

# Wolverine

## *Gulo gulo*

### **REGULATORY STATUS**

USFWS: Proposed Threatened  
USFS R2: Sensitive  
USFS R4: No special status  
Wyoming BLM: No special status  
State of Wyoming: Protected Animal

### **CONSERVATION RANKS**

USFWS: No special status  
WGFD: NSS3 (Bb), Tier II  
WYNDD: G4, S1S2  
Wyoming Contribution: LOW  
IUCN: Least Concern

### **STATUS AND RANK COMMENTS**

Wolverine (*Gulo gulo*) has a complicated history with the U.S. Endangered Species Act (ESA) involving several decisions, litigations, and re-decisions, starting with a 1994 listing petition. In 2014 the U.S. Fish and Wildlife Service (USFWS) withdrew the species' Proposed Threatened status <sup>1</sup>, but that withdrawal was litigated and eventually reversed by the District Court of Montana in April 2016, effectively reinstating the Proposed Threatened status <sup>2</sup>. The same court decision also effectively reinstated a proposed USFWS rule to designate all Wolverines in the Southern Rocky Mountains, including southern Wyoming, as part of a Nonessential Experimental Population. Wolverine is assigned a range of state conservation ranks by the Wyoming Natural Diversity Database due to uncertainty in the amount of range actually occupied, population trends, and effects of extrinsic stressors in the state.

### **NATURAL HISTORY**

#### **Taxonomy:**

*Gulo gulo* is currently the only species recognized within the genus. Several Wolverine subspecies were recognized in the past, but only two subspecies are generally recognized today: *G. g. luscus* in North America and *G. g. gulo* in Eurasia <sup>3,4</sup>. The older name *G. luscus* infrequently appears in reference to the New World form, but has formally yielded to *G. gulo*.

#### **Description:**

Identification of Wolverine is possible in the field. The species generally appears as a small bear or large badger, with massive limbs, dark brown fur, bushy tail, and relatively large feet. The fur is paler on the head, and there are two broad yellowish stripes extending from the shoulders and joining at the rump <sup>3,5</sup>. In Idaho, adult females averaged 87.5 cm in total length and 7.9 kg in weight; adult males averaged 97.2 cm and 12.7 kg <sup>5</sup>.

### **Distribution & Range:**

Wolverine has a Holarctic distribution, occupying boreal regions of North America, Asia, and Europe. The species once occupied mountain ranges in the western U.S. as far south as the Colorado/New Mexico border. In North America Wolverine is currently found in Alaska, Canada, Washington, Idaho, Montana, and Wyoming<sup>6, 7</sup>. Single animals are occasionally documented in other states – including California, Colorado, Utah, and North Dakota – but these are assumed to be non-breeding dispersers. The species' secretive nature, naturally low density, and high mobility make it difficult to know precise range limits<sup>8</sup>. Historically, Wolverine likely occupied all major mountain ranges in Wyoming. Currently, breeding populations are likely only found in the northwestern mountains, although the full extent of breeding populations is unknown, with irregular detections and unknown breeding status elsewhere in the state<sup>8-10</sup>. Wolverine has been observed in 11 of Wyoming's 28 degree blocks, with suspected breeding in 6 degree blocks<sup>11</sup>.

### **Habitat:**

In parts of Alaska and Canada suitable Wolverine habitat occurs in non-mountainous landscapes, but in Wyoming suitable habitat is almost completely restricted to prominent mountain ranges<sup>12</sup>. Wolverine uses a variety of mountain habitats, but centers its activities in large subalpine and alpine landscapes. Important habitat needs include cold temperatures and cold microsites like persistent snow drifts and chilled talus fields; ample den structures such as caves, rock crevices, fallen trees, and deep snow drifts; and abundant carrion, usually supplied by large populations of ungulates<sup>8, 9, 13</sup>. By regularly producing ungulate carrion, large carnivores such as Gray Wolf (*Canis lupus*), Mountain Lion (*Puma concolor*), and Grizzly Bear (*Ursus arctos*) may enhance Wolverine habitat quality<sup>14</sup>, although these species are also known to prey on Wolverine.

### **Phenology:**

Wolverine does not hibernate. Mating typically occurs in the summer, with delayed implantation of the embryo in early winter<sup>8</sup>. Although litters of up to 4 and even 5 young have been recorded elsewhere, litters in the contiguous U.S. are generally assumed to include only 1–3 young. Young are born in late winter, typically in February and early March, after a 30–50 day post-implantation pregnancy. Kits are tended only by the mother, are weaned at about 8 weeks of age, and are adult sized in about 8 months. Young disperse from the natal area at 10–15 months of age<sup>3, 8</sup>. Wolverine generally moves to higher elevations in the summer, likely following lower temperatures, persistent snow fields, and large prey/carrion sources<sup>8</sup>. The species tends to remain at relatively high elevations – even higher than most ungulate herds – in winter<sup>12</sup>.

### **Diet:**

Wolverine is a strongly opportunistic feeder, eating berries, insect larvae, fish, birds and mammals of almost all sizes, and carrion of all types. Wolverine relies especially heavily on carrion as a food source, and population performance may depend on a regular supply of carrion from ungulates such as Mule Deer (*Odocoileus hemionus*), Elk (*Cervus elaphus*), and Moose (*Alces americanus*)<sup>3, 8</sup>. In the Greater Yellowstone Ecosystem (GYE), Wolverine may rely more heavily on ungulate carrion in the winter, with small prey, especially Yellow-bellied Marmot (*Marmota flaviventris*), becoming more prevalent in the diet during the warmer months<sup>15</sup>. Gut piles from hunter-killed ungulates are an important food source for Grizzly Bear in Wyoming, and may function similarly for Wolverine<sup>16</sup>.

## **CONSERVATION CONCERNS**

### **Abundance:**

**Continental:** WIDESPREAD BUT PATCHY

**Wyoming:** VERY RARE

The secretive nature, naturally low density, and high mobility of Wolverine make it difficult to precisely estimate population size. Most Wolverines in North America occupy Canada and Alaska. In 2013, the contiguous U.S. population was estimated at 318 (95% CI = 249–926) individuals, with most in Montana and Idaho. The GYE, the bulk of which falls in Wyoming, was estimated to support 20% (63 individuals; 95% CI = 51–175) of that total <sup>7</sup>. A coarse approximation from these data suggests about 50 total individuals occupying Wyoming, which means the species is rare even within suitable habitat in the state <sup>11</sup>. From a survey of 18 grid cells in the mountains of western Wyoming in 2015, Wolverine occupancy was estimated at 62.9% (95% CI = 36.2–83.7) throughout suitable habitat <sup>17</sup>.

### **Population Trends:**

**Historic:** LARGE DECLINE

**Recent:** INCREASE

Wolverine is thought to have been more abundant prior to Euro-American settlement than now. Near the turn of the 20<sup>th</sup> century, human-caused mortality drastically reduced, and possibly extirpated, Wolverine in the contiguous 48 states. This was followed by a slow re-colonization by animals dispersing south from Canada <sup>4</sup>. It is suspected that Wolverine numbers in Wyoming have been slowly increasing for a few decades. The suspected increase is based on increasing numbers of sightings in the state and may be due to reduced fur trapping, less broad-scale carnivore poisoning, increasing numbers of Elk, and increased ungulate carrion resulting from predation by reintroduced Gray Wolf <sup>8</sup>.

### **Intrinsic Vulnerability:**

HIGH VULNERABILITY

Wolverine habitat requirements, space use, and breeding biology make the species highly vulnerable. An individual Wolverine requires a huge amount of subalpine and alpine habitat. In the GYE, female home ranges averaged 303 km<sup>2</sup>, and male home ranges averaged 797 km<sup>2</sup>. Furthermore, home ranges of same-sex adults did not overlap, suggesting territoriality and consequent low population density. Wolverine density in the GYE was estimated at 3.5 individuals per 1,000 km<sup>2</sup> of suitable habitat <sup>12</sup>. Individuals of both sexes typically do not breed until at least 2 years of age, at which point females produce only 1 small litter per year. Mortality of kits and dispersing sub-adults is assumed to be high, although reliable estimates for populations in the contiguous U.S. are difficult to find <sup>8, 13</sup>. Site fidelity of Wolverines in Wyoming may be high <sup>8</sup>, although individuals have been known to disperse several hundred kilometers from Wyoming points of origin <sup>5</sup>.

### **Extrinsic Stressors:**

MODERATELY STRESSED

Evidence for most extrinsic stressors on Wolverine come from studies performed across the species' range, and thus the degree to which they pertain specifically to Wyoming populations is unclear. In the contiguous U.S., a primary near-term stressor to Wolverine is increasing human use and development of core habitat (i.e., subalpine and alpine landscapes) and, especially, the valleys and basins between “islands” of core habitat through which Wolverines disperse <sup>7</sup>. Wolverine avoids landscapes with higher levels of human presence and development, including

backcountry skiing, residential subdivision, oil and gas extraction, and timber harvesting operations<sup>18-20</sup>. Direct human-caused mortality via illegal shooting, inadvertent trapping, and roadkill may account for numerically few Wolverine, but has a functionally high impact due to the species' overall small population size, low density, and slow reproductive rate<sup>8</sup>. Individual home ranges may include portions of 2 or 3 states, so mortality in adjacent states will negatively impact populations in Wyoming<sup>21, 22</sup>. Wolverine appears to depend on persistent snow drifts and cold microsites for a range of life history functions, and thus the possible effects of global climate change on the species are being debated in the expert community and are receiving current research attention<sup>8, 23, 24</sup>.

### **KEY ACTIVITIES IN WYOMING**

Wolverine is currently proposed for listing as Threatened under the ESA. The final listing decision is expected in federal fiscal year 2018 (July 2017–June 2018). Currently, there is no legal trapping or hunting of Wolverine in Wyoming or any surrounding state, although incidental take in traps set for other species may occur. There is a rapidly developing scientific literature on Wolverine, and several on-going studies involve portions of Wyoming or individuals that range through the state. In addition to ongoing Wyoming Game and Fish Department (WGFD) efforts, there are several working groups (e.g., Western Association of Fish and Wildlife Agency [WAFWA] Wildlife Chiefs Wolverine Sub-committee, Alberta Wolverine Working Group) and non-profit organizations (e.g., Wolverine Network, The Wolverine Foundation, Wildlife Conservation Society, Round River Conservation Studies) sponsoring Wolverine conservation and research initiatives across the species' range. Ongoing work by Round River Conservation Studies in the Teton Mountains focuses on the effects of recreational activity on Wolverine movement patterns. The WGFD has collected some Wolverine observations as part of camera trapping inventories targeting a range of other species<sup>25</sup>. In 2015, the WGFD funded a pilot project through The Wolverine Initiative to evaluate Wolverine detection and monitoring techniques, status, and distribution in the state<sup>17</sup>. Concurrent with this project, WAFWA developed a multi-state, multi-agency working group to identify and address issues pertaining to Wolverine conservation and management in the contiguous U.S. The pilot project conducted in Wyoming contributed to a multi-state effort among Wyoming, Idaho, Montana, and Washington to develop a coordinated multi-state monitoring strategy and define baseline Wolverine distribution. The WGFD began implementing this monitoring strategy in Wyoming throughout the GYE and the Bighorn Mountains in the winter of 2015–2016, and final results from all states will be available in 2017. Additional priorities of the Multistate Wolverine Working Group include modeling range-wide connectivity to focus and prioritize habitat conservation delivery; this project is currently being conducted through the University of Montana.

### **ECOLOGICAL INFORMATION NEEDS**

Given the species' naturally low population density and extreme movement ability, understanding the residency status of individual Wolverine (particularly females) in Wyoming, and the relative dependence of the state population segment on immigrants versus recruitment of individuals produced within Wyoming itself, will be valuable to Wyoming managers. A better understanding of the extent of breeding Wolverine in Wyoming, including outlying mountain ranges such as the Bighorn and Medicine Bow Mountains, would allow more appropriate implementation of management and research activities. Research from some portions of Wolverine range suggests the species may be more tolerant of human presence and impacts to

the landscape than previously assumed<sup>26</sup> - further knowledge of how this and other extrinsic stressors operate specifically in Wyoming would allow better estimation of extent, distribution, and connectivity of suitable habitat. Wyoming-specific estimates of litter frequency, litter size, kit survival, and disperser survival would also help with management of the species.

### **MANAGEMENT IN WYOMING**

*This section authored solely by WGFD; Nichole L. Bjornlie.* Recent management activities for Wolverine include evaluating and implementing monitoring protocols throughout suitable habitat in western Wyoming. Initiated in 2015, results from this effort will provide a state- and range-wide baseline occupancy estimate. Moving forward, priorities will include continued coordination and collaboration with other western states to periodically repeat surveys in order to evaluate population trends and distribution. Incorporating genetic analyses from hair snares will also allow for a better understanding of number of individuals as well as the distribution of female Wolverine, information critical to better evaluating extent of breeding distribution in the state. Additional priorities will include continued participation in the WAFWA Multistate Wolverine Working Group and collaborating among states and agencies to promote Wolverine conservation and management in the contiguous U.S. Results from monitoring efforts and connectivity models will be used to develop conservation and management recommendations for Wolverine in Wyoming.

### **CONTRIBUTORS**

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Figure 1: Female Wolverine (front) and two five-month old cubs in the Gravelly Range, Montana. (Photo courtesy of Mark Packila, WCS Wolverine Program)



Figure 2: North American range of *Gulo gulo*. Note that this map does not adequately depict Wyoming range, and does not include range data from research since 2007. (Map from: Patterson, B. D., et al. (2007) Digital Distribution Maps of the Mammals of the Western Hemisphere, version 3.0, NatureServe, Arlington, Virginia.)

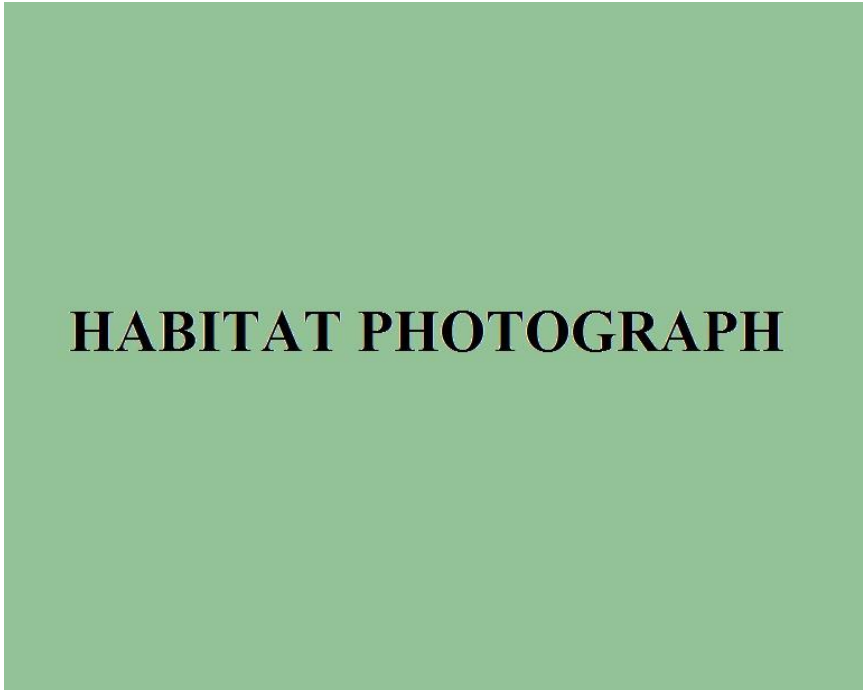
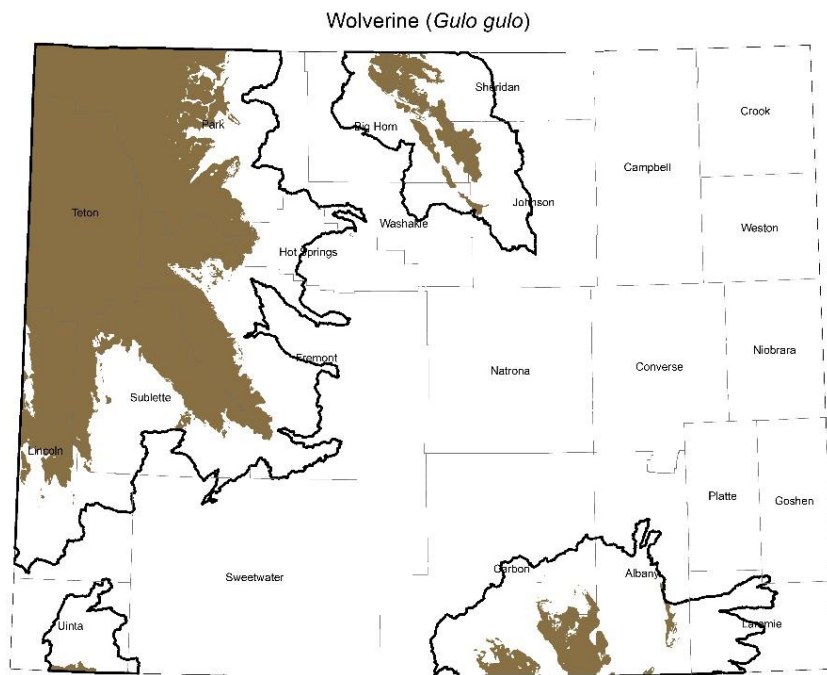


Figure 3: Photo not available.



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 *Gulo gulo* in Wyoming.





Figure 5: Wolverine tracks in snow-covered alpine habitat at an elevation of 9,000 ft in Gallatin National Forest, Montana. (Photo courtesy of Robert Inman)