio. El cambio del nido no estuvo asociado con el éxito de nidificación del año anterior, pero las águilas tendieron a cambiar de nido después de un recambio de al menos uno de los miembros de la pareja. Cinco de 42 nidos utilizados en 1971 y monitoreados continuamente hasta el 2011 fueron ocupados sólo una vez y 21 fueron utilizados >5 veces. Dos nidos no fueron utilizados por 21 y 27 años después de 1971 para ser luego ocupados cada uno a tres años a partir de entonces. Las águilas utilizaron el 43% de los nidos en series de años consecutivos (rango de 3 a 20 nidadas consecutivas). La protección de nidos sin utilizar durante 10 años posteriores al último uso conocido no hubiera alcanzado un 34% del total de los

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300 nidos que fueron reutilizados durante el estudio y 49% de los 37 nidos reutilizados monitoreados constantemente durante 41 años. Los 102 nidos que no hubieran recibido protección se ubicaron en 56 de los 66 territorios.

[Traducción del equipo editorial]

Most species of hawks and eagles maintain and use more than one nest in their nesting territory (Newton 1979, Watson 2010). Several factors are thought to influence this phenomenon. Maintaining multiple nests may be important for courtship and pair bonding (Brown and Amadon 1968), and pairs may use different nests to reinforce territory ownership (Watson 2010). Switching nests may reduce the incidence of parasites that overwinter in the nest material (Brown and Amadon 1968, Newton 1979, Watson 2010). The availability of alternative nests may be important when a nest sustains damage close to the time of laying, forcing a pair to change from its intended nesting site (Newton 1979, Watson 2010). Pairs may switch nests in response to a failed reproductive effort (Brown and Amadon 1968, Dijak et al. 1990, Buehler 2000), disturbance (Watson 2010, Kochert et al. 2002), or turnover of adults.

Whether an unused nest is valuable for a raptor population depends, in part, on the reason it is not being used. Nests in abandoned or vacant nesting territories will be unused, and a nesting territory may be vacant for any of the following reasons: (1) the territory has become temporarily vacant due to disturbance or local changes in prey abundance (Newton 1979); (2) members of the pair have died and may not yet be replaced (Ratcliffe 1993); (3) nesting populations have declined for reasons unrelated to the suitability of the nesting habitat (e.g., pesticide contamination; Ratcliffe 1993); or (4) the habitat around the nest has become permanently unsuitable for supporting nesting pairs. In cases 1 to 3, nests in vacant territories may still have value. A nest in an occupied nesting territory might be unused if the pair uses one of the alternative nests within the nesting territory or if the pair does not lay eggs. Not all pairs lay eggs every year, particularly when prey abundance is low (Steenhof et al. 1997). One way to ascertain if a nest is still valuable is to understand normal variation in time that elapses between uses of a particular nest.

Golden Eagles (*Aquila chrysaetos*) are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (Eagle Act), which prohibit take of nests as well as the birds themselves (U.S. Fish and Wildlife Service 2009). One issue facing managers is how much protection to afford historical nests that have not been used by eagles in recent years. Reported declines in Golden Eagle populations throughout their range in the contiguous United States (Kochert and Steenhof 2002) and recent regulations regarding take under the Eagle Act have raised awareness of the importance of protecting Golden Eagle nests (U.S. Fish and Wildlife Service 2009). Increasing demands for energy development on public lands pose many challenges in protecting nesting Golden Eagles (U.S. Fish and Wildlife Service 2009). Golden Eagles often construct alternative nests, and pairs sometimes add new material to >1 nest before laying eggs in one of them (Kochert et al. 2002). Draft Raptor Conservation Measures being developed by the U.S. Fish and Wildlife Service (USFWS) propose that unused Golden Eagle nests be protected from disturbing activities that may render a nest site unsuitable for 10 yr since the last known use (D. Whittington pers. comm.) The Golden Eagle nesting population in the Morley Nelson Snake River Birds of Prey National Conservation Area (NCA) and adjacent Comparison Area has been studied since 1966 (Hickman 1968, Beecham 1970, Kochert 1972, Steenhof et al. 1997). During these long-term studies we observed use and reuse of nests within 66 different eagle nesting territories. The purpose of this report is to assess the frequency of nest reuse within Golden Eagle territories and to ascertain the length of time that elapses between uses of nests. We assess our results in relation to the proposed USFWS management guidelines. We also test hypotheses that reproductive success and turnover will influence nest switching by eagles.

METHODS

We conducted our study in the NCA and the adjacent Comparison Area upstream and downstream from the NCA (42°50′N, 115°50′W). The principal physiographic feature of the areas is the Snake River Canyon, and native vegetation is characteristic of shrub-steppe and salt-desert shrub communities (U.S. Department of the Interior 1996). The Golden Eagles we studied nested mainly on cliffs with four nests on the towers of the PacifiCorp (PPL) 500-kV transmission line (Steenhof et al. 1997).

Table 1. Golden Eagle use of 42 nests used in 1971 and monitored through 2011 in southwestern Idaho. Ranges in parentheses.

TYPE OF USE	NUMBER OF NESTS	MEAN NUMBER OF YEARS USED	MEAN NUMBER OF YEARS BETWEEN USE	MAXIMUM GAP (YR) BETWEEN NEST USES	MEAN NUMBER OF YEARS PRIOR TO 2011 OF LAST USE	NUMBER OF NESTS WITH SERIES OF USE	MEAN NUMBER OF NESTINGS PER SERIES[a]
Frequent[b]	6	17.0 (13–25)	2.6 (1–8)	5 to 8	1.2 (0–3)	6	8.2 (3–20)
Intermittent ≥2000[c]	14	9.4 (5–17)	4.6 (1–27)	6 to 27	4.9 (0–9)	9	6.5 (3–17)
Intermittent <2000[c]	5	6.2 (4–11)	4.6 (1 to 22)	4 to 22	18.0 (10–27)	4	3.5 (3–10)
Rare[d]	12	2.6 (2–4)	12.2 (1–35)	4 to 35	22.8 (3–34)	0	*
Used once[e]	5	*	*		40	0	*
Total	42	7.1 (1–23)	6.7 (1–35)	11.6 (5–35)	15.9 (0–40)	19	5.9 (3–20)

[a] Series is a string of consecutive nestings where ≤3 yr separated each subsequent nesting.
[b] Used consistently at uniform intervals throughout the study (≤8 yr between use) and last used after 2006.
[c] Used repeatedly throughout the study; either had wide gaps between reuses (>8 yr), was used in <50% of the nestings, or was last used before 2005; ≥2000 = last used between 2000 and 2011; <2000 = last used before 2000.
[d] Used 2 to 4 times.
[e] All nests gone by 2011.

We surveyed nesting eagles from fixed-wing (1971 only) and roto-wing aircraft and from the ground between 1971 and 2011. In 10 yr (1972, 1975–80, 2007, 2010, and 2011), we conducted surveys only from the ground. We conducted follow-up ground surveys in all nesting territories where nest use could not be confirmed from aircraft to verify whether or not a nest was used. Our observations were supplemented with surveys of nesting eagles conducted from fixed-wing aircraft and from the ground between 1966 and 1970 (Hickman 1968, Beecham 1970, Kochert 1972). We used data from 1966 to 1970 in our analyses when we knew which nests were used based on available field notes, maps, photographs, and personal communications. We defined a nesting territory as any stretch of cliff containing nests where an eagle pair was found in one or more years but where no more than one pair nested in the same year (Newton and Marquiss 1982, Steenhof and Newton 2007). We considered a nest to be ''used'' if it contained an incubating adult, eggs, young, or any indication that eggs had been laid. We refer to each nest use event as a ''nesting.'' Successful nestings were those that produced at least one young that reached ≥51 d of age (Steenhof 1987). We plotted nests on 1:24 000 scale USGS topographic maps and aerial photos. Individual nests were identified by their unique Universal Transverse Mercator (UTM) coordinates and their relative location to unique features on the cliff. We photographed nesting cliffs and beginning in 2002 recorded coordinates of most nests with a Global Positioning System.

We assessed nest use from two datasets. First, we analyzed all nests used in all territories regardless of year of construction or year of first use. Second, we analyzed a subset of 42 nests that were used in 1971 and monitored continuously through 2011 (Table 1). Eagles used 57 nests in 66 territories in 1971, but we excluded 15 of these nests from the second analysis because these territories were vacant for >5 yr between 1971 and 2011. We classified reuse of the 42 nests into three main categories: ''Frequently'' used nests were used consistently throughout the 41 yr of monitoring, used at uniform intervals (≤8 yr between use), and last used after 2006. ''Intermittently'' used nests differed from frequently used nests in that they either had had wide gaps between reuses (>8 yr), were used in <50% of the nestings, or were last used before 2005. We divided intermittently used nests into those used after 1999 and those last used before 2000. ''Rarely'' used nests were those used only 2–4 times throughout the study with wide gaps (10 to 35 yr) between reuse.

We used Pearson correlations in SYSTAT 12 (SYSTAT 2007) to compare new nest construction and use with the total number of nests used and to compare number of new nests used with percent of years successful. We used chi-square analyses to assess differences in territory occupancy rates and the frequency of nesting in specific nests between the first and last 20 yr of monitoring at 42 intensively

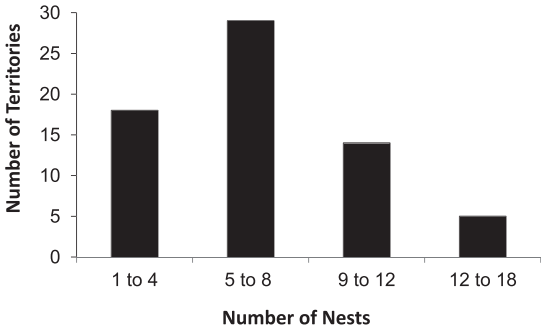

Figure 1. Number of nests used in each of 66 Golden Eagle nesting territories in southwestern Idaho, 1966–2011.

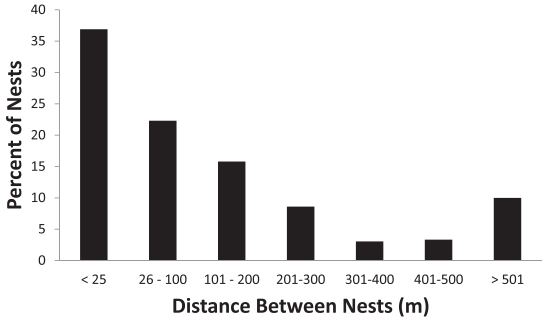

Figure 2. Percent of nests by distance category to nearest alternative nest in 66 Golden Eagle nesting territories (n = 360 pairs of nests) in southwestern Idaho, 1966–2011.

monitored territories. To assess if nesting success (i.e., whether or not a nesting produced at least one young to ≥51 d of age) in a given year influenced nest reuse the following year, we used a chi-square analysis to compare the previous year's nesting success of eagles that used a different nest with that of eagles that used the same nest. To assess if nest switching was related to turnover, we ascertained whether the nest used in the first nesting after turnover was the same as or different from the nest used in the nesting prior to turnover. Evidence for turnover of at least one member of the pair was based on observations of wing-marked or radio-tagged individuals on a territory previously occupied by unmarked birds or observations of two unmarked birds in a territory previously occupied by at least one marked bird. In two cases we confirmed turnover by discovering a dead eagle banded with a USGS leg band in the autumn after it was known to occupy the territory the previous nesting season. Observation of one member of the pair in subadult plumage after a territory was occupied by two adults also constituted evidence for turnover. We recorded the number of times each of the 42 nests used in 1971 and monitored through 2011 were and were not used in consecutive nestings to estimate the overall probability that any nest would be used in consecutive nestings. We used a chi-square analysis to compare this probability with the incidence of use of the same nest before and after a turnover event. Except where noted, values reported in the Results section are means ± SD, and we used an α-level of 0.05 for all tests.

RESULTS

All Nests Used. Golden Eagles used at least 454 nests in 66 territories between 1966 and 2011 ($\bar{x}$ = 6.9 ± 3.7; range = 1–18 per territory). Pairs used >1 nest in 61 territories and 5 to 8 nests in 30 (45%) territories (Fig. 1). Four of the five territories with only one nest were on 500-kV transmission line towers, and eagles nested in all but one of the transmission line territories for only one year. Eagles used the remaining transmission line tower nest 18 times. Distance between nearest alternative nests in each nesting territory ranged between <1 and 1822 m ($\bar{x}$ =191 ± 326 m). Only 10% of nests were >500 m apart; 75% were <200 m apart and 36% were ≤25 m apart (Fig. 2).

Golden Eagles used individual nests in 66 territories 1 to 26 times ($\bar{x}$ = 3.7 ± 3.7 uses). Eagles used 75% of 454 nests ≤4 times and 36% (154 nests) only once (Fig. 3). Time between reuse of 300 nests used more than once ranged from 1 to 39 yr ($\bar{x}$ = 4.4 ± 4.9 yr; n = 1250 nestings). All nestings (995) were ≤10 yr apart in 198 (66%) of the reused nests. Fifty-six of 66 territories contained at least one nest that was reused after a lapse of >10 yr, and 255 nestings occurred in these nests after >10 yr of no use. We determined success for 250 of these nestings, and 164 successful nestings fledged ≥274 young. More than 20 yr separated 26 nestings in 26 nests in 18 territories, with seven nests in six territories remaining empty ≥30 yr before being reused. Eagles reoccupied a territory that had been vacant for 16 consecutive yr, and reused one of the old nests after 22 yr of nonuse. In 2011, 269 of 454 nests had not been used for >10 yr.

Eagles built at least 160 new nests between 1970 and 2011 and nested in 141 new nests ($\bar{x}$ = 2.14 ± 1.83 per territory; range 1–10; 31% of all nests used) in 57 (86%) of 66 territories. Of the 135 nests where

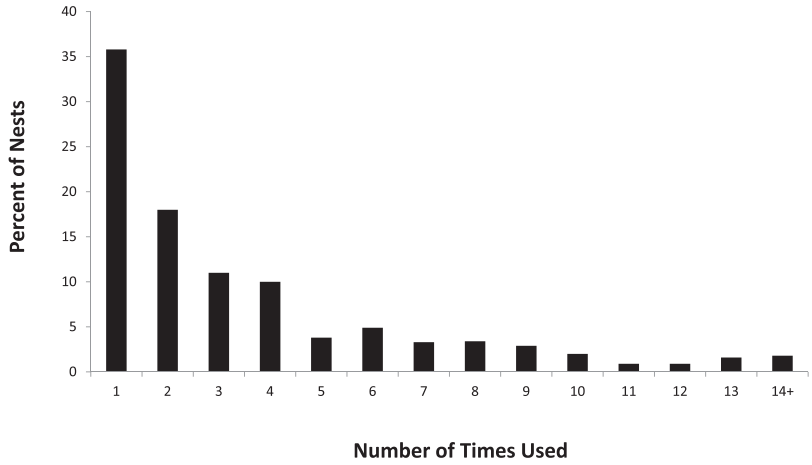

Figure 3. Frequency of use of 454 nests by Golden Eagles in southwestern Idaho, 1966–2011.

we were able to determine the year of construction, pairs used 119 (86%) nests in the year of construction, seven (5%) 1 yr after construction, and 11 (9%) 2–11 yr after construction. Of nests built and used ≥1 yr after construction, 50% were built by pairs that did not lay eggs and 50% were built by pairs that laid eggs in other nests in the year of construction. Within each of 64 territories, the number of new nests constructed and used correlated with the total number of nests used during all years ($r = 0.80$, $P < 0.001$). However, we observed no relationship between the number of new nests used and percent of years successful ($r = 0.040$; $P = 0.375$; $n = 66$). Occasionally eagles built new nests on or near sites of nests that had been destroyed or had fallen off the cliff. Eagles built a nest on the exact spot of a nest that burned 2 yr previous, and eagles built three more nests 4, 10, and 26 m, respectively, from sites where nests had fallen 22, 28, and 31 yr earlier. Eagles built a new nest in 2010 on the same ledge that contained a dilapidated Golden Eagle nest 40 yr earlier.

Previous year's nesting success was similar for 909 nestings where eagles used a different nest and 309 where they used the same nest as in the prior year (68% and 73%, respectively; $\chi^2_1 = 2.31$, $P = 0.128$). We recorded 40 cases of turnover of at least one member of the pair in 27 nesting territories. The new pair used the same nest in the first nesting after turnover in 9 cases and a different nest in 31 cases. The rate of nest reuse by new pairs (22%) was significantly lower ($\chi^2_1 = 5.69$, $P = 0.02$) than the overall probability of nest reuse in consecutive nestings (42% based on the 42 nests used in 1971 and monitored through 2011).

Nests Continuously Monitored for 41 yr. Golden Eagles nested 1 to 25 times ($\bar{x} = 7.2 + 5.8$) in each of the 42 nests used in 1971 and monitored through 2011 (Table 1). Pairs used five nests (14%) only once and 21 nests (50%) >5 times (Fig. 4). We recorded significantly more nestings in the nests used in 1971 in the first 20 yr of monitoring compared to the number of nestings in the last 20 yr (186 vs. 111; $\chi^2_1 = 9.37$, $P = 0.002$), even though occupancy of the 42 territories did not differ between the first and last 20 yr of monitoring ($\chi^2_1 = 0.17$, $P = 0.9$). The number of years between nest reuse ranged from 1 to 35 ($\bar{x} = 4.4 + 3.8$; $n = 255$ nestings). All nestings were ≤10 yr apart in 19 (51%) of the 37 nests used more than once. At least one reuse event occurred at an interval >10 yr in 18 (49%) of the reused nests, and all nestings were 11 to 35 yr apart in three of these nests. In 2011, 21 of the 42 intensively monitored nests had not been used for >10 yr. Nine of 13 nests unused for >25 yr were virtually gone by 2011, including all nests used only once. This amounted to a nest disappearance rate of 21% during 41 yr of monitoring.

Six of the 42 nests were used frequently throughout the entire 41 yr of monitoring (last used between 2007 and 2011); averaging 17.0 times per nest and 2.6 yr between uses (Table 1). Eagles used 19 other nests intermittently 4 to 17 times, with gaps between reuse of up to 27 yr (Table 1). Most intermittently

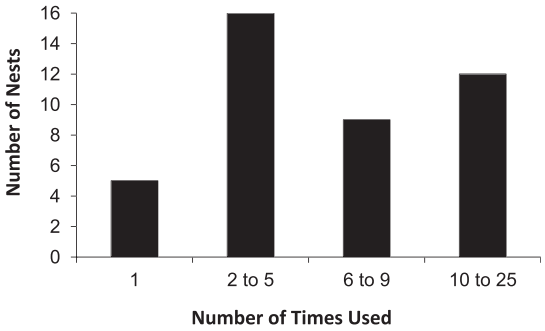

Figure 4. Frequency of use by Golden Eagles of 42 nests used in 1971 and monitored through 2011 in southwestern Idaho.

used nests (14) were last reused between 2000 and 2011, but five were last used 10 to 29 yr prior to 2011 (Table 1). Two nests remained unused for 21 and 27 yr after initial use in 1971 before being reused (every 1 to 3 yr) five and nine times post-1999. Eagles used 12 nests only 2 to 4 times ($\bar{x}$ = 2.6) and five nests only once (Table 1). Nine of the rarely used nests were last used 18 to 36 yr prior to 2011. One nest, built and used in 1971, was reused in 2006 after 35 yr of no use. Eagles used 19 nests in strings or series of years (Table 1). Eleven and eight nests were used respectively in one and two series of nestings, with series ranging from 3 to 20 consecutive nestings spanning 3 to 29 yr (Table 1). Considering 37 nests used more than once, 9 (24%) were last used ≥20 yr prior to 2011.

DISCUSSION

Golden Eagles frequently reused historical nests, consistent with other accounts of the species (Watson 2010, Kochert et al. 2002). We observed that eagles used up to 18 nests in a nesting territory, which exceeds the most (12 to 14) nests per territory reported by Dixon (1937) and Kochert et al. (2002). The mean number of nests used per territory (6.9) was higher than the 2 nests reported during a 4-yr study in Montana and 3.4 and 4.5 nests recorded respectively in a 1-yr survey (114 territories) and 15-yr study (20 territories) in Scotland (McGahan 1968, Watson 2010). These differences may be expected because our study covered >40 yr, and short-term surveys may underestimate the number of nests in a territory (Watson 2010).

Most alternative nests were within 500 m of each other, and we did not record the large separation (4.8 and 6.1 km) between alternative nests reported by McGahan (1968) and Lockie and Ratcliffe (1964). Golden Eagles in our study area nest at relatively high densities primarily in a linear fashion along the Snake River ($\bar{x}$ = 3.5 km between nearest adjacent pairs; U.S. Department of the Interior 1979), so we did not expect >2 to 3 km between alternative nests within territories. Distances between alternative Golden Eagle nests are likely related to terrain and proximity of other nesting pairs (Boeker and Ray 1971), and our results may not be comparable to those from nonlinear habitats. In addition, McGahan (1968) and Lockie and Ratcliffe (1964) did not describe how they defined a nesting territory, so the distances reported actually may represent distances between nests in different territories.

Some Golden Eagle pairs in southwestern Idaho used the same nest for many years as reported by Boeker and Ray (1971), but most pairs used numerous nests and tended to switch nests as reported by Dixon (1937). In contrast, Golden Eagle pairs in Montana generally used the same nest in consecutive seasons, but this area had many (44%) territories with only one nest (McGahan 1968). Nearly half of our intensively monitored nests were used frequently or intermittently during the monitoring period, and eagles used nearly half of the intensively studied nests in strings of consecutive nestings. Many other nesting studies have been short-term (2 to 6 yr; e.g., McGahan 1968, Beecham 1970, Boeker and Ray 1971, Kochert 1972). A short-term sampling window during strings of use would have shown a higher proportion of use of the same nest and less nest switching.

Reusing the same nest in consecutive nestings might reflect individual pair preferences for particular nests. However, one nest was used in two series of consecutive nestings in 26 of the 32 nestings in the territory over 45 yr. It is unlikely that the same individuals occupied the territory over the entire period because Golden Eagles rarely live >20 yr in the wild (U.S. Geological Survey 2011). This nest site appeared to have some intrinsic value because two other nests were available in this territory, and just one of them was used and only six times in 45 yr.

Microclimate may be a factor in nest site selection (Kochert et al. 2002). The orientation and exposure of a nest may offer protection from wind, intense sun exposure, and inclement weather (Mosher and White 1976, MacLaren et al. 1988, Poole and Bromley 1988, Watson and Dennis 1992, Morneau et al. 1994). Placement of nests also can offer updrafts

and reduce exposure to cold temperatures (Mosher and White 1976, Poole and Bromley 1988, Kochert et al. 2002). The type and amount of protection that is optimal may vary from year to year (Kochert et al. 2002). Certain nests might be more valuable during warm periods and others more valuable during cold periods. The fact that many eagles used nests in series of years suggests that eagles might select nests based on conditions during winter or the previous nesting season.

Golden Eagles tended to change nests after turnover of at least one member of the pair, supporting our hypothesis that nest switching may result from a change of individuals. Dixon (1937) believed that female Golden Eagles selected the nest to be used by the pair. Because we were not able to differentiate between sexes, we feel that our assessment of nest switching is a conservative test. Switching of nests by Golden Eagles was not associated with the previous year's nesting success, supporting other observations of nesting Golden Eagles (Boeker and Ray 1971). We also observed no relationship between overall nesting success and construction of new nests. The lack of relationships may be related to security and stability of the nesting substrate. Nesting success of Red-shouldered Hawks (*Buteo lineatus*) was related to stability of nesting substrate, and pairs tended to switch nest sites and build new nests the year following failure (Dijak et al. 1990). Ferruginous Hawks (*Buteo regalis*) in southwestern Idaho that nested on stable artificial nesting substrates that were inaccessible to mammalian predators had higher nesting success, and they also switched nests less often than those that nested on less secure and accessible natural substrates (Steenhof et al. 1993, USGS, Snake River Field Station unpubl. data). Eagles in our and Boeker and Ray's (1971) study areas nested almost entirely on cliffs, and most (80%) nests in our study area were inaccessible to humans and mammalian predators (Kochert et al. 2002).

New nest construction varied among territories. Although 31% of the nests used were constructed during our study, pairs in 14% of territories never used a nest constructed during the study period. Why some pairs build and use newly constructed nests and others do not remains unclear. Similar rates of new nest construction and nest disappearance suggest that a purpose of new nest construction might be to offset nest loss. Golden Eagles occasionally add new material to alternative nests they do not use during a nesting season (McGahan 1968, Boeker and Ray 1971, Kochert et al. 2002); this could increase longevity of existing nests and reduce the need for new construction. Some pairs we studied built new nests in years when they did not lay eggs. Pairs that do not lay eggs also commonly add new material to existing alternative nests (Brown and Amadon 1968, USGS, Snake River Field Station unpubl. data). A possible explanation for this behavior would be to maintain the pair bond (Brown and Amadon 1968). Periodic use of alternative nests may be a means of reducing parasites that live in the nest material (Brown and Amadon 1968, Newton 1979, Watson 2010), and construction of new nests could offer a similar advantage. Many Golden Eagle nests in our study area were infested with numerous species of Cimicidae that live in the nest material (Hickman 1968, McFadzen et al. 1996). Some Golden Eagle and Prairie Falcon (*Falco mexicanus*) nests in our study area appeared more infested than others (Sitter 1983; USGS, Snake River Field Station unpubl. data). The disproportionate incidence of new nest construction we observed might reflect disproportionate parasite infestation among territories.

A 10-yr protection period for unused Golden Eagle nests would have protected only 198 (66%) of the 300 nests that were reused during our 41-yr study. The 102 nests that would not have received protection were in 56 different territories (85% of all study territories). During our study, a total of 255 nestings occurred at nests that had not been used for more than 10 yr. These nestings fledged at least 274 young. The reuse pattern we observed with all nests regardless of when first used may be slightly biased in favor of a more frequent periodicity of reuse because some nests were not monitored in all years. When we consider the 37 reused nests monitored consistently for 41 yr, the proposal would have protected only 51% of these nests. However, by 2011 half of the 42 consistently monitored nests had not been used in >10 yr, and 40% of the nests unused for >10 yr were gone. Evaluations of potential impacts of land-use actions on nesting Golden Eagles should consider that unused nests could be reused even after decades of nonuse. We found that some nests were reused or a new nest was built on the ledge of a former nest after 30 to 40 yr of nonuse. Elimination of a nest would likely have a greater effect in a territory containing one nest than in a territory containing numerous widely separated nests. However, questions remain regarding the function and importance of individual nests. If loss

of nests is inevitable, we suggest that affected territories be monitored in an adaptive management framework (Lancia et al. 1996) to assess how the loss of one or two nests will affect use of other nests within the territory, subsequent reproduction, and ultimately the stability of the nesting territory.

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