Great Gray Owl

Strix nebulosa

REGULATORY STATUS

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

CONSERVATION RANKS

USFWS: No special status
WGFD: NSSU (U), Tier II
WYNDD: G5, S2
Wyoming Contribution: LOW
IUCN: Least Concern
PIF Continental Concern Score: 11

STATUS AND RANK COMMENTS

Great Gray Owl (*Strix nebulosa*) has no additional regulatory status or conservation rank considerations beyond those listed above.

NATURAL HISTORY

Taxonomy:
There are currently two recognized subspecies of Great Gray Owl; *S. n. nebulosa* is the only subspecies found in North America, and therefore also in Wyoming [1, 2]. Some researchers suggest that a geographically isolated population in the southern Sierra Nevada Mountains in California should be recognized as a third subspecies [3].

Description:

Identification of Great Gray Owl is possible in the field. It is the largest owl in North America, measuring 61–84 cm tall. Males, females, and juveniles have identical plumage, which is a mixture of brown, gray, and white that appears gray overall [1]. The underparts have heavy vertical streaking. The head is very round with a well-pronounced, lined facial disk; no ear tufts; yellow eyes; and a black chin spot centered between two white patches giving the appearance of a "bowtie" [4]. Where their ranges overlap, Great Horned Owl (*Bubo virginianus*) can easily be distinguished from Great Gray Owl by its conspicuous ear tufts [4].

Distribution & Range:

Globally, Great Gray Owl has a Holarctic distribution and is found across the boreal and taiga forests in North America and Eurasia. In the United States, the species range extends south along the Cascade Range, Sierra Nevada, and Rocky Mountains. The southernmost part of the species range in the Rocky Mountains is in Wyoming and Idaho and possibly northeastern Utah [1, 5, 6]. In Wyoming, the species is known to breed in Yellowstone National Park, the Absaroka Range, the Teton Range, the Wyoming Range (Roberts USFS, pers. comm.), and the Wind River Range.

Unconfirmed reports of the species have occurred in the Bighorn Range, and breeding status in this region is unknown [1, 5, 7, 8]. Great Gray Owl has been observed in 11 of Wyoming's 28 latitude/longitude degree blocks, with confirmed or suspected breeding documented in 4 degree blocks [9]. The species is resident across its range, though local, irregular winter irruptions occur outside the breeding range [1].

Habitat:
In the southern portion of the range of Great Gray Owl, mature deciduous and coniferous forest stands are preferred during the breeding season [5]. This contrasts with the bulk of the species range in the boreal zone, where habitat is taiga forest with interspersed bogs, muskegs, and other open areas [1, 5]. Habitat use in the non-breeding season is identical to the breeding season, though the species will also use more open areas with a few perching structures [5]. In Idaho and Wyoming during the breeding season, the species has been found in forests comprised of Lodgepole Pine (*Pinus contorta*), Douglas Fir (*Pseudotsuga menziesii*), Aspen (*Populus tremuloides*), and cottonwood (*Populus angustifolia*)/spruce (*Picea* spp.) at elevations ranging from 1,524 m to 3,000 m [6, 10]. Nest locations are generally in close proximity to foraging habitat, which includes clearings such as wet meadows and clear cut areas [5, 11-14]. Cottonwood riparian habitat provides important wintering habitat in the Teton Range [6].

Phenology:
In Wyoming, egg laying has been documented from early April to May [6]. Egg laying has been documented in Oregon and California as early as March. Incubation in Wyoming averages 30 days. Young fledge at 26–29 days of age, though they are incapable of sustained gliding flight for two weeks after fledging. The young may be dependent upon parents for up to 3 months [1, 10].

Diet:
Great Gray Owl feeds upon small mammals, especially small rodents [1]. In Wyoming, pocket gophers (*Thomomys* spp.) and voles (*Microtus* spp.) are the primary food [6, 10].

CONSERVATION CONCERNS

Abundance:
Continental: WIDESPREAD
Wyoming: VERY RARE
There are no robust estimates of abundance for Great Gray Owl in Wyoming. The species has a statewide abundance rank of VERY RARE and appears to be rare to uncommon within suitable environments in the occupied area [6, 9]. Great Gray Owl has never been detected during annual surveys for the Wyoming Breeding Bird Survey (BBS) between 1968–2015 [15]. Only 3 Great Gray Owls were detected during surveys for the Integrated Monitoring in Bird Conservation Regions (IMBCR) program between 2009–2015 [16]. While surveys conducted as part of the BBS and IMBCR programs may occasionally detect this species, neither is specifically designed to capture owl observations.

Population Trends:
Historic: UNKNOWN
Recent: UNKNOWN
Historic and recent population trends for Great Gray owl in Wyoming are unknown. Although changing availability of small mammals and nesting sites can lead to local fluctuations in abundance, population trends are thought to have remained relatively stable across North

America over the past century [13]. A recent study reported a decline in mean productivity, however, from 3.0 fledglings/nest in the 1980s to 1.7 in 2013–2015 in western Wyoming [6].

Intrinsic Vulnerability:

HIGH VULNERABILITY

Great Gray Owl requires mature forest habitat with high canopy cover including trees with large diameters, alive or dead, near optimal foraging areas for nesting [6]. The species does not construct a nest, but uses existing nests or platforms. Nest structures and optimal locations have been shown to be limiting factors for breeding in some areas [1, 5, 13, 14]. Great Gray Owl does not regularly breed until 3 years of age and typically raises no more than three young a year, resulting in low fecundity. The species requires a large home range, though home ranges may overlap [1, 17]. Prey abundance and availability in both summer and winter drive movements and occurrence and likely influence nesting demographics [10, 13, 18].

Extrinsic Stressors:

MODERATELY STRESSED

Nesting locations for Great Gray Owl are limited, and forestry practices which remove potential nest sites or reduce canopy cover and large diameter trees threaten the species [1, 13, 19]. Strychnine poisoning of pocket gophers, which would reduce the availability of a primary food of Great Gray Owl in Wyoming, may have a harmful effect on the owl [1]. Livestock grazing in montane meadow habitats may negatively impact the species through habitat degradation [20]. Residential development in lower elevation riparian forests could reduce limited wintering habitat [6]. Long-term climate change trends may impact nesting habitat and prey by affecting conifer mortality, frequency of forest fires, snow conditions, and prey density and availability [6].

KEY ACTIVITIES IN WYOMING

The Wyoming Game and Fish Department and the United States Forest Service have performed pre-nesting season call back surveys for Great Gray Owl across a portion of the species' range in Wyoming. These surveys were performed in the Wyoming Range in 2009 and 2010 and in the Shoshone National Forest in 1998, 1999, and 2008–2010. The surveys were also conducted in the Bridger-Teton National Forest in 2001 and 2008–2009 [21-23]. Additionally, more focused surveys are conducted by Forest Service biologists in specific project areas in suitable habitat. Biologists on the Bighorn National Forest have performed owl surveys in that region [8]. These surveys have detected a limited number of territorial owls. A study of Great Gray Owl habitat use and seasonal movement was conducted in the Jackson Hole area in the 2013–2015 breeding seasons [6]. Thirty-six nest attempts were documented across years with a nest density of one nest/2.7 km^2. Nest success ranged from 75% to 83% with 1.5 to 1.9 fledglings/nest produced per year. A total of 33 owls were outfitted with VHF or GPS satellite transmitters. Home ranges of breeding owls (7 females, 3 males) was estimated to be 1.53 km^2 and non-breeding owls 14.4 km^2 during the breeding season, 1 May–31 August. In the 2016 breeding season, automatic recording devises were tested in the same study area to evaluate their potential use for monitoring forest owls (B. Bedrosian, pers. comm.).

ECOLOGICAL INFORMATION NEEDS

Information is lacking on population trend, distribution, nesting density, and abundance of Great Gray Owl across the state outside of the Jackson area. Great Gray Owl is known to select mature forest habitat for nesting, but data are lacking on fine-scale habitat use and selection especially by breeding males as they supply food for incubating females and also feed young in the post-

fledging period. Little information exists on survival and dispersal of young owls and how isolated breeding populations may be at the southern extent of the species' range. How climate change and forest management practices affect nesting density, owl survivorship and productivity, and important prey populations also is largely unknown.

MANAGEMENT IN WYOMING

This section authored solely by WGFD; Susan M. Patla. Past survey work for Great Gray Owl in Wyoming has focused on Forest Service lands as the owl is a designated Sensitive Species associated with mature conifer forest habitat. Information is lacking on population trend and the overall distribution and abundance of this species in the state outside of the Jackson area. A statewide, long-term monitoring protocol needs to be developed and implemented including the Big Horn Range. Use of automated recording devises should be explored as they may help to reduce costs and eliminate the need to deploy survey crews at night (B. Bedrosian, pers. comm.). Results from a recent intensive, year-round study (2013–2015) found that Great Gray Owl nests were distributed evenly across suitable habitat, but most owls concentrated in winter in a small area in the Snake River riparian corridor south of Jackson highlighting how limited winter habitat may be in Wyoming [6]. Owls nested in similar numbers in both broken-top snags and raptor stick nests with a few pairs nesting in low elevation cottonwood/spruce riparian habitat. Nest sites did not seem to be limiting as artificial nest platforms were rarely used. Snow depth was related to the number of nesting pairs with significantly fewer owl detections and occupied nests in a high snowfall year. Productivity per nest attempt overall was much was much lower compared to earlier studies in the 1980s and 1990s [10, 19]. Additional research that focuses on fine-scale habitat use based on satellite tracking of male breeding adults is recommended to understand how habitat/prey interactions may be limiting density and productivity. Such a study would also help to predict the impacts of future habitat changes (both natural and anthropogenic) on breeding populations and allow managers to develop management strategies to sustain the breeding population.

CONTRIBUTORS

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Figure 1: Great Gray Owl in Sublette County, Wyoming. (Photo courtesy of Shawn Billerman)

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

Figure 3: Potential habitat of Great Gray Owl in Grand Teton National park, with wetland foraging area near forest. (Photo courtesy of WYNDD)

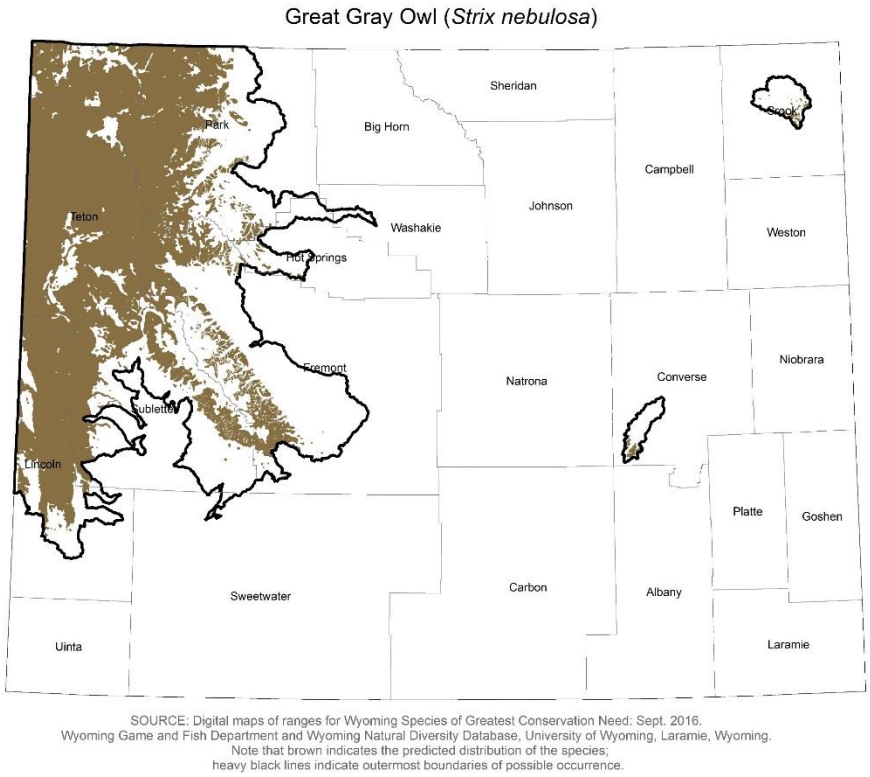

Figure 4: Range and predicted distribution of *Strix nebulosa* in Wyoming.