

↳ [Birds of North America \(/Species-Account/bna/home\)](#)



◀ [Swallow-tailed Kite \(/Species-Account/bna/species/swtkit/distribution/\)](#)

[Snail Kite \(/Species-Account/bna/species/snakit/distribution/\)](#) ▶

# Golden Eagle

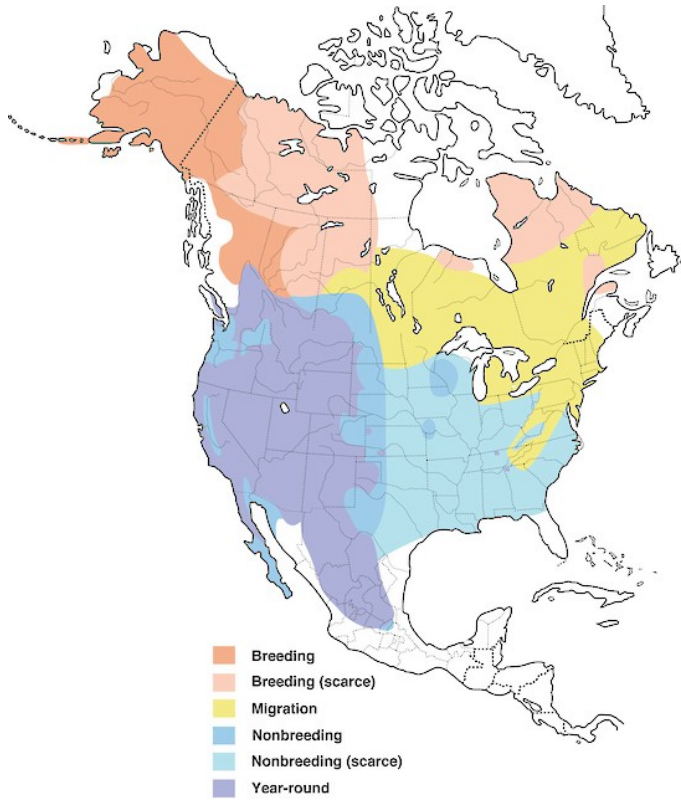
*Aquila chrysaetos*

Order: ACCIPITRIFORMES

Family: ACCIPITRIDAE

**Sections**

## Distribution, Migration and Habitat

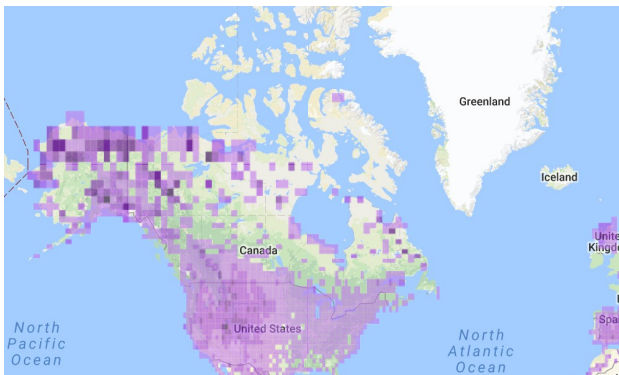


<https://download.ams.birds.cornell.edu/api/v1/asset/32273781>

**Figure 1. Distribution of the Golden Eagle in North America.**

[+Enlarge \(https://download.ams.birds.cornell.edu/api/v1/asset/32273781\)](https://download.ams.birds.cornell.edu/api/v1/asset/32273781)

This species winters locally within the areas shown. This species also breeds in Europe and Asia. See text for details.



[+ Enlarge \(https://ebird.org/ebird/embedmap/goleag?](https://ebird.org/ebird/embedmap/goleag?scrollwheel=true&draggable=true&env.minX=-99.47021484375&env.minY=10&env.maxX=-78.37646484375&env.maxY=65&mapType=roadmap)

[scrollwheel=true&draggable=true&env.minX=-99.47021484375&env.minY=10&env.maxX=-78.37646484375&env.maxY=65&mapType=roadmap\)](https://ebird.org/ebird/embedmap/goleag?scrollwheel=true&draggable=true&env.minX=-99.47021484375&env.minY=10&env.maxX=-78.37646484375&env.maxY=65&mapType=roadmap)

#### eBird range map for Golden Eagle

Generated from eBird observations (Year-Round, 1900-2017)

[Explore more on eBird \(https://ebird.org/ebird/map/goleag?scrollwheel=true&draggable=true&mapType=roadmap\)](https://ebird.org/ebird/map/goleag?scrollwheel=true&draggable=true&mapType=roadmap)

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## Distribution

eBird Year-round Range and Point Map for Golden Eagle (<http://ebird.org/ebird/map/goleag?neg=true&env.minX=&env.minY=&env.maxX=&env.maxY=&zh=false&gp=false&ev=Z&mr=1-12&bmo=1&emo=12&yr=all&byr=1900&eyr=2015>).

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## Distribution in the Americas

### Breeding Range

Mainly w. North America (west of 100th meridian) from Alaska south to central Mexico ([Figure 1 \(https://download.ams.birds.cornell.edu/api/v1/asset/25018741\)](https://download.ams.birds.cornell.edu/api/v1/asset/25018741)) with small numbers in e. Canada and a few isolated pairs in e. U.S.

*Alaska.* From north slopes of Brooks Range (north to 69°30'N in the east and to the Lisborne Peninsula in the west) south throughout most of Alaska (including e. Aleutians west to Unalaska), except rare on Kodiak I. and in s.-coastal and se. Alaska ([Armstrong 1995a \(/Species-Account/bna/species/goleag/references#REF8039\)](#), [Young et al. 1995 \(/Species-Account/bna/species/goleag/references#REF10355\)](#), *Am. Ornithol. Union American Ornithologists' Union 1998a (/Species-Account/bna/species/goleag/references#REF63025)*, *B. Ritchie unpubl.*).

*Canada.* From southern coast of Beaufort Sea (east to Coronation Gulf; [Poole and Bromley 1988a \(/Species-Account/bna/species/goleag/references#REF59100\)](#)) south throughout w. Canada to U.S. border. Absent from coastal portions of British Columbia (except se. Vancouver I. and Fraser Lowlands; [Campbell et al. 1990a \(/Species-Account/bna/species/goleag/references#REF15960\)](#)), and much of Saskatchewan (except Lake Athabasca, Foster Lakes, Lower Churchill River, and S. Saskatchewan River regions; [Smith 1996b \(/Species-Account/bna/species/goleag/references#REF55615\)](#)). Breeding records scattered for Northwest Territories, Nunavut, se. Yukon, ne. British Columbia, n. and all but southern portions of e. Alberta, and much of Saskatchewan. Also discontinuous nesting in e. Canada in nw. Ontario south of Hudson Bay ([De Smet and James 1987 \(/Species-Account/bna/species/goleag/references#REF43262\)](#)), n. Quebec, n. Labrador, and se. Quebec especially on Gaspé Peninsula ([Kirk 1996 \(/Species-Account/bna/species/goleag/references#REF10271\)](#), [Robert 1996a \(/Species-Account/bna/species/goleag/references#REF10313\)](#), [Brodeur and Morneau 1999 \(/Species-Account/bna/species/goleag/references#REF43253\)](#)). May breed in Manitoba, s. Ontario, s. Quebec ([Godfrey 1986 \(/Species-Account/bna/species/goleag/references#REF62222\)](#)), New Brunswick, and Nova Scotia ([Erskine 1992a \(/Species-Account/bna/species/goleag/references#REF64430\)](#)), but breeding records unknown or very few in these areas ([De Smet 1987 \(/Species-Account/bna/species/goleag/references#REF10237\)](#), K. D. De Smet pers. comm.).

*United States.* In West, from Canadian border south through Washington, Idaho, and Montana to Mexican border and east to sw. North Dakota ([Stewart 1975b \(/Species-Account/bna/species/goleag/references#REF2259\)](#), [Ward et al. 1983 \(/Species-Account/bna/species/goleag/references#REF10346\)](#)), w. South Dakota ([Peterson 1995 \(/Species-Account/bna/species/goleag/references#REF29173\)](#)), panhandle of w. Nebraska ([Wingfield 1991 \(/Species-Account/bna/species/goleag/references#REF43326\)](#), [Sharpe et al. 2001c \(/Species-Account/bna/species/goleag/references#REF41266\)](#)), n.-central and se. Colorado ([Barrett 1998c \(/Species-Account/bna/species/goleag/references#REF43244\)](#)), western panhandle of Oklahoma ([Baumgartner and Baumgartner 1992 \(/Species-Account/bna/species/goleag/references#REF6921\)](#)), panhandle of Texas ([Swepston et al. 1984 \(/Species-Account/bna/species/goleag/references#REF33314\)](#), Texas Breeding Bird Atlas [BBA] 1987–1992 unpubl.), e. New Mexico ([Hubbard 1978c \(/Species-Account/bna/species/goleag/references#REF28607\)](#)), and the Trans-pecos of Texas. Within this area, rare or absent west of Cascades in Washington (except Olympic Mtns.) and Oregon (except some southern valleys and some higher portions of Cascades), the immediate coast and flat portions of Central Valley of California, the Salton Sea, the lower Colorado River, desert regions of se. California and sw. Arizona, agricultural portions of e. Washington, and mountains of the panhandle of Idaho ([Bruce et al. 1982 \(/Species-Account/bna/species/goleag/references#REF10224\)](#), [Gilligan et al. 1994 \(/Species-Account/bna/species/goleag/references#REF56692\)](#), [Small 1994 \(/Species-Account/bna/species/goleag/references#REF7103\)](#), [Smith et al. 1997 \(/Species-Account/bna/species/goleag/references#REF62031\)](#), [Stephens and Sturts 1997 \(/Species-Account/bna/species/goleag/references#REF22162\)](#), Arizona BBA 1993–2000 unpubl.). Patchy nesting in w. Kansas ([Weigel 1993 \(/Species-Account/bna/species/goleag/references#REF10349\)](#)), and suspected nesting in central S. Dakota west of the Missouri River ([Peterson 1995 \(/Species-Account/bna/species/goleag/references#REF29173\)](#)). Breeds irregularly in w. Nebraska ([Sharpe et al. 2001c \(/Species-Account/bna/species/goleag/references#REF41266\)](#)).

In East, 2 nesting pairs in Maine ([Todd 1989 \(/Species-Account/bna/species/goleag/references#REF43319\)](#), Maine Dept. Inland Fisheries and Wildlife [DIFW] unpubl.) and 1 each in Tennessee and nw. Georgia (B. Anderson and T. Touchstone pers. comm.); both the result of re-introductions (see Conservation and management: management, below).

*Mexico.* N. Baja California and highlands of central Mexico, including ne. Sonora ([Russell and Monson 1998 \(/Species-Account/bna/species/goleag/references#REF1812\)](#)), and from Chihuahua and Coahuila south to San Luis Potosí, Guanajuato, and Queretaro ([Howell and Webb 1995 \(/Species-Account/bna/species/goleag/references#REF62109\)](#), Instituto Nacional De Ecología 1999 (/Species-

[Account/bna/species/goleag/references#REF43279](#)). Suspected nesting in s. Baja California ([Rodríguez-Estrella 2002 \(/Species-Account/bna/species/goleag/references#REF33310\)](#)). May be extirpated as breeding in Guanajuato and Queretaro (E. Inigo-Elias pers. comm.).

### Winter Range

Winters in sw., s.-coastal, and se. Alaska (rare; [Armstrong 1995a \(/Species-Account/bna/species/goleag/references#REF8039\)](#)), and from southernmost British Columbia, s. Alberta, and s. Saskatchewan, south throughout breeding range in w. U.S. and Mexico, and in areas of lower elevations not occupied during breeding season west to Pacific Coast (rarely), south to s. Baja California and nw. Sonora and Hidalgo, Mexico ([Howell and Webb 1995 \(/Species-Account/bna/species/goleag/references#REF62109\)](#), *Am. Ornithol. Union* [American Ornithologists' Union 1998a \(/Species-Account/bna/species/goleag/references#REF63025\)](#), [Russell and Monson 1998 \(/Species-Account/bna/species/goleag/references#REF1812\)](#)), and (regularly) east to central Dakotas, central Kansas, w. Oklahoma, and w. Texas ([Sauer et al. 1996c \(/Species-Account/bna/species/goleag/references#REF45960\)](#)). Also winters very locally east throughout e. U.S. north to Great Lakes and mid-Atlantic states (e.g., n. Wisconsin, n. Pennsylvania, se. New York, central Massachusetts, and se. Maine) and south to Gulf Coast and Florida Panhandle ([Millsap and Vana 1984 \(/Species-Account/bna/species/goleag/references#REF60968\)](#), [Mitchell and Millsap 1990 \(/Species-Account/bna/species/goleag/references#REF10292\)](#), [Robbins 1991 \(/Species-Account/bna/species/goleag/references#REF14463\)](#), [Robertson and Woolfenden 1992a \(/Species-Account/bna/species/goleag/references#REF57808\)](#), [Veit and Petersen 1993 \(/Species-Account/bna/species/goleag/references#REF17580\)](#), *Am. Ornithol. Union* [American Ornithologists' Union 1998a \(/Species-Account/bna/species/goleag/references#REF63025\)](#), [Levine 1998 \(/Species-Account/bna/species/goleag/references#REF59495\)](#), [McWilliams and McWilliams and Brauning 2000 \(/Species-Account/bna/species/goleag/references#REF29488\)](#), [Turcotte and Watts 1999 \(/Species-Account/bna/species/goleag/references#REF59259\)](#), Maine DIFW unpubl.), with rare reports south to Florida Keys ([Robertson and Woolfenden 1992a \(/Species-Account/bna/species/goleag/references#REF57808\)](#), *Am. Ornithol. Union* [American Ornithologists' Union 1998a \(/Species-Account/bna/species/goleag/references#REF63025\)](#)). Emigrates from northern latitudes and higher elevations in winter, but can winter at >66°N latitude whenever sufficient prey is available ([Kessel 1989 \(/Species-Account/bna/species/goleag/references#REF61012\)](#)). Rare in Kuskokwim River drainage and Alaska and Brooks Ranges, AK, and Mackenzie Mtns., Northwest Territories ([Fleck et al. 1987 \(/Species-Account/bna/species/goleag/references#REF33296\)](#), [Petersen et al. 1991 \(/Species-Account/bna/species/goleag/references#REF31791\)](#), T. and E. Craig unpubl., CLM).

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### Distribution Outside the Americas

Holarctic distribution spanning latitudes from approximately 20 to 70°N, with scattered populations farther south ([Orta 1994a \(/Species-Account/bna/species/goleag/references#REF43296\)](#), [Watson 1997 \(/Species-Account/bna/species/goleag/references#REF10348\)](#), [Snow and Perrins 1998a \(/Species-Account/bna/species/goleag/references#REF18704\)](#)). Occurs throughout Europe, Asia, and n. Africa. Northern extent of range stretches from n. Europe (n. British Isles and Scandinavia) to Kola Pen-insula and on to e. Siberia and Kamchatka Peninsula. Breeds in s. Europe from Iberian Peninsula to Turkey and much of Asia south to Israel, Saudi Arabia, Yemen, Oman, Afghanistan, the Himalayas, s. China, Korea, and Japan. Nests in n. Africa and large Mediterranean islands from Mauritania and Niger to Egypt; isolated sub-Saharan population in Bale Mtns. in s. Ethiopia. Accidental in Belgium, Netherlands, Cyprus, Kuwait, Canary Is., and Hawaiian Is.; 1 individual seen in Hawaiian Is. for 17 yr ([Pyle 1984b \(/Species-Account/bna/species/goleag/references#REF10309\)](#)).

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### Nature of Migration

Short- to medium-distance partial migrant. Individuals from northern breeding areas (>55°N) usually migratory ([Brown and Amadon 1968 \(/Species-Account/bna/species/goleag/references#REF9577\)](#), [Kerlinger 1989a \(/Species-Account/bna/species/goleag/references#REF8570\)](#)); migrate longer distances than individuals nesting farther south ([McGahan 1966 \(/Species-Account/bna/species/goleag/references#REF56191\)](#), [Mead 1973 \(/Species-Account/bna/species/goleag/references#REF56192\)](#)). Former can migrate >5,000 km from breeding to wintering areas ([Kuyt 1967 \(/Species-Account/bna/species/goleag/references#REF10276\)](#), CLM). Migratory adults and juveniles usually fly directly to wintering areas ([Brodeur et al. 1996 \(/Species-Account/bna/species/goleag/references#REF33286\)](#), CLM). Overwintering in interior and n. Alaska coincides with high abundance of snowshoe hare (*Lepus americanus*; [Kessel 1989 \(/Species-Account/bna/species/goleag/references#REF61012\)](#)). Many individuals breeding south of 55°N are not migratory; winter ranges of individuals from Canada and U.S. probably overlap extensively. Juveniles from sw. Idaho moved in almost all directions from natal areas after breeding season ([Steenhof et al. 1984 \(/Species-Account/bna/species/goleag/references#REF17488\)](#)).

## Timing and Routes of Migration

### Autumn

Individuals leave northern areas from Sep to early Oct; main exodus from Alaska occurs before end of Sep ([Kessel 1989 \(/Species-Account/bna/species/goleag/references#REF61012\)](#)). Juveniles from Denali National Park, AK, tracked by satellite telemetry, initiated migration between mid-Sep and early Oct (mean 24 Sep  $\pm$  5 d SD [ $n = 43$ ]; CLM). A radio-tagged adult remained in its northern (>55°N) breeding area in ne. Quebec until 30 Oct ([Brodeur et al. 1996 \(/Species-Account/bna/species/goleag/references#REF33286\)](#)) before migrating south. Autumn flights occur from early Sep through Dec at raptor migration count sites in n. U.S. and s. Canada, with most peak flights in Oct. Long-term median passage dates with 95% C.I. at sites with  $\geq 8$  yr of observations between 1983 and 1999: 1 Oct  $\pm$  1.7 d at Wellsville Mtns., UT ([Tidhar and Peacock 1999 \(/Species-Account/bna/species/goleag/references#REF56198\)](#)); 7 Oct  $\pm$  2 d at Goshutes Mtns., NV ([Lanzone 1999 \(/Species-Account/bna/species/goleag/references#REF10277\)](#)); 10 Oct  $\pm$  3.3 d at Bridger Mtn., MT ([Neal 1999 \(/Species-Account/bna/species/goleag/references#REF43295\)](#)); 13 Oct  $\pm$  2 d for Manzano Mtns., NM ([Rossman 1999 \(/Species-Account/bna/species/goleag/references#REF43305\)](#)); 14 Oct for w. Alberta ([Sherrington 2000 \(/Species-Account/bna/species/goleag/references#REF43308\)](#)). Maximum passage rates early Oct in Glacier National Park, MT ([Yates et al. 2001 \(/Species-Account/bna/species/goleag/references#REF43327\)](#)). Peak flights usually later at eastern raptor migration sites; median passage date 4 Nov for Hawk Mtn., PA (Hawk Mountain Sanctuary unpubl.).

Immatures migrate earlier in autumn than adults at most locations. Median passage dates  $\pm$  95% C.I. follow. Bridger Mtn., MT: immatures, 7 Oct  $\pm$  4 d; adults, 11 Oct  $\pm$  2.5 d ([Neal 1999 \(/Species-Account/bna/species/goleag/references#REF43295\)](#)). Manzano Mtns., NM: immatures, 13 Oct  $\pm$  2.8 d; adults, 16 Oct  $\pm$  2.8 d ([Rossman 1999 \(/Species-Account/bna/species/goleag/references#REF43305\)](#)). Hawk Mtn., PA: immatures, 31 Oct; adults, 6 Nov (Hawk Mountain Sanctuary unpubl.). However, median passage dates for adults (29 Sep  $\pm$  3.1 d) slightly earlier than for immatures (1 Oct  $\pm$  2.2 d) at Wellsville Mtns., UT ([Tidhar and Peacock 1999 \(/Species-Account/bna/species/goleag/references#REF56198\)](#)).

Juveniles from Denali National Park, AK, reached their wintering areas in 28–58 d (mean 44 d  $\pm$  9 SD [ $n = 26$ ]), arriving on winter ranges throughout w. North America from s. Alberta to se. New Mexico from 26 Oct to 19 Nov (mean 7 Nov  $\pm$  7 d SD [ $n = 16$ ] CLM). Second-year eagles from Denali National Park arrived on winter ranges from 1 to 8 Oct in 2000 (mean 5 Oct  $\pm$  3.9 d SD [ $n = 3$ ]; CLM). Radio-tagged adults from e. Hudson Bay took 26–40 d to reach their wintering areas in central Michigan, e. West Virginia, s. Pennsylvania, and ne. Alabama, arriving early Nov–early Dec ([Brodeur et al. 1996 \(/Species-Account/bna/species/goleag/references#REF33286\)](#)). Individuals arrive on wintering areas in New Mexico and w. Texas in Oct, reaching peak numbers from Dec to Feb ([Boeker and Ray 1971 \(/Species-Account/bna/species/goleag/references#REF43249\)](#)).

### Spring

Adults from e. Hudson Bay departed winter ranges early to late Mar and arrive on breeding areas from late Mar to mid-May ([Brodeur et al. 1996 \(/Species-Account/bna/species/goleag/references#REF33286\)](#)). Ju-veniles from Denali National Park, AK, departed wintering areas in s. Canada and w. U.S. 6 Apr–8 May (mean 21 Apr  $\pm$  12 d SD [ $n = 12$ ; CLM]). Travel time between wintering areas and summering areas in Alaska and nw. Canada, determined from satellite telemetry, ranged from 22 to 47 d (mean 35 d  $\pm$  6 SD [ $n = 12$ ] CLM). Adults departed wintering areas in sw. Idaho 20 Mar–13 Apr in 1993 (mean 29 Mar  $\pm$  12 d SD [ $n = 3$ ]) and 9–20 Mar in 1994 (mean 14 Mar  $\pm$  6 d SD [ $n = 3$ ]; L. Schueck, J. Marzluff, M. Vekasy, M. Fuller, and T. Zarriello unpubl.); both age groups leave wintering areas in sw. U.S. in Mar ([Boeker and Ray 1971 \(/Species-Account/bna/species/goleag/references#REF43249\)](#)). Travel time between sw. Idaho wintering areas and breeding areas in Alaska and nw. Canada, determined from satellite telemetry, ranged from 7 to 15 d ( $n = 3$ ; L. Schueck et al. unpubl.). Median passage date  $\pm$  95% C.I. at Sandia Mtns., NM, is 20 Mar  $\pm$  4 d ([Smith 1999c \(/Species-Account/bna/species/goleag/references#REF43310\)](#)). Maximum passage rates during second and third weeks of Mar at Glacier National Park, MT ([Yates et al. 2001 \(/Species-Account/bna/species/goleag/references#REF43327\)](#)). Peak flights from 8 to 27 Mar at Rogers Pass, MT ([Tilly and Tilly 1998 \(/Species-Account/bna/species/goleag/references#REF10337\)](#)), and 19 to 25 Mar in w. Alberta ([Sherrington 1998 \(/Species-Account/bna/species/goleag/references#REF59558\)](#)). Spring migration in w. Alberta spans  $\geq 92$  d ([Sherrington 1997 \(/Species-Account/bna/species/goleag/references#REF10322\)](#)): first migrants seen in mid-Feb, with large movements of immatures from mid-Apr to May ([Sherrington 1997 \(/Species-Account/bna/species/goleag/references#REF10322\)](#)). Adults arrive on breeding areas in Alaska from late Feb to late Mar ([Kessel 1989 \(/Species-Account/bna/species/goleag/references#REF61012\)](#)). [Young et al. 1995 \(/Species-Account/bna/species/goleag/references#REF10355\)](#), CLM).

Adults usually migrate earlier in spring than immatures. Median passage date for adults at Sandia Mtns., NM (9 Mar  $\pm$  1.7 d), significantly earlier than for immatures (3 Apr  $\pm$  3.4 d; [Smith 1999c \(/Species-Account/bna/species/goleag/references#REF43310\)](#)). Proportion of immatures migrating at Glacier National Park increased from mid-Mar to mid-Apr ([Yates et al. 2001 \(/Species-Account/bna/species/goleag/references#REF43327\)](#)). Adults move through s. Alberta earlier than immatures; adults common in Mar, immatures in Apr ([Sherrington 1998 \(/Species-Account/bna/species/goleag/references#REF59558\)](#)).

### Routes

Poorly known except for small numbers tagged with satellite-received radio transmitters. Large concentrations at raptor-migration count sites in U.S. and s. Canada suggest migration corridors exist along Rocky Mtns. and Appalachian Mtns. Largest autumn and spring passages in w. Alberta ([Dekker 1970 \(/Species-Account/bna/species/goleag/references#REF10235\)](#); [Sherrington 1993 \(/Species-Account/bna/species/goleag/references#REF33313\)](#), [Sherrington 1997 \(/Species-Account/bna/species/goleag/references#REF10322\)](#)) and w. Montana ([Tilly and Tilly 1998 \(/Species-Account/bna/species/goleag/references#REF10337\)](#), [Neal 1999 \(/Species-Account/bna/species/goleag/references#REF43295\)](#)). In n. continental U.S. and w. Canada, most concentrated flights detected along north-south-oriented mountain ranges, (e.g., Rocky and Appalachian Mtns.); concentrated flights also noted in Great Lakes region. Smaller passages along Cascade Mtns. in Oregon and Washington ([Van Der Geld 1998 \(/Species-Account/bna/species/goleag/references#REF10344\)](#)). Concentrations also observed in spring at Anaktuvuk Pass, AK ([Irving 1960a \(/Species-Account/bna/species/goleag/references#REF48929\)](#)). Spring migration corridor near Marsh Lake and Whitehorse, Yukon, Canada; upper Tanana River Valley, AK; e. and central Alaska Range, AK (CLM); and the Matanuska Valley, AK (T. Swem and B. Dittrick pers. comm.). Migration corridors in sw. U.S. include Sandia Mtns. and Manzano Mtns., NM ([Grindrod 1998 \(/Species-Account/bna/species/goleag/references#REF43271\)](#), [Rossman 1999 \(/Species-Account/bna/species/goleag/references#REF43305\)](#)). Spring migration corridors in e. U.S. include ridges on or near Appalachian and Allegheny Mtns. in New York, Pennsylvania, w. Maryland, Virginia, W. Virginia, N. Carolina, and Tennessee ([Brodeur et al. 1996 \(/Species-Account/bna/species/goleag/references#REF33286\)](#), [Brandes 1998](#)

([/Species-Account/bna/species/goleag/references#REF43252](#)). Spring migration evident in Great Lakes region; increasing numbers observed at Whitefish Point, MI, since 1986 ([Nicoletti 1998](#) ([/Species-Account/bna/species/goleag/references#REF10297](#))). Very rare at coastal raptor-migration sites (i.e., Sandy Hook, NJ; Cape Henlopen, DE; Plum I., MA); and at raptor-migration count sites in Massachusetts, Vermont, and Maine ([Brandes 1998](#) ([/Species-Account/bna/species/goleag/references#REF43252](#)), [Kellog 2000](#) ([/Species-Account/bna/species/goleag/references#REF43280](#))).

Satellite-telemetry studies provide detailed information on migration routes of adults and juveniles ([Brodeur et al. 1996](#) ([/Species-Account/bna/species/goleag/references#REF33286](#)), CLM). Four adults radio-tagged at nesting areas in n. Quebec used different migration routes to reach their winter ranges. Three flew south through central Quebec, around Lake Ontario and south along Appalachian Mtns. to their winter ranges in Pennsylvania, W. Virginia, and Alabama, while another migrated along Hudson Bay, south through Ontario, crossing Great Lakes by Straits of Mackinac to its winter range in Michigan ([Brodeur et al. 1996](#) ([/Species-Account/bna/species/goleag/references#REF33286](#))). In spring, 2 of the 4 adults generally retraced their southbound route to return to their breeding areas, and 1 wandered westward, remained west of Hudson Bay for a month, before heading back to e. Hudson Bay ([Brodeur et al. 1996](#) ([/Species-Account/bna/species/goleag/references#REF33286](#))). Juveniles from Denali National Park, AK, used different migration routes in autumn and spring. In autumn, most flew eastward along Alaska Range, southeast through Yukon, and south along Rocky Mtns. through Alberta into the U.S. Others flew eastward along Alaska Range, southeast through Yukon, and south through Rocky Mtn. trench in British Columbia to winter range. Followed similar routes in spring until reaching central Alberta, where they veered east of Rocky Mtns., flying north through Alberta, across central Yukon, and to summer ranges throughout Alaska and n. Yukon (CLM).

Migration patterns of adults and immatures may differ; immatures move through New Mexico and w. Texas at beginning and end of wintering period (Nov and Mar), but winter in unknown areas ([Boeker and Ray 1971](#) ([/Species-Account/bna/species/goleag/references#REF43249](#))). Immature:adult ratios recorded at autumn raptor-migration count sites vary geographically. Mean immature:adult ratio 0.27 in Alberta (P. Sherrington unpubl.) and 1.2 at Bridger Mtn., MT ([Neal 1999](#) ([/Species-Account/bna/species/goleag/references#REF43295](#))). Ratios  $\pm$  95% C.I. are  $1.74 \pm 0.401$  at Goshutes Mtns., NV ([Lanzone 1999](#) ([/Species-Account/bna/species/goleag/references#REF10277](#)));  $1.8 \pm 1.15$  at Wellsville Mtns., UT ([Tidhar and Peacock 1999](#) ([/Species-Account/bna/species/goleag/references#REF56198](#)));  $2.5 \pm 0.86$  in Manzano Mtns., NM ([Rossman 1999](#) ([/Species-Account/bna/species/goleag/references#REF43305](#))); and 1.03 at Hawk Mtn., PA (Hawk Mountain Sanctuary unpubl.). Most individuals observed at coastal raptor-migration counts in e. U.S. are immatures ([Greenstone 1996](#) ([/Species-Account/bna/species/goleag/references#REF43270](#))).

Little information continent-wide on age ratios in spring. Mean immature:adult ratios 0.12 in Alberta (P. Sherrington unpubl.); 0.08 at Rodgers Pass, MT ([Tilly and Tilly 1998](#) ([/Species-Account/bna/species/goleag/references#REF10337](#))); and  $5.51 \pm 1.85$  C.I. in Sandia Mtns., NM ([Smith 1999c](#) ([/Species-Account/bna/species/goleag/references#REF43310](#))). Differences between immature:adult ratio in fall and spring at raptor-migration count sites might reflect age class differences in survival rates or migration routes.

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## Migratory Behavior

From [Kerlinger 1989a](#) ([/Species-Account/bna/species/goleag/references#REF8570](#)), [Brodeur et al. 1996](#) ([/Species-Account/bna/species/goleag/references#REF33286](#)), and others as noted. Diurnal migrant; nonflocking ([Omland and Hoffman 1996](#) ([/Species-Account/bna/species/goleag/references#REF33308](#))), but observed in small "kettles" near thermals ([Sherrington 1993](#) ([/Species-Account/bna/species/goleag/references#REF33313](#))). Up to 137/h counted in nw. Montana in autumn ([Yates et al. 2001](#) ([/Species-Account/bna/species/goleag/references#REF43327](#))). Mean number seen/h ( $\pm$  95% C.I.) in autumn: 0.06 at Hawk Mtn., PA;  $0.26 \pm 0.05$  in Manzano Mtns., NM;  $0.44 \pm 0.37$  at Goshute Mtns., NV; 5.4 near Mt. Lorrette, Alberta;  $5.6 \pm 0.67$  at Bridger Mtn., MT; and  $0.66 \pm 0.17$  at Wellsville Mtns., UT ([Lanzone 1999](#) ([/Species-](#)



[Account/bna/species/goleag/references#REF10277](#)), Neal [Neal 1999 \(/Species-Account/bna/species/goleag/references#REF43295\)](#), Rossman [Rossman 1999 \(/Species-Account/bna/species/goleag/references#REF43305\)](#), [Tidhar and Peacock 1999 \(/Species-Account/bna/species/goleag/references#REF56198\)](#), Hawk Mountain unpubl., P. Sherrington pers. comm.).

Uses orographic lift (uplifts of thermal convection: [Kerlinger 1989a \(/Species-Account/bna/species/goleag/references#REF8570\)](#), 86) along ridges, but also migrates over large flat or featureless terrain. Might compensate for potential flight-path displacement caused by winds; radio-tagged eagles deviated little from a direct line during migration. Water crossings >50 km not recorded; large water bodies may divert migrating eagles.

Individuals from northern breeding areas migrate to wintering areas with little or no wandering, but some wander after reaching winter destinations ([Applegate et al. 1987 \(/Species-Account/bna/species/goleag/references#REF33283\)](#), [Brodeur et al. 1996 \(/Species-Account/bna/species/goleag/references#REF33286\)](#), CLM). Migrants commonly use continuous gliding flight ([Yates et al. 2001 \(/Species-Account/bna/species/goleag/references#REF43327\)](#)). Speed during migratory flights up to 51 km/h ([Broun and Goodwin 1943 \(/Species-Account/bna/species/goleag/references#REF8607\)](#)). Radio-tagged eagles from e. Hudson Bay migrated mean of 65 km/d (range 49–81) during fall migration and 68 km/d (range 32–91) during spring migration. No evidence that adults and juveniles in northern areas start migration together, as reported by Palmer ([Palmer 1988c \(/Species-Account/bna/species/goleag/references#REF38067\)](#)). Significant shifts in magnitude of hourly passage rates at Hawk Mtn., PA, related to cold fronts; passage rates peaked 1 d after a cold front and declined steadily for next 3 d ([Allen et al. 1996 \(/Species-Account/bna/species/goleag/references#REF58621\)](#)). Four radio-tagged eagles from e. Hudson Bay usually stayed <2 d in any local area during migration ([Brodeur et al. 1996 \(/Species-Account/bna/species/goleag/references#REF33286\)](#)). Immatures may abandon summer ranges earlier than adults because they have less experience in foraging ([Omland and Hoffman 1996 \(/Species-Account/bna/species/goleag/references#REF33308\)](#)). Compared to adults, immatures in sw. Montana spent more time migrating each day and were less selective about time of day for migrating; at autumn migration lookouts in sw. Montana, immatures observed more frequently than adults from 08:00 to 12:00 and >17:00 ([Omland and Hoffman 1996 \(/Species-Account/bna/species/goleag/references#REF33308\)](#)). Individuals often hunt during migration ([Dekker 1985 \(/Species-Account/bna/species/goleag/references#REF43261\)](#)).

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## Control and Physiology of Migration

Few data on proximate cues for migration. Tendency to migrate is strongest at northern latitudes ([Kerlinger 1989a \(/Species-Account/bna/species/goleag/references#REF8570\)](#)). Departure from northern breeding areas coincides with first lasting snowfall, freeze-up, or decreasing prey abundance; also north winds ([Brodeur et al. 1996 \(/Species-Account/bna/species/goleag/references#REF33286\)](#)). Poor winter foraging conditions due to low jackrabbit abundance in w. U.S.'s Great Basin may stimulate migratory movements among otherwise sedentary eagles ([Rossman 1999 \(/Species-Account/bna/species/goleag/references#REF43305\)](#)), but individuals from sw. Idaho did not exhibit "irruptive" movement patterns during prey shortages ([Steenhof et al. 1984 \(/Species-Account/bna/species/goleag/references#REF17488\)](#)). Eagles respond opportunistically to varying weather factors in complex landscapes with high topographic relief. Numbers of migrating individuals increased with increasing air temperature, rising barometric pressure, and decreasing relative humidity at Glacier National Park, MT in autumn; numbers increased with increasing wind speed and rising barometric pressure in spring ([Yates et al. 2001 \(/Species-Account/bna/species/goleag/references#REF43327\)](#)).

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## Habitat in Breeding Range



Breeds in open and semiopen habitats from near sea level to 3,630 m ([Poole and Bromley 1988a \(/Species-Account/bna/species/goleag/references#REF59100\)](#), G. R. Craig pers. comm.)—tundra, shrublands, grasslands, woodland-brushlands, and coniferous forests ([Kochert 1986 \(/Species-Account/bna/species/goleag/references#REF10274\)](#)). Also in farmland and riparian habitats ([Kochert 1972 \(/Species-Account/bna/species/goleag/references#REF10273\)](#), [Menkens and Anderson 1987 \(/Species-Account/bna/species/goleag/references#REF56193\)](#)). Avoids heavily forested areas.

Occurs primarily in mountainous canyon land, rimrock terrain of open desert and grassland areas of w. U.S. Also nests extensively in riparian habitats in e. Great Plains ([Menkens and Anderson 1987 \(/Species-Account/bna/species/goleag/references#REF56193\)](#)) and occasionally in forested areas. Nesting territories in sw. Montana are at lower elevations and contain more sagebrush (*Artemisia* spp.)-grassland habitat than unused areas ([Baglien 1975 \(/Species-Account/bna/species/goleag/references#REF33284\)](#)). Nesting density in s.-central Idaho was higher in areas bordered by sagebrush/grass seedings than in areas bordered by agriculture ([Craig and Craig 1984b \(/Species-Account/bna/species/goleag/references#REF43258\)](#)). In ne. Colorado, nests primarily in grasslands near cliffs and avoids cultivated areas ([Olendorff 1973 \(/Species-Account/bna/species/goleag/references#REF57538\)](#)). In n. Utah, nests mainly in grass, shrub, and juniper (*Juniperus* spp.) habitats ([Peterson 1988a \(/Species-Account/bna/species/goleag/references#REF60858\)](#)). In e. Utah, used valley, aspen (*Populus* spp.)-conifer, and piñon (*Pinus* spp.)-juniper habitats as expected based on availability and talus habitat less than expected ([Bates and Moretti 1994 \(/Species-Account/bna/species/goleag/references#REF10210\)](#)). In Wyoming, nests primarily in grassland, shrubland, or riparian habitats; absent or rare in flat desert terrain, farmlands, and dense forests ([Phillips et al. 1984 \(/Species-Account/bna/species/goleag/references#REF10307\)](#)). In central California, nests primarily in open grasslands and oak (*Quercus* spp.) savanna and to a lesser degree in oak woodland and open shrublands ([Hunt et al. 1995b \(/Species-Account/bna/species/goleag/references#REF43278\)](#), [Hunt et al. 1999b \(/Species-Account/bna/species/goleag/references#REF10266\)](#)). In Arizona, prefers desert grasslands and chaparral habitats ([Millsap 1981 \(/Species-Account/bna/species/goleag/references#REF8575\)](#)).

Typically forages in open habitats: grasslands or steppelike vegetation. In sw. Idaho, prefers to forage in shrub habitat; avoids agriculture, grassland, and burned habitats ([Marzluff et al. 1997b \(/Species-Account/bna/species/goleag/references#REF43288\)](#), USGS unpubl.). In central California, forages in open grassland habitats ([Hunt et al. 1999b \(/Species-Account/bna/species/goleag/references#REF10266\)](#)). In forests west of Cascade Mtns., associated with open habitats ([Anderson and Bruce 1980 \(/Species-Account/bna/species/goleag/references#REF43241\)](#), [Bruce et al. 1982 \(/Species-Account/bna/species/goleag/references#REF10224\)](#)). In e. North America, nests near burns, open marshes, meadows, bogs, and lakes and forages in open and semiopen mountainous or hilly terrain ([Spofford 1971 \(/Species-Account/bna/species/goleag/references#REF43313\)](#), [Singer 1974 \(/Species-Account/bna/species/goleag/references#REF43309\)](#), [Brodeur and Morneau 1999 \(/Species-Account/bna/species/goleag/references#REF43253\)](#)).

Farther north in interior and n. Alaska and interior w. Canada, breeds in habitat dominated by rugged topography or mountainous terrain, near or above timberline, and along riparian areas ([Ritchie and Curatolo 1982 \(/Species-Account/bna/species/goleag/references#REF43304\)](#), [Petersen et al. 1991 \(/Species-Account/bna/species/goleag/references#REF31791\)](#), [Young et al. 1995 \(/Species-Account/bna/species/goleag/references#REF10355\)](#)). Also breeds on bluffs and cliffs along rivers below timberline in Alaska ([Ritchie and Curatolo 1982 \(/Species-Account/bna/species/goleag/references#REF43304\)](#)) and on sea cliffs in nw. Alaska (K. Titus pers. comm.). Common in mountainous areas dominated by subalpine and alpine vegetation between 300 and 1,525 m in Denali National Park, AK (CLM). Associated with tundra areas, river outwash plains, and alpine-subalpine ecotypes in e.-central Yukon ([Hayes and Mossop 1981 \(/Species-Account/bna/species/goleag/references#REF33299\)](#)). Occurs in areas with high topographic relief dominated by low-arctic tundra plant species in coastal central Canadian Arctic ([Poole and Bromley 1988a \(/Species-Account/bna/species/goleag/references#REF59100\)](#)); in areas with cuesta relief (asymmetric hills or ridges with

gentle slopes and steep escarpments) and rugged topography in e. Hudson Bay region ([Morneau et al. 1994 \(/Species-Account/bna/species/goleag/references#REF10294\)](#)). Forages on alpine tundra slopes at edges of subalpine scrub in sw. Alaska; rarely in open areas below timberline ([Petersen et al. 1991 \(/Species-Account/bna/species/goleag/references#REF31791\)](#)). Forages in wet marsh tundra, heath tundra, tussock-heath tundra, and hillside heath tundra valleys in Alaska along the Kolomak River and Yukon-Kuskokwim Delta and in the Atigun and Sagavanirktok River valleys ([Holmes and Black 1973 \(/Species-Account/bna/species/goleag/references#REF16912\)](#), [Sage 1974 \(/Species-Account/bna/species/goleag/references#REF13862\)](#)).

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### Habitat in Migration

In w. U.S. and Canada, may hunt over wetlands, agricultural areas, and grassy foothills during migration ([Dekker 1985 \(/Species-Account/bna/species/goleag/references#REF43261\)](#)). In w. Canada, may select areas with strong thermal activity and uplifts for energy-efficient migration ([Sherrington 1993 \(/Species-Account/bna/species/goleag/references#REF33313\)](#)). Radio-tagged eagles followed topographical features in e. U.S., but where these features were lacking in central Quebec and Ontario, they migrated over largely flat or featureless terrain ([Brodeur et al. 1996 \(/Species-Account/bna/species/goleag/references#REF33286\)](#)).

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### Habitat in the Winter Range

From [Root 1988b \(/Species-Account/bna/species/goleag/references#REF44041\)](#) and others as noted. Primarily Humid Temperate and Dry ecoregion domains ([Bailey 1989a \(/Species-Account/bna/species/goleag/references#REF10209\)](#)) from s. Alaska and Canada to central Mexico. Frequents areas in w. North America >457 m in elevation and winters up to 2,500 m (e.g., San Luis Valley, CO). Generally absent from harsh, dry areas (<20 cm annual precipitation) of Sonoran Desert and central Nevada; does not winter in western temperate forests in and west of Rocky Mtns. Winter habitat east of Canadian Rockies skirts northern edge of grasslands and excludes mixed mesophytic and deciduous forest. Forages at edges of woodland-scrub habitat in valley floors, riparian areas, and over areas dominated by dwarf shrub mat at northern limit of wintering distribution in Alaska ([Petersen et al. 1991 \(/Species-Account/bna/species/goleag/references#REF31791\)](#)). In s. Yukon, may frequent local dumps and roadways searching for road kills ([Burles and Frey 1981 \(/Species-Account/bna/species/goleag/references#REF10225\)](#)).

Across w. U.S., prefers open habitats with native vegetation and avoids urban, agricultural, and forested areas ([Millsap 1981 \(/Species-Account/bna/species/goleag/references#REF8575\)](#), [Fischer et al. 1984 \(/Species-Account/bna/species/goleag/references#REF19178\)](#), [Craig et al. 1986 \(/Species-Account/bna/species/goleag/references#REF10229\)](#), [Marzluff et al. 1997b \(/Species-Account/bna/species/goleag/references#REF43288\)](#)). Uses sagebrush communities, riparian areas, grasslands, and rolling oak savanna ([Knight et al. 1979 \(/Species-Account/bna/species/goleag/references#REF60669\)](#), [Fischer et al. 1984 \(/Species-Account/bna/species/goleag/references#REF19178\)](#), [Hayden 1984 \(/Species-Account/bna/species/goleag/references#REF10258\)](#), [Estep and Sculley 1989 \(/Species-Account/bna/species/goleag/references#REF43267\)](#)). In sw. Idaho, forages primarily in shrubland and avoids grassland and agriculture, with foraging points concentrated in sagebrush/rabbitbrush (*Chrysothamnus* spp.) habitat and cliff areas ([Marzluff et al. 1997b \(/Species-Account/bna/species/goleag/references#REF43288\)](#)). Common in grazed areas; much remaining habitat in central and s. California in patches of relatively inaccessible mountainous country, primarily livestock ranches ([Thelander 1974 \(/Species-Account/bna/species/goleag/references#REF43316\)](#)).

Common near reservoirs and wildlife refuges that provide foraging opportunities at winter waterfowl concentrations in midwestern U.S. ([Wingfield 1991 \(/Species-Account/bna/species/goleag/references#REF43326\)](#)). Associated with riverine or wetland systems east of Mississippi River ([Millsap and Vana 1984 \(/Species-Account/bna/species/goleag/references#REF60968\)](#)). Most

sightings in e. U.S. concentrated within or along southwestern border of the Appalachian Plateau (30% of records) and within the Coastal Plain physiographic region (33% of records). Associated with steep river valleys, reservoirs, and marshes in inland areas; estuarine marshlands, barrier islands, managed wetlands, sounds, and mouths of major river systems in coastal areas. These wetlands are attractive due to a dominance of open vegetation, large concentrations of prey, and absence of human disturbance. Winters on montane grass and heath balds in the Appalachian Plateau region ([Millsap and Vana 1984 \(/Species-Account/bna/species/goleag/references#REF60968\)](#)). Immatures more common along coastal plain on lower river estuaries, adjacent marshlands, and barrier islands of e. U.S.; adults more common than immatures near inland waterways on Appalachian and New England plateau ([Millsap and Vana 1984 \(/Species-Account/bna/species/goleag/references#REF60968\)](#), [Todd 1989 \(/Species-Account/bna/species/goleag/references#REF43319\)](#)).

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### Historical Changes to the Distribution

Historically nested throughout most of North America ([Bent 1937b \(/Species-Account/bna/species/goleag/references#REF23961\)](#)), but breeding records lacking for Iowa, Minnesota, and Indiana ([Wingfield 1991 \(/Species-Account/bna/species/goleag/references#REF43326\)](#)). Formerly nested in e. Nebraska, se. South Dakota, Wisconsin, and Central Valley of California ([Harlow and Bloom 1989 \(/Species-Account/bna/species/goleag/references#REF43274\)](#), [Wingfield 1991 \(/Species-Account/bna/species/goleag/references#REF43326\)](#)). Historical nesting confirmed in Maine, New Hampshire, New York, and Vermont ([Todd 1989 \(/Species-Account/bna/species/goleag/references#REF43319\)](#)). Last reported nesting in New Hampshire in 1961 and New York in 1972 ([Todd 1989 \(/Species-Account/bna/species/goleag/references#REF43319\)](#)). In Maine, 2 pairs nested in 1983, only 1 pair between 1984 and 1998, and 2 in 1999 ([Todd 1989 \(/Species-Account/bna/species/goleag/references#REF43319\)](#), C. Todd pers. comm.). Historical nesting suspected in Pennsylvania, Massachusetts, N. Carolina, Tennessee, Kentucky, W. Virginia, Virginia, S. Carolina, and Georgia ([Smith 1982a \(/Species-Account/bna/species/goleag/references#REF10324\)](#), [Palmer 1988c \(/Species-Account/bna/species/goleag/references#REF38067\)](#), [Todd 1989 \(/Species-Account/bna/species/goleag/references#REF43319\)](#), C. Todd pers. comm.). Nesting not confirmed in s. Appalachians ([Lee and Spofford 1990 \(/Species-Account/bna/species/goleag/references#REF43285\)](#)) until late 1990s after successful reintroduction efforts (see Conservation and management: management, below). Nested historically in s.-central Mexico (Guanajuato and Querétaro de Arteaga; [Instituto Nacional De Ecologia 1999 \(/Species-Account/bna/species/goleag/references#REF43279\)](#)).

Most breeding records for Maritime Provinces of Canada unsubstantiated ([De Smet 1987 \(/Species-Account/bna/species/goleag/references#REF10237\)](#)). Believed to have nested in Nova Scotia in late 1800s, and evidence exists for nesting in New Brunswick. Casual visitor to Maritime Provinces in late 1980s, with a large increase in sightings between late 1960s and 1980s. More common historically in Ontario and Quebec; currently rare, particularly in southern portions ([De Smet 1987 \(/Species-Account/bna/species/goleag/references#REF10237\)](#)).

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### Fossil History

Pleistocene records of Golden Eagle in North America for Oregon, California, Nevada, New Mexico, Texas, Utah, and Mexico ([Emslie and Heaton 1987 \(/Species-Account/bna/species/goleag/references#REF29098\)](#), [Palmer 1988c \(/Species-Account/bna/species/goleag/references#REF38067\)](#)). Remains also found at archaeological sites inhabited by prehistoric Native Americans in Utah ([Parmalee 1980 \(/Species-Account/bna/species/goleag/references#REF58782\)](#)) and New Mexico ([Emslie 1981 \(/Species-Account/bna/species/goleag/references#REF10245\)](#)). *Aquila* remains reported in fossils from the Upper Miocene in Nebraska ([Wetmore 1923a \(/Species-Account/bna/species/goleag/references#REF17358\)](#)), and *Aquila* -like

remains reported in fossils from the Upper Eocene or Lower Oligocene in Europe ([Brodkorb 1964a \(/Species-Account/bna/species/goleag/references#REF22648\)](#)). Considerable overlap and gradation between contemporary Golden Eagle and Pleistocene specimens ([Howard 1947 \(/Species-Account/bna/species/goleag/references#REF33300\)](#)).

[◀ Systematics \(/Species-Account/bna/species/goleag/systematics\)](#)

[Diet and Foraging \(/Species-Account/bna/species/goleag/foodhabits\) ▶](#)

[Introduction \(/Species-Account/bna/species/goleag/introduction\)](#)

[Appearance \(/Species-Account/bna/species/goleag/appearance\)](#)

[Systematics \(/Species-Account/bna/species/goleag/systematics\)](#)

[Distribution, Migration and Habitat \(/Species-Account/bna/species/goleag/distribution\)](#)

[Distribution \(/Species-Account/bna/species/goleag/distribution#distrib\)](#)

[Distribution in the Americas \(/Species-Account/bna/species/goleag/distribution#inwh\)](#)

[Distribution Outside the Americas \(/Species-Account/bna/species/goleag/distribution#nonwh\)](#)

[Nature of Migration \(/Species-Account/bna/species/goleag/distribution#mignat\)](#)

[Timing and Routes of Migration \(/Species-Account/bna/species/goleag/distribution#migroute\)](#)

[Migratory Behavior \(/Species-Account/bna/species/goleag/distribution#migbehav\)](#)

[Control and Physiology of Migration \(/Species-Account/bna/species/goleag/distribution#migphys\)](#)

[Habitat in Breeding Range \(/Species-Account/bna/species/goleag/distribution#breedhab\)](#)

[Habitat in Migration \(/Species-Account/bna/species/goleag/distribution#mighab\)](#)

[Habitat in the Winter Range \(/Species-Account/bna/species/goleag/distribution#winhab\)](#)

[Historical Changes to the Distribution \(/Species-Account/bna/species/goleag/distribution#hist\)](#)

[Fossil History \(/Species-Account/bna/species/goleag/distribution#fossil\)](#)

[Diet and Foraging \(/Species-Account/bna/species/goleag/foodhabits\)](#)

[Sounds and Vocal Behavior \(/Species-Account/bna/species/goleag/sounds\)](#)

[Behavior \(/Species-Account/bna/species/goleag/behavior\)](#)

[Breeding \(/Species-Account/bna/species/goleag/breeding\)](#)

[Demography and Populations \(/Species-Account/bna/species/goleag/demography\)](#)

[Conservation and Management \(/Species-Account/bna/species/goleag/conservation\)](#)

[Priorities for Future Research \(/Species-Account/bna/species/goleag/priorities\)](#)

[Acknowledgments \(/Species-Account/bna/species/goleag/acknowledgments\)](#)

[About the Author\(s\) \(/Species-Account/bna/species/goleag/aboutauthors\)](#)

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[Multimedia \(/Species-Account/bna/species/goleag/multimedia/photos\)](#)

[Tables and Appendices \(/Species-Account/bna/species/goleag/appendices\)](#)

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[References \(/Species-Account/bna/species/goleag/references\)](#)

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