

Background on USFWS suitable habitat

The USFWS defined biologically suitable habitat for grizzly bears in the Greater Yellowstone Area (GYA) in the Final Rule Removing the GYA Population of Grizzly Bears from the Federal List of Endangered and Threatened Wildlife (72 FR 14866, March 29, 2007, pp. 14,912-14,913 – currently vacated). A summary is provided below.

Suitable habitat is considered the area capable of supporting a viable grizzly bear population now or in the foreseeable future. We defined suitable habitat for grizzly bears as areas having three characteristics—(1) being of adequate habitat quality and quantity to support grizzly bear reproduction and survival; (2) contiguity with the current distribution of Yellowstone grizzly bears such that natural recolonization is possible; and (3) having low mortality risk as indicated through reasonable and manageable levels of grizzly bear mortality.

Our definition and delineation of suitable habitat is built on the widely accepted conclusions of extensive research (Craighead 1980, pp. 8–11; Knight 1980, pp. 1–3; Peek *et al.* 1987, pp. 160–161; Merrill *et al.* 1999, pp. 233–235; Pease and Mattson 1999, p. 969; Schwartz *et al.* 2010, p. 661) that grizzly bear reproduction and survival is a function of both the biological needs of grizzly bears and remoteness from human activities, which minimizes mortality risk for grizzly bears. Mountainous areas provide hiding cover, the topographic variation necessary to ensure a wide variety of seasonal foods, and the steep slopes used for denning (Judd *et al.* 1986, pp. 114–115; Aune and Kasworm 1989, pp. 29–58; Linnell *et al.* 2000, pp. 403–405).

For our analysis of suitable habitat, we considered the Middle Rockies ecoregion, within which the Greater Yellowstone Area is contained, (Omernik 1987, pp. 120–121; Woods *et al.* 1999; McGrath *et al.* 2002; Chapman *et al.* 2004) to meet grizzly bear biological needs providing food, seasonal foraging opportunities, cover, and denning areas (Mattson and Merrill 2002, p. 1125). Although grizzly bears historically occurred throughout the Rocky Mountains and adjacent plains in Wyoming, Montana, and Idaho (Stebler 1972, pp. 297–298), many of these prairie habitats are not, today, biologically suitable for grizzly bears. While there are records of grizzly bears in eastern Wyoming near present-day Sheridan, Casper, and Wheatland, even in the early 19th century, indirect evidence suggests that grizzly bears were always less common in these eastern prairie habitats than in mountainous areas to the west (Rollins 1935, p. 191; Wade 1947, p. 444). Grizzly bear presence in these drier, grassland habitats was associated with rivers and streams where grizzlies used bison carcasses as a major food source (Burroughs 1961, pp. 57–60; Herrero 1972, pp. 224–227; Stebler 1972, pp. 297–298; Mattson and Merrill 2002, pp. 1128–1129). Because wild bison herds no longer exist in these areas, these areas are no longer capable of contributing, in a meaningful way, to the recovery of the GYA grizzly bear population. Thus, we did not include drier sagebrush, prairie, or agricultural lands within our definition of suitable habitat because these land types no longer contain adequate food resources (i.e., bison) to support grizzly bears.

Mortality risk also impacts the biological suitability of habitat for grizzly bears. Some mortality, including human-caused mortality, is unavoidable in a dynamic system where hundreds of bears inhabit large areas of diverse habitat with several million human visitors and residents. The negative impacts of humans on grizzly bear survival and habitat use are well documented (Harding and Nagy 1980, p. 278; McLellan and Shackleton 1988, pp. 458–459; Aune and Kasworm 1989, pp. 83–103; McLellan 1989, pp. 1862–1864; McLellan and Shackleton 1989, pp. 377–378; Mattson 1990, pp. 41–44; Mattson and Knight 1991, pp. 9–11; Mattson *et al.* 1992, pp. 436–438; Mace *et al.* 1996, p. 1403; McLellan *et al.* 1999, pp.

914–916; White *et al.* 1999, p. 150; Woodroffe 2000, pp. 166–168; Boyce *et al.* 2001, p. 34; Johnson *et al.* 2004, p. 976; Schwartz *et al.* 2010, p. 661). These effects range from temporary displacement to actual mortality. Mattson and Merrill (2002, pp. 1129–1134) found that grizzly bear persistence in the contiguous United States between 1920 and 2000 was negatively associated with human and livestock densities. As human population densities increase, the frequency of encounters between humans and grizzly bears also increases, resulting in more human-caused grizzly bear mortalities due to a perceived or real threat to human life or property (Mattson *et al.* 1996, pp. 1014–1015). Similarly, as livestock densities increase in habitat occupied by grizzly bears, depredations follow. Although grizzly bears frequently coexist with cattle without depredating them, when grizzly bears encounter domestic sheep, they usually are attracted to such flocks and depredate the sheep (Jonkel 1980, p. 12; Knight and Judd 1983, pp. 188–189; Orme and Williams 1986, pp. 199–202; Anderson *et al.* 2002, pp. 252–253). If repeated depredations occur, managers either relocate the bear or remove it from the population, resulting in such domestic sheep areas becoming population sinks (Knight *et al.* 1988, pp. 122–123).

Because urban sites and sheep allotments possess high mortality risks for grizzly bears, we did not consider these areas suitable habitat (Knight *et al.* 1988, pp. 122–123). Based on 2000 Census data, we defined urban areas as census blocks with human population densities of more than 50 people per sq km (129 people per sq mi). As a result, cities like West Yellowstone, Gardiner, Big Sky, and Cooke City, Montana, and Jackson, Wyoming, were not included as suitable habitat. Similarly, large, contiguous blocks of sheep allotments in peripheral areas of the ecosystem did not meet the definition of suitable habitat because of the increased mortality risk associated with these areas.

Some areas that are not considered suitable habitat by our definition are occasionally used by grizzly bears (Schwartz *et al.* 2002, p. 209; Schwartz *et al.* 2006, pp. 64–66). The records of grizzly bears in these areas are generally due to recorded grizzly bear/human conflicts or mortalities. These areas are defined as unsuitable due to the high risk of mortality resulting from these grizzly bear/human conflicts. These unsuitable habitat areas do not permit grizzly bear reproduction or survival because bears that repeatedly come into conflict with humans or livestock are usually either relocated or removed from these areas. It is important to note that most grizzly bears (approximately 84–90% of females with cubs-of-the-year) are found within the Recovery Zone (Schwartz *et al.* 2006, pp. 64–66).

Based on these habitat suitability criteria, the GYA contains approximately 46,035 sq km (17,774 sq mi) of biologically suitable grizzly bear habitat. This amount of suitable habitat is sufficient to meet all habitat needs of a recovered grizzly bear population and provide ecological resiliency to the population through the availability of widely distributed, high-quality habitat that will allow the population to respond to environmental changes.

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