

Merlin

Falco columbarius

REGULATORY STATUS

USFWS: Migratory Bird
USFS R2: No special status
USFS R4: No special status
Wyoming BLM: No special status
State of Wyoming: Protected Bird

CONSERVATION RANKS

USFWS: No special status
WGFD: NSSU (U), Tier III
WYNDD: G5, S4
Wyoming Contribution: LOW
IUCN: Least Concern
PIF Continental Concern Score: 7

STATUS AND RANK COMMENTS

Merlin (*Falco columbarius*) has no additional regulatory status or conservation rank considerations beyond those listed above.

NATURAL HISTORY

Taxonomy:

There are nine subspecies of Merlin worldwide but only three occur in North America: Black Merlin (*F. c. suckleyi*), Boreal Merlin or Taiga Merlin (*F. c. columbarius*), and Prairie Merlin (*F. c. richardsonii*)^{1, 2}. The remaining subspecies are found across Eurasia¹. Most breeding and migrant Merlin in Wyoming are *F. c. richardsonii*.

Description:

Identification of Merlin is possible in the field. It is a small falcon, with a body length of 24 to 30 cm and a wingspan of 53 to 68 cm. Merlin is sexually dimorphic in size and plumage^{1, 2}. Both sexes have strong streaking on the underside, yellow legs, and alternating broad dark and narrow light bands on the tail, ending with a light band. However, adult females are larger than males and have dusky brown plumage on the neck and back, and a dusky brown tail with cream bands. Males are noticeably smaller with a pale bluish-gray neck and back, and a dark gray to black tail with white or pale gray bands. Merlin lacks the distinct dark “mustache” facial marking common in many sympatric falcon species, and instead has indistinct streaking in the same area¹⁻³. Within its Wyoming distribution, Merlin is most similar in appearance to Peregrine Falcon (*F. peregrinus*), Prairie Falcon (*F. mexicanus*), and American Kestrel (*F. sparverius*). However, both Peregrine Falcon and Prairie Falcon are much larger than Merlin and have dark mustaches. American Kestrel is slightly smaller than Merlin, with a dark mustache and rufous back and tail³.

Distribution & Range:

During the breeding season, Merlin is widespread across northern North America¹. Wyoming is on the southernmost extent of the breeding range, though birds may be found anywhere in the state during any time of year⁴. During the non-breeding season, some individuals remain year-round, others migrate out of the state, and some migrate into the state from northern regions. The southern boundary of the breeding distribution of Merlin in North America has been expanding southward across the northern United States from Idaho to New England over the past several decades^{1,5}. Winter season range expansions into the northern Great Plains have occurred, likely due to increases in abundance of important avian prey species¹.

Habitat:

Merlin forages in open to semi-open areas during the breeding season and will use a variety of habitats, including conifer, deciduous, and mixed-wood forests and woodlands with forest openings, riparian woodlands, shrub-steppe, prairie, and urban/suburban areas with trees^{1,6}. Potential habitat exists for this species throughout Wyoming⁴. Merlin nests in abandoned magpie, crow (*Corvus* spp.), hawk, or squirrel nests, as well as natural tree cavities, tree cavities excavated by woodpeckers, and cliff ledges. In some parts of their range where trees are absent, particularly in northern Eurasia and the arctic tundra, Merlin will nest on the ground^{1,6}. During migration and the non-breeding season the species will use grasslands, semi-open forests, and coastal areas¹.

Phenology:

Spring migration into Wyoming probably occurs from February through April, though some birds remain in the state year round⁷. Breeding phenology has not been studied in Wyoming. However, egg laying occurs from late April to late May in Saskatchewan and is usually completed by 20 May in Montana^{1,6}. Incubation lasts 28 to 32 days, and nestlings fledge at about 29 days of age. Fledglings are dependent upon the parents for food for up to five weeks. In Montana, dispersal from the nest area occurs by mid-August^{1,6}. Timing of fall migration is difficult to determine in Wyoming because some individuals remain in the state year-round while others migrate⁸. The median date for passage of fall migrants in southwestern Wyoming is October 4 and migration through Wyoming has ceased by the end of November^{1,9}.

Diet:

Merlin primarily preys on small to medium-sized birds. Other prey include insects, mammals (including bats), and reptiles^{1,10}.

CONSERVATION CONCERNS

Abundance:

Continental: WIDESPREAD

Wyoming: RARE

Abundance is poorly understood for Merlin but is known to vary markedly across the species' range, with relatively high densities in some urban areas in Canada and Britain¹. Using Breeding Bird Survey (BBS) and Northwest Territories and Nunavut checklist data, Partners in Flight estimated the global population of Merlin to be approximately 3 million individuals in 2013, with about 140,000 in the United States and roughly 2,000 present in Wyoming during the breeding season¹¹. However, the population estimate for Wyoming is based on very few detections in the state and should be viewed with caution. During winter in Wyoming, abundance of Merlin is lower as many individuals migrate out of the state¹.

Population Trends:

Historic: MODERATE DECLINE

Recent: UNKNOWN

Across North America, historic declines of Merlin occurred in the 1960s due to pesticides, including DDT and organochlorines ¹. Populations in Wyoming appear to have experienced historic declines but recent trends are poorly understood due to insufficient data ¹². Data from the BBS suggest the recent (2003–2013) population trend may be stable in Wyoming ¹²; however Christmas Bird Count data suggest that the population wintering in Wyoming has fluctuated markedly over the past 10 years ¹³. These data contrast with BBS data elsewhere across the continent, which show stable or increasing population trends in nearly every state, province, and bioregion. However, due to the low number of Merlin detected on BBS routes throughout the species’ range, these data should be viewed with caution ¹². Data from sites monitored by Hawk Watch International in western North America also indicate increasing population trends since the early 1980s ¹⁴. The Wyoming Game and Fish Department (WGFD) documented the extirpation of a small population that nested along the Green River in southwest Wyoming ¹⁵.

Intrinsic Vulnerability:

MODERATE VULNERABILITY

Merlin has low fecundity, which makes it moderately vulnerable. Merlin has limited opportunity to breed and increase or maintain its population. Mortality of birds in their first year is near 70%, and mean annual survivorship is 62%. Life expectancy averages 3 years for females and 2.5 years for males, and male Merlins typically do not breed until at least 2 years of age. Only one clutch can be raised each year ¹.

Extrinsic Stressors:

SLIGHTLY STRESSED

Merlin is adversely affected by various human impacts on the environment, which makes the species slightly stressed in Wyoming. Pesticides such as DDT negatively affect breeding success of Merlin through eggshell thinning. Recent evidence from Canada and New York indicate that Merlin is still affected by pesticides including DDT and organochlorines that persist in the environment ^{1, 16}. Merlin is expanding into urban areas, where human-induced mortality such as window and automobile collisions are a leading cause of mortality ¹⁷. The recovery of Peregrine Falcon may threaten Merlin in some areas, either directly through predation or indirectly through competition for food ¹⁸.

KEY ACTIVITIES IN WYOMING

There are currently no research projects in Wyoming specifically focused on Merlin. Annual permits are issued by the WGFD for capture of Merlin for falconry purposes, and the department monitors the number taken annually ¹⁹. Although the species is observed on a few BBS routes in Wyoming, total detections are limited, resulting in low confidence in abundance and population trend estimates for Merlin in the state ¹². Similarly, the species is rarely detected in Wyoming by the Integrated Monitoring in Bird Conservation Regions program, prohibiting density and population estimates under this program ²⁰.

ECOLOGICAL INFORMATION NEEDS

Current breeding locations and preferred habitat of Merlin in Wyoming are not well known, however, a survey of historic nest sites in the northeastern section of the state found a high rate of occupancy of historic sites ⁸. The phenology of the species in Wyoming is poorly understood,

especially arrival and departure dates of breeding individuals. Merlin would benefit from research and long-term monitoring to examine abundance and population trends in the state, as well as the mechanisms driving those trends. Very little is known about the wintering ecology of Merlin from North America, including migration routes, the relative importance of different known wintering areas, diet, and potential threats facing the species on wintering grounds ¹.

MANAGEMENT IN WYOMING

This section authored solely by WGFD; Susan M. Patla. Currently there are no studies or monitoring of Merlin nesting populations in Wyoming or the Intermountain Region. The WGFD Nongame Program initiated monitoring of Merlin nest sites in 1980 and 1982 with limited follow up work in 1986-1989 which included banding and radio-tracking a few pairs ^{15, 21}. A more focused statewide survey effort in 1990 of 35 locations resulted in documenting only 3 occupied territories in the northeast corner of the state in Ponderosa pine habitat ¹⁵. Another statewide survey completed in 1991 of 36 sites included a focus on nest site behavior ²². Six nesting pairs were found in 1991, none in western Wyoming although 12 previously occupied sites along the Green River were surveyed. In the 1996 Nongame Bird and Mammal Plan, Merlin was designated a Species of Special Concern Category III. A study was initiated 1998 to assess Merlin population status and habitat use that included surveys of 58 historic sites and 52 random sites throughout Wyoming ⁸. Confirmed breeding attempts were documented at 10 of 58 historic sites (17.2%) and Merlin was observed at a total of 18/58 sites (31.0%). Nest success (90%) and productivity of active nests (3.6 fledglings/successful attempt) was found to be high. Most nests were found in northeast Wyoming in mixed grass prairie and ponderosa pine habitat with 60% in domed magpie nest structures. To assess the current state-wide population status, a reevaluation of historic sites should be completed as well as surveys at new potential sites that have been documented since 1999 from the Wildlife Observation System, Wyoming Natural Diversity Database records, and cooperative falconers in the state. Tracking studies of nesting adults, as satellite transmitters of suitable size become available, would be valuable to provide data on migration routes, wintering areas and survivorship.

CONTRIBUTORS

Michael T. Wickens, WYNDD
Wendy A. Estes-Zumpf, WYNDD
Susan M. Patla, WGFD
Ian M. Abernethy, WYNDD
Douglas A. Keinath, WYNDD
Kaylan A. Hubbard, WYNDD

REFERENCES

- [1] Warkentin, I. G., Sodhi, N. S., Espie, R. H. M., Poole, A. F., Oliphant, L. W., and James, P. C. (2005) Merlin (*Falco columbarius*), In *The Birds of North America* (Rodewald, P. G., Ed.), Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: <https://birdsna.org/Species-Account/bna/species/merlin>.
- [2] Pyle, P. (2008) *Identification Guide to North American Birds, Part II*, Slate Creek Press, Point Reyes Station, California.
- [3] Peterson, R. T. (2008) *Peterson Field Guide to Birds of North America*, First ed., Houghton Mifflin Company, New York.

- [4] Keinath, D., Anderson, M., and Beauvais, G. (2010) Range and modeled distribution of Wyoming's species of greatest conservation need, Wyoming Natural Diversity Database, University of Wyoming, Laramie, Wyoming.
- [5] Cava, J. A., Richardson, A. D., Jacobs, E. A., and Rosenfield, R. N. (2014) Breeding range expansion of Taiga Merlins (*Falco columbarius columbarius*) in Wisconsin reflects continental changes, *Journal of Raptor Research* 48, 182-188.
- [6] NatureServe. (2015) NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1, <http://explorer.natureserve.org>, NatureServe, Arlington, Virginia.
- [7] Faulkner, D. W. (2010) *Birds of Wyoming*, Roberts and Company Publishers, Greenwood Village, CO.
- [8] Ayers, L. W., and Anderson, S. H. (1999) Reoccupancy and use of historic breeding sites by Richardson's Merlin (*Falco columbarius richardsonii*) in Wyoming, Final Report, p 74, Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie, Wyoming.
- [9] Hawks, S. E., and Mika, M. (2012) Fall 2011 raptor migration studies at Commissary Ridge in southwestern Wyoming, p 32, HawkWatch International, Inc., Salt Lake City, UT.
- [10] Martinez, S. G., and Lee Jr., T. E. (2013) Predation on Mexican Free-tailed Bats (*Tadarida brasiliensis*) by Merlin (*Falco columbarius*), *Southwestern Naturalist* 58, 508-512.
- [11] Partners in Flight Science Committee. (2013) Population Estimates Database, version 2013, <http://rmbo.org/pifpopestimates>.
- [12] Sauer, J. R., Hines, J. E., Fallon, J. E., Pardieck, K. L., Ziolkowski, D. J., Jr., and Link, W. A. (2014) The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015, USGS Patuxent Wildlife Research Center, Laurel, MD.
- [13] National Audubon Society. (2015) Christmas Bird Count Historical Results [Online], 2015 ed., National Audubon Society, <http://www.christmasbirdcount.org>.
- [14] Farmer, C. J., Goodrich, L. J., Inzunza, E. R., and Smith, J. P. (2008) Conservation status of North America's birds of prey, In *State of North America's Birds of Prey* (Bildstein, K. L., Smith, J. P., Inzunza, E. R., and Veit, R. R., Eds.), p 466, Nuttall Ornithological Club, Cambridge, MA.
- [15] Grebence, B., and Ritter, S. (1991) Merlin Surveys Completion Report, In *Endangered and Nongame Bird and Mammal Investigations: Annual Completion Report*, pp 99-117, Wyoming Game and Fish Department.
- [16] Okoniewski, J. C., Stone, W. B., and Hynes, K. P. (2006) Continuing organochlorine insecticide mortality in wild birds in New York, 2000-2004, *Bulletin of Environmental Contamination and Toxicology* 77, 726-731.
- [17] Hager, S. B. (2009) Human-related threats to urban raptors, *Journal of Raptor Research* 43, 210-226.
- [18] Buchanan, J. B. (2009) Change in the winter occurrence of Merlins at a western Washington estuary following recovery of Peregrine Falcon populations, *Journal of Raptor Research* 43, 149-151.
- [19] Rudd, C., and Roberts, N. (2014) Harvest of raptors for falconry, In *Threatened, Endangered, and Nongame Bird and Mammal Investigations: Annual Completion Report* (Orabona, A. C., and Cudworth, N., Eds.), pp 343-345.
- [20] Bird Conservancy of the Rockies. (2016) The Rocky Mountain Avian Data Center [web application], Brighton, CO. <http://adc.rmbo.org>.
- [21] Platt, S. (1986) Southwestern Wyoming Merlin Survey Report, In *Endangered and Nongame Bird and Mammal Investigations: Annual Completion Report*, pp 42-47, Wyoming Game and Fish Department.
- [22] Ritter, S., Cerovski, A., and Johnson, A. (1992) Merlin Surveys Completion Report, In *Endangered and Nongame Bird and Mammal Investigations: Annual Completion Report*, pp 27-40, Wyoming Game and Fish Department.



Figure 1: Adult female Merlin (*richardsonii* subspecies) in Boulder County, Colorado. (Photo courtesy of Bill Schmoker)

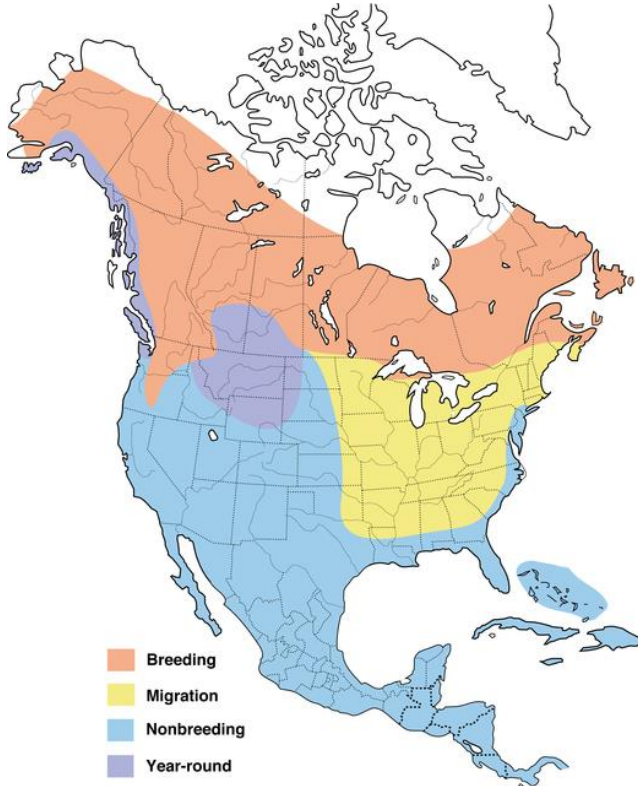
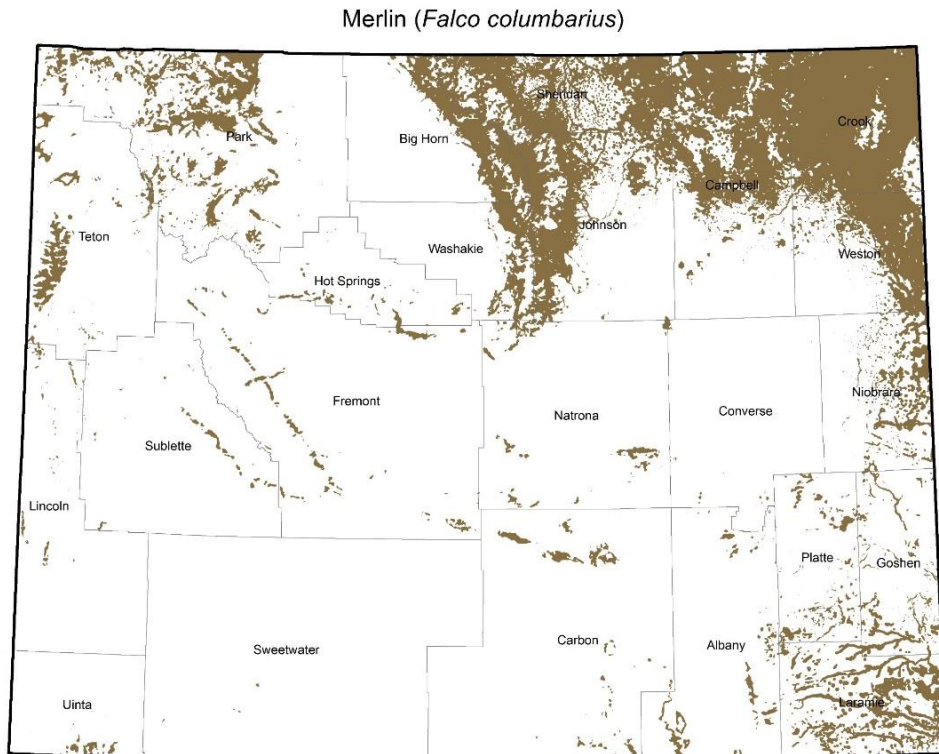


Figure 2: North American range of *Falco columbarius*. (Map courtesy of Birds of North America, <http://bna.birds.cornell.edu/bna>, maintained by the Cornell Lab of Ornithology)



Figure 3: Potential Merlin habitat in Thunder Basin National Grassland. Open areas provide food and foraging areas, and trees along stream provide nest locations. (Photo courtesy of Michael T. Wickens)



SOURCE: Digital maps of ranges for Wyoming Species of Greatest Conservation Need: Sept. 2016.
Wyoming Game and Fish Department and Wyoming Natural Diversity Database, University of Wyoming, Laramie, Wyoming.
Note that brown indicates the predicted distribution of the species;
heavy black lines indicate outermost boundaries of possible occurrence.

Figure 4: Range and predicted distribution of *Falco columbarius* in Wyoming.