**U.S. FISH AND WILDLIFE SERVICE**
**5-YEAR REVIEW for**
**GRIZZLY BEAR**
**(*Ursus arctos horribilis*)**

**Species Reviewed:** Grizzly bear (*Ursus arctos horribilis*)

**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:** August 10, 2018. Endangered and Threatened Wildlife and Plants; 5-Year Status Reviews of 11 Species in the Mountain-Prairie Region (83 FR 39771).

**Lead Region**: Region 6, Grizzly Bear Recovery Office, Hilary Cooley, Grizzly Bear Recovery Program, 406-243-4903.

**Classification:** Threatened

**Methodology used to complete the review:** In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a 5-year review is to assess each threatened species 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. The U.S. Fish and Wildlife Service (Service) recently evaluated the biology and status of the grizzly bear in the lower-48 states as part of a Species Status Assessment (SSA) to inform this 5-year review. Our SSA report for grizzly bear was independently reviewed by peer reviewers and partners. The SSA report represents our evaluation of the best available scientific information, including the resource needs and the current and future condition of the species. We developed five future scenarios of land and species management conditions to portray a range of possible future conditions of the species. The SSA report is the scientific basis for this 5-year review decision-making process.

Additionally, we solicited data for this review from interested parties through January 14, 2020, Federal Register Notice announcing this review (85 FR 2143). Information we received from this data call included summaries of recent conservation actions by State wildlife agencies in Utah and Colorado, conservation actions by non-governmental organizations (NGOs), the Bureau of Land Management (BLM), and counties.

## REVIEW ANALYSIS

### Updated Information and Current Species Status

**Biology and Habitat:**

Our SSA report (Service 2020) provides a detailed summary of the biology, habitats, and current and future condition for the grizzly bear in the lower-48 states, which we summarize below. The grizzly bear is listed as threatened under the Act in the lower-48 States, and this listed entity is the subject of this SSA report. As such, unless specified otherwise, we use the term "species" to refer to the listed entity and the term "ecosystem" to refer to the populations of this listed entity.

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 in the lower-48 States. 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 United States, 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. Grizzly bears were reduced to less than 2 percent of their former range in the lower-48 States by the time grizzly bear was listed as threatened under the Act in 1975, and 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. The Northern Continental Divide, Selkirk, and Cabinet-Yaak populations 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. Grizzly bears were also known to have existed in the recent past 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. There are no known populations in the North Cascades and Bitterroot (BE) ecosystems and no known populations outside these defined ecosystems, although we have documented bears, primarily solitary, outside these ecosystems (see Figure 1 in Service 2020, p. ). It is estimated that there are at least 1,913 individuals in the lower-48 States (1,068 in the NCDE, 737 in the GYE DMA, 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 2020, pg. ) (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. As described in our recovery planning documents, 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 assessment, we evaluated resiliency, redundancy, and representation at the scale of the six ecosystems identified in the 1993 Recovery Plan (Service 1993) (see Figure 9 in Service 2020, p. ):

*Summary of Needs*

In general, a grizzly bear's individual habitat needs and daily movements are driven by the search for food, mates, cover, security, or den sites. All life stages need large intact blocks of land to breed, feed, shelter and disperse; cover to shelter; high-caloric foods to feed and breed; and dens as winter shelter. For the purposes of this model, breeding includes all stages of reproduction. In order to be resilient, grizzly bear populations need sufficient abundance for genetic and demographic health, stable to positive population trends, high adult female survival, adequate survival of all other life stages, fecundity and recruitment that is at least equal to mortality that translates into stable to increasing population trends, and genetic diversity. 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. 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 (see Figure 2, Service 2020, p. ).

*Summary of Stressors and Conservation Efforts*

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 (Chapter 5). We also evaluated the potential cumulative effects of stressors that may act together in concert to influence ecosystem resiliency. A stressor is defined as the potential change in demographics, such as an increase in human-caused mortality, or the habitat resources needed by the species, such as a decrease in high-caloric foods that causes a demographic response such as a decrease in abundance. We evaluated the potential effects of three categories of stressors on the grizzly bear: those with habitat-related effects;

sources of human-caused mortality; and other stressors. These stressors are interrelated to varying degrees (e.g., habitat stressors around motorized access are related to both habitat and human-caused mortality). Stressors with potential habitat-related effects 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: disease; natural predation and mortality; lack of connectivity and low 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, such that the stressor does not individually or cumulatively effect the resiliency of an ecosystem. 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.

**Current Condition**

To evaluate resiliency for each ecosystem, we developed a categorical model, called a condition category table, 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). 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 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 2020, p. ). Populations in higher resiliency categories are at less risk from potential stochastic events, such as extreme weather events, than populations in lower resiliency categories.

Table 1 summarizes our evaluation of current resiliency for each ecosystem. Currently, the NCDE and GYE have high resiliency. The SE has moderate resiliency and the CYE has low resiliency. Resiliency of the NCDE and GYE is currently high due to the generally high and moderate conditions for the habitat and demographic factors that influence resiliency (Table 1). A variety of land protections and the availability and diversity of foods contribute to the high conditions for habitat factors in these two ecosystems.

Despite high population trends and high and moderate adult female survival, the CYE currently has a very low numbers of bears, although this factor could improve as bears reproduce and expand in the future (Table 1). The CYE is a smaller ecosystem that is still slowly recovering

from being close to historical extirpation, particularly in the Cabinets portion of the ecosystem. This portion of the CYE has recently benefitted from an augmentation program (Kasworm *et al*. 2020a, pp. 24–25; Service 2020, p. ). Data collected since the 1988 population estimate now suggest the population may have been even smaller than the previously thought estimate of 15 or fewer individuals in 1988. However, this recent data also suggests that the number of grizzly bears in the Cabinet portion of the CYE has increased to 22–24 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. Although there are large protected areas within the CYE recovery zone (with 44 percent designated as Wilderness or IRAs), additional protections outside the recovery zone, and recent conservation efforts on private lands, motorized route densities have not yet met habitat standards established for the CYE recovery zone.

Despite high population trends and high and moderate adult female survival, the SE currently has a very low numbers of bears, although this factor could improve as bears reproduce and expand in the future (Table 1). 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.

Despite the moderate condition of habitats, due in part to considerable amounts of protected areas, without known populations, the BE and North Cascades are currently in functionally extirpated condition, and therefore have no resiliency. As a result, these two ecosystems also do not currently contribute to redundancy and representation.

*Table 1. Current condition for six ecosystems for grizzly bear in the lower-48 States, evaluated used 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) | | | | | |
| **NCDE** | High | High | High | High | High | High | Moderate | High | High | **High** |
| **GYE** | High | High | High | High | Moderate | High | High | X | Moderate | **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** |
| **North Casca-des** | Moderate | Moderate | X | X | X | X | X | X | X | **X** |

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 ecosystem with moderate resiliency, and one

ecosystem with low resiliency. Two ecosystems are currently 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 1. Representation is currently captured by ecological diversity inherent within the four resilient ecosystems (Figure 1). 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.

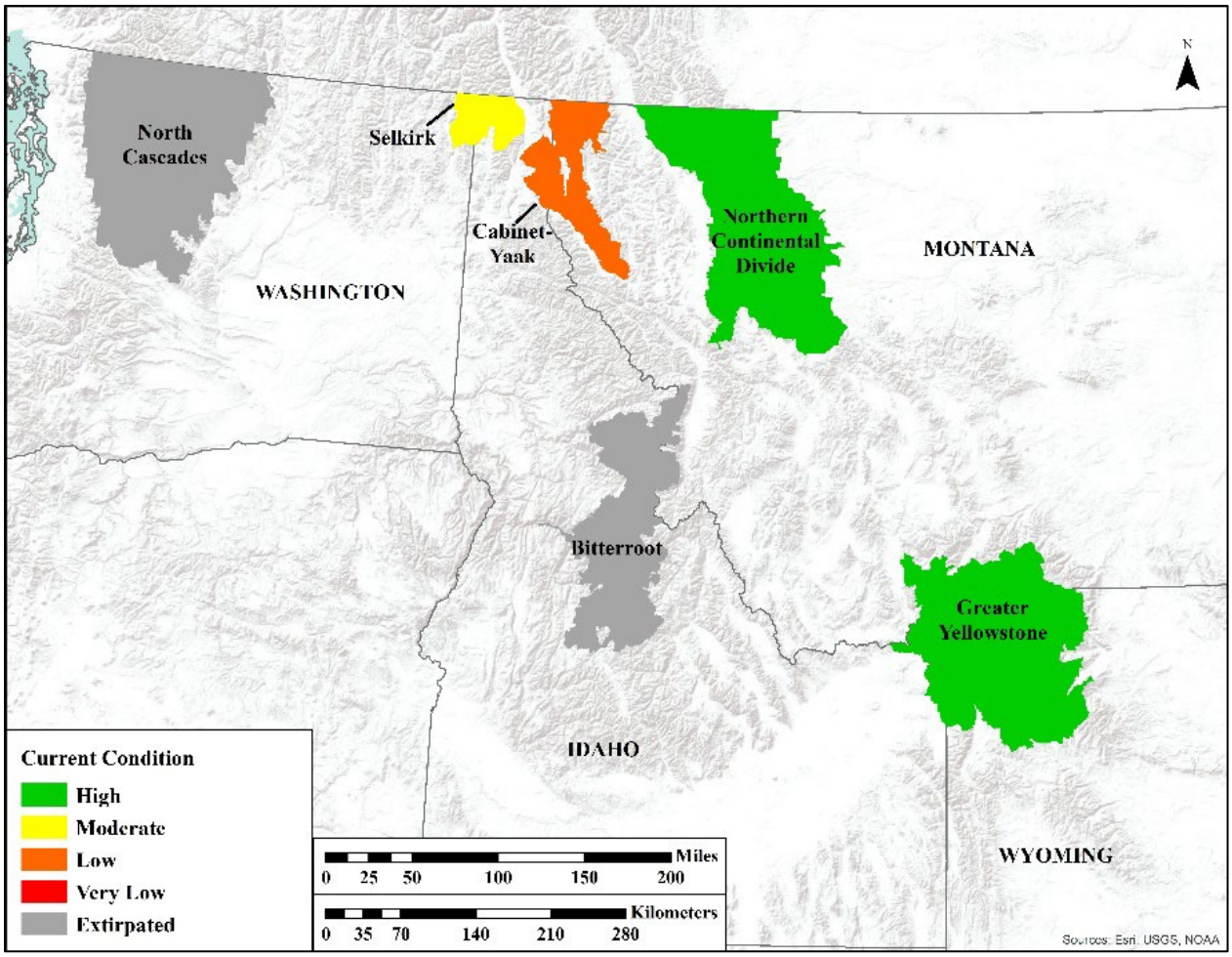


*Figure 1. Map of the overall current condition for the six grizzly bear ecosystems in the lower-48 States, in terms of resiliency, redundancy, and representation. Colors represent the current resiliency for each ecosystem, based on the current condition of two habitat factors and six demographic factors 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.*

Of the six ecosystems, two ecosystems currently have high resiliency, one ecosystem has moderate resiliency, and one ecosystem has low resiliency. Two ecosystems are currently in functionally extirpated condition, with no resiliency. The four resilient ecosystems, the NCDE, GYE, CYE, and SE, contribute to redundancy as they are distributed north to south and east to west across the lower-48 States, and the ecological diversity inherent within these ecosystems contributes to representation (Figure 1, above).

**Future Condition**

We projected a range of plausible future conditions for the grizzly bear in the lower-48 States, 30 to 45 years into the future, a biologically meaningful timeframe that captures approximately two to three generation intervals for grizzly bear. A generation interval is defined for grizzly bears as the approximate time that it takes a female to replace herself in the population. For female grizzly bears, average generation intervals range from 10 to 15 years. Given the longevity of grizzly bears, up to 30 years in the wild, 2 to 3 generation intervals represent a time period during which a complete turnover of the population would have occurred and any positive or adverse 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 by applicable land management agencies at least once.

We used future scenario planning to describe plausible futures for the grizzly bear and to capture uncertainty associated with the future. We developed two pessimistic future scenarios, two optimistic future scenarios, and one continuation future scenario. These future scenarios that we used to project the condition for the grizzly bear in the lower-48 States are:

- **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 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 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 rate of private land development remains the same;
- **Future Scenario 4 – Increased Conservation:** Under this scenario, conservation actions increase or improve, and rate of private land development decreases, and rate of private land development decreases;
- **Future Scenario 5 – Significantly Increased Conservation:** Under this scenario, conservation actions increase significantly, and rate of private land development decreases dramatically.

Although there may be different probabilities associated with our future scenarios, all five of our scenarios are equally plausible for the purposes of our SSA analysis. We then 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.

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. Although resiliency decreases, redundancy and representation remain the same under Scenario 1, with four ecosystems distributed similarly to current condition within their ecological types (Figure 6).

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). Although resiliency decreases, redundancy and representation remain the same under Scenario 2, with four ecosystems distributed similarly to current condition within their ecological types (Figure 6).

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 and 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 (Figure 6).

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) (Figure 6).

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) (Figure 6).

*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*** |
| **NCDE** | High | Moderate | High | High | High | High |
| **GYE** | 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 |
| **North Cascades** | X | X | X | X | Low | Low |

Currently, redundancy for the grizzly bear is described as four ecosystems, the NCDE, GYE, 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, are not resilient, 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 as they are distributed. 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. But 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 have low resiliency, and catastrophic risk increases if conservation efforts are reduced. Representation declines with decreases in conservation efforts, 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.

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 expert judgement and the best scientific understanding of its current and future abundance, distribution, and diversity. 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 declines, viability also decreases. If conservation efforts increase, viability improves.

*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.*

| 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<br>1 Moderate<br>1 Low<br>2 Extirpated | 2 Moderate<br>2 Very Low<br>2 Extirpated | 2 High<br>2 Low<br>2 Extirpated | 2 High<br>2 Moderate<br>2 Extirpated | 2 High<br>2 Moderate<br>2 Low | 4 High<br>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 |

[we can add a summary of new information we feel important to include here, if needed]

**Threats Analysis (threats, conservation measures, and regulatory mechanisms):**
When we listed the grizzly bear, we identified the dramatic decreases in historical range (Factor A), land management practices (e.g., timber harvest and livestock grazing) and the building of roads and trails in formerly secure grizzly bear habitat (Factor A), and excessive human-caused mortalities (Factor B in the listing rule, but categorized as Factor C now) as the primary stressors. 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 at the time of listing (Factor D) (40 FR 31734-31736, July 28, 1975). Under Factor E, the 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, July 28, 1975).

The SSA considered these stressors and also considered several additional stressors that affect the resiliency of grizzly bear ecosystems. The additional current and future rangewide threats to the grizzly bear in the lower-48 states considered in the SSA include:

- Motorized access and its management; (Factor A)
- Developed recreation sites; (Factor A)
- Livestock allotments; (Factor A)
- Mineral and energy development; (Factor A)
- Recreation; (Factor A)
- Vegetation management, such as prescribed burns and riparian area protections; (Factor A)
- Habitat fragmentation; (Factor A)

- Development on private lands; (Factor A)
- Activities that may disturb dens; (Factor A)
- Sources of human-caused mortality, including;
    - Management removals; (Factor C)
    - Accidental killings (automobile and train collisions, drowning, poisoning, capture-related); (Factor C)
    - Mistaken identity kills; (Factor C)
    - Illegal killings; (Factor C)
    - Defense of life kills; and (Factor C)
    - Undetermined human-caused; (Factor C)
- Disease; (Factor C)
- Natural predation and mortality; (Factor C)
- Connectivity and genetic health; (Factor E)
- Changes in food resources (Factor E);
- Effects of climate change; and (Factor E)
- Catastrophic events, such as earthquakes and volcanic eruptions. (Factor E)

We also evaluated legal hunting as a potential future stressor in the SSA (Factor B).

Conservation efforts we considered in the SSA that either reduce a stressor or improve the condition of habitat or demographics include:

- Federal land protections, such as motorized restrictions, the Wilderness Act, and Inventoried Roadless Areas (IRAs) (Factor D);
- Attractant removal or storage, such as food storage orders and community sanitation measures (Factor D);
- Conservation easements and other private land trust acquisitions (Factor D);
- Information and education (I&E) programs;
- Augmentation or translocation programs;
- State and private forestlands with motorized restrictions (Factor D); and
- Effective law enforcement (Factor D).

The SSA concluded that the stressors that influence current resiliency of ecosystems include sources of human-caused mortality in all six ecosystems, and motorized access in the BE, CYE, SE, and North Cascades ecosystems. As also discussed in the SSA, a variety of conservation measures help reduce the impact of these stressors on ecosystem resiliency.

All stressors were evaluated in an analysis of rangewide threats, and were evaluated cumulatively (Service 2020, Chapter 5). Specifically, we incorporate cumulative effects into our analysis when we characterize the current and future conditions for each ecosystem, which we do both individually and cumulatively. Our analysis described the ways in which anthropogenic and natural factors singly and collectively affect the habitat and/or demographics needed by individuals and populations. Because the SSA framework considers not just the presence of the factors but also the degree to which they collectively influence the species' viability, our assessment integrates cumulative impacts of stressors.

***<u>Factor A:</u> The present or threatened destruction, modification, or curtailment of its habitat or range***

In the SSA, we discuss a number of stressors related to Factor A that affect the resiliency of grizzly bear ecosystems, now or in the future. First, motorized access, which brings humans and their vehicles into grizzly bear habitats, may indirectly influence grizzly bears by reducing the availability of large, intact blocks of land or directly by disturbing, displacing, or killing individual bears through increased noise, activity, presence, vehicle strikes, or other activities associated with human-caused mortality. Second, operation and maintenance of developed sites, livestock allotments, and energy and mineral development in addition to access for recreation may result in displacement of bears from habitat and food sources or mortality of grizzly bears if interactions result in activities associated with human-caused mortality or management removals of grizzly bears that repeatedly prey on livestock. Third, vegetation management projects typically include timber harvest, thinning, prescribed fire, and salvage of burned, diseased, or insect-infested stands. Vegetation management programs can negatively affect grizzly bears by temporarily removing cover, displacing bears from habitat, and increasing the chances of an encounter that could result in human-caused mortality. Vegetation management can also result in habitat improvements that benefit grizzly bears. Fourth, habitat fragmentation can cause loss of connectivity and indirectly increase human-caused mortalities. Finally, private land development can lead to habitat fragmentation, can limit connectivity between ecosystems, reduce the expansion of grizzly bear range, and hinder natural recolonization of the BE and North Cascades.

In the GYE and NCDE, the primary factors related to past habitat destruction and modification have been reduced through changes in management practices that have been formally incorporated into regulatory documents. We expect many of these stressors to continue to occur at some level in these ecosystems, but assuming that current regulatory mechanisms remain in place, these stressors are currently sufficiently reduced so that they affect only a small proportion of the population. Habitat standards currently exist only in the CYE and SE recovery zones and BORZ are managed under a "no net loss" policy (in their entirety: USDA FS 2011a, 2015a, 2015b, 2018). Standards are not yet in place in the two unoccupied recovery zones, the BE and North Cascades. We do not view the lack of standards in the BE as a threat, however, because it is 98 percent Wilderness. In the North Cascades, approximately 64 percent of the public lands are designated Wilderness or IRAs and existing regulatory mechanisms regulate the remaining Federal lands under a "no net loss" policy for secure core habitat. However, existing motorized access levels are unknown on USFS lands and we are unable to assess the adequacy of existing levels. Further monitoring of the population and cause-specific mortality will determine the success of the current "no net loss" policy. Habitat protections within the CYE and SE and in potential connectivity areas in the form of easements and purchases have protected additional lands. Because habitat in the BE, CYE, North Cascades, and SE may only support relatively small grizzly bear populations, connectivity with other grizzly bear populations, including Canada, is necessary for their long-term conservation.

***<u>Factor B:</u> Overutilization for commercial or scientific purposes***

The species is not currently used for commercial or scientific purposes. Legal hunting of grizzly bears (i.e., recreational purposes) was allowed in the NCDE from 1975 until 1991, under a special rule authorizing take in the 1975 listing (40 FR 331734, July 28, 1975). During this time, recreational hunting accounted for 50 percent of human-caused mortality in the NCDE (124 of 249). The special rule allowing a limited hunt in the NCDE was removed in 1992 (57 FR 37478, August 19, 1992). In the future, although the States may choose to institute carefully regulated grizzly bear hunting outside of the National Parks in the GYE and the NCDE, it would be within scientifically determined sustainable levels to maintain the population in the long term and would not occur if other sources of human-caused mortality were excessive.

***Factor C:* Disease or predation**

While there has been a positive shift in public perceptions and attitudes towards grizzly bears in the last several decades, human-caused mortalities continue to be the leading cause of grizzly bear mortalities range wide. Excessive human-caused mortality, including "indiscriminate illegal killing" and management removals, was the primary factor contributing to grizzly bear decline during the 19th and 20th centuries (Leopold 1967, p. 30; Koford 1969, p. 95; Servheen 1990, p. 1; Servheen 1999, pp. 50–52; Mattson and Merrill 2002, pp. 1129, 1132; Schwartz *et al.* 2003a, p. 571), eventually leading to their listing as a threatened species in 1975 (40 FR 31734, July 28, 1975). Human-caused mortality includes illegal kills, defense of life and property mortality, accidental mortality, and management removals. Despite these mortalities, the GYE, NCDE, CYE, and SE grizzly bear populations have continued to increase in size and expand their current distribution (Pyare *et al.* 2004, pp. 5–6; Schwartz *et al*. 2006a, pp. 64–66; Schwartz *et al.* 2006b, p. 48; IGBST 2012, p. 34; Bjornlie *et al.* 2014a, p. 184; Costello *et al.* 2016, pp. 2, 10; Bjornlie and Haroldson 2019, pp. 25–28; Haroldson *et al.* 2020b, p. 13; Kasworm *et al.* 2020a, p. 38–40; Kasworm *et al.* 2020b, p. 26–27). Although humans are still directly or indirectly responsible for the majority of grizzly bear deaths, this source of mortality is mitigated through science-based management, monitoring, and outreach efforts. Monitoring agencies have committed to continuing to produce annual reports that analyze the causes of known and probable grizzly bear mortalities. Total mortality rates are managed consistent with recovery criteria and/or updated population objectives in the GYE, NCDE, CYE, and SE with a goal of recovering and maintaining grizzly bear populations.

There are no food storage orders within the BE recovery zone. In the North Cascades, food storage orders are in effect in North Cascades NP, but not on 75 percent of land managed by the USFS within the North Cascades recovery zone. The lack of mandatory food storage orders within the North Cascades and BE recovery zones may contribute to future grizzly bear mortality risk and inhibit restoration efforts or natural recolonization. As grizzly bear distribution expands, food storage orders in areas outside the recovery zones would likely facilitate connectivity.

Although grizzly bears have been documented with a variety of bacteria and other pathogens, parasites, and disease, fatalities from disease are uncommon (LeFranc *et al.* 1987, p. 61) and do not appear to have population-level impacts on grizzly bears (Jonkel and Cowan 1971, pp. 31–32; Mundy and Flook 1973, p. 13; Rogers and Rogers 1976, p. 423). Based on nearly 40 years of research by the IGBST and MFWP, natural mortalities in the wild due to disease have never

been documented (Craighead *et al.* 1988, pp. 24–84; IGBST 2005, pp. 34–35; Haroldson 2019c, *in litt.*; MFWP, unpublished data). Based on this absence in more than 50 years of data, we conclude that mortalities due to bacteria, pathogens, or disease are negligible components of total mortality for grizzly bears and are likely to remain an insignificant factor in population dynamics. Therefore, although disease may affect individuals, it does not significantly influence the resiliency of ecosystems. Grizzly bears are sometimes killed by other grizzly bears or other species. Overall, these types of aggressive interactions among grizzly bears or with other wildlife are rare and are an insignificant factor in population dynamics (Service 2020, pg. ).

***Factor D:* The inadequacy of existing regulatory mechanisms**

We discuss a multitude of existing regulatory mechanisms in the SSA (Service 2020, Chapter 5). Despite the various stressors discussed in the SSA, 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 ameliorated the multiple negative effects so that these populations are currently stable or increasing. In addition, the likelihood of natural recolonization of the BE is better now than at any point since listing. However, 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.

***Factor E:* Other natural or manmade factors affecting its survival**

Genetic concerns are not an immediate threat to the GYE or NCDE grizzly bear populations (Miller and Waits 2003, p. 4338; Kamath *et al.* 2015, entire; Paetkau *et al.* 1998, p. 421; Kendall *et al.* 2009, p. 12; Proctor *et al.* 2012, p. 12). We remain confident that genetic monitoring, and translocation if necessary, will address the ability of future GYE bears to adapt evolutionarily (Hedrick 1995, p. 1004; Miller and Waits 2003, p. 4338). Overall, the NCDE population is genetically and demographically well connected to Canadian populations; current levels of genetic diversity are sufficient to support healthy reproduction and survival; and the NCDE's current population size ensures genetic health. Accordingly, genetic health is not affecting the continued existence of the NCDE grizzly bear population and we do not expect that to change in the future. Because of the small populations sizes in the in CYE and SE, and the lack of known populations in the BE and North Cascades, isolation is still a potential future threat to the resiliency of these populations. To address this threat, interagency efforts are continuing to provide and maintain movement opportunities for grizzly bears, and reestablish natural connectivity and gene flow among all grizzly bear populations in the lower-48 States.

However, because of the small population sizes in the in CYE and SE, isolation is still a potential threat to the resiliency of these grizzly bear populations. Trans-boundary connectivity has been observed in the NCDE and limited demographic and genetic connectivity has been observed between Canadian populations and the SE and Yaak portion of the CYE. While gene flow has not yet been documented between the CYE and SE, movements between the CYE, SE, BE, and NCDE, and between the CYE, SE, and NCDE and Canada have increased. In addition, the estimated distribution of the NCDE grizzly

bear population is within 7 km (4.3 mi) of the BE recovery zone and there are multiple verified sightings between the GYE and NCDE distributions and the BE (figure 2).

***Changes in Food Resources:*** There are no indications that the availability of foods, other than whitebark pine nuts, cutthroat trout, and salmon, or the diets of grizzly bears have changed in the NCDE, CYE, SE, BE, and North Cascades in the last several decades. Although grizzly bears in the GYE have experienced a decline in the availability of whitebark pine nuts and cutthroat trout, bears are finding sufficient alternative food resources to maintain body condition. We anticipate that grizzly bears will be able to adapt to any future potential changes in individual food sources because of the great plasticity of grizzly bear diets and the range of available foods, as long as there are sufficiently large intact, blocks of land available.

***Climate Change:*** Most grizzly bear biologists in the United States and Canada do not expect habitat changes predicted under climate change scenarios to directly threaten grizzly bears (Servheen and Cross 2010, p. 4). Climate change may even make habitat more suitable and food sources more abundant (Servheen and Cross 2010, Appendix D). Timing and frequency of human-grizzly bear interactions and conflicts may change (Servheen and Cross 2010, p. 4). We expect that conservation plans and strategies and mortality limits will limit negative effects of climate change on grizzly bears.

***Catastrophic Events:*** In the SSA, we considered catastrophic and stochastic (random probability) events that might reasonably occur in the each of the ecosystems within the 30 to 45-year future, to the extent possible including fire, volcanic activity, and earthquakes (Service 2020, pg. ). Most catastrophic events discussed in the SSA are unpredictable and unlikely to occur within the biologically meaningful timeframe for our SSA. Other events that might occur within the future would likely cause only localized and temporary impacts that would not significantly reduce the resiliency of any of the six ecosystems.

Essentially, the management response to all these potential threats would be to limit human-caused mortality through conflict prevention and management as well as managing discretionary mortality. Because of the manageable nature of these potential threats through conflict prevention and response efforts and the large amount of suitable, secure habitat within the GYE, we do not expect these other natural or manmade factors to become threats to the GYE grizzly bear population. Likewise, the NCDE grizzly bear population has experienced population growth and range expansion since 1993 (Dood *et al.* 1986, p. 164; Kendall *et al.* 2009, p. 3; Mace *et al.* 2012, p. 124; Costello *et al.* 2016, p. 2; Costello 2018, *in litt.*; Costello and Roberts 2019, p. 10; MFWP, unpublished data), in spite of potential threats from disease, predation, genetic health, potential changes in food resources, climate change, and catastrophic events. Many of these are infrequent and unpredictable and are not currently a significant concern for the NCDE population.

***Factor A: The present or threatened destruction, modification, or curtailment of its habitat or range***

A variety of conservation efforts or mechanisms, such as the Wilderness Act, IRAs, and federal land management plans help reduce the potential effects of **motorized access** on the resiliency of ecosystems. Currently, conservation mechanisms have reduced the negative effects of motorized access in the GYE and NCDE, and these conservation mechanisms are expected to continue into the future. Although conservation mechanisms are expected to reduce potential effects of motorized access in the BE recovery zone, additional data are needed to inform potential effects of motorized access in potential connectivity areas to facilitate natural recolonization of the BE. Motorized access remains an issue for the CYE, SE, and North Cascades, where conservation mechanisms to address motorized access are not yet finalized or standards have not been met. Although progress has been made towards meeting the standards in the CYE and SE, additional improvements are needed. One challenge in the CYE and SE is that they have a much lower proportion of protected areas (i.e., federal lands that have wilderness protections) than the other ecosystems (see *Protected Areas* above for further discussion). Additional data are needed to inform the potential effect of motorized access in the North Cascades.

Habitat loss or destruction caused by developed sites, energy and mineral development, livestock allotments, and recreation are not limiting populations in the GYE and NCDE; conservation strategies have reduced negative effects from these stressors in the GYE and NCDE. The Wilderness Act and other regulations reduces these stressors in the North Cascades, CYE, SE, and BE. Additional data would help inform the potential effects of developed sites, livestock allotments, and energy and mineral development on grizzly bear populations in the CYE, SE, BE, and North Cascades.

In the GYE, although there are known, usually temporary, impacts to individual bears from timber management activities, these impacts have been adequately mitigated using the Guidelines in place since 1986, and will continue to be managed at levels acceptable to the grizzly bear population under the 2016 GYE Conservation Strategy. The extent of protected lands inside the recovery zone and management standards in the NCDE Conservation Strategy and land management plans regarding vegetation management, limit potential negative impacts of vegetation management to the NCDE grizzly bear population. Despite potential negative impacts from vegetation management, mortality risk from vegetation management activities are and will continue to be largely mitigated through motorized access standards in the CYE and SE and the "no net loss" policy in the North Cascades.

Only the CYE ecosystem shows evidence of detrimental habitat fragmentation within the ecosystem, between the Yaak and Cabinet Mountains portions due to human settlement, U.S. Hwy. 2, and a busy rail line (Proctor *et al*. 2018, p. 350). Corridors have been identified (Proctor *et al*. 2015, p. 553) and management to re-establish connectivity between these two areas has included non-lethal management of appropriate conflict bears, land purchases, electric fencing programs to rescue attractants and conflicts, and more (Proctor *et al*. 2018, p. 366). There is recent evidence that some movements are starting to take place (Kasworm *et al*. 2020a, p. 32) and functional connectivity remains a management objective.

In the GYE, the large areas of widely distributed suitable habitat on public lands that are protected by federal legislation help to minimize risk posed by human population growth on private lands and ensure that the grizzly bear population continues to meet recovery criteria. In the NCDE, CYE, and SE, State and Federal agencies will continue to assist NGOs and other entities to identify and prioritize potential lands suitable for permanent conservation through easements and other means as much as possible (Servheen *et al*. 1981, pp. 34–35; Dood 2006,

pp. 36, 45; NCDE Subcommittee, Chapter 3; USDA FS 2018d, p. 2; USDA FS 2018e, pp. 70, 131). To facilitate natural recolonization of the BE and the North Cascades, strategies to minimize human-caused mortality will need to be applied in the intervening linkage areas and may include access management.

Many of the stressors faced by grizzly bears are interrelated and could cumulatively impact the GYE or the NCDE grizzly bear populations through excessive grizzly bear mortality. While these numerous stressors on grizzly bear persistence are challenging to conservation, our experience demonstrates it is possible for large carnivore conservation to be compatible with them as long as regulatory mechanisms remain in place (Linnell *et al*. 2001, p. 48), particularly given the rigorous scientific monitoring protocols established for the GYE and NCDE grizzly bear populations. There will always be stressors that influence individuals, and potentially ecosystems, but if these are not causing the population to decline, we do not consider them to reduce resiliency.

## RECOMMENDATION ON SPECIES STATUS

The Act defines an endangered species as any species that is "in danger of extinction throughout all or a significant portion of its range" and a threatened species as any species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." After evaluating threats to the species and assessing the cumulative effects of the threats under the section 4(a)(1) factors, we conclude that GUSG is not currently in danger of extinction, but is likely to become in danger of extinction within the foreseeable future throughout all of its range. Currently, resource conditions are adequate to support the large, stable Gunnison Basin population, with seven additional populations of varying resiliency across the occupied range. Although the current risk of extinction throughout all of its range is low, there is enough risk associated with ongoing threats such that the species is vulnerable and likely to become endangered throughout all of its range within the foreseeable future. Therefore, our review of new information, as documented in our SSA report (Service 2019) and summarized in this 5-year review, does not change our evaluation of species status and the threats affecting the species under the factors in 4(a)(1) of the Act from our last and most recent review of the species (November 20, 2014; 79 FR 69191). Specifically, the continued low population numbers and continued risk of habitat loss, which results in low resiliency for many of the populations, the low redundancy of the species, and low representation across the species' range, support our previous evaluation that GUSG continues to meet the definition of a threatened species under the Act. Therefore, we recommend no change in status to the species at this time.

**U.S. FISH AND WILDLIFE SERVICE**
**5-YEAR REVIEW**
**GRIZZLY BEAR (*Ursus arctos horribilis*)**

**CURRENT CLASSIFICATION:** Threatened

**RECOMMENDATION RESULTING FROM THE 5-YEAR REVIEW:**

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

**APPROPRIATE LISTING/RECLASSIFICATION PRIORITY NUMBER, IF APPLICABLE:** NA

**RECOMMENDATIONS FOR FUTURE ACTIONS:**

- COMPLETE IN JANUARY

**FIELD OFFICE APPROVAL:**

Approve: _____ Date: _____

Noreen Walsh
U.S. Fish and Wildlife Service
Regional Director
Interior Regions 5 and 7

*The lead Field Office must ensure that other offices within the range of the species have been provided adequate opportunity to review and comment prior to the review's completion. The lead field office should document this coordination in the agency record.*

**REFERENCES CITED**

CITE SSA