GRIZZLY BEAR IN THE COTERMINOUS UNITED STATES

(*Ursus arctos horribilis)*

5-Year Status Review: Summary and Evaluation

Photo Credit: Jennifer Fortin-Noreus, USFWS

U.S. Fish and Wildlife Service
Upper Colorado Region
Denver, Colorado

March 2021
U.S. FISH AND WILDLIFE SERVICE
5-YEAR STATUS REVIEW for
GRIZZLY BEAR IN THE LOWER-48 STATES
(*Ursus arctos horribilis*)

Species Reviewed: Grizzly bear (*Ursus arctos horribilis*) in the conterminous United States (lower 48-States)

Federal Register Notice of Listing Determination:

- July 28, 1975. Amendment Listing the Grizzly Bear of the 48 Conterminous States as a Threatened Species (40 FR 31734).

Federal Register Notice Announcing Initiation of this Review:

- January 14, 2020. Initiation of 5-Year Status Review of Grizzly Bear (*Ursus arctos horribilis*) in the conterminous United States; request for information (85 FR 2143).

Lead Region: Legacy Region 6, Interior Regions 5 and 7, Grizzly Bear Recovery Office, Hilary Cooley, Grizzly Bear Recovery Coordinator, 406–243–4903.

Classification: Threatened

Methodology used to complete this review: In accordance with section 4(c)(2) of the Endangered Species Act of 1973 (16 U.S.C 1531 *et seq.*), as amended (Act), the purpose of a 5-year status review is to assess each threatened and endangered species to determine whether its status has changed and it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants. We solicited data for this 5-year status review from interested parties through a January 14, 2020, *Federal Register* notice announcing this review (85 FR 2143). We reviewed all information that we received and incorporated information relevant to our analyses in our species status assessment (SSA) report (Service 2021, entire). Information that we received from this data call relevant to our analyses included: summaries of conservation actions by the U.S. Forest Service (USFS), Idaho Department of Lands, and Washington Department of Fish and Wildlife (WDFW); monitoring information from Idaho's Office of Species Conservation, Idaho Department of Fish and Game (IDFG), and WDFW; and information on potential threats from non-governmental organizations (NGOs) and other interested parties. We did not consider or incorporate comments that were outside the scope of our SSA or 5-year status review, such as comments related to our authorities under the Act.

The grizzly bear is listed as threatened under the Act in the conterminous United States, or lower-48 States, and this listed entity is the subject of our SSA report and this 5-year status review. Unless specified otherwise, throughout this document, we use the term "grizzly bears in the lower-48 States" to refer to the entity currently listed as a threatened species under the Act. Additionally, we use the term "ecosystem" to refer to individual populations of this listed entity.

REVIEW ANALYSIS

Summary of the Species Status Assessment

We completed an SSA report for grizzly bears in the lower-48 States (Service 2021, entire), which is available online on the U.S. Fish and Wildlife Service's (Service's) grizzly bear webpage (*https://www.fws.gov/mountain-prairie/es/grizzlybear.php*) or at *https://ecos.fws.gov/ecp/species/7642*. The SSA report provides the Service's comprehensive biological status review for grizzly bears in the lower-48 States; the SS provides a thorough account of grizzly bears in the lower-48 States' current and future overall viability and, therefore, risk of extinction (Service 2021, entire). Scientific experts contributed to our analysis, and a draft SSA report was independently peer reviewed and reviewed by partners, including those from state wildlife agencies, Federal agencies, and Tribal wildlife agencies. We incorporated the results of the peer and partner review in our SSA report. The results of the independent peer review of the draft SSA report are available online on the Service's Science Peer Review webpage (*https://www.fws.gov/mountain-prairie/science/peerreview.php*).

The SSA report provides the best available biological information to inform our recommendation on the status of grizzly bears in the lower-48 States under this 5-year status review. The SSA report represents our evaluation of the best available scientific information for grizzly bears in the lower-48 States, including their resource needs and current and future conditions, which we describe in terms of stochastic risk (resiliency), catastrophic risk (redundancy), and diversity (representation). This 5-year status review recommendation involves the application of standards within the Act, its implementing regulations, and Service policies, and is based on the analysis in the SSA report. The following discussion is a summary of the results and conclusions of the SSA report (Service 2021, entire).

For this species status assessment, we defined viability as the ability of the grizzly bear in the lower-48 States to sustain populations in natural ecosystems over a biologically meaningful timeframe, which, in this case, we defined as the middle of the 21st century (2050 to 2065), or 30 to 45 years into the future. This timeframe is a period that captures approximately two to three grizzly bear generations (10 to 15 years) (Service 2021, p. 226). This timeframe is consistent with available data and is a period that allows us to reasonably project conservation efforts and actions and the potential effects of various stressors (Service 2021, p. 226).

To assess the viability of grizzly bears in the lower-48 States, we used the three conservation biology principles of resiliency, redundancy, and representation, collectively known as the 3Rs (Shaffer *et al.* 2002, pp. 139–140; Wolf *et al.* 2015, entire; Smith *et al.* 2018, entire; Service 2021, pp. 29–32). In short:

- Resiliency is the ability for populations to persist in the face of stochastic events, or for populations to recover from years with low reproduction or reduced survival, and is associated with population size, growth rate, and the quality and quantity of habitats;
- Redundancy is the ability for the species to withstand catastrophic events, for which adaptation is unlikely, and is associated with the number and distribution of populations; and

- Representation is the ability of a species to adapt to changes in the environment and is associated with its diversity, whether ecological, genetic, behavioral, or morphological.

For our analysis, we identified grizzly bears in the lower-48 States' ecological requirements for survival and reproduction at the individual, population, and lower-48 States levels, and described the factors, both positive and negative, that influence the viability of grizzly bears in the lower-48 States, currently and into the future. We evaluated the listed entity's current levels of resiliency, redundancy, and representation, and projected plausible changes to these 3Rs into the foreseeable future (Service 2021, pp. 29–32).

Summary of Life History, Ecology, Range, and Distribution

Our SSA report provides our full account of the life history, ecology, range, and historical and current distribution for grizzly bears in the lower-48 States (Service 2021, pp. 38–70), which we summarize here. The grizzly bear is a large, long-lived mammal that occurs in a variety of habitat types in portions of Idaho, Montana, Washington, and Wyoming. Grizzly bears hibernate in the winter, typically in dens, feed on a wide variety of foods, weigh up to 363 kilograms (800 pounds), and live more than 25 years in the wild. Grizzly bears are light brown to nearly black and are so named for their "grizzled" coats with silver or golden tips. Grizzly bears (*Ursus arctos horribilis*) are a member of the brown bear species (*U. arctos*) that occurs in North America, Europe, and Asia. The subspecies *U. a. horribilis* is limited to North America (Rausch 1963, p. 43; Servheen 1999, pp. 50–53). Grizzly bears have three life stages: dependent young, subadults, and adults.

Historically, the grizzly bear occurred throughout much of the western half of the contiguous U.S., central Mexico, western Canada, and most of Alaska. An estimated 50,000 to 100,000 grizzly bears were distributed in one large contiguous area throughout all or portions of 18 western States (i.e., Washington, Oregon, California, Idaho, Montana, Wyoming, Nevada, Colorado, Utah, New Mexico, Arizona, North Dakota, South Dakota, Minnesota, Nebraska, Kansas, Oklahoma, and Texas). Populations declined in the late 1800s with the arrival of European settlers, government-funded bounty programs, and the conversion of habitats to agricultural uses. When the Service listed grizzly bears in the lower-48 States as threatened under the Act in 1975, grizzly bears had been reduced to less than two percent of their former range in the lower-48 States; at the time, the estimated population in the lower-48 States was 700 to 800 individuals. Only five areas in mountainous regions, national parks, and wilderness areas contained populations, including the Northern Continental Divide in northwest Montana; the Greater Yellowstone area in northwest Wyoming, eastern Idaho, and southwest Montana; the Cabinet-Yaak Mountains in northeast Idaho and northwest Montana; the Selkirk Mountains in northwest Idaho and northeast Washington; and the North Cascades range in northcentral Washington. Current populations in the Northern Continental Divide, Selkirk, and Cabinet-Yaak extend into Canada to varying degrees. Although there is currently no known population in the North Cascades, it constitutes a large block of contiguous habitat that spans the international border with Canada. In the recent past, grizzly bears also existed in in two additional areas: the Bitterroot Mountains in central Idaho and western Montana, and the San Juan Mountains in Colorado. The Grizzly Bear Recovery Plan refers to these areas as grizzly bear ecosystems (Service 1993, p. 10). In 1993, the Service designated six of these areas as recovery areas, and

recommended further evaluation of the seventh, the San Juan Mountains, to determine recovery potential (Service 1993, p. 121).

Grizzly bear populations in the lower-48 States have significantly expanded since the time of listing in 1975 and now occupy approximately 6 percent of their historical range in the lower-48 States (Haroldson *et al.* 2020a, *in press*). Currently, grizzly bears primarily exist in four ecosystems: the Northern Continental Divide (NCDE), Greater Yellowstone (GYE), Cabinet-Yaak (CYE), and Selkirk (SE) ecosystems (see Figure 1 in Service 2021, p. 6). There are no known populations in the North Cascades and Bitterroot (BE) ecosystems and no known populations outside the six defined ecosystems, although we have documented bears, primarily solitary, between the six ecosystems. It is estimated that there are at least 1,913 individuals in the lower-48 States (737 in the GYE Demographic Monitoring Area, 1,068 in the NCDE, 55–60 in the CYE, and a minimum of 53 in the U.S. portion of the SE, although some bears have home ranges that crossed the international border) (see Table 7 in Service 2021, p. 61) (Costello 2020, *in litt.*; Haroldson *et al.* 2020b, p. 13; Kasworm *et al.* 2020a, p. 40; Kasworm *et al*. 2020b, p 19).

For the purposes of our SSA, we refer to populations of the grizzly bear in the lower-48 States as ecosystems (Service 2021, pp. 32–35). As described in our recovery planning documents for grizzly bears, ecosystems are areas that have the potential to provide adequate space and habitat to maintain the grizzly bear as a viable and self-sustaining species (Service 1993, p. 33). Ecosystems are generally considered to be the larger area surrounding the recovery zones in which grizzly bears may be anticipated to occur as part of the same population. For this species status assessment, we evaluated resiliency, redundancy, and representation at the scale of the six ecosystems identified in the 1993 Recovery Plan (Service 1993) (Figure 1).

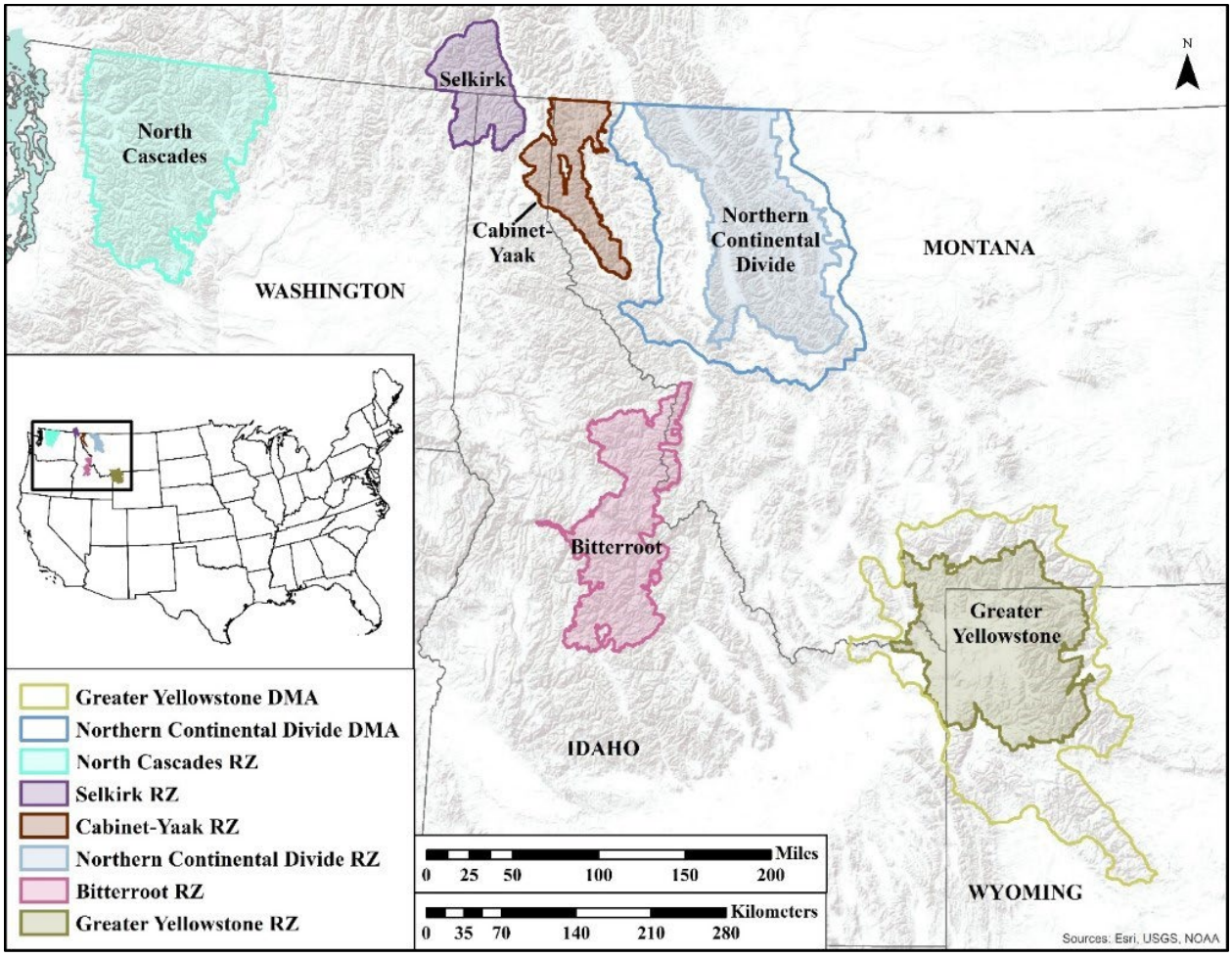

Figure 1. Recovery zones (RZ) and demographic monitoring areas (DMA), where applicable, for the six ecosystems identified in the Recovery Plan, the Northern Continental Divide (NCDE), Greater Yellowstone (GYE), Cabinet-Yaak (CYE), Selkirk (SE), Bitterroot (BE) and North Cascades ecosystems. DMAs surround and include the recovery zones in the GYE and NCDE. The Service has not defined ecosystem boundaries for any of the ecosystems across the lower-48 States, but for the purposes of our analysis, ecosystems are generally the larger area surrounding the recovery zone. For our SSA, we evaluated resiliency at the scale of these ecosystems, which are synonymous with populations for our assessment.

Summary of Needs

Above, we summarized the habitats and distribution of grizzly bears in the lower-48 States, and in greater detail in our SSA report (Service 2021, pp. 38–70). Here we summarize what individual grizzly bears in the lower-48 States need to breed, feed, and shelter. We also summarize the results of our analysis regarding the factors that ecosystems need to be resilient and the factors that grizzly bears in the lower-48 States need to be redundant and representative, with greater detail provided in our SSA report (Service 2021, pp. 7, 93–96).

In general, the search food, water, mates, cover, security, and den sites drives a grizzly bear's individual habitat needs and daily movements. Grizzly bears in the lower-48 States need access to large, intact blocks of land that provide cover, high-caloric foods, dens, and areas for dispersal. The specific quality and quantity of these resources influence the ability of individual

grizzly bears to reproduce, grow, and survive at different life stages (Service 2021, pp. 94–95). These resources support resilient ecosystems, which may be characterized generally by grizzly bear abundance, population trends, survival rates, and connectivity levels sufficient to withstand environmental stochasticity and support fecundity (Service 2021, p. 95). Grizzly bears in the lower-48 States need multiple, resilient ecosystems distributed across a broad geographic range in order to be redundant and withstand catastrophic events (Service 2021, p. 95–96). Specific quantities or qualities needed for each of these factors may vary by ecosystem. Additionally, grizzly bears in the lower-48 States need genetic and ecological diversity in order to preserve variation and the ability to adapt to changing conditions (Service 2021, p. 96). In general, grizzly bears in the lower-48 States need to occur in multiple, resilient populations distributed across a broad range of ecosystems in order to be redundant and withstand catastrophic events. Additionally, grizzly bears in the lower-48 States in general need genetic and ecological diversity to preserve variation and adapt to changing conditions (Service 2021, p. 96).

Summary of Cause-and-Effects: Stressors and Conservation Efforts

As documented in our SSA report, we evaluated sources, stressors, and other activities that can positively (conservation actions) or negatively (stressors) affect grizzly bears at the individual, ecosystem, or lower-48 States levels, either currently or into the future (Service 2021, pp. 97–209). The stressors we evaluated fit into three broad categories: those with habitat-related effects, sources of human-caused mortality, and other stressors. These stressors are interrelated to varying degrees; for example, motorized access influences both habitats and human-caused mortality. As summarized below, although a wide variety of sources and stressors may influence the resiliency of the six ecosystems, either by directly affecting individuals or indirectly by reducing the quality and quantity of habitats, numerous conservation efforts, including land protections and regulations, have reduced sources of habitat loss and human-caused mortality. These reductions have improved resiliency from historical levels in four out of the six ecosystems, and will be important to the viability of grizzly bears in the lower-48 States in the future.

Stressors with potential habitat-related effects that we analyzed include: motorized access and its management; developed sites; livestock allotments; mineral and energy development; recreation; vegetation management; habitat fragmentation; development on private lands; and activities that may disturb dens. Sources of human-caused mortality that we evaluated include: management removals; accidental killings (e.g., train and vehicular strikes); mistaken identity kills; illegal killings; and defense of life kills. We also evaluated other stressors including: natural mortality; connectivity and genetic health; changes in food resources; effects of climate change; and catastrophic events, such as earthquakes and volcanic eruptions.

There are a variety of conservation efforts and mechanisms across the six ecosystems that either reduce or ameliorate stressors or improve the condition of habitats or demographics. These conservation efforts or mechanisms include: Federal land protections, such as the Wilderness Act and Inventoried Roadless Areas (IRAs); State and private forestlands with motorized restrictions; habitat improvements/vegetation management; attractant removal and community sanitation measures, such as food storage orders; conservation easements; information and education (I&E) programs; effective law enforcement; and augmentation or translocation

programs. Our SSA report provides our full analysis of stressors and conservation efforts (Service 2021, pp. 97–209).

Summary of Current Condition

In our SSA report, we describe the resiliency for each of the six ecosystems in terms of the habitat and demographic factors needed by grizzly bears in the lower-48 States (Service 2021, pp. 35–36, 210–213). To evaluate resiliency for each ecosystem, we developed a categorical model to calibrate resiliency based on a range of conditions for two habitat factors (natural, high-caloric foods and large intact blocks of land) and six demographic factors (adult female survival, abundance as measured by population targets and number of bears, population trend, fecundity, inter-ecosystem connectivity, and genetic diversity) (Service 2021, pp. 210–213). We selected these habitat and demographic factors based on their importance to resiliency and because we had information to evaluate them relatively consistently across all six ecosystems. We then used the condition category table like a key to evaluate resiliency for each ecosystem by systematically evaluating the current condition for each habitat and demographic factor. To calculate an overall score for resiliency, we assigned weighted values to the resiliency categories and then calculated a weighted average of the habitat and demographic factor ranking (Service 2021, p. 212). Populations in higher resiliency categories are at less risk from potential stochastic events, such as extreme weather events, than populations in lower resiliency categories (Service 2021, p. 213). Our SSA report provides additional detail regarding the methodology we used to evaluate resiliency for each of the six ecosystems (Service 2021, pp. 210–213).

Table 1 summarizes our evaluation of current resiliency for each ecosystem. Of the six ecosystems, two ecosystems currently have high resiliency, the GYE and NCDE; one ecosystem has moderate resiliency, the SE; and one ecosystem has low resiliency, the CYE. Two ecosystems are currently in functionally extirpated condition, with no resiliency: the BE and North Cascades (Service 2021, pp. 215, 220–222). Despite high population trends and high and moderate adult female survival, both the CYE and SE currently have very low numbers of bears, although this factor could improve as bears reproduce and expand in the future (Service 2021, pp. 215, 218–220). Despite the moderate condition of habitats, due largely to large quantities of protected lands, without known populations, the BE and North Cascades are currently in functionally extirpated condition, and therefore have no resiliency (Service 2021, pp. 215, 220–222). At the lower-48 states level, the four resilient ecosystems, the GYE, NCDE, CYE, and SE, contribute to redundancy as they are distributed north to south and east to west across the lower-48 States (Figure 2), and the ecological diversity inherent within these ecosystems contributes to representation (Service 2021, pp. 223–225). Below, we summarize our evaluation of current condition for each of the 3Rs, with additional detail regarding our analysis provided in the SSA report (Service 2021, pp. 210–225).

Summary of Current Resiliency

Currently, the GYE and NCDE are the only ecosystems where grizzly bears have high resiliency. A variety of land protections, particularly those that have reduced motorized access, and the availability and diversity of natural foods contribute to the high ranking for habitat factors in these two ecosystems (Service 2021, pp. 215, 216–217). State, Federal, Tribal, and non-

governmental organization partners have implemented conservation activities and land protections in the GYE and NCDE that help reduce human caused mortality and contribute to large population sizes in these two ecosystems (Service 2021, pp. 216–217). In the GYE, the demographic factors of genetic diversity and inter-ecosystem connectivity could improve if natural immigration into the GYE occurs in the future (Service 2021, p. 216).

Table 1.Current condition for six ecosystems for grizzly bear in the lower-48 States, evaluated using the condition category table for resiliency. We calculated an overall score for resiliency as the weighted average of all factors, with "number of bears" weighted three times due to its importance to resiliency. High=4, Moderate = 3, Low=2, Very Low=1, and Functionally Extirpated (X) = 0, with score thresholds as Moderate= 2.4–3.19, Low= 1.6–2.39, Very Low=0.8–1.59= Very Low Condition; and less than 0.79 = Functionally Extirpated (X) Condition. An X in number of bears results in an overall condition of X, regardless of the other factors. In general, ecosystems with higher resiliency have a greater probability of persistence over the next 30 to 45 years, based on their ability to withstand stochastic events, than ecosystems with lower resiliency.

CURRENT CONDITION										
Ecosystem	Habitat Factors		Demographic Factors							RESILIENCY
	Natural, High-Caloric Foods	Large, Intact Blocks of Land	Adult Female Survival	Abundance		Population Trend	Fecundity	Inter-Ecosystem Connectivity	Genetic Diversity	
				Population Target	Number of Bears (3x)					
GYE	High	High	High	High	Moderate	High	High	X	Moderate	**High**
NCDE	High	High	High	High	High	High	Moderate	High	High	**High**
CYE	Moderate	Moderate	High	Low	Very Low	High	Low	Moderate	Low	**Low**
SE	Moderate	Moderate	Moderate	Moderate	Very Low	High	Moderate	Moderate	Moderate	**Moderate**
BE	Moderate	Moderate	X	X	X	X	X	Very Low	X	**X**
NCE	Moderate	Moderate	X	X	X	X	X	X	X	**X**

Grizzly bears in the CYE currently have low resiliency (Table 1, above). Despite high population trends and high and moderate adult female survival, the CYE currently has very low numbers of bears, although this factor could improve as bears reproduce and expand in the future (Table 1, above). The CYE is a smaller ecosystem that is still slowly recovering from being close to historical extirpation, particularly in the Cabinet portion of the ecosystem. This portion of the CYE has recently benefitted from an augmentation program (Kasworm *et al*. 2020a, pp. 24–25; Service 2021, p. 176). Recent data also suggests that the number of grizzly bears in the Cabinet portion of the CYE has increased from fewer than 15 individuals to 22 to 24 bears (Kendall *et al.* 2016, p. 314), almost exclusively through the augmentation effort and reproduction from those individuals (Kasworm *et al.* 2020a, p. 31). This ecosystem also has a less diverse assortment of foods, though body fat levels indicate that natural, high-caloric foods are not limiting. Large intact blocks of land are also somewhat limiting in the CYE. While the

CYE recovery zone has large protected areas (with 44 percent designated as Wilderness or IRAs), and while there are additional protections outside the CYE recovery zone, and while recent conservation efforts on private lands have improved security for grizzly bears, habitat standards for motorized route densities established for the CYE recovery zone have not yet been met (Service 2021, pp. 218–219).

Grizzly bears in the SE currently have moderate resiliency. Despite high population trends and high and moderate adult female survival, the SE currently has very low numbers of bears, although this factor could improve as bears reproduce and expand in the future (Table 1, above). This ecosystem also has a less diverse assortment of foods, though body fat levels indicate that individuals are relatively healthy. The SE contains a limited amount of protected areas inside the recovery zone (3 percent designated or recommended Wilderness) and motorized route densities do not yet meet applicable habitat standards, although they are close. There have been recent conservation efforts on private lands in Canada and there are some regulations that manage motorized access outside the recovery zone. However, motorized access standards have not been fully implemented, and motorized route densities somewhat limit the availability of large intact blocks of land in the SE (Service 2021, pp. 219–220).

Despite the moderate condition of habitats, due in part to considerable amounts of protected areas, without known populations, grizzly bears are currently functionally extirpated from the BE, and therefore have no resiliency. Approximately 98 percent of the BE recovery zone is designated Wilderness, but the condition of this category is moderate because motorized access standards have not been developed for the recovery zone or for adjacent areas to the north and east, where female occupancy is necessary for natural recolonization of the BE (Service 2021, pp. 220). Despite its relative isolation from other ecosystems, recent sightings suggest that inter-ecosystem connectivity is currently very low for the BE. In 2019, at least one bear from the CYE spent time in the BE recovery zone, and there have been multiple, verified sightings to the north, east, and west of the recovery zone, one of which is known to have originated from the SE (Service 2021, p. 221).

The North Cascades ecosystem currently has moderate habitat conditions, due in part to protected areas within the ecosystem, but without known populations, grizzly bears are functionally extirpated, and therefore have no resiliency (Service 2021, pp. 221–222). Approximately 63 percent of the North Cascades ecosystem is designated Wilderness or IRAs. Although the North Cascades is currently isolated, it is within the long-distance dispersal distance for males of existing populations in the United States or Canada, and inter-ecosystem connectivity could improve in the future, which in turn could improve the condition of the other demographic factors (Service 2021, p. 222).

Summary of Current Redundancy and Representation

Redundancy describes the number and distribution of ecosystems, such that the greater the number and the wider the distribution of the ecosystems, the better grizzly bears in the lower-48 States can withstand catastrophic events. Grizzly bears in the lower-48 States currently occupy four ecosystems, two with high resiliency, one with moderate resiliency, and one with low resiliency. Grizzly bears within two ecosystems are functionally extirpated, with no resiliency,

so do not contribute to redundancy. The four ecosystems are currently distributed from north to south and east to west as illustrated in Figure 2. Representation is currently captured by ecological diversity inherent within the four resilient ecosystems (Figure 2). For example, the GYE, contained in the Middle Rockies ecoregion, is dominated by forested, mountainous habitat, and dry sagebrush to the east and south, and includes hydrothermal features and other unique geologic features. The NCDE includes parts of the Great Plains, Middle Rockies, and Northern Rockies ecoregions, and habitat varies from wet forested lands west of Glacier Park to much drier habitat to the east, including prairie grasslands. The CYE and SE are both contained within the Rocky Mountains, and are characterized by wet, forested mountains. The BE is primarily contained in the Idaho Batholith ecoregion, and contains mountainous regions, canyons, dry partly-wooded mountains, grasslands, high glacial valleys, and hot dry canyons. The North Cascades is composed of high rugged mountains, and has a high concentration of active glaciers (Service 2021, pp. 224–225).

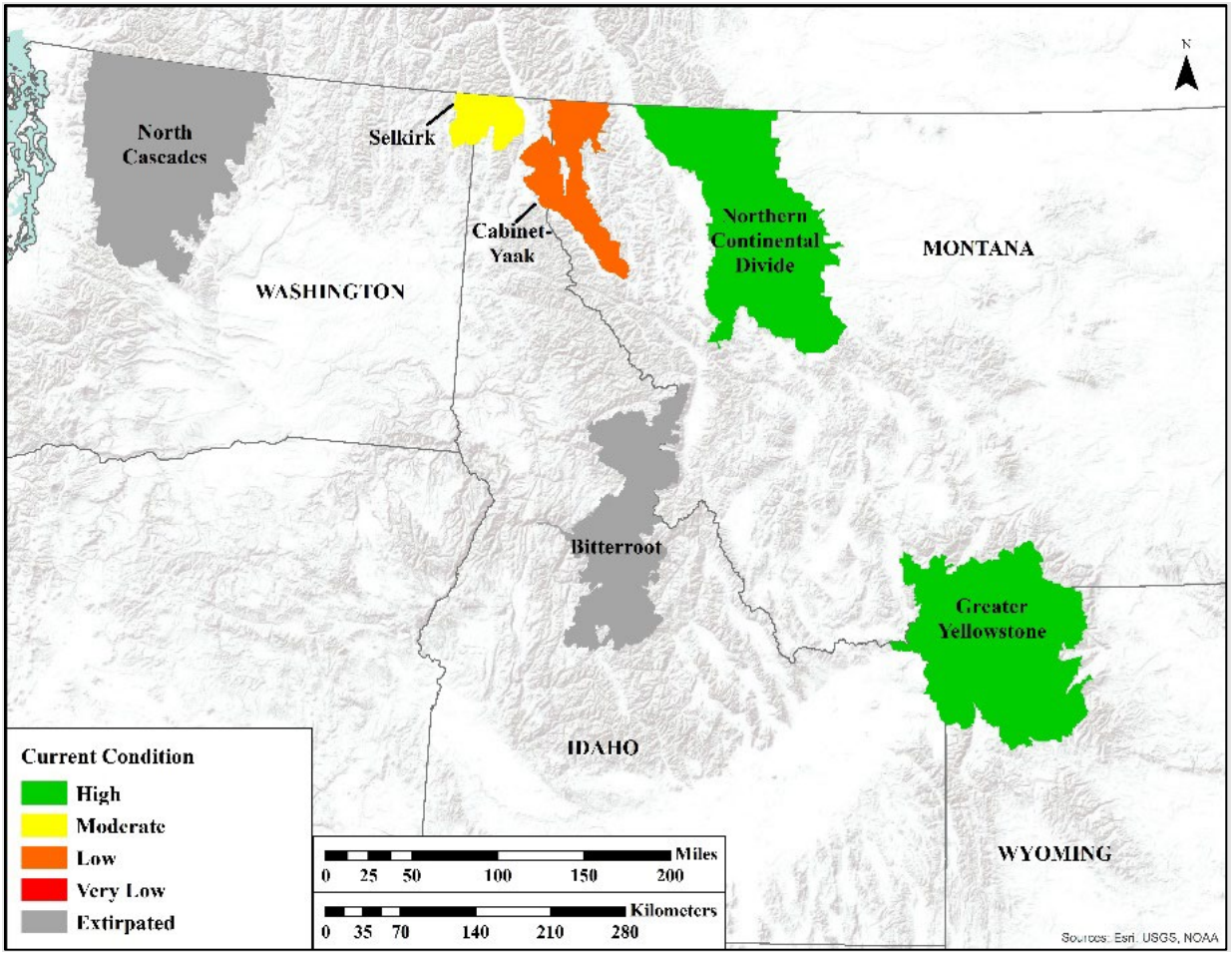

Figure 2. Map of the overall current condition for the six grizzly bear ecosystems in the lower-48 States, in terms of resiliency, redundancy, and representation. Colors represent the current resiliency for each ecosystem, based on the current condition of two habitat factors and six demographic factors for each ecosystem. Ecosystems with higher levels of resiliency are at less risk from environmental and demographic stochasticity. Currently, the Greater Yellowstone (GYE) and Northern Continental Divide (NCDE) ecosystems have high resiliency, the Selkirk ecosystem (SE) has moderate resiliency, and the Cabinet-Yaak ecosystem (CYE) has low resiliency. The North Cascades and Bitterroot (BE) ecosystems are in an extirpated condition currently, so have no resiliency. Four ecosystems (GYE, NCDE, SE, and CYE) distributed as illustrated on the map contribute to redundancy and these ecosystems feature a diversity of ecological types used by the grizzly bear for representation.

Summary of Future Conditions

We evaluated future conditions for grizzly bear in the lower-48 States using projections for the stressors, habitat factors, and demographic factors that influence resiliency, redundancy, and representation. To evaluate future conditions, we used the same methodology that we used to evaluate current condition, but instead considered the plausible conditions for the two habitat factors and six demographic factors projected into the future under a range of plausible future scenarios. We evaluated future conditions for the grizzly bear 30 to 45 years into the future, a timeframe that captures approximately two to three grizzly bear generations. A generation is the approximate time that it takes a female grizzly bear to replace herself in the population. Given the longevity of grizzly bears, two to three generations represent a period during which a complete turnover of the population would have occurred; any positive or adverse changes in the status of the population would be evident. Additionally, this timeframe considers the possibility that land management plans, which may provide important conservation measures to reduce potential stressors, could go through at least one revision (Service 2021, p. 226). Below we summarize the future scenarios and our evaluation of future condition under each scenario, with our full analysis in the SSA report (Service 2021, pp. 226–241).

Summary of future scenarios

We used scenario planning to describe plausible futures for the grizzly bear and to capture uncertainty associated with our future projections. Future scenarios allowed us to explore a range of possible future conditions for the grizzly bear in the lower-48 States, given the uncertainty in both the stressors grizzly bears in the lower-48 States may face, their potential response to those stressors, and the potential for possible conservation efforts to influence future conditions. As described in more detail in our SSA report (Service 2021, pp. 226–229), we developed two pessimistic future scenarios, two optimistic future scenarios, and one continuation future scenario, as summarized below:

- **Future Scenario 1 – Significantly Decreased Conservation**: Under this scenario, conservation actions decrease significantly, largely through the termination or non-renewal of plans or regulations, and the rate of private land development increases dramatically;
- **Future Scenario 2** – **Decreased Conservation**: Under this scenario, conservation actions decrease, but not as significantly as Scenario 1, due to decreased effectiveness and implementation of conservation actions and mechanisms, and the rate of private land development increases;
- **Future Scenario 3 – Continuation of Conservation:** Under this scenario, conservation actions continue at their same rate, magnitude, and effectiveness as current condition, and the rate of private land development remains the same;
- **Future Scenario 4 – Increased Conservation:** Under this scenario, conservation actions increase or improve, and the rate of private land development decreases;
- **Future Scenario 5 – Significantly Increased Conservation:** Under this scenario, conservation actions increase significantly, and the rate of private land development decreases dramatically.

Although there are likely different probabilities associated with our future scenarios, we considered all five of our scenarios to be plausible for the purposes of our SSA analysis (Service 2021, p. 226). We used the same methodology that we used to evaluate current condition to project the resiliency for the six ecosystems 30 to 45 years into the future. We projected the future condition for the two habitat factors and six demographic factors for each of the five future scenarios and then calculated an overall resiliency score for each ecosystem under each scenario using the same weighted average as our current condition evaluation. After evaluating resiliency, we then evaluated redundancy and representation for each future scenario.

Summary of future conditions by scenario

With a significant decrease in conservation under Scenario 1, there are subsequent decreases in resiliency across the habitat and demographic factors over the next 30 to 45 years (Table 2). Both the NCDE and GYE decrease in overall resiliency from high to moderate, the SE declines from moderate to very low, and the CYE declines from low to very low. While the four ecosystems are still distributed similarly to current condition within their respective ecological types, the resiliency of each ecosystem has decreased under this Scenario; given this decrease in resiliency, grizzly bears in the lower-48 States are also less able to withstand catastrophic risk and environmental change (Service 2021, pp. 19, 230–233). In other words, as resiliency declines with decreased conservation under Scenario 1, redundancy and representation decrease correspondingly.

With a decrease in conservation efforts under Scenario 2, potential decreases in overall resiliency are less severe than under Scenario 1. Under Scenario 2, both the NCDE and GYE remain in high overall resiliency, the CYE remains in low resiliency, but the SE drops from moderate to low overall resiliency (Table 2). While the four ecosystems are still distributed similarly to current condition within their respective ecological types, the resiliency of one ecosystem decreases under this Scenario; given this decrease in resiliency, grizzly bears in the lower-48 States are also slightly less able to withstand catastrophic risk and environmental change (Service 2021, pp. 19, 233–235). In other words, as resiliency declines with decreased conservation under Scenario 2, redundancy and representation decrease correspondingly.

Under Scenario 3, the continuation scenario, all stressors and conservation efforts continue at their same rate and magnitude 30 to 45 years into the future. The current levels of funding, effectiveness, and implementation of conservation actions and mechanisms stay the same under this scenario. As a result, the NCDE and GYE remain in high resiliency, the SE stays moderate resiliency, but the CYE improves in overall resiliency from low to moderate (Table 2). The BE and North Cascades ecosystems remain in a functionally extirpated condition, with no resiliency under the continuation scenario (Table 2). Redundancy and representation stay the same as current conditions under this scenario (Service 2021, pp. 19, 235–237).

With an increase in conservation under Scenario 4, redundancy and representation improve, as both the BE and North Cascades shift from functionally extirpated condition with no resiliency to low resiliency. The NCDE and GYE remain in high resiliency, the SE remains moderate, and the CYE improves from low to moderate resiliency (Table 2). Risk from potential catastrophic

events is now spread across six instead of four ecosystems (redundancy) with additional ecological diversity gained at the northwestern and central extents of the overall range (representation) (Service 2021, pp. 19, 237–239).

Future Scenario 5 is an optimistic scenario under which conservation increases significantly. As a result, resiliency, redundancy, and representation for the grizzly bear improve. Under this scenario, the NCDE and GYE stay in high resiliency, but the CYE and SE improve to high resiliency. The BE and North Cascades shift from functionally extirpated condition with no resiliency to low resiliency under this scenario (Table 2). Four ecosystems have high resiliency under this scenario, and catastrophic risk is spread across six ecosystems (redundancy) with additional ecological diversity gained at the northwestern and central extents of the overall range (representation) (Service 2021, pp. 19, 239–241).

Table 2. Current and future conditions in terms of overall resiliency for six ecosystems for the grizzly bear in the lower-48 States. NCDE= Northern Continental Divide Ecosystem, GYE= Greater Yellowstone Ecosystem, CYE= Cabinet-Yaak Ecosystem, SE= Selkirk Ecosystem, BE=Bitterroot Ecosystem. Future projections are 30 to 45 years into the future under five plausible future scenarios: Scenario 1= conservation decreases significantly, Scenario 2=conservation decreases, Scenario 3 = conservation stays the same, Scenario 4 = conservation increases, and Scenario 5 =conservation increases significantly.

CURRENT AND FUTURE RESILIENCY						
	Current Condition	***Future Scenario 1*** ↓↓ ***Conservation***	***Future Scenario 2*** ↓ ***Conservation***	***Future Scenario 3*** ***Continuation Conservation***	***Future Scenario 4*** ↑ ***Conservation***	***Future Scenario 5*** ↑↑ ***Conservation***
GYE	High	Moderate	High	High	High	High
NCDE	High	Moderate	High	High	High	High
CYE	Low	V Low	Low	Moderate	Moderate	High
SE	Moderate	V Low	Low	Moderate	Moderate	High
BE	X	X	X	X	Low	Low
NCE	X	X	X	X	Low	Low

Summary of Viability

Currently, there are two ecosystems with high resiliency, one ecosystem with moderate resiliency, one ecosystem with low resiliency, and two ecosystems that are functionally extirpated (Table 2, above). Within 30 to 45 years in the future, there are improvements and reductions in resiliency across the ecosystems depending on the scenario; with reductions in resiliency under Scenario 1, the most pessimistic scenario where conservation efforts decline significantly and improvements in resiliency under Scenario 5, the most optimistic scenario where conservation efforts improve significantly. If conservation efforts stay the same, as under Scenario 3, the continuation scenarios, the CYE improves from low to moderate resiliency. Under this continuation scenario, the GYE and NCDE stay in high resiliency and the SE retains moderate resiliency. Under the optimistic scenarios where conservation efforts increase under Scenarios 4 and 5, the BE and North Cascades improve from functionally extirpated conditions

with no resiliency to low resiliency, which also represents an increase in redundancy and representation. To summarize changes in resiliency from current to future conditions, there is less risk from stochastic events if conservation efforts continue or improve, but there is greater risk from stochastic events if conservation efforts decrease (Table 2, above).

Currently, redundancy for the grizzly bear is four ecosystems, the GYE, NCDE, CYE, and SE, as they are distributed from north to south and east to west across the lower-48 States. Catastrophic risk is spread across these four ecosystems and their ecological diversity contributes to representation. Two ecosystems, the BE and North Cascades have no populations so do not currently contribute to redundancy or representation. In 30 to 45 years, redundancy is maintained across the future scenarios and never falls below the four currently resilient ecosystems. Although redundancy stays the same from now to the future, if conservation efforts decrease, as under Scenarios 1 and 2, resiliency decreases, and the four ecosystems are at greater risk to stochastic events. However, if conservation efforts increase, as under Scenarios 4 and 5, resiliency in the BE and North Cascades improves, as does redundancy, as the number and distribution of ecosystems increases from four to six ecosystems. This improvement in redundancy reduces risk to the grizzly bear from catastrophic events (Table 3). To summarize redundancy across the future scenarios, catastrophic risk to the grizzly bear stays the same if conservation efforts continue at their current rate and effectiveness, catastrophic risk decreases with increased conservation as the BE and North Cascades improve from functionally extirpated to low resiliency, and catastrophic risk increases if conservation efforts are reduced. Representation declines as resiliency of the ecosystems decreases with decreased conservation efforts and stays the same with a continuation of conservation efforts, but ecological diversity increases if conservation efforts increase primarily through improving resiliency of the BE and North Cascades ecosystems (Table 3).

Our SSA characterizes the viability for the grizzly bear in the lower-48 States, or its ability to sustain populations in the wild over time, based on the best scientific understanding of its current and future abundance, distribution, and diversity (Service 2021, entire). Based on our assessment of the 3Rs, currently and 30 to 45 years into the future, viability for the grizzly bear in the lower-48 States improves slightly if conservation efforts continue at their current rate and levels of effectiveness. If conservation efforts decline, viability also decreases. If conservation efforts increase, viability improves (Service 2021, p. 243).

Table 3. Summary of current and future (30 to 45 years) viability, in terms of resiliency, redundancy, and representation, for the grizzly bear in the lower-48 States. Numbers for resiliency represent the number of populations in each condition category.

VIABILITY: CURRENT AND FUTURE 3Rs						
	Current Condition	***Future Scenario 1*** ↓↓ ***Conservation***	***Future Scenario 2*** ↓ ***Conservation***	***Future Scenario 3*** ***Continuation Conservation***	***Future Scenario 4*** ↑ ***Conservation***	***Future Scenario 5*** ↑↑ ***Conservation***
Resiliency	2 High 1 Moderate 1 Low 2 Extirpated	2 Moderate 2 Very Low 2 Extirpated	2 High 2 Low 2 Extirpated	2 High 2 Moderate 2 Extirpated	2 High 2 Moderate 2 Low	4 High 2 Low
Redundancy	4 ecosystems, as distributed	4 ecosystems, as distributed	4 ecosystems, as distributed	4 ecosystems, as distributed	6 ecosystems, as distributed	6 ecosystems, as distributed
Representation	Ecological diversity across 4 ecosystems	Ecological diversity across 4 ecosystems	Ecological diversity across 4 ecosystems	Ecological diversity across 4 ecosystems	Ecological diversity across 6 ecosystems	Ecological diversity across 6 ecosystems

STATUS RECOMMENDATION

Standard for Review

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of "endangered species" or "threatened species." The Act defines an "endangered species" as a species that is "in danger of extinction throughout all or a significant portion of its range," and a "threatened species" as a species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The Act requires that we determine whether a species meets the definition of "endangered species" or "threatened species" because of any of the following factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;
(B) Overutilization for commercial, recreational, scientific, or educational purposes;
(C) Disease or predation;
(D) The inadequacy of existing regulatory mechanisms; or
(E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

We use the term "threat" to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term "threat" includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term "threat" may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the Act's definition of an "endangered species" or a "threatened species." In assessing whether a species meets either definition, we must evaluate all identified threats by considering the expected response of the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species—such as any existing regulatory mechanisms or conservation efforts. The Service recommends whether the species meets the definition of an "endangered species" or a "threatened species" only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future.

In our recommendation, we correlate the threats acting on grizzly bears in the lower-48 States to the factors in section 4(a)(1) of the Act. We summarize our five-year status review for the grizzly bear in the lower-48 States below.

Summary of Analysis

The biological information we reviewed and analyzed as the basis for our findings is documented in the SSA report (Service 2021, entire), a summary of which is provided above. The projections for the future condition of grizzly bears in the lower-48 States are based on our expectations of the potential stressors that may affect the listed entity. When we listed the grizzly bear as a threatened species on July 28, 1975, we identified the dramatic decreases in historical range (Factor A), certain detrimental land management practices, such as timber harvest, livestock grazing, and building of roads, in formerly secure grizzly bear habitat (Factor A), and excessive human-caused mortalities (Factors B and C) as the primary stressors (40 FR 31734–31736). The listing rule also discussed the lack of regulatory mechanisms to control take and protect habitat as a contributing factor to grizzly bear population declines (Factor D) (40 FR 31734–31736, July 28, 1975). Under Factor E, the July 28, 1975, listing identified the genetic isolation of some grizzly bear populations as a potential threat and identified human attitudes toward grizzly bears as the cause of "a continual loss of animals through indiscriminate illegal killing" (40 FR 31734).

In our SSA report, we evaluated these stressors and additional stressors that fall broadly into three categories: those with habitat-related effects (Factor A); sources of human-caused mortality (Factors B and C); and other stressors (Factor E) (Service 2021, pp. 97–209). These stressors are interrelated to varying degrees; for example, motorized access is related to both habitat and human-caused mortality. Specifically, stressors with potential habitat-related effects

(Factor A) include: motorized access and its management; developed sites; livestock allotments; mineral and energy development; recreation; vegetation management; habitat fragmentation; development on private lands; and activities that may disturb dens. Sources of human-caused mortality (Factors B and C) that we evaluated include: management removals; accidental killings (e.g., train and vehicular strikes); mistaken identity kills; illegal killings; and defense of life kills. We also evaluated other stressors (Factor E) including: natural mortality; connectivity and genetic health; changes in food resources; effects of climate change; and catastrophic events, such as earthquakes and volcanic eruptions (Service 2021, pp. 8, 9, 97–209). Lastly, we evaluated potential cumulative effects of these stressors (Service 2021, pp. 203–204). Our SSA report provides our full analysis of stressors on grizzly bears in the lower-48 States (Service 2021, pp. 8, 9, 97–209).

In our SSA report, we also evaluated a variety of conservation efforts and mechanisms across the six ecosystems that either reduce or ameliorate stressors, or improve the condition of habitats or demographics. These conservation efforts or mechanisms include: Federal land protections, such as the Wilderness Act and Inventoried Roadless Areas (IRAs); State and private forestlands with motorized restrictions; habitat improvements/vegetation management; attractant removal and community sanitation measures, such as food storage orders; conservation easements; information and education (I&E) programs; effective law enforcement; and augmentation or translocation programs (Service 2021, pp. 8, 9, 201–204). States, National Forests, National Parks, and Tribes have implemented regulatory mechanisms that help address the stressors we identified under Factors A, B, C, and E. However, these regulatory mechanisms (Factor D) do not yet fully address all of the stressors identified under these factors across grizzly bears' range in the lower-48 States, including motorized access management and human-caused mortality. For some ecosystems, the motorized access management approaches and mortality limits have yet to be formally incorporated into regulatory documents. Additionally, some National Forests lack formal food storage orders, which will become increasingly important to grizzly bear conservation as grizzly bear and human populations both expand.

We note that by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have not only analyzed individual effects of stressors on individuals, ecosystems, and grizzly bears in the lower-48 States, but we have also analyzed their potential cumulative effects (Service 2021 pp. 9, 203–204). We incorporate the cumulative effects into our analysis when we characterize the current and future condition of grizzly bears in the lower-48 States. Our assessment of the current and future conditions encompasses and incorporates the threats individually and cumulatively. Our current and future condition assessment is iterative because it accumulates and evaluates the effects of all the factors that may be influencing grizzly bears in the lower-48 States, including negative influences from stressors and positive influences from conservation efforts. We evaluate potential effects from these influences consistently across the same subset of habitat and demographic needs for grizzly bears in the lower-48 States, both currently and into the future. Because the SSA framework considers not just the presence of the factors, but also to what degree they collectively influence risk to the entire listed entity, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative effects analysis.

Although stressors in the six ecosystems are numerous and challenging to conservation, our experience demonstrates that if human-caused mortality of grizzly bears can be sufficiently limited, it is possible for large carnivore conservation to be compatible with them (Linnell *et al.* 2001, p. 48). We consider estimates of population trend to be the ultimate metric to assess cumulative impacts to the population. Population trend reflects all of the various stressors on the population, total mortality, fecundity, changes in habitat quality, changes in population density, changes in current range, displacement effects, and so forth. Despite the various stressors that we evaluated in our SSA report, the best available data indicate that, due to ongoing conservation efforts in the GYE, NCDE, CYE, and SE, grizzly bear population trends in these ecosystems are stable or increasing, and range extent has continued to expand. Ongoing conservation efforts have reduced the multiple negative effects of these stressors to such levels that these populations have a stable or positive population trend. As long as conservation efforts continue, existing threats are not significantly reducing the 3Rs in the ecosystems, either individually or cumulatively, although stressors continue to operate. In addition, the likelihood of natural recolonization of the BE is better now than at any point since listing. Natural recolonization of the North Cascades is unlikely in the near future due to the low numbers of bears in nearby populations and the highly fragmented landscape in between (Service 2021, pp. 204–209).

The purpose of the SSA was to characterize the current and future viability of grizzly bears in the lower-48 States in terms of the 3Rs, considering the potential current and future effects of stressors. In our SSA report, we described the current condition and five plausible future conditions for grizzly bears in the lower-48 States in terms of their resiliency, redundancy, and representation (Service 2021, entire).

The best available information, as described in our SSA, indicates that the current condition of grizzly bears in the lower-48 States is characterized by four extant ecosystems and two functionally extirpated ecosystems distributed across Wyoming, Montana, Idaho and Washington (Figure 2, above) (Service 2021, pp. 10–14, 210–225). Based on important habitat, demographic, and environmental factors, two ecosystems, the GYE and NCDE, currently have high resiliency; one ecosystem, the SE, has medium resiliency; one ecosystem, the CYE, has low resiliency; and two ecosystems, the BE and North Cascades, have no resiliency and are functionally extirpated (Service 2021, pp. 10–14, 210–225).

In our evaluation of future viability for grizzly bears in the lower 48-States, we determined that future conditions for grizzly bears in the lower-48 States could range from approximately the same levels of the 3Rs as current condition, to reductions or improvements in levels of the 3Rs corresponding to changes in conservation efforts. If conservation efforts continue at their current rate and effectiveness, the GYE and NCDE maintain high resiliency, the SE maintains medium resiliency, but resiliency of the CYE improves from low to medium (Table 2, above) (Service 2021, pp. 235–237). As a result, viability for the grizzly bear in the lower-48 States improves slightly if conservation efforts continue at their current rate and levels of effectiveness, however with only two ecosystems with high resiliency, risk to the listed entity from stochastic and catastrophic events remains. If conservation improves, redundancy and representation also improves, with an improvement from functionally extirpated to low resiliency in the BE and North Cascades, which represents an improvement in viability. If conservation efforts decrease,

resiliency of the ecosystems declines and, as risk to the listed entity from stochastic change increases, representation and redundancy decrease accordingly (Service 2021, pp. 17–18).

Application of Analysis to the Status Recommendation

The SSA describes the current and future viability of grizzly bears in the lower-48 States in terms of the 3Rs, which characterize risk to grizzly bears in the lower-48 states in terms of stochasticity (resiliency), catastrophes (redundancy), and long-term environmental change (representation) (Service 2021, entire). This analysis forms the basis for our recommendation under the Act. Because of uncertainties regarding the future, we evaluated future condition for five plausible future scenarios designed to capture the relevant uncertainties regarding future conservation efforts. The fundamental question before the Service is whether the projections of extinction risk, described in the SSA report in terms of the resiliency, redundancy, and representation of grizzly bears in the lower-48 States, under a range of future scenarios, indicate that the listed entity meets the definition of an endangered or threatened species under the Act. Theoretically, if the abundance (resiliency), distribution (redundancy), and diversity (representation) of grizzly bears in the lower-48 decreases, thereby decreasing overall viability, the extinction risk of grizzly bears in the lower-48 States would correspondingly increase.

As described below, we first evaluate whether grizzly bears in the lower-48 States are in danger of extinction throughout their range now. We then evaluate whether grizzly bears in the lower-48 States are likely to become in danger of extinction throughout their range in the foreseeable future. We finally consider whether grizzly bears in the lower-48 States are an endangered or threatened species in a significant portion of their range (SPR).

Evaluation of status: In Danger of Extinction Throughout its Range

Under the Act, an endangered species is any species that is "in danger of extinction throughout all or a significant portion of its range." For this 5-year status review, we evaluate the best available scientific information about the listed entity's current levels of demographic and habitat factors (these are described in the SSA report in terms of resiliency, redundancy, and representation) to describe the viability of grizzly bears in the lower-48 States (Service 2021, entire). Ultimately, we compare our evaluation of the listed entity's current risk of extinction against the definition of an endangered species.

Currently, four of the six ecosystems of grizzly bears in the lower-48 States are currently extant (Service 2021, pp. 58–70). Two of these ecosystems have high resiliency, one has moderate resiliency, and one has low resiliency (Service 2021, pp. 10–14, 210–225). The GYE and NCDE currently have high resiliency due to the high conditions of their habitat and demographic factors, such as widely available and protected large, intact blocks of land, positive population growth rates, expanding ranges, and high survival rates of adult females (Service 2021, pp. 13, 213–217). With high resiliency, the GYE and NCDE are currently the best able of the four extant ecosystems to withstand environmental and demographic stochasticity, followed by the SE with medium resiliency and the CYE with low resiliency. Ongoing conservation actions implemented since the time of listing, such as regulatory mechanisms that reduce habitat loss and sources of human-caused mortality, have significantly improved the resiliency of these four

ecosystems over the last several decades (Service 2021, pp. 100–104). These levels of resiliency currently reduce extinction risk for grizzly bears in the lower-48 States. Considered together at the lower-48 States level, the four resilient ecosystems provide ecological diversity and their longitudinal and latitudinal distribution helps reduce catastrophic risk to grizzly bears in the lower-48 States (Service 2021, pp. 10–14, 210–225). Further reducing extinction risk is the fact that catastrophes, such as large, catastrophic wildfires, earthquakes, disease, or volcanic eruptions, are relatively unlikely to occur now, that grizzly bears in the lower-48 States have demonstrated the ability to recover from catastrophic wildfires (Service 2021, p. 199), and that catastrophic risk is sufficiently spread across the four extant ecosystems.

The current condition of grizzly bears in the lower-48 States represents a marked improvement from the conditions when we listed grizzly bears in 1975. Over the last 45 years, threats to grizzly bears in the lower-48 States have declined and, in some cases, have been ameliorated. With the end of government-sanctioned programs, population losses from predator control and poisoning declined, and new federally designated wilderness areas and IRAs helped secure large, intact blocks of land and reduce sources of human-caused conflicts. The management of motorized access similarly reduced stressors associated with habitat loss and human access in grizzly hear habitats. Additionally, Federal land management plans in four out of the six recovery zones (GYE, NCDE, CYE, and SE) adopted legally binding and enforceable science- and research-based measures and management practices specifically to conserve grizzly bears in the lower-48 States, though these measures are not yet fully implemented in the CYE and SE. These regulatory mechanism also help reduce threats associated with habitat loss and fragmentation on the Federal lands where they apply (Service 2021, pp. 100–104, 201–203). Due to these and many other conservation actions, the number of bears in the lower-48 states has more than doubled since the time of listing and grizzly bears have since expanded their range and abundance, growing from occupying approximately only two percent of their historical range in 1975 to six percent in 2020 (Costello 2020, *in litt.*; Haroldson *et al.* 2020b, p. 13; Kasworm *et al.* 2020a, p. 40; Kasworm *et al*. 2020b, p 19; Haroldson *et al.* 2020a, *in press*; see Table 7 in Service 2021, pp. 58–59). As a result, the 3Rs for grizzly bears in the lower-48 States have improved since 1975.

Given the current levels of resiliency in four out of six ecosystems, the high resiliency of the GYE and NCDE, and the lack of significant, imminent stressors, we believe that grizzly bears in the lower-48 States currently have sufficient ability to withstand stochastic events, catastrophic events, and to adapt to environmental changes. Therefore, we conclude that the current risk of extinction is low, such that grizzly bears in the lower-48 States are not in danger of extinction throughout all of their range.

Having found that grizzly bears in the lower-48 States are not in danger of extinction throughout their range, we next evaluated whether the listed entity is likely to become an endangered species within the foreseeable future throughout all of its range.

Evaluation of status: Likely to Become Endangered Throughout its Range

Under the Act, a threatened species is any species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The

term foreseeable future extends only so far into the future as the Service can reasonably determine that both the future threats and the species' responses to those threats are likely. In other words, the foreseeable future extends only so far as the predictions about the future are reliable. The Service will describe the foreseeable future on a case-by-case basis, using the best available data and taking into account considerations such as the species' life history characteristics, threat-projection timeframes, and environmental variability (50 CFR 424.11(d)). The key statutory difference between a threatened species and an endangered species is the timing of when a species may be in danger of extinction, either now (endangered species) or in the foreseeable future (threatened species).

In considering the foreseeable future, we projected a range of plausible future conditions for grizzly bears in the lower-48 States and evaluated the condition of demographic factors (adult female survival, abundance, population trend, fecundity, inter-ecosystem connectivity and genetic diversity) and habitat factors (natural, high-caloric foods and large, intact blocks of land) under each future scenario (Service 2021, pp. 10–14, 210–213, 226–229). We then summarized the future viability for grizzly bears in the lower-48 States in terms of their resiliency, redundancy, and representation under each of the five future scenarios (Service 2021, pp. 15–19, 230–241). For the purposes of this recommendation, we generally define viability as the ability of the species to sustain a population in the wild over a biologically meaningful timeframe, in this case, 30 to 45 years into the future. We chose this timeframe because it is biologically meaningful by accounting for two to three generation intervals, or the average amount of time it takes a female to breed and replace herself in the population. Given the longevity of grizzly bears, up to 37 years in the wild (Kasworm et al. 2020a, p. 17), two to three generation intervals represent a period during which a complete turnover of the population would have occurred and any changes in the demographics of the population would be detectable. This timeframe also considers the possibility that conservation measures that reduce and regulate potential stressors, such as land management plans, could be revised at least once by any applicable land management agencies (Service 2021, pp. 15, 226). Therefore, this 30 to 45-year timeframe should be sufficient to be able to observe changes in the condition of grizzly bears through multiple generations and multiple cycles of changes to environmental conditions. Moreover, it is a timeframe during which we can reasonably rely on projections about the future.

To assist us in evaluating the status of grizzly bears in the lower-48 States in the foreseeable future over the next 30 to 45 years, we evaluated the future condition for grizzly bears in the lower-48 States under five plausible future scenarios: a continuation scenario, two pessimistic scenarios, and two optimistic scenarios (Service 2021, pp. 226–229). We designed these future scenarios to capture the full range of plausible futures and uncertainty associated with changes in stressors, such as developed sites and unsecured attractants, and conservation efforts, such as Federal land protections and land management plans (Service 2021, pp. 226–229). Although the likelihood of each scenario occurring in the future varies, the changes in conservation efforts and environmental factors projected by the five scenarios are all plausible, so the scenarios capture the full range of environmental conditions that grizzly bears in the lower-48 States could experience by years 2050 to 2065. As a result, we must consider the full range of plausible futures as captured by the five future scenarios when we evaluate overall extinction risk to the listed entity. We evaluated the viability of grizzly bears in the lower-48 States under each of

these scenarios in terms of their expected resiliency, redundancy, and representation into the foreseeable future (Service 2021, pp. 226–241).

Looking into the foreseeable future by 2050 to 2065, we anticipate a range of future conditions for grizzly bears in the lower-48 States, with nearly the same level of the 3Rs as current condition under one future scenario, improved conditions of the 3Rs under two future scenarios, and decreased conditions of the 3Rs under two future conditions (Service 2021, pp. 15–19, 230–241). In four out of the five future scenarios, the GYE and NCDE remain in high resiliency, including under the continuation scenario. However, if conservation decreases significantly, resiliency declines from high to moderate in both the GYE and NCDE (Service 2021, p. 230–231), which lends increased risk to grizzly bears in the lower-48 States. This projected decline in resiliency for the GYE and NCDE is concerning given the importance of both ecosystems to the overall viability of grizzly bears in the lower-48 States, both currently and into the future. Resiliency in the CYE and SE also decreases as conservation decreases (Service 2021, p. 242), which represents greater risk to grizzly bears in the lower-48 States. Into the foreseeable future, the CYE and SE have moderate to very low levels of resiliency, and only achieve high resiliency with the significantly improved conservation under Scenario 5 (Service 2021, p. 242). As a result, the CYE and SE only contribute moderate, to low, to very low levels of resiliency under four out of the five future scenarios (Service 2021, p. 242). Finally, the BE and North Cascades only begin to contribute to the 3Rs if conservation improves (Service 2021, p. 242).

Additionally, human populations continue to expand across all six ecosystems, and humans may engage with grizzly bears and their habitats in increasingly unpredictable ways. Scenarios 1 and 2 suggest that growing human populations could lead to increased private land development, additional habitat loss, and more human-bear conflicts over the next 30 to 45 years. Human-bear conflicts are now more common on private lands than public lands (Cooley *et al.* 2018, entire), which generally afford more protections to grizzly bears. The uncertainty associated with these stressors further suggests the possible future reduction in overall viability of grizzly bears in the lower-48 States.

Given these future projections of the 3Rs 30 to 45 years into the future, grizzly bears in the lower-48 States could experience either the same or increased risk of extinction under three out of the five future scenarios. Extinction risk only decreases substantially under the two optimistic future scenarios, which rely on increases in conservation efforts such that the BE and North Cascades support resilient populations. Although these are plausible future outcomes for grizzly bears in the lower-48 States, there is enough future uncertainty associated with conservation efforts such that grizzly bears in the lower-48 States are at risk in the foreseeable future.

Therefore, we find that grizzly bears in the lower 48-States are at risk of extirpation due to stochastic and catastrophic events that could plausibly occur in the future. Under these conditions, grizzly bears in the lower-48 States would be less likely to withstand plausible stochastic events, catastrophic events, or retain sufficient adaptive capacity to withstand environmental change. Therefore, we conclude that there is enough risk in the foreseeable future, such that grizzly bears in the lower-48 States are likely to become an endangered species within the foreseeable future throughout all of their range.

Therefore, after assessing the best available information, we conclude that grizzly bears in the lower-48 States are not currently in danger of extinction throughout all of their range, but the species is likely to become so in the foreseeable future. Therefore, grizzly bears in the lower-48 States continue to meet the definition of a threatened species under the Act.

Evaluation of Status Throughout a Significant Portion of its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. Having determined that grizzly bears in the lower-48 States are not in danger of extinction, but are likely to become so in the foreseeable future throughout all of their range, we now consider whether they may be in danger of extinction in a significant portion of their range—that is, whether there is any portion of the species' range for which it is true that both (1) the portion is significant; and, (2) the species is in danger of extinction now in that portion. Depending on the case, it might be more efficient for us to address the "significance" question or the "status" question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species' range.

In undertaking this analysis for grizzly bears in the lower-48 States, we choose to address the status question first—we consider information pertaining to the geographic distribution of both the listed entity and the threats that the listed entity faces to identify any portions of the range where grizzly bears in the lower-48 States may be endangered.

For grizzly bears in the lower-48 States, we considered whether threats are geographically concentrated in any portion of the bears' range at a biologically meaningful scale. As summarized above and documented in our SSA report (Service 2021, pp. 97–209), we evaluated a variety of stressors associated with habitat destruction and modification, human-caused mortality, natural mortality, effects due to genetic health, effects due to changes in food resources, effects due to climate change, and cumulative effects (Service 2021, pp. 97–209). Overall, we did not identify any concentrations of threats across the six ecosystems.

We first examined whether there might be a geographic concentration of threats in the CYE and SE, given their lower levels of resiliency documented in the SSA report, both currently and 30 to 45 years into the future. However, rates of human-caused mortality in the CYE and SE are similar to those in the GYE and NCDE (Kasworm *et al.* 2020a, p. 33; Kasworm *et al.* 2020b, p. 23; Servheen *et al.* 2004, p. 21; van Manen 2002, *in litt.*; MFWP, unpublished data). The moderate condition of habitats, small population size, and somewhat limited connectivity between ecosystems (Service 2021, pp. 218–220) may be driving lower resiliency in these ecosystems rather than a concentration of threats. Additionally, the GYE, NCDE, CYE, and SE have all experienced positive population growth rates (Service 2021, p. 215), which suggests that no concentration of threats is influencing resiliency in any portion of these ecosystems.

We explored the possibility of a concentration of threats in the connectivity areas between the six ecosystems. Unlike the six ecosystems, connectivity areas provide corridors for individual

grizzly bears to move between ecosystems; they support grizzly bears at lower densities than in the core of the ecosystems. The connectivity areas generally lack the same habitat protections, motorized access standards, and food storage orders that help reduce stressors in the six ecosystems. For example, in Idaho, hunters can legally bait black bears in the connectivity areas, which increases risks associated with human-caused mortality. Mistaken identity kills may also be more frequent in these connectivity areas. However, even if we were to regard threats in these connectivity areas as concentrated, they lack known populations (Service 2000, pp. 3-14–15; Service 2021, p. 58), so would not be considered significant for the purposes of our analysis. Therefore, connectivity areas do not represent significant portions of the range.

Based on this analysis, we found no concentration of threats in any portion of grizzly bears' range in the lower-48 States at a biologically meaningful scale. Therefore, no portion of the grizzly bear's range in the lower-48 States can provide a basis for determining that the listed entity is in danger of extinction now in a significant portion of its range, and we find that grizzly bears in the lower-48 States are not in danger of extinction now in any significant portion of their range. This is consistent with the courts' holdings in *Desert Survivors v. Department of the Interior*, No. 16-cv-01165-JCS, 2018 WL 4053447 (N.D. Cal. Aug. 24, 2018) and *Center for Biological Diversity v. Jewell*, 248 F. Supp. 3d , 946, 959 (D. Ariz. 2017).

Summary of evaluation and recommendation

Our review of the best available scientific and commercial information indicates that grizzly bears in the lower-48 States do not meet the definition of an endangered species, but do meet the definition of a threatened species in accordance with Section 3(6) and 3(20) of the Act. Therefore, with this 5-year status review, we recommend that grizzly bears in the lower-48 States retain their status as a threatened species under the Act.

U.S. FISH AND WILDLIFE SERVICE
5-YEAR STATUS REVIEW FOR
GRIZZLY BEARS IN THE LOWER-48 STATES
(*Ursus arctos horribilis*)

CURRENT CLASSIFICATION: Threatened

RECOMMENDATION RESULTING FROM THIS 5-YEAR STATUS REVIEW:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist:
____ Extinction
____ Recovery
____ Original data for classification in error
_X_ No change is needed

REGIONAL OFFICE APPROVAL:

Approved by: _____ Date: _____
Noreen Walsh
U.S. Fish and Wildlife Service
Regional Director
Interior Regions 5 and 7

REFERENCES CITED

To be inserted post-internal review