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Longevity of Flammulated Owls: additional records and comparisons to other North American strigiforms

Brian D. Linkhart[1,3] and Richard T. Reynolds[2]

[1] *Department of Biology, The Colorado College, 14 East Cache La Poudre Street, Colorado Springs, Colorado 80903 USA*
[2] *USDA Forest Service, Rocky Mountain Research Station, 2150 Center Avenue, Bldg A, Ft. Collins, Colorado 80526 USA*

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ABSTRACT. A male Flammulated Owl (*Otus flammeolus*), banded as a breeding adult (age unknown) on 8 July 1988 in central Colorado, was last recaptured on 8 July 2001. On the same study area, a female Flammulated Owl was banded as a breeding adult (age unknown) on 7 July 1988 and was last recaptured on 22 June 1995. These data establish longevity at a minimum 14 yrs for males and 8 yrs for females. The data suggest that Flammulated Owls may be relatively long-lived, and support evidence that this species has a life history strategy similar to larger raptors.

SINOPSIS. **Longevidad en *Otus flammeolus*: registro adicional y comparasión con otros Strigiformes de Norte América**

Un individuo macho del buho *Otus flammeolus*, anillado como adulto el 8 de julio de 1988 en la parte central de Colorado, fue recapturado el 8 de julio de 2001. En la misma localidad, una hembra adulta de la misma especie fue anillada el 7 de julio de 1988 y recapturada el 22 de junio de 1995. Estos datos establecen una longevidad mínima de 14 años para los machos y de 8 años para las hembras, de esta especie. Los datos sugieren que este buho es longevo y que tiene una estrategia de vida similar a la de rapaces de gran tamaño.

Key words: Flammulated Owl, life history strategy, longevity, *Otus flammeolus*, strigiformes

Previously we reported (Reynolds and Linkhart 1990) longevity records for the Flammulated Owl (*Otus flammeolus*), an insectivorous and migratory species that breeds in montane forests in western North America (McCallum 1994). Here we present new longevity records for male and female Flammulated Owls, and compare longevity of this species to other strigiforms.

Since 1981, we have annually banded and recaptured adult Flammulated Owls on 14 territories as part of a long-term study of demography and habitat on the Manitou Experimental Forest, Teller County, Colorado (Linkhart and Reynolds 1987, 1997; Reynolds and Linkhart 1987a,b; Linkhart et al. 1998; Linkhart 2001). On 8 July 1988, we banded an adult male Flammulated Owl at its nest (39°0′N, 105°0′W). This male (USFWS #1373-33705), which was at least 1 yr old (breeding adults cannot be aged), was last recaptured at his nest on 8 July 2001. He had been recaptured annually at his nest, except in 1995 and 1998, when he was territorial but unpaired and did not breed. This establishes longevity for male Flammulated Owls at a minimum 14 yrs. On 20 June 1984, we banded another adult male at its nest on the Manitou Experimental Forest, and this male (USFWS #1373-33651) was last recaptured on his day-roost on 13 July 1994. At last capture this male was a minimum 11 yrs old. Additionally, as of autumn 2002, one male at last capture was at least 9 yrs old, and two males were at least 8 yrs old. Previously we reported longevity of male Flammulated Owls as 8 yrs-1 mo, based on capture-recapture data from a different male within the same study area (Reynolds and Linkhart 1990).

On 7 July 1988, we banded an adult female Flammulated Owl at her nest on the Manitou Experimental Forest; at that time she was at least 1 yr old. This female (USFWS #1373-33703) was last recaptured at an alternate nest (approximately 100 m from the original nest) within the same territory on 22 June 1995, and she was last observed in the nest cavity on 13 July 1995. She had been previously recaptured

[3] Corresponding author. Email: blinkhart@coloradocollege.edu

Table 1. Body mass and longevity records for North American strigiforms. Species are ranked by body mass. Mean body mass is reported for adults during the breeding season, unless otherwise indicated.

Species	Mean body mass (g)		Longevity record (yrs–mo)
	Male	Female	
Snowy Owl (*Nyctea scandiaca*)	1806[1]	2279[1]	10–09[2]
Great Horned Owl (*Bubo virginianus*)	1304[3]	1706[3]	27–07[2]
Great Gray Owl (*Strix nebulosa*)	891[4]	1267[4]	13–00[4]
Barred Owl (*S. varia*)	632[5]	801[5]	18–02[2]
Spotted Owl (*S. occidentalis caurina*)	579[6]	637[6]	17–00[7]
Barn Owl (*Tyto alba*)	474[8]	566[8]	15–05[2]
Short-eared Owl (*Asio flammeus*)	315[5]	378[5]	4–05[2]
Long-eared Owl (*Asio otus*)	271[9]	281[9]	11–01[2]
Eastern Screech Owl (*Otus asio*)	159[10]	166[10]	14–02[11]
Western Screech Owl (*O. kennicottii*)	128[10]	151[10]	12–11[12]
Burrowing Owl (*Athene cunicularia*)	146[13]	156[13]	9–0[2]
Boreal Owl (*Aegolius funereus*)	117[14]	167[14]	8–2[15]
Saw-whet Owl (*Aegolius acadicus*)	77[16]	131[16]	10–04[2]
Flammulated Owl (*O. flammeolus*)	53[17]	62[17]	14–0[18]
Elf Owl (*Micrathene whitneyi*)	41[19]		4–11[20]
			mean = 12.7 ± 1.5 (SE) yrs

[1] Kerlinger and Lein (1988); winter mass.
[2] Klimkiewicz (2002).
[3] Craighead and Craighead (1956); subspecies not indicated.
[4] Bull and Duncan (1993); Oregon.
[5] Earhart and Johnson (1970); museum specimens.
[6] Blakesley et al. (1990); California.
[7] E. Forsman, pers. comm.
[8] Marti (1990); Utah.
[9] Marks et al. (1994); fall migration, Minnesota.
[10] Gehlbach (2003); mean mass across subspecies.
[11] Gehlbach (1994).
[12] Clapp et al. (1983).
[13] Haug et al. (1993); Colorado.
[14] Hayward and Hayward (1993); Idaho.
[15] Korpimaki (1992).
[16] Cannings (1993); British Columbia.
[17] B. Linkhart, unpubl. data; Colorado.
[18] Present study.
[19] Walters (1981); sex not specified; Arizona.
[20] Klimkiewicz and Futcher (1989).

at three different nest trees in the same territory in 1989 (8 July), 1990 (27 June), and 1992 (3 July). This establishes longevity for female Flammulated Owls at a minimum 8 yrs. Previously we reported longevity for female Flammulated Owls as 7 yrs-1 mo, based on capture-recapture data from a different female within the same study area (Reynolds and Linkhart 1990).

Compared to other North American strigiforms for which data exist, the longevity of male Flammulated Owls appears to be similar to or to exceed that of several larger species, despite having the second-least body mass (Table 1). Flammulated Owls might be expected to be relatively short-lived because longevity is positively correlated with increasing mass for most birds (Newton 1998), and this trend also may hold for North American strigiforms (Fig. 1). The fact that the longevity of Flammulated Owls appears similar to several larger owls also is interesting given that this species annually migrates the greatest distance of all North American strigiforms (Johnsgard 2002), breeding as far north as southern British Columbia and wintering as far south as El Salvador

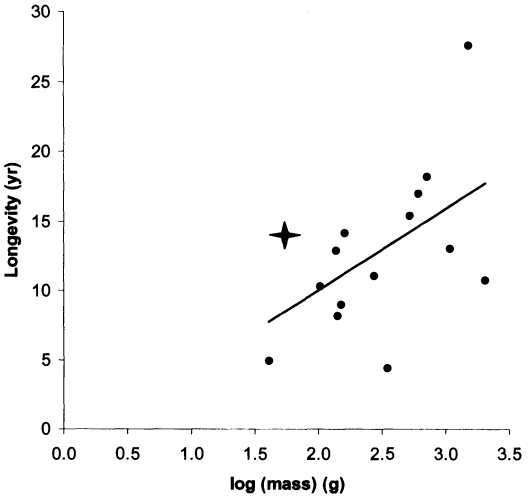

Fig. 1. Relationship between longevity and body mass in North American strigiforms (15 species). Mass for each species was calculated as the mean of the male and female mean body mass (Table 1). Data point for the Flammulated Owl is represented by the star symbol. Linear regression: longevity = 5.9–1.8 log (mass); $r = 0.53$, $P = 0.04$.

(McCallum 1994). The traditional paradigm held that long-distant migrants had lower longevity than resident populations of the same or different species (von Haartman 1968), although recent studies have found that several migrant passerines actually have higher annual survival than residents (Nichols 1996; Sandercock and Jaramillo 2002).

The apparent greater longevity of Flammulated Owls compared to several larger strigiforms (Table 1) may reflect the fact that these latter species are lacking sufficient data to permit accurate estimates of their longevity, especially those with large geographic ranges whose mass, and possibly longevity, vary with latitude, as was shown in the Eastern Screech Owl (*O. asio*) and Western Screech Owl (*O. kennicottii*; Gehlbach 2003). Alternatively, given the fact that in addition to Flammulated Owls, three other relatively small owls (Eastern Screech Owl, Western Screech Owl, and Saw-whet Owl [*Aegolius acadicus*]) also have longevity that exceeds 10 yrs, these data may indicate that longevity of strigiforms is not as strongly correlated with body mass as with other birds.

Elsewhere, Linkhart (2001) reported that Flammulated Owls have one of the smallest and least variable clutch sizes (2.4 ± 0.5 eggs) among North American strigiforms (mean, 4.5 ± 1.8 eggs for all species), comparable to Spotted Owls (*Strix occidentalis*) and Great Horned Owls (*Bubo virginianus*). Combined with our findings that Flammulated Owls may be relatively long-lived, these data support evidence that suggest this species has a life history strategy similar to larger raptors (McCallum 1994; Linkhart 2001).

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