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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R6–ES–2016–0042; FXES11130900000C6–178–FF09E42000]

RIN 1018–BA41

Endangered and Threatened Wildlife and Plants; Removing the Greater Yellowstone Ecosystem Population of Grizzly Bears from the Federal List of Endangered and Threatened Wildlife

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule; availability of final Grizzly Bear Recovery Plan Supplement: Revised Demographic Criteria.

SUMMARY: The best available scientific and commercial data indicate that the Greater Yellowstone Ecosystem (GYE) population of grizzly bears (*Ursus arctos horribilis*) is a valid distinct population segment (DPS) and that this DPS has recovered and no longer meets the definition of an endangered or threatened species under the Endangered Species Act, as amended (Act). Therefore, we, the U.S. Fish and Wildlife Service (Service), hereby revise the List of Endangered and Threatened Wildlife, under the authority of the Act, by establishing a DPS and removing the GYE grizzly bear DPS. The Service has determined that the GYE grizzly bear population has increased in size and more than tripled its occupied range since being listed as threatened under the Act in 1975 and that threats to the population are sufficiently minimized. The participating States of Idaho, Montana, and Wyoming and Federal agencies have adopted the

necessary post-delisting plans and regulations, which adequately ensure that the GYE population of grizzly bears remains recovered.

Concurrent to this final rule, we are appending the Grizzly Bear Recovery Plan Supplement: Revised Demographic Criteria to the 1993 Recovery Plan. Moreover, prior to publication of this final rule, the Yellowstone Ecosystem Subcommittee finalized the 2016 Conservation Strategy that will guide post-delisting monitoring and management of the grizzly bear in the GYE. Additionally, the U.S. Forest Service finalized in 2006 the Forest Plan Amendment for Grizzly Bear Conservation for the GYE National Forests and made a decision to incorporate this Amendment into the affected National Forests' Land Management Plans. Yellowstone National Park and Grand Teton National Park appended the habitat standards to their Park Superintendent's Compendia, thereby ensuring that these national parks would manage habitat in accordance with the habitat standards. The States of Idaho, Montana, and Wyoming have signed a Tri-State Memorandum of Agreement and enacted regulatory mechanisms to ensure that State management of mortality limits is consistent with the demographic recovery criteria.

DATES: This final rule becomes effective [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE **FEDERAL REGISTER**].

ADDRESSES: Comments and materials received, as well as supporting documentation used in preparation of this final rule, are available for inspection, by appointment, during normal business hours, at the Grizzly Bear Recovery Office, University Hall, Room #309, University of Montana, Missoula, Montana 59812. To make arrangements, call 406–243–4903.

Document availability: This final rule and supporting documents are available on *http://www.regulations.gov* under Docket No. FWS–R6–ES–2016–0042. In addition, certain documents, such as the final 2016 Conservation Strategy, the final Grizzly Bear Recovery Plan Supplement: Revised Demographic Criteria, and a list of references cited, are available at *http://www.fws.gov/mountain-prairie/es/grizzlyBear.php*. The Service will complete the decision file shortly.

FOR FURTHER INFORMATION CONTACT: Dr. Hilary Cooley, Grizzly Bear Recovery Coordinator, U.S. Fish and Wildlife Service, University Hall, Room #309, University of Montana, Missoula, MT 59812; telephone 406–243–4903; facsimile 406–329–3212. For Tribal inquiries, contact Roya Mogadam, Deputy Assistant Regional Director, External Affairs, U.S. Fish and Wildlife Service; telephone: 303–236–4572. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Relay Service at 800–877–8339.

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Executive Summary

(1) Purpose of the Regulatory Action

Section 4 of the Act and its implementing regulations in part 424 of title 50 of the Code of Federal Regulations (50 CFR part 424) set forth the procedures for revising the Federal Lists of Endangered and Threatened Wildlife and Plants. Rulemaking is required to remove a species from these lists. Accordingly, we are issuing this final rule to identify the Greater Yellowstone Ecosystem (GYE) grizzly bear distinct population segment (DPS) and revise the List of Endangered and Threatened Wildlife by removing

the DPS from the List. The population is stable (i.e., no statistical trend in the population trajectory), threats are sufficiently ameliorated, and a post-delisting monitoring and management framework has been developed and has been incorporated into regulatory mechanisms or other operative documents. The best scientific and commercial data available, including our detailed evaluation of information related to the population's trend and structure, indicate that the GYE grizzly bear DPS has recovered and threats have been reduced such that it no longer meets the definition of threatened, or endangered, under the Act. To better articulate demographic criteria that adequately describe a recovered population, we are releasing a supplement to the 1993 Recovery Plan's demographic recovery criteria for this population of grizzly bears. In addition, the 2016 Conservation Strategy was finalized and signed by all partner agencies in December 2016. Identifying the GYE grizzly bear DPS and removing that DPS from the List of Endangered and Threatened Wildlife does not change the threatened status of the remaining grizzly bears in the lower 48 States, which remain protected by the Act.

On September 21, 2009, the U.S. District Court for the District of Montana vacated and remanded the Service's previous final rule establishing and delisting this DPS. The Ninth Circuit Court of Appeals affirmed the district court finding that the Service had not adequately analyzed the effects of whitebark pine as a food source for this DPS, but reversed the district court finding that the Service had permissibly and appropriately considered the 2007 Conservation Strategy under section 4 of the Act. *Greater Yellowstone Coalition* v. *Servheen*, 665 F.3d 1015 (9th Cir. 2011). This final rule completes that remand order by addressing the effects of whitebark pine, as well as the other applicable factors under section 4 of the Act.

(2) Major Provision of the Regulatory Action

This action is authorized by the Act. We are amending 50 CFR 17.11(h) by revising the listing for "Bear, grizzly" under "Mammals" in the List of Endangered and Threatened Wildlife to remove the GYE grizzly bear DPS.

(3) Costs and Benefits

We have not analyzed the costs or benefits of this rulemaking action because the Act precludes consideration of such impacts on listing and delisting determinations. Instead, listing and delisting decisions are based solely on the best scientific and commercial data available regarding the status of the subject species.

Greater Yellowstone Ecosystem (GYE)

The Greater Yellowstone Ecosystem (GYE) refers to the larger ecological system containing and surrounding Yellowstone National Park (YNP). The GYE includes portions of five National Forests; YNP, Grand Teton National Park (GTNP), and the John D. Rockefeller Memorial Parkway (JDR; administered by GTNP); and State, Tribal, and private lands. The GYE is generally defined as those lands surrounding YNP with elevations greater than 1,500 meters (m) (4,900 feet (ft)) (see USDA FS 2004, p. 46; Schwartz *et al.* 2006b, p. 9). While we consider the terms "Greater Yellowstone Area" and "Greater Yellowstone Ecosystem" to be interchangeable, we use GYE in this final rule to be consistent with the 2016 Conservation Strategy. The Primary Conservation Area (PCA) boundary is the same as and replaces the existing Yellowstone Recovery Zone as identified in the *1993 Grizzly Bear Recovery Plan* (USFWS 1993, p. 41) to reflect the paradigm shift from managing for recovery as a listed species under the Act to one of conservation as a non-listed species (figure 1). Monitoring of the demographic

criteria for the GYE grizzly bear population will occur, by the Interagency Grizzly Bear Study Team (IGBST), within the demographic monitoring area (DMA) to ensure a recovered population (figure 1).

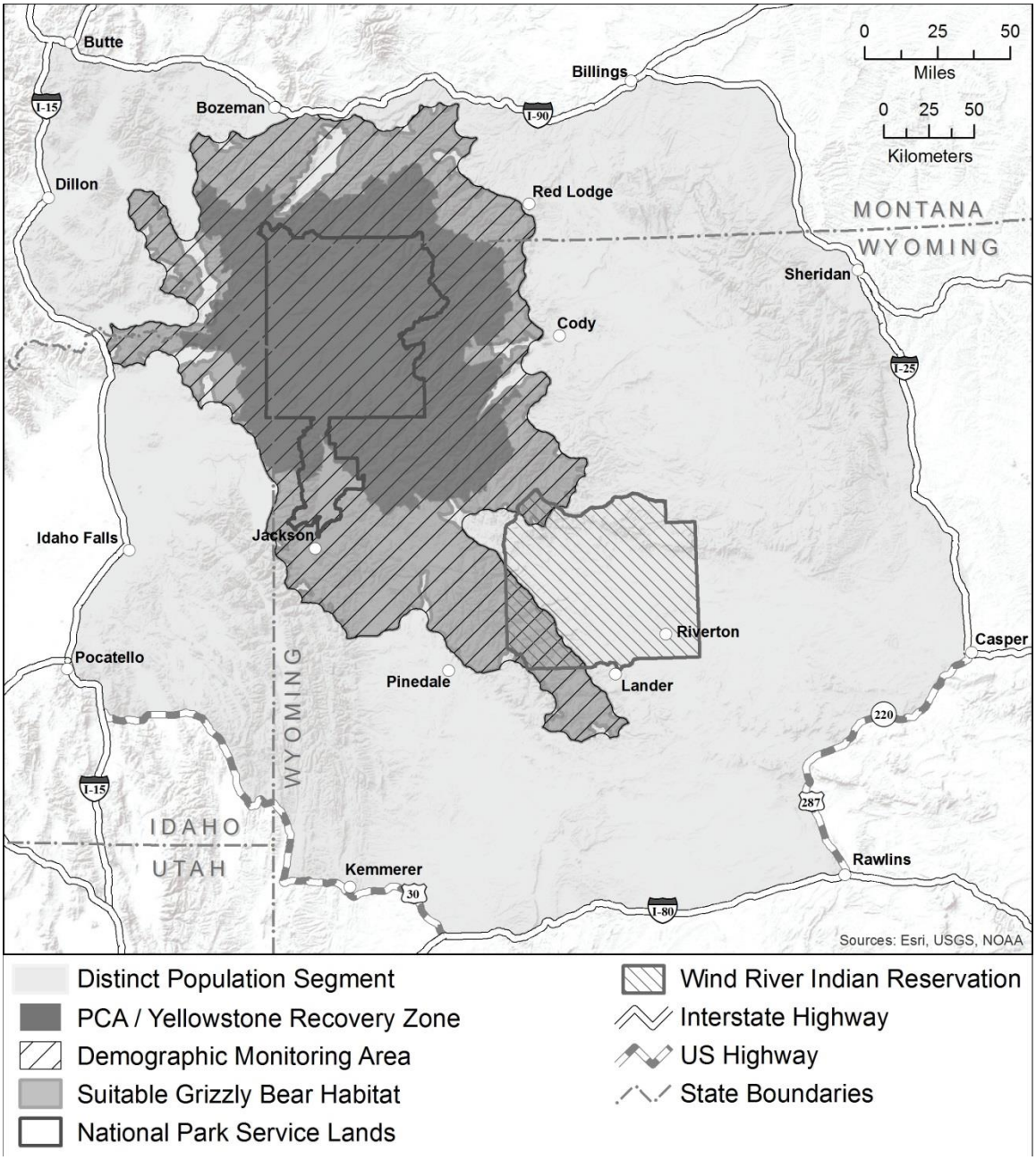

Figure 1. Map of the Greater Yellowstone Ecosystem (GYE). Boundaries are shown for: (1) the GYE grizzly bear Distinct Population Segment; (2) the Primary Conservation Area; (3) the Demographic Monitoring Area; (4) biologically suitable habitat (as defined in Factor A, below); and (5) National Park Service lands. An interactive map of the GYE boundaries is available at *http://usgs.maps.arcgis.com/home/webmap/viewer.html?webmap=78152b8e0bde457ca95918fdd48c5352.*

Previous Federal Actions

On July 28, 1975, we published a rule to designate the grizzly bear as threatened in the conterminous (lower 48) United States (40 FR 31734). Accordingly, we developed a Grizzly Bear Recovery Plan (U.S. Fish and Wildlife Service 1982) and updated that plan as necessary (72 FR 11376, March 13, 2007; U.S. Fish and Wildlife Service 1993, 2007*a*, 2007*b*, 2017). On November 17, 2005, we proposed to designate the GYE population of grizzly bears as a DPS and to remove (delist) this DPS from the Federal List of Endangered and Threatened Wildlife (70 FR 69854). On March 29, 2007, we finalized this proposed action, designating the GYE population as a DPS and removing (delisting) grizzly bears in the GYE from the Federal List of Endangered and Threatened Wildlife (72 FR 14866). This final determination was vacated and remanded by the U.S. District Court for the District of Montana on September 21, 2009, in *Greater Yellowstone Coalition* v. *Servheen, et al.,* 672 F.Supp.2d 1105 (D. Mont. 2009). The District Court ruled against the Service on two of the four points brought against it: That the Service was arbitrary and capricious in its evaluation of whitebark pine and that the identified regulatory mechanisms were inadequate because they were not legally enforceable. In compliance with this order, the GYE grizzly bear population was once again made a threatened population under the Act (16 U.S.C. 1531 et seq.) (see 75 FR 14496, March 26, 2010), and the Service withdrew the delisting rule.

The Service appealed the District Court decision, and on November 15, 2011, the Ninth Circuit Court of Appeals issued an opinion affirming in part and reversing in part the district court's decision vacating and remanding the final rule delisting grizzly bears in the Greater Yellowstone Ecosystem (*Greater Yellowstone Coalition* v. *Servheen, et al.,* 665 F.3d 1015 (9th Cir. 2011)). The Ninth Circuit held that the Service's consideration of the regulatory mechanisms was permissible, but that the Service inadequately explained why the loss of whitebark pine was not a threat to the GYE grizzly bear population. In compliance with this order, the GYE population of grizzly bears remained federally listed as "threatened" under the Act, and the IGBST initiated more thorough research into the potential impact of whitebark pine decline on GYE grizzly bears. In this final rule, among the other findings, we respond to the District Court's remand and the Ninth Circuit's determination that the Service failed to support its conclusion that whitebark pine declines did not threaten GYE grizzly bears.

On March 11, 2016, we proposed to designate the GYE population of grizzly bears as a DPS and to remove (delist) this DPS from the Federal List of Endangered and Threatened Wildlife (81 FR 13174). In addition, our proposed rule included a notice announcing the availability of the draft Grizzly Bear Recovery Plan Supplement: Revised Demographic Criteria and the draft 2016 Conservation Strategy. The proposed rule was followed by a 60-day comment period, during which we held two open houses and two public hearings (81 FR 13174, March 11, 2016). The public comment period was later reopened for an additional 30 days in light of the receipt of five peer reviews and the States of Idaho, Montana, and Wyoming finalizing regulatory mechanisms to manage human-caused mortality of grizzly bears (81 FR 61658, September 7, 2016).

Please refer to the proposed rule for more detailed information on previous Federal actions (81 FR 13174, March 11, 2016).

Background

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 are generally larger than other bears and average 200 to 300 kilograms (kg) (400 to 600 pounds (lb)) for males and 110 to 160 kg (250 to 350 lb) for females in the lower 48 States (Craighead and Mitchell 1982, pp. 517–520; Schwartz *et al*. 2003, p. 558). Although their coloration can vary widely from light brown to nearly black (LeFranc *et al*. 1987, pp. 17–18), they can be distinguished from black bears by longer curved claws, humped shoulders, and a face that appears to be concave (Craighead and Mitchell 1982, p. 517). Grizzly bears are long-lived mammals, generally living to be around 25 years old (LeFranc *et al*. 1987, pp. 47, 51).

Adult grizzly bears are normally solitary except when females have dependent young (Nowak and Paradiso 1983, p. 971), but they are not territorial and home ranges of adult bears frequently overlap (Schwartz *et al.* 2003, pp. 565–566). Home range size is affected by resource availability, sex, age, and reproductive status (LeFranc *et al.* 1987, p. 31; Blanchard and Knight 1991, pp. 48–51; Mace and Waller 1997, p. 48). The annual home ranges of adult male grizzly bears in the GYE are approximately 800 square kilometers (km^2) (309 square miles (mi^2)), while female home ranges are typically smaller, approximately 210 km^2 (81 mi^2) (Bjornlie *et al.* 2014b, p. 3). The large home ranges of grizzly bears, particularly males, enhance maintenance of genetic diversity in

the population by enabling males to mate with numerous females (Blanchard and Knight 1991, pp. 46–51; Craighead *et al.* 1998, p. 326).

Grizzly bears are extremely omnivorous, display great diet plasticity—even within a population (Edwards *et al*. 2011, pp. 883–886)—and shift and switch food habits according to their availability (Servheen 1983, pp. 1029–1030; Mace and Jonkel 1986, p. 108; LeFranc *et al.* 1987, pp. 113–114; Aune and Kasworm 1989, pp. 63–71; Schwartz *et al.* 2003, pp. 568–569; Gunther *et al.* 2014, p. 65). Gunther *et al.* (2014, p. 65) conducted an extensive literature review and documented over 260 species of foods consumed by grizzly bears in the GYE, representing 4 of the 5 kingdoms of life. The ability to use whatever food resources are available is one reason grizzly bears are the most widely distributed bear species in the world, occupying habitats from deserts to alpine mountains and everything in between. This ability to live in a variety of habitats and eat a wide array of foods makes grizzly bears a generalist species.

Grizzly bears use a variety of habitats in the GYE (LeFranc *et al.* 1987, p. 120). In general, a grizzly bear's individual habitat needs and daily movements are largely driven by the search for food, mates, cover, security, or den sites. The available habitat for bears is also influenced by people and their activities. Human activities are the primary factor impacting habitat security and the ability of bears to find and access foods, mates, cover, and den sites (Mattson *et al.* 1987, pp. 269–271; McLellan and Shackleton 1988, pp. 458–459; McLellan 1989, pp. 1862–1864; Mace *et al.* 1996, pp. 1402–1403; Nielsen *et al.* 2006, p. 225; Schwartz *et al.* 2010, p. 661). Other factors influencing habitat use and function for grizzly bears include overall habitat productivity (e.g., food distribution and abundance), the availability of habitat components (e.g., denning areas,

cover types), grizzly bear social dynamics, learned behavior and preferences of individual grizzly bears, grizzly bear population density, and random variation (LeFranc *et al.* 1987, p. 120).

For detailed information on the biology of this species, see the "Taxonomy and Species Description, Behavior and Life History, Nutritional Ecology, and Habitat Management" sections of the March 11, 2016, proposed rule Removing the Greater Yellowstone Ecosystem Population of Grizzly Bears from the Federal List of Endangered and Threatened Wildlife; proposed rule (81 FR 13176–13186).

Population Ecology—Background

The scientific discipline that informs decisions about most wildlife population management is population ecology: the study of how populations change over time and space and interact with their environment (Vandermeer and Goldberg 2003, p. 2; Snider and Brimlow 2013, p. 1). Ultimately, the goal of population ecology is to understand why and how populations change over time. Wildlife managers and population ecologists monitor a number of factors to gauge the status of a population and make scientifically informed decisions. These measures include population size, population trend, density, and current range.

While population size is a well-known and easily understood metric, it only provides information about a population at a single point in time. Wildlife managers often want to know how a population is changing over time and why. Population trend is determined by births, deaths, and how many animals move into or out of the population (i.e., disperse) and is typically expressed as the population growth rate (represented by the symbol λ, the Greek letter "lambda"). For grizzly bear populations, lambda estimates

the average rate of annual growth, with a value of 1.0 indicating a stable population trend with no net growth or decline. A lambda value of 1.03 means the population size is increasing at 3 percent per year. Conversely, a lambda value of 0.98 means the population size is decreasing at 2 percent per year.

In its simplest form, population trend is driven by births and deaths. Survival and reproduction are the fundamental demographic vital rates driving whether the grizzly bear population increases, decreases, or remains stable. When wildlife biologists refer to demographic vital rates, they are referring to all of the different aspects of reproduction and survival that cumulatively determine a population's trend (i.e., lambda). Some of the demographic factors influencing population trend for grizzly bears are age-specific survival, sex-specific survival, average number of cubs per litter, the time between litters (i.e., interbirth interval), age ratios, sex ratios, average age of first reproduction, lifespan, transition probabilities (see *Glossary*), immigration, and emigration. These data are all used to determine if and why a population is increasing or decreasing (Anderson 2002, p. 53; Mills 2007, p. 59; Mace *et al.* 2012, p. 124).

No population can grow forever because the resources it requires are finite. This understanding led ecologists to develop the concept of carrying capacity (expressed as the symbol "K"). This is the maximum number of individuals a particular environment can support over the long term without resulting in population declines caused by resource depletion (Vandermeer and Goldberg 2003, p. 261; Krebs 2009, p. 148). Classical studies of population growth occurred under controlled laboratory conditions where populations of a single organism, often an insect species or single-celled organism, were allowed to grow in a confined space with a constant supply of food (Vandermeer and

Goldberg 2003, pp. 14–17). Under these conditions, K is a constant value that is approached in a predictable way and can be described by a mathematical equation. However, few studies of wild populations have demonstrated the stability and constant population size suggested by this equation. Instead, many factors affect carrying capacity of animal populations in the wild, and carrying capacity itself typically varies over time. Populations usually fluctuate above and below carrying capacity, resulting in relative population stability over time (i.e., lambda value of approximately 1.0 over the long term) (Colinvaux 1986, pp. 138–139, 142; Krebs 2009, p. 148). For populations at or near carrying capacity, population size may fluctuate just above and below carrying capacity around a long-term mean, sometimes resulting in annual estimates of lambda showing a declining population (figure 2). However, to obtain a biologically meaningful estimate of average annual population growth rate for a long-lived species like the grizzly bear that reproduces only once every 3 years and does not start reproducing until at least 4 years old, we must examine lambda over a longer period of time to see what the average trend is over that specified time. This is not an easy task. For grizzly bears, it takes at least 6 years of monitoring as many as 30 females with radio-collars to accurately estimate average annual population growth (Harris *et al.* 2011, p. 29).

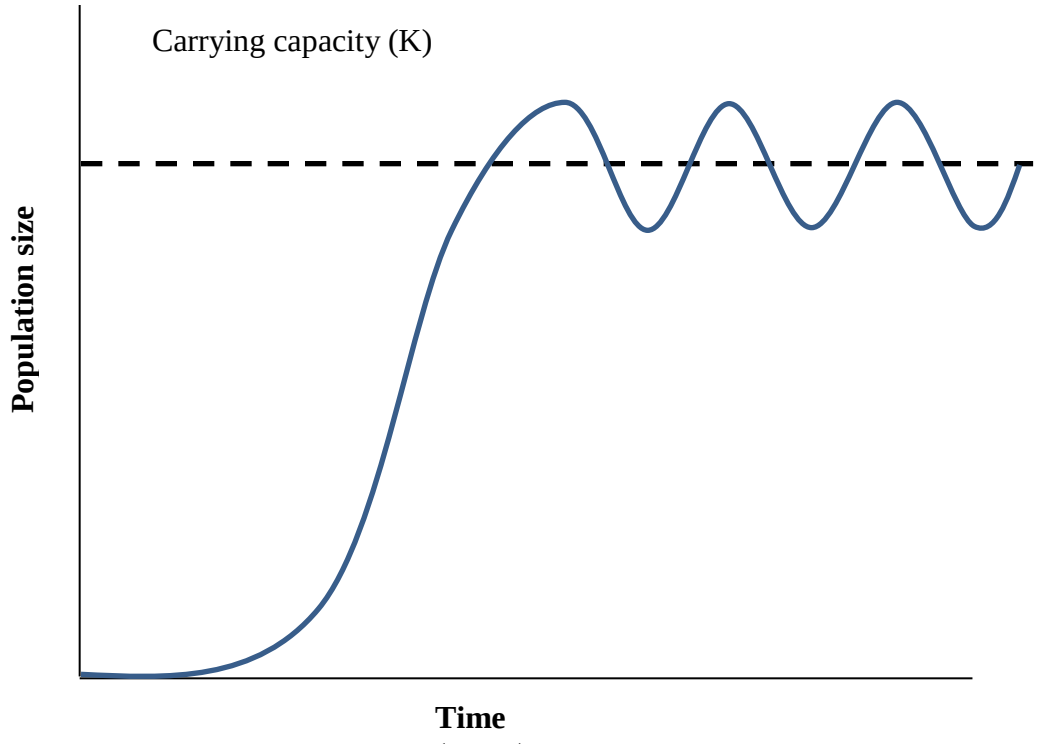

Figure 2. Typical population trend with respect to carrying capacity (K). When the population is low, growth rate is rapid. When the population is at or near K, growth rates decelerate and may temporarily decrease as population size fluctuates around K. This figure has been edited to show that fluctuations are typically larger than what was depicted in the proposed rule.

When a population is at or near carrying capacity, mechanisms that regulate or control population size fall into two broad categories: density-dependent effects and density-independent effects. Generally, factors that limit population growth more strongly as population size increases are density-dependent effects, or intrinsic factors, usually expressed through individual behaviors, physiology, or genetic potential (McLellan 1994, p. 15). Extrinsic factors, such as drought or fire that kill individuals regardless of how many individuals are in a population, are considered density-independent effects (Colinvaux 1986, p. 172). These extrinsic factors may include changes in resources, predators, or human impacts and may cause carrying capacity to

vary over time. Population stability (i.e., fluctuation around carrying capacity or a long-term equilibrium) is often influenced by a combination of density-dependent and density-independent effects. Among grizzly bears, indicators of density-dependent population regulation can include: (1) decreased yearling and cub survival due to increases in intraspecific killing (i.e., bears killing other bears), (2) decreases in home range size, (3) increases in generation time, (4) increases in age of first reproduction, and (5) decreased reproduction (McLellan 1994, entire; Eberhardt 2002, pp. 2851–2852; Kamath *et al.* 2015, p. 5516; van Manen *et al*. 2016, pp. 307–308). Indicators that density-independent effects are influencing population growth can include: (1) larger home range sizes (because bears are roaming more widely in search of foods) (McLoughlin *et al.* 2000, pp. 49–51), (2) decreased cub and yearling survival due to starvation, (3) increases in age of first reproduction due to limited food resources, and (4) decreased reproduction due to limited food resources.

As a result of these sometimes similar indicators, determining whether a population is affected more strongly by density-dependent or density-independent effects can be a complex undertaking. For long-lived mammals such as grizzly bears, extensive data collected over decades are needed to understand if and how these factors are operating in a population. We have these data for the GYE grizzly bear population, and the IGBST examined some of these confounding effects to find that density-dependent effects are the likely cause of the recent slowing in population growth factors. The slowing of population growth since the early 2000s was primarily a function of lower survival of dependent young and moderate reproductive suppression (IGBST 2012, p. 8). Survival of cubs-of-the-year and reproduction were lower in areas with higher grizzly

bear densities but showed no association with estimates of decline in whitebark pine tree cover, suggesting that density-dependent factors contributed to the change in population growth (van Manen *et al*. 2016, entire). In addition, female home range sizes have decreased in areas of greater bear densities, as would be expected if density-dependent regulation is occurring (Bjornlie *et al.* 2014b, p. 4) (see *Changes in Food Resources* under *Factor E*, below, for more detailed information).

Population viability analyses (PVAs) are another tool population ecologists often use to assess the status of a population by estimating its likelihood of persistence in the future. Boyce *et al.* (2001, pp. 1–11) reviewed the existing published PVAs for GYE grizzly bears and updated these previous analyses using data collected since the original analyses were completed. They also conducted new PVAs using two software packages that had not been available to previous investigators. They found that the GYE grizzly bear population had a 1 percent chance of going extinct within the next 100 years and a 4 percent chance of going extinct in the next 500 years (Boyce *et al.* 2001, pp. 1, 10–11). The authors cautioned that their analyses were not entirely sufficient because they were not able to consider possible changes in habitat and how these may affect population vital rates (Boyce *et al.* 2001, pp. 31–32). Based on the recommendation that the population models incorporate habitat variables, Boyce worked with other researchers to develop a habitat-based framework for evaluating mortality risk of a grizzly bear population in Alberta, Canada (Nielsen *et al.* 2006, p. 225). They concluded that secure habitat (low mortality risk) was the key to grizzly bear survival. Schwartz *et al.* (2010, p. 661) created a similar mortality risk model for the GYE with similar results. Both studies suggest that

managing for secure habitat is one of the most effective management actions to ensure population persistence.

Recovery Planning and Implementation

Background

Prior to the arrival of Europeans, the grizzly bear occurred throughout the western half of the contiguous United States, central Mexico, western Canada, and most of Alaska (Roosevelt 1907, pp. 27–28; Wright 1909, pp. vii, 3, 185–186; Merriam 1922, p. 1; Storer and Tevis 1955, p. 18; Rausch 1963, p. 35; Herrero 1972, pp. 224–227; Schwartz *et al.* 2003, pp. 557–558). Pre-settlement population levels for the western contiguous United States are believed to have been in the range of 50,000 animals (Servheen 1999, p. 50). With European settlement of the American West and government-funded bounty programs aimed at eradication, grizzly bears were shot, poisoned, and trapped wherever they were found, and the resulting declines in range and population were dramatic (Roosevelt 1907, pp. 27–28; Wright 1909, p. vii; Storer and Tevis 1955, pp. 26–27; Leopold 1967, p. 30; Koford 1969, p. 95; Craighead and Mitchell 1982, p. 516; Servheen 1999, pp. 50–51). The range and numbers of grizzly bears were reduced to less than 2 percent of their former range and numbers by the 1930s, approximately 125 years after first contact with European settlers (USFWS 1993, p. 9; Servheen 1999, p. 51). Of 37 grizzly bear populations present within the lower 48 States in 1922, 31 were extirpated by 1975 (Servheen 1999, p. 51).

By the 1950s, with little or no conservation effort or management directed at maintaining grizzly bears anywhere in their range, the GYE population had been reduced in numbers and was restricted largely to the confines of YNP and some surrounding areas

(Craighead *et al.* 1995, pp. 41–42; Schwartz *et al.* 2003, pp. 575–579). High grizzly bear mortality in 1970 and 1971, following closure of the open-pit garbage dumps in YNP (Gunther 1994, p. 550; Craighead *et al.* 1995, pp. 34–36), and concern about grizzly bear population status throughout its remaining range prompted the 1975 listing of the grizzly bear as a threatened species in the lower 48 States under the Act (40 FR 31734, July 28, 1975). When the grizzly bear was listed in 1975, the population estimate in the GYE ranged from 136 to 312 individuals (Cowan *et al.* 1974, pp. 32, 36; Craighead *et al.* 1974, p. 16; McCullough 1981, p. 175).

Grizzly bear recovery has required, and will continue to require, cooperation among numerous government agencies and the public for a unified management approach. To this end, there are three interagency groups that help guide grizzly bear management in the GYE. The IGBST, created in 1973, provides the scientific information necessary to make informed management decisions about grizzly bear habitat and conservation in the GYE. Since its formation in 1973, the published work of the IGBST has made the GYE grizzly bear population the most studied in the world. The wealth of biological information produced by the IGBST over the years includes 30 annual reports, hundreds of articles in peer-reviewed journals, dozens of theses, and other technical reports (see: *https://www.usgs.gov/science/interagency-grizzly-bear-study-team?qt-science_center_objects=4#qt-science_center_objects*). Members of the IGBST include scientists and wildlife managers from the Service, U.S. Geological Survey (USGS), National Park Service (NPS), U.S. Forest Service (USFS), academia, and each State wildlife agency involved in grizzly bear recovery.

The second interagency group guiding grizzly bear conservation efforts is the Interagency Grizzly Bear Committee (IGBC). Created in 1983, its members coordinate management efforts and research actions across multiple Federal lands and States to recover the grizzly bear in the lower 48 States (USDA and USDOI 1983, entire). One of the objectives of the IGBC is to change land management practices to more effectively provide security and maintain or improve habitat conditions for the grizzly bear (USDA and USDOI 1983, entire). IGBC members include upper level managers from the Service, USFS, USGS, Bureau of Land Management (BLM), and the States of Idaho, Montana, Washington, and Wyoming (USDA and USDOI 1983, entire). The IGBST Team Leader, the National Carnivore Program Leader, and the Service Grizzly Bear Recovery Coordinator are advisors to the subcommittee providing all the scientific information on the GYE grizzly bear population and its habitat.

The third interagency group guiding management of the GYE grizzly bear is a subcommittee of the IGBC: the Yellowstone Ecosystem Subcommittee (YES). Formed in 1983 to coordinate recovery efforts specific to the GYE, the YES includes mid-level managers and representatives from the Service; the five GYE National Forests (the Shoshone, Beaverhead-Deerlodge, Bridger-Teton, Custer Gallatin, and Caribou-Targhee); YNP; GTNP; the Wyoming Game and Fish Department (WGFD); the Montana Department of Fish, Wildlife, and Parks (MFWP); the Idaho Department of Fish and Game (IDFG); the BLM; county governments from each affected State; and the Shoshone Bannock, Northern Arapahoe, and Eastern Shoshone Tribes (USDA and USDOI 1983). The IGBST Team Leader and the Service Grizzly Bear Recovery Coordinator are advisors to the subcommittee providing all the scientific information on

the GYE grizzly bear population and its habitat. Upon implementation of the 2016 Conservation Strategy, the Yellowstone Grizzly Bear Coordinating Committee (YGCC) will replace the YES.

Recovery Planning

In accordance with section 4(f)(1) of the Act, the Service completed a Grizzly Bear Recovery Plan (Recovery Plan) in 1982 (USFWS 1982, p. ii). Recovery plans serve as road maps for species recovery—they lay out where we need to go and how to get there through specific actions. Recovery plans are not regulatory documents and are instead intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved.

The Recovery Plan identified six recovery ecosystems within the conterminous United States thought to support grizzly bears. Today, current grizzly bear distribution is primarily within and around the areas identified as Recovery Zones (USFWS 1993, pp. 10–13, 17–18), including: (1) the GYE in northwestern Wyoming, eastern Idaho, and southwestern Montana (24,000 km^2 (9,200 mi^2)) at more than 700 bears (Haroldson *et al.* 2014, p. 17); (2) the Northern Continental Divide Ecosystem (NCDE) of north-central Montana (25,000 km^2 (9,600 mi^2)) at more than 900 bears (Kendall *et al.* 2009, p. 9; Mace *et al.* 2012, p. 124); (3) the North Cascades area of north-central Washington (25,000 km^2 (9,500 mi^2)) at fewer than 20 bears (last documented sighting in 1996) (Almack *et al.* 1993, p. 4; NPS and USFWS 2015, p. 3); (4) the Selkirk Mountains area of northern Idaho, northeastern Washington, and southeastern British Columbia (5,700 km^2 (2,200 mi^2)) at approximately 88 bears (USFWS 2011, p. 26); and (5) the Cabinet-

Yaak area of northwestern Montana and northern Idaho (6,700 km^2 (2,600 mi^2)) at approximately 48 bears (Kendall *et al.* 2016, p. 314). The Bitterroot Ecosystem in the Bitterroot Mountains of central Idaho and western Montana (14,500 km^2 (5,600 mi^2)) is not known to contain a population of grizzly bears at this time (USFWS 1996, p. 1; 65 FR 69624, November 17, 2000; USFWS 2000, pp. 1–3). The San Juan Mountains of Colorado also were identified as an area of possible grizzly bear occurrence (40 FR 31734, July 28, 1975; USFWS 1982, p. 12; USFWS 1993, p. 11), but no confirmed sightings of grizzly bears have occurred there since a grizzly bear mortality in 1979 (USFWS 1993, p. 11).

In 1993, the Service completed revisions to the Recovery Plan to include additional tasks and new information that increased the focus and effectiveness of recovery efforts (USFWS 1993, pp. 41–58). In 1996 and 1997, we released supplemental chapters to the Recovery Plan to direct recovery in the Bitterroot and North Cascades Recovery Zones, respectively (USFWS 1996; USFWS 1997). In the GYE, we updated both the habitat and demographic recovery criteria in 2007 (72 FR 11376, March 13, 2007). We proposed revisions to the demographic recovery criteria in 2013 (78 FR 17708, March 22, 2013) and proposed additional revisions concurrent with the proposed rule (81 FR 13174, March 11, 2016) to reflect the best available science. Although it is not necessary to update recovery plans prior to delisting, the *Recovery Plan Supplement: Revised Demographic Recovery Criteria* was updated to reflect the best available science because the 2016 Conservation Strategy directly incorporates the Recovery Plan for post-delisting monitoring. The final revised demographic recovery criteria are appended to

the Recovery Plan concurrent with this final rule. Below, we report the status of both the habitat and demographic recovery criteria in the GYE.

In 1979, the IGBST developed the first comprehensive "Guidelines for Management Involving Grizzly Bears in the Greater Yellowstone Area" (hereafter referred to as the Guidelines) (Mealey 1979, pp. 1–4). We determined in a biological opinion that implementation of the Guidelines by Federal land management agencies would promote conservation of the grizzly bear (USFWS 1979, p. 1). Beginning in 1979, the five affected National Forests (Beaverhead-Deerlodge, Bridger-Teton, Caribou-Targhee, Custer Gallatin, and Shoshone), YNP and GTNP, and the BLM in the GYE began managing habitats for grizzly bears under direction specified in the Guidelines.

In 1986, the IGBC modified the Guidelines to more effectively manage habitat by mapping and managing according to three different management situations (USDA FS 1986, pp. 35–39). In areas governed by "Management Situation One," grizzly bear habitat maintenance and improvement and grizzly bear–human conflict minimization received the highest management priority. In areas governed by "Management Situation Two," grizzly bear use was important, but not the primary use of the area. In areas governed by "Management Situation Three," grizzly bear habitat maintenance and improvement were not management considerations.

The National Forests and National Parks delineated 18 different bear management units (BMUs) within the GYE Recovery Zone to aid in managing habitat and monitoring population trends. Each BMU was further subdivided into subunits, resulting in a total of 40 subunits contained within the 18 BMUs (see map at *http://www.fws.gov/mountain-*

prairie/es/species/mammals/grizzly/Yellowstone_Recovery_Zone_map.pdf). The BMUs are analysis areas that approximate the lifetime size of a female's home range, while subunits are analysis areas that approximate the annual home range size of adult females. Subunits provide the optimal scale for evaluation of seasonal feeding opportunities and landscape patterns of food availability for grizzly bears (Weaver *et al.* 1986, p. 236). The BMUs and subunits were identified to provide enough quality habitat and to ensure that grizzly bears were well distributed across the GYE Recovery Zone as per the Recovery Plan (USFWS 2007*c*, pp. 20, 41, 44–46). Management improvements made as a result of these Guidelines are discussed under *Factor A*, below.

Habitat-Based Recovery Criteria

On June 17, 1997, we held a public workshop in Bozeman, Montana, to develop and refine habitat-based recovery criteria for the grizzly bear, with an emphasis on the GYE. This workshop was held as part of the settlement agreement in *Fund for Animals* v. *Babbitt*, 967 F.Supp.6 (D. D.C. 1997). A *Federal Register* notice notified the public of this workshop and provided interested parties an opportunity to participate and submit comments (62 FR 19777, April 23, 1997). After considering 1,167 written comments, we developed biologically based habitat recovery criteria, which were appended to the 1993 Recovery Plan in 2007 (USFWS 2007*b*, entire), with the overall goal of maintaining or improving habitat conditions at levels that existed in 1998.

There is no published method to deductively calculate minimum habitat values required for a healthy and recovered population. Grizzly bears are long-lived opportunistic omnivores whose food and space requirements vary depending on a multitude of environmental and behavioral factors and on variation in the experience and

knowledge of each individual bear. Grizzly bear home ranges overlap and change seasonally, annually, and with reproductive status. While these factors make the development of threshold habitat criteria difficult, these may be established by assessing what habitat factors in the past were compatible with a stable to increasing grizzly bear population, and then using these habitat conditions as threshold values to be maintained to ensure a healthy population (i.e., a "no net loss" approach), as suggested by Nielsen *et al.* (2006, p. 227). We selected 1998 levels as our baseline year because it was known that habitat values at that time were compatible with an increasing grizzly bear population throughout the 1990s (Harris *et al*. 2006, p. 48) and that the levels of both secure habitat and the number and capacity of developed sites (those sites or facilities on federal public land with features intended to accommodate public use or recreation) had changed little from 1988 to 1998 (USDA FS 2004, pp. 140–141, 159–162). The 1998 baseline is also described in detail in *Factor A*, below.

The habitat-based recovery criteria established objective, measurable values for levels of motorized access, secure habitat, developed sites, and livestock allotments (i.e., "the 1998 baseline") for the GYE. The 1998 values will not change through time, unless improvements benefit bears (e.g., expansion of existing administrative sites to enhance public land management if other viable alternatives are not available, modifications to dispersed or developed sites to reduce grizzly bear conflicts, such as installing bear-resistant storage structures). As each of these management objectives are central to potential present or threatened destruction, modification, or curtailment of habitat or range, they are discussed in detail under *Factor A*, below. These habitat-based recovery

criteria have been met since their incorporation into the Recovery Plan (USFWS 2007*b*, entire).

Additionally, we developed several monitoring items that may help inform management decisions or explain population trends: (1) trends in the location and availability of food sources such as whitebark pine (*Pinus albicaulis*), cutthroat trout (*Oncorhynchus clarki*), army cutworm moths (*Euxoa auxiliaris*), and ungulates (bison (*Bison bison*) and elk (*Cervus canadensis*)); and (2) grizzly bear mortality numbers, locations, and causes; grizzly bear–human conflicts; conflict bear management actions; bear-hunter conflicts; and bear-livestock conflicts (YES 2016a, pp. 33–91). Federal and State agencies monitor these items, and the IGBST produces an annual report with their results. This information is used to examine relationships between food availability, human activity, and demographic parameters of the population such as survival, population growth, or reproduction. The habitat-based recovery criteria were appended to the Recovery Plan in 2007 and are included in the 2016 Conservation Strategy, which is the comprehensive post-delisting management plan for a recovered population as called for in the Recovery Plan.

Suitable Habitat

Because we used easily recognized boundaries to delineate the boundaries of the GYE grizzly bear DPS, it includes both suitable and unsuitable habitat (figure 1). For the purposes of this final rule, "suitable habitat" is considered the area within the DPS boundaries capable of supporting grizzly bear reproduction and survival now and in the foreseeable future. We have defined "suitable habitat" for grizzly bears as areas having three characteristics: (1) being of adequate habitat quality and quantity to support grizzly

bear reproduction and survival; (2) being contiguous with the current distribution of GYE grizzly bears such that natural recolonization is possible; and (3) having low mortality risk as indicated through reasonable and manageable levels of grizzly bear mortality.

Our definition and delineation of suitable habitat is built on the widely accepted conclusions of extensive research (Craighead 1980, pp. 8–11; Knight 1980, pp. 1–3; Peek *et al.* 1987, pp. 160–161; Merrill *et al.* 1999, pp. 233–235; Schwartz *et al.* 2010, p. 661) that grizzly bear reproduction and survival is a function of both the biological needs of grizzly bears and remoteness from human activities, which minimizes mortality risk for grizzly bears. Mountainous areas provide hiding cover, the topographic variation necessary to ensure a wide variety of seasonal foods, and the steep slopes used for denning (Judd *et al.* 1986, pp. 114–115; Aune and Kasworm 1989, pp. 29–58; Linnell *et al.* 2000, pp. 403–405). Higher elevation, mountainous regions in the GYE (Omernik 1987, pp. 118–125; Omernik 1995, pp. 49–62; Woods *et al.* 1999, entire; McGrath *et al.* 2002, entire; Chapman *et al.* 2004, entire) contain high-energy foods such as whitebark pine seeds (Mattson and Jonkel 1990, p. 223; Mattson *et al.* 1991*a*, p. 1623) and army cutworm moths (Mattson *et al.* 1991*b*, 2434; French *et al.* 1994, p. 391).

For our analysis of suitable habitat, we considered the Middle Rockies ecoregion, within which the GYE is contained (Omernik 1987, pp. 120–121; Woods *et al.* 1999, entire; McGrath *et al.* 2002, entire; Chapman *et al.* 2004, entire), to meet grizzly bear biological needs providing food, seasonal foraging opportunities, cover, and denning areas (Mattson and Merrill 2002, p. 1125). Although grizzly bears historically occurred throughout the area of the proposed GYE grizzly bear DPS (Stebler 1972, pp. 297–298), today many of these habitats are not biologically suitable for grizzly bears. While there

are records of grizzly bears in eastern Wyoming near present-day Sheridan, Casper, and Wheatland, even in the early 19th century, indirect evidence suggests that grizzly bears were less common in these eastern prairie habitats than in mountainous areas to the west (Rollins 1935, p. 191; Wade 1947, p. 444).

Grizzly bear presence in these drier, grassland habitats was associated with rivers and streams where grizzly bears used bison carcasses as a major food source (Burroughs 1961, pp. 57–60; Herrero 1972, pp. 224–227; Stebler 1972, pp. 297–298; Mattson and Merrill 2002, pp. 1128–1129). Most of the short-grass prairie on the east side of the Rocky Mountains has been converted into agricultural land (Woods *et al.* 1999, entire), and high densities of traditional food sources are no longer available due to land conversion and human occupancy of urban and rural lands. Traditional food sources such as bison and elk have been reduced and replaced with domestic livestock such as cattle, sheep, chickens, goats, pigs, and bee hives, which can become anthropogenic sources of prey for grizzly bears. While food sources such as grasses and berries are abundant in some years in the riparian zones within which the bears travel, these are not reliable every year and can only support a small number of bears. These nutritional constraints and the potential for human-bear conflicts limit the potential for a self-sustaining population of grizzly bears to develop in the prairies, although we expect some grizzly bears to live in these areas. Because wild bison herds no longer exist in these areas, and are mainly contained within YNP in the GYE, they are no longer capable of contributing in a meaningful way to the overall status of the GYE grizzly bear DPS. Thus, we did not include drier sagebrush, prairie, or agricultural lands within our definition of suitable habitat because these land types no longer contain adequate food resources (i.e., bison) to

support grizzly bears. Figure 1 illustrates suitable habitat within the GYE grizzly bear DPS.

Although there are historical records of grizzly bears throughout the GYE DPS, evidence suggests that grizzly bears were less common in prairie habitats (Rollins 1935, p. 191; Wade 1947, p. 444). Bears in these peripheral areas will not establish self-sustaining, year-round populations due to a lack of suitable habitat, land ownership patterns, and the lack of traditional, natural grizzly bear foods (i.e., bison). Instead, bears in these peripheral areas will likely always rely on the GYE grizzly bear population inside the DMA as a source population. Grizzly bears in these peripheral areas are not biologically necessary to the GYE grizzly bear population and a lack of occupancy outside the DMA boundaries in peripheral areas will not impact whether the GYE population is likely to become endangered or threatened in the foreseeable future throughout all or a significant portion of its range. Grizzly bear recovery in these portions of the species' historical range is unnecessary, because there is more than enough suitable habitat to support a viable and recovered grizzly bear population as set forth in the demographic recovery criteria. Therefore, additional recovery efforts in these areas are beyond what is required by the Act.

Human-caused mortality risk also can impact which habitat might be considered suitable. Some human-caused mortality is unavoidable in a dynamic system where hundreds of bears inhabit large areas of diverse habitat with several million human visitors and residents. The negative impacts of humans on grizzly bear survival and habitat use are well documented (Harding and Nagy 1980, p. 278; McLellan and Shackleton 1988, pp. 458–459; Aune and Kasworm 1989, pp. 83–103; McLellan 1989,

pp. 1862–1864; McLellan and Shackleton 1989, pp. 377–378; Mattson 1990, pp. 41–44; Mattson and Knight 1991, pp. 9–11; Mace *et al.* 1996, p. 1403; McLellan *et al.* 1999, pp. 914–916; White *et al.* 1999, p. 150; Woodroffe 2000, pp. 166–168; Boyce *et al.* 2001, p. 34; Johnson *et al.* 2004, p. 976; Schwartz *et al.* 2010, p. 661). These effects range from temporary displacement to actual mortality. Grizzly bear persistence in the contiguous United States between 1920 and 2000 was negatively associated with human and livestock densities (Mattson and Merrill 2002, pp. 1129–1134).

As human population densities increase, the frequency of encounters between humans and grizzly bears also increases, resulting in more human-caused grizzly bear mortalities due to a perceived or real threat to human life or property (Mattson *et al.* 1996, pp. 1014–1015). Similarly, as livestock densities increase in habitat occupied by grizzly bears, depredations follow. Although grizzly bears frequently coexist with cattle without depredating them, when grizzly bears encounter domestic sheep, they usually are attracted to such flocks and depredate the sheep (Jonkel 1980, p. 12; Knight and Judd 1983, pp. 188–189; Orme and Williams 1986, pp. 199–202; Anderson *et al.* 2002, pp. 252–253). If repeated depredations occur, managers either relocate the bear or remove it (i.e., euthanize or place in an approved American Zoological Association facility) from the population, resulting in such domestic sheep areas becoming population sinks (areas where death rates exceed birth rates) (Knight *et al.* 1988, pp. 122–123).

Because urban sites and sheep allotments possess high mortality risks for grizzly bears, we did not include these areas as suitable habitat (Knight *et al.* 1988, pp. 122–123). Based on 2000 census data, we defined urban areas as census blocks with human population densities of more than 50 people per km^2 (129 people per mi^2) (U.S. Census

Bureau 2005, entire). Cities within the Middle Rockies ecoregion, such as West Yellowstone, Gardiner, Big Sky, and Cooke City, Montana, and Jackson, Wyoming, were not included as suitable habitat. There are large, contiguous blocks of sheep allotments in peripheral areas of the ecosystem in the Wyoming Mountain Range, the Salt River Mountain Range, and portions of the Wind River Mountain Range on the Bridger-Teton and the Targhee National Forests (see figure 1). This spatial distribution of sheep allotments on the periphery of suitable habitat results in areas of high mortality risk to bears within these allotments and a few small, isolated patches or strips of suitable habitat adjacent to or within sheep allotments. These strips and patches of land possess higher mortality risks for grizzly bears because of their enclosure by and/or proximity to areas of high mortality risk. This phenomenon in which the quantity and quality of suitable habitat is diminished because of interactions with surrounding less suitable habitat is known as an "edge effect" (Lande 1988, pp. 3–4; Yahner 1988, pp. 335–337; Mills 1995, p. 396). Edge effects are exacerbated in small habitat patches with high perimeter-to-area ratios (i.e., those that are longer and narrower) and in wide-ranging species such as grizzly bears because they are more likely to encounter surrounding, unsuitable habitat (Woodroffe and Ginsberg 1998, p. 2126). Due to the negative edge effects of this distribution of sheep allotments on the periphery of current grizzly bear range, our analysis did not classify linear strips and isolated patches of habitat as suitable habitat.

Finally, dispersal capabilities of grizzly bears were considered in our determination of which potential habitat areas might be considered suitable. Although the Bighorn Mountains west of I–90 near Sheridan, Wyoming, are grouped within the Middle Rockies ecoregion, they are not connected to the current distribution of grizzly

bears via suitable habitat or linkage zones, nor are there opportunities for such linkage. The Bighorn Mountains comprise 6,341 km^2 (2,448 mi^2) of habitat that is classified as part of the Middle Rockies ecoregion, but are separated from the current grizzly bear distribution by approximately 100 km (60 mi) of a mosaic of private and BLM lands primarily used for agriculture, livestock grazing, and oil and gas production (Chapman *et al.* 2004, entire). Although there is a possibility that individual bears may emigrate from the GYE to the Bighorn Mountains occasionally, this dispersal distance exceeds the average dispersal distance for both males (30 to 42 km (19 to 26 mi)) and females (10 to 14 km (6 to 9 mi)) (McLellan and Hovey 2001, p. 842; Proctor *et al.* 2004, p. 1108). Without constant emigrants from suitable habitat, the Bighorn Mountains will not support a self-sustaining grizzly bear population. Therefore, due to the fact that this mountain range is disjunct from other suitable habitat and current grizzly bear distribution, our analysis did not classify the Bighorn Mountains as suitable habitat within the GYE grizzly bear DPS boundaries.

Some areas that do not meet our definition of suitable habitat may still be used by grizzly bears (4,635 km^2 (1,787 mi^2)) (Schwartz *et al.* 2002, p. 209; Schwartz *et al.* 2006b, pp. 64–66). The records of grizzly bears in these unsuitable habitat areas are generally due to recorded grizzly bear–human conflicts or to transient animals. These areas are defined as unsuitable due to the high risk of mortality resulting from these grizzly bear–human conflicts. These unsuitable habitat areas may contain grizzly bears but do not support grizzly bear reproduction or survival because bears that repeatedly come into conflict with humans or livestock are usually either relocated or removed from these areas.

According to the habitat suitability criteria described above, the GYE contains approximately 46,035 km^2 (17,774 mi^2) of suitable grizzly bear habitat within the DPS boundaries; or roughly 24 percent of the total area within the DPS boundaries (see figure 1). The Service concluded that this amount of suitable habitat is sufficient to meet all habitat needs of a recovered grizzly bear population and provide ecological resiliency to the population through the availability of widely distributed, high-quality habitat that will allow the population to respond to environmental changes. This amount of secure habitat was chosen because it existed at the time when the population was increasing at a rate of 4 to 7 percent per year (Schwartz *et al.* 2006b, p. 48). Grizzly bears currently occupy about 92 percent of that suitable habitat (42,180 km^2 (16,286 mi^2)) (Fortin-Noreus 2015, *in litt*.) and are expected to occupy the remaining 8 percent in the near future. Grizzly bears have nearly doubled their occupied range since the early 1980s (USFWS 1982, p. 11) and have increased the amount of suitable habitat from the 68 percent that was occupied in the early 2000s (Schwartz *et al*. 2002, pp. 207–209; Schwartz *et al.* 2006b, pp. 64–66). It is important to note that the current grizzly bear occupancy does not mean that equal densities of grizzly bears are found throughout the region. Instead, most grizzly bears (approximately 75 percent of females with cubs-of-the-year) are within the PCA for most or part of each year (Schwartz *et al.* 2006a, pp. 64–66; Haroldson 2014a, *in litt*.). Grizzly bear use of suitable habitat may vary seasonally and annually with different areas being more important than others in some seasons or years (Aune and Kasworm 1989, pp. 48–62). As predicted by Pyare *et al.* (2004, pp. 5–6), grizzly bears have naturally recolonized the vast majority of suitable habitat and currently occupy about 92 percent of suitable habitat (42,180 km^2 (16,286 mi^2)) (Fortin-Noreus 2015, *in litt*.).

Demographic Recovery Criteria

The 1993 Recovery Plan and subsequent supplements to it identified three demographic criteria to objectively measure and monitor recovery in the GYE (USFWS 1993, pp. 20–21; USFWS 2007*a*, p. 2). The first criterion established a minimum population size. The second criterion ensured reproductive females were distributed across the Recovery Zone, and the third criterion created annual human-caused mortality limits that would allow the population to achieve and sustain recovery. Since the 1993 Recovery Plan was released, we have evaluated and updated how we assess those recovery criteria as newer, better science became available. These revisions include implementing new scientific methods to determine the status of the GYE grizzly bear population in the DMA, estimate population size, and determine what levels of mortality the population could withstand to maintain recovery goals (i.e., the sustainable mortality rate). The DMA is the area within which the population is annually surveyed and estimated and within which the total mortality limits apply, and is based on the suitable habitat area (see figure 2). The Wildlife Monograph: "Temporal, Spatial, and Environmental Influences on The Demographics of Grizzly Bears in The Greater Yellowstone Ecosystem" (Schwartz *et al.* 2006b, entire); the report: "Reassessing Methods to Estimate Population Size and Sustainable Mortality Limits for the Yellowstone Grizzly Bear" (IGBST 2005, entire); and the report: "Reassessing Methods to Estimate Population Size and Sustainable Mortality Limits for the Yellowstone Grizzly Bear Workshop Document Supplement 19–21 June, 2006" (IGBST 2006, entire) provided the scientific basis for revising the demographic recovery criteria in the GYE in 2007 (72 FR 11376, March 13, 2007). Similarly, the revisions we proposed to

implement in 2013 (78 FR 17708, March 22, 2013) were based on updated demographic analyses using the same methods as before (Schwartz *et al.* 2006b, pp. 9–16) and reported in the IGBST's 2012 report: "Updating and Evaluating Approaches to Estimate Population Size and Sustainable Mortality Limits for Grizzly Bears in the Greater Yellowstone Ecosystem" (hereafter referred to as the 2012 IGBST report).

In 2013, we proposed to change two of the recovery criteria for the Yellowstone Ecosystem in the Grizzly Bear Recovery Plan (78 FR 17708, March 22, 2013). The proposed changes were: (1) update demographic recovery criterion 1 to maintain a minimum population of 500 animals and at least 48 females with cubs-of-the-year, and to eliminate this criterion's dependence on a specific counting method; (2) revise the area where the demographic recovery criteria apply; and (3) update the sustainable mortality rates for independent females to 7.6 percent (IGBST 2012). We chose to revise the criteria because they no longer represented the best scientific data or the best technique to assess recovery of the GYE grizzly bear DMA population (78 FR 17708, March 22, 2013). Specifically, these criteria warranted revision because: (1) updated demographic analyses for 2002–2011 indicated that the rate of growth seen during the 1983–2001 period has slowed and sex ratios have changed; (2) there was consensus among scientists and statisticians that the area within which we apply total mortality limits should be the same area we use to estimate population size; and (3) the population had basically stabilized inside the DMA since 2002, with an average population size between 2002–2014 of 674 using the model-averaged Chao2 population estimator (see *Glossary*) (95% confidence interval (CI) = 600–747). This stabilization is evidence that the population

was close to its carrying capacity as supported by density-dependent regulation occurring inside the DMA (van Manen *et al.* 2016, entire).

We released these proposed revisions related to population size and total mortality limits for public comment in 2013 (78 FR 17708, March 22, 2013) but did not finalize them so that we could consider another round of public comments on these revisions in association with the comments on the proposed rule (81 FR 13174, March 11, 2016). Further proposed revisions to the Recovery Plan Supplement: Revised Demographic Criteria and the draft 2016 Conservation Strategy for the Grizzly Bear in the GYE were made available for public review and comment concurrent with the proposed rule (81 FR 13174, March 11, 2016). The first two proposed changes were the same as those proposed in 2013: (1) update demographic recovery criterion 1 to maintain a minimum population of 500 animals and at least 48 females with cubs-of-the-year, and to eliminate this criterion's dependence on a specific counting method; and (2) revise the area where the demographic recovery criteria apply. The third change is to update the mortality limits for independent females, independent males, and dependent young to maintain the population within the DMA around the 2002–2014 population size. After review and incorporation of appropriate public comments, we are releasing a final Grizzly Bear Recovery Plan Supplement: Revised Demographic Criteria (USFWS 2017, entire) and announcing the availability of the 2016 Conservation Strategy for the Grizzly Bear in the GYE concurrent with this final rule.

Below, we summarize relevant portions of the demographic analyses contained in the IGBST's 2012 report (IGBST 2012, entire) and compare them with the previous results of Schwartz *et al.* (2006b, entire) to draw conclusions concerning the grizzly bear

population in the GYE DMA using these collective results. These analyses inform the scientific basis for our revisions. While Schwartz *et al.* (2006b, p. 11) used data from 1983 through 2001; the 2012 IGBST report examined a more recent time period, 2002 through 2011 (IGBST 2012, p. 33). The IGBST found that population growth had slowed since the previous time period, but was still stable to slightly increasing, meaning the population had not declined. Because the fates of some radio-collared bears are unknown, Harris *et al.* (2006, p. 48) and the IGBST (2012, p. 34) calculated two separate estimates of population growth rate: one based on the assumption that every bear with an unknown fate had died (i.e., a conservative estimate) and the other simply removing bears with an unknown fate from the sample. The true population growth rate is assumed to be somewhere in between these two estimates because we know from 40 years of tracking grizzly bears with radio-collars that every lost collar does not indicate a dead bear. While Harris *et al.* (2006, p. 48) found the GYE grizzly bear DMA population increased at a rate between 4.2 and 7.6 percent per year between 1983 and 2002, the IGBST (2012, p. 34) found this growth had slowed and leveled off and was between 0.3 percent and 2.2 percent per year during 2002–2011. The population trajectory that includes the most recent data is based on the Chao2 estimator and indicates no statistical trend (i.e., relatively flat population trajectory) within the DMA for the period 2002 to 2014 (van Manen 2016a, *in litt.*).

The model-averaged Chao2 population estimator is currently the best available science to derive annual estimates of total population size in the GYE. The basis for the estimation is an annual count of female grizzly bears with cubs-of-the-year, based on sightings on aerial surveys and ground observations. Those sightings are clustered into

those estimated to be from the same family group (i.e., female with cubs-of-the-year) using a "rule set" to avoid duplicate counts, primarily based on spatial, temporal, and litter size criteria (Knight *et al.* 1995). In clustering the observations, a balance must be obtained between overestimating or underestimating the actual number of unique females with cubs-of-the-year. The rule set was constructed to be conservative (i.e., reduce Type I errors or mistakenly identifying sightings of the same family as different families). Using the frequencies of sightings of unique females with cubs-of-the-year obtained from application of the rule set, an annual estimate of the total number of females with cubs-of-the-year is calculated using the Chao2 estimator, a bias-corrected estimator that is robust to differences in sighting probabilities among individuals (Chao 1989; Keating *et al.* 2002; Cherry *et al.* 2007). In the final step, the annual estimate of total number of females with cubs-of-the-year is combined with those of previous years to assess trend. Changes in numbers of females with cubs-of-the-year are representative of the rate of change for the entire population, but additional process variation comes from the proportion of females that have cubs-of-the-year.

Annual estimates of females with cubs-of-the-year based on Chao2 have been reported by IGBST since 2005, accompanied by the derivation of total population estimates. The model-averaged Chao2 estimates of females with cubs-of-the-year and derived total population estimates have been applied and reported by the IGBST since 2007.

As the grizzly bear population has increased, the model-averaged Chao2 population estimates have become increasingly conservative (i.e., prone to underestimation), primarily due to conservative criteria of the "rule set" (Schwartz *et al.*

2008) as well as underestimation bias associated with the Chao2 estimator itself (Cherry *et al.* 2007). As a conservative approach to population estimation, the model-averaged Chao2 population estimator will continue to be the method used to assess criterion 1 (see YES 2016b, Appendix C, for the application protocol for deriving the annual population estimation from the model-averaged Chao2 estimate of females with cubs) until a new population estimator is approved. The IGBST may continue to investigate new methods for population estimation as appropriate; however, the model-averaged Chao2 method will continue to be used for the foreseeable future.

Schwartz *et al.* (2006b, entire) estimated survivorship of cubs-of-the-year, yearlings, and independent (2 years old or older) bears as well as reproductive performance to estimate population growth. They examined geographic patterns of population growth based on whether bears lived inside YNP, outside the Park but inside the Recovery Zone or PCA, or outside the PCA entirely. The PCA boundaries (containing 23,853 km^2 (9,210 mi^2)) correspond to those of the Yellowstone Recovery Zone (USFWS 1993, p. 41) and will replace the Recovery Zone boundary (see figure 1). Based on decreased cub and yearling survival inside YNP compared to outside YNP, Schwartz *et al.* (2006b, p. 29) concluded that grizzly bears were approaching carrying capacity inside YNP. The IGBST (2012, p. 33) documented lower cub and yearling survival than in the previous time period, results consistent with the conclusion by Schwartz *et al.* (2006b). Importantly, annual survival of independent females (the most influential age-sex cohort on population trend) remained the same while independent male survival increased (IGBST 2012, p. 33). The GYE grizzly bear population exhibited signs of density-dependent effects, suggesting that it may be approaching

carrying capacity (K), including: decreased cub survival and reproduction in areas with higher bear densities (van Manen *et al*. 2016, entire) and decreasing female home ranges (Bjornlie *et al*. 2014b, p. 4). Collectively, these studies indicate that the growth rate of the GYE grizzly bear DMA population has slowed as bear densities have approached carrying capacity, particularly in the core area of their current range.

Mortality reduction is a key part of any successful management effort for grizzly bears; however, some mortality, including most human-caused mortality, is unavoidable in a dynamic system where hundreds of bears inhabit large areas of diverse habitat with several million human visitors and residents. Adult female mortality influences the population trajectory more than mortality of males or dependent young (Eberhardt 1977, p. 210; Knight and Eberhardt 1985, p. 331; Schwartz *et al.* 2006b, p. 48). Low adult female survival was the critical factor that caused decline in the GYE population prior to the mid-1980s (Knight and Eberhardt 1985, p. 331). In the early 1980s, with the development of the first Recovery Plan (USFWS 1982, pp. 21–24), agencies began to address mortality and increased adult female survivorship (USDA FS 1986, pp. 1–2; Knight *et al.* 1999, pp. 56–57).

The most current demographic criteria were appended to the 1993 Recovery Plan in 2007, and proposed revisions to those were released for public comment in 2013, though not finalized, as explained above. Further revisions to the demographic criteria were released for public comment concurrent with the proposed rule (81 FR 13174, March 11, 2016). Below, we detail each recovery criterion that is appended to the Recovery Plan concurrent with this final rule and included in the 2016 Conservation Strategy.

To achieve mortality management in the area appropriate to the long-term conservation of the GYE population and to assure that the area of mortality management was the same as the area where the population estimates are made, the Service, based on recommendations in an IGBST report (2012), has modified the area where mortalities are counted against the total mortality limits to be the same area that is monitored for unique adult female grizzly bears with cubs-of-the-year (see *Glossary*) and in which the population size is estimated. The basis for the DMA was the boundary developed in 2007 by the Service (USFWS 2007*b*) for what was termed "suitable habitat." This suitable habitat boundary (enclosing a total area of 46,035 km^2 (17,774 mi^2)) is sufficiently large to support a viable population in the long term, so that mortalities outside of it and inside the DPS could be excluded from consideration. This DMA area is thus most appropriate for applying total mortality limits. The IGBST's 2012 report noted, however, that because the suitable habitat boundary was drawn using mountainous ecoregions, there were narrow, linear areas along valley floors that did not meet the definition of suitable habitat and where population sinks may be created. These edge effects are exacerbated in small habitat patches that are long and narrow and in wide-ranging species such as grizzly bears because they are more likely to encounter surrounding, unsuitable habitat (Woodroffe and Ginsberg 1998, p. 2126). Mortalities in these areas would be outside suitable habitat but could have disproportionate effects on the population generally contained within the suitable habitat zone, potentially acting as mortality sinks. The Service accepted the recommendation of the IGBST in the 2012 report for an alternative boundary that includes these narrow areas outside of, but largely bounded by, suitable habitat (see figure 1). The final designation of the DMA includes

suitable habitat plus the potential sink areas for a total area of approximately 49,928 km^2 (19,279 mi^2) (see figure 1). The DMA contains 100 percent of the PCA and 100 percent of the suitable habitat, as shown in figure 1.

Demographic Recovery Criterion 1—Maintain a minimum population size of 500 grizzly bears[1] and at least 48 females with cubs-of-the-year in the DMA (figure 1) as indicated by methods established in published, peer-reviewed scientific literature and calculated by the IGBST using the most updated Application Protocol as posted on their website. If the estimate of total population size drops below 500 in any year or below 48 with cubs-of-the-year in 3 consecutive years, this criterion will not be met. The 48 females with cubs-of-the-year metric is a model-averaged number of documented unique females with cubs-of-the-year.

A minimum population size of at least 500 animals within the DMA will ensure short-term genetic health (Miller and Waits 2003, p. 4338) and is not a population goal. Population size will be quantified by methods established in published, peer-reviewed scientific literature and calculated by the IGBST using the most updated protocol, as posted on their website. Five hundred is a minimum population threshold and will ensure the short-term fitness of the population is not threatened by losses in genetic diversity in such an isolated population. The goal is to maintain the population well above this threshold to ensure that genetic issues are not a detriment to the short-term genetic fitness of the GYE grizzly bear population. The Service will initiate a formal status review if the total population estimate is less than 500 inside the DMA in any year or if counts of

[1] This number is required to maintain short-term genetic fitness in the next few decades. It is not a population target, but a minimum.

females with cubs-of-the-year fall below 48 for 3 consecutive years. *Status:* This recovery criterion has been met since 2003 (see IGBST annual reports available at *https://www.usgs.gov/centers/norock/science/igbst-annual-reports?qt-science_center_objects=1#qt-sicence_center_objects*).

Demographic Recovery Criterion 2—Sixteen of 18 BMUs within the Recovery Zone (see map at *http://www.fws.gov/mountain-prairie/es/species/mammals/grizzly/Yellowstone_Recovery_Zone_map.pdf*) must be occupied by females with young, with no two adjacent bear management units unoccupied, during a 6-year sum of observations. This criterion is important as it ensures that reproductive females occupy the majority of the Recovery Zone and are not concentrated in one portion of the ecosystem. If less than 16 of 18 bear management units are occupied by females with young for 3 successive 6-year sums of observations this criterion will not be met. See table 1 below for most current 3 consecutive 6-year sums of observations data. *Status:* This recovery criterion has been met since at least 2001.

TABLE 1.—Demographic recovery criterion 2 is measured by the number of occupied bear management units (BMUs) for each 6-year sum of observations.

6-year period	Number of BMUs occupied by females with young by year								Criteria met (16 of 18 occupied at least once)
	2008	2009	2010	2011	2012	2013	2014	2015	
2008–2013	18	18	18	16	15	18			Yes
2009–2014		18	18	16	15	18	18		Yes
2010–2015			18	16	15	18	18	17	Yes

Demographic Recovery Criterion 3—Maintain the population within the DMA around the 2002–2014 model-averaged Chao2 population estimate average size (average = 674; 95% CI = 600–747; 90% CI = 612–735) by maintaining annual mortality limits for independent females, independent males, and dependent young as shown in table 2 in

this final rule. These adjustable mortality rates were calculated as those necessary to manage the population to the modeled average Chao2 population estimate of 674 bears, which occurred during the time period that this population had a relatively flat population trajectory. If mortality limits are exceeded for any sex/age class for 3 consecutive years and any annual population estimate falls below 612 (the lower bound of the 90% confidence interval), the IGBST will produce a Biology and Monitoring Review to inform the appropriate management response. If any annual population estimate falls below 600 (the lower bound of the 95% confidence interval), this criterion will not be met and there will be no discretionary mortality (see *Glossary*), except as necessary for human safety.

The population had stabilized during the period of 2002–2014, and the mean model-averaged Chao2 population estimate over that time period was 674 (95% CI = 600–747), which is very close to the population size of 683 when the GYE population was previously delisted in 2007 (72 FR 14866, March 29, 2007). The population naturally stabilized because of reduced survival of dependent young and subadults, and lower reproduction in areas with higher grizzly bear densities, suggesting density-dependent population effects associated with the population approaching carrying capacity. The existence of lower subadult survival and occupancy by grizzly bears in almost all suitable habitat inside the DMA has been demonstrated by van Manen *et al.* (2016, entire). *Status:* This criterion has been met for all age and sex classes since 2004.

TABLE 2.—Total mortality rate used to establish annual total mortality limits for independent females, independent males, and dependent young[1] inside the DMA. These mortality limits are on a sliding scale to achieve the population goal inside the DMA of the model-averaged Chao2 population size of 674 between 2002–2014 (95% CI = 600–747). For populations less than 600, there will be no discretionary mortality unless necessary for human safety.

	Total Grizzly Bear Population Estimate*		
	≤674	675–747	>747
Total mortality rate for independent FEMALES	<7.6%	9%	10%
Total mortality rate for independent MALES	15%	20%	22%
Total mortality rate for DEPENDENT YOUNG	<7.6%	9%	10%

Total mortality: Documented known and probable grizzly bear mortalities from all causes including but not limited to: management removals, illegal kills, mistaken identity kills, self-defense kills, vehicle kills, natural mortalities, undetermined-cause mortalities, grizzly bear hunting, and a statistical estimate of the number of unknown/unreported mortalities.

* using the model-averaged Chao2 estimate

The 2016 Conservation Strategy

In order to document the regulatory mechanisms and coordinated management approach necessary to ensure the long-term maintenance of a recovered population, the Recovery Plan calls for the development of "a conservation strategy to outline habitat and population monitoring that will continue in force after recovery" (Recovery Plan Task Y426) (USFWS 1993, p. 55). To accomplish this goal, a Conservation Strategy Team was formed in 1993. This team included biologists and managers from the Service, NPS, USFS, USGS, IDFG, WGFD, and MFWP.

[1] Total mortality rates are based on the mortality percentage of the respective population segment relative to the population estimates

In March 2000, a draft Conservation Strategy for the GYE was released for public review and comment (65 FR 11340, March 2, 2000). Also in 2000, a Governors' Roundtable was organized to provide recommendations from the perspectives of the three States that would be involved with grizzly bear management after delisting. In 2003, the draft Final Conservation Strategy for the Grizzly Bear in the GYE was released, along with drafts of State grizzly bear management plans (all accessible at *http://www.fws.gov/mountain-prairie/es/grizzlyBear.php*). We responded to all public comments and peer reviews received on the Conservation Strategy and involved partners finalized the Conservation Strategy, which was published in the *Federal Register* in 2007 (72 FR 11376, March 13, 2007).

Revisions were made to the Conservation Strategy, and a draft 2016 Conservation Strategy was presented for public comment concurrent with the proposed rule to delist the GYE grizzly bear DPS (81 FR 13174, March 11, 2016). The 2016 Conservation Strategy was finalized on December 16, 2016 (available at *http://www.fws.gov/mountain-prairie/es/grizzlyBear.php*). Both the 2007 and 2016 Conservation Strategies describe the coordinated, multi-agency efforts to monitor and manage the GYE grizzly bear population that have been ongoing for decades. These efforts contributed to the recovery of the GYE grizzly bear and will ensure the maintenance of a recovered population. The most significant change between the 2007 and 2016 Conservation Strategies is the update of the demographic recovery criteria to reflect revisions to the Recovery Plan based on the best available science.

The 2016 Conservation Strategy will guide post-delisting management of the GYE grizzly bear population for the foreseeable future, beyond the minimum 5-year

post-delisting monitoring period required by the Act. The purposes of the 2016 Conservation Strategy and associated State, Tribal, and Federal implementation plans are to: (1) describe, summarize, and implement the coordinated efforts to manage the grizzly bear population and its habitat to ensure continued conservation of the GYE grizzly bear population; (2) specify and implement the population/mortality management, habitat, and conflict bear standards to maintain a recovered grizzly bear population for the future; (3) document specific State, Tribal, and Federal regulatory mechanisms and legal authorities, policies, management, and monitoring programs that exist to maintain the recovered grizzly bear population; and (4) document the actions that participating agencies have agreed to implement (YES 2016a, pp. 1–12).

Implementation of the 2016 Conservation Strategy by all agency partners will coordinate management and monitoring of the GYE grizzly bear population and its habitat after delisting. The 2016 Conservation Strategy summarizes the regulatory framework that Federal and State agencies will use for management of the GYE grizzly bear population after delisting. The 2016 Conservation Strategy also identifies and defines adequate post-delisting monitoring to maintain a healthy GYE grizzly bear population (YES 2016a, pp. 33–85). The 2016 Conservation Strategy has objective, measurable habitat and population standards, with clear State and Federal management responses if deviations occur (YES 2016a, pp. 100–103). It represents 20 years of a collaborative, interagency effort among the members of the YES. State grizzly bear management plans were developed in all three affected States (Idaho, Montana, and Wyoming) and are incorporated into the final 2016 Conservation Strategy as appendices (accessible at *http://www.fws.gov/mountain-prairie/es/grizzlyBear.php*). All State and

Federal agencies party to the 2016 Conservation Strategy signed a memorandum of understanding (MOU) agreeing to implement the 2016 Conservation Strategy prior to publication of this final rule.

The 2016 Conservation Strategy identifies and provides a framework for managing habitat within the PCA and managing demographic parameters within the DMA (see figure 1). The PCA contains adequate seasonal habitat components for a portion of the recovered GYE grizzly bear population for the future and to allow bears to continue to expand outside the PCA. The PCA includes approximately 51 percent of suitable grizzly bear habitat within the GYE, and approximately 75 percent of the population of female grizzly bears with cubs-of-the-year spent part or all of the year within the PCA (Haroldson 2014a, *in litt*.) (For more information about what constitutes "suitable habitat," see the *Suitable Habitat* discussion under *Factor A*, below).

The 2016 Conservation Strategy will be implemented and funded by Federal, Tribal, and State agencies within the GYE. The signatories to the final 2016 Conservation Strategy have a demonstrated track record of funding measures to ensure recovery of this grizzly bear population for more than 3 decades. Post delisting, mortality management will be the responsibility of State fish and wildlife agencies. In general, the USFS and NPS will be responsible for habitat management to reduce the risk of human-caused mortality to grizzly bears, while the NPS, and State and Tribal wildlife agencies, will be responsible for managing the population within specific total mortality limits within their respective areas of responsibility. The USFS and NPS collectively manage approximately 98 percent of lands inside the PCA. Specifically, YNP; GTNP; and the Shoshone, Beaverhead-Deerlodge, Bridger-Teton, Caribou-Targhee, and Custer Gallatin

National Forests are the Federal entities responsible for implementing the 2016 Conservation Strategy. Affected National Forests and National Parks have incorporated the habitat standards and criteria into their Forest Plans and National Park management plans and/or Superintendent's Compendia via appropriate amendment processes so that they are legally applied to these public lands within the GYE (USDA FS 2006b, p. 4; YNP 2014b, p. 18; GTNP and JDR 2016, p. 3). Outside of the PCA, grizzly bear habitat is well protected via Wilderness Area designation (Wilderness or Wilderness Study Area (WSA)) or Forest Plan direction, and demographic standards will protect the population throughout the DMA.

When this final rule goes into effect, the YGCC will replace the YES as the interagency group coordinating implementation of the 2016 Conservation Strategy's habitat and population standards, and monitoring (YES 2016a, pp. 96–98). Similar to the YES, the YGCC members include representatives from YNP, GTNP, the five affected National Forests, BLM, USGS, IDFG, MFWP, WGFD, one member from local county governments within each State, and one member from the Shoshone Bannock, Northern Arapahoe, and Eastern Shoshone Tribes. Through this action, the Service is transferring primary management authority from the Service to the States, other Federal agencies, and the Tribes; therefore, the Service is not a member of the YGCC. The Service Grizzly Bear Recovery Coordinator and the IGBST Team Leader will serve as advisors to the YGCC as they did to the YES. All meetings will be open to the public. Besides coordinating management, research, and financial needs for successful conservation of the GYE grizzly bear population, the YGCC will review the IGBST Annual Reports and review and respond to any deviations from habitat or population standards. As per the

implementation section of the 2016 Conservation Strategy, the YGCC will coordinate management and implementation of the 2016 Conservation Strategy and work together to rectify problems and to ensure that the habitat and population standards and total mortality limits will be met and maintained.

The 2016 Conservation Strategy is an adaptive, dynamic document that establishes a framework to incorporate new and better scientific information as it becomes available or as necessary in response to environmental changes. The signatories to the 2016 Conservation Strategy have agreed that any changes and updates to the 2016 Conservation Strategy will occur only if they are based on the best available science, and subject to public comment before being implemented by the YGCC (YES 2016a, pp. 2, 18).

Distinct Vertebrate Population Segment Policy Overview

Section 4 of the Act and its implementing regulations (50 CFR part 424) set forth the procedures for listing species, reclassifying species, or removing species from listed status. "Species" is defined by the Act as including any species or subspecies of fish or wildlife or plants, and any distinct vertebrate population segment of fish or wildlife that interbreeds when mature (16 U.S.C. 1532(16)). We, along with the National Marine Fisheries Service (NMFS) (now the National Oceanic and Atmospheric Administration—Fisheries), developed the Policy Regarding the Recognition of Distinct Vertebrate Population Segments (DPS policy) (61 FR 4722, February 7, 1996), to help us in determining what constitutes a distinct population segment (DPS). Under this policy, the Service considers two factors to determine whether the population segment is a valid DPS: (1) discreteness of the population segment in relation to the remainder of the taxon

to which it belongs; and (2) the significance of the population segment to the taxon to which it belongs. If a population meets both tests, it is a DPS, and the Service then evaluates the population segment's conservation status according to the standards in section 4 of the Act for listing, delisting, or reclassification (i.e., is the DPS endangered or threatened). Our policy further recognizes it may be appropriate to assign different classifications (i.e., endangered or threatened) to different DPSs of the same vertebrate taxon (61 FR 4725, February 7, 1996).

Past Practice and History of Using DPSs

As of April 11, 2017, of the 439 native vertebrate listings, 97 are listed as less than an entire taxonomic species or subspecies (henceforth referred to in this discussion as populations) under one of several authorities, including the "distinct population segment" language in the Act's definition of species (section 3(16)). Twenty-three of these 97 populations, which span 5 different taxa, predate either the 1978 amendments to the ESA which revised the definition of "species" to include DPSs of vertebrate fish and wildlife or the 1996 DPS Policy; as such, the final listing determinations for these populations did not include formal policy-based analyses or expressly designate the listed entity as a DPS. In several instances, however, the Service and NMFS have established a DPS and revised the List of Endangered and Threatened Wildlife in a single action, as shown in several of the following examples (see proposed rule for further details, 81 FR 13174, March 11, 2016) for the brown pelican (*Pelecanus occidentalis*) (50 FR 4938, February 4, 1985; 74 FR 59444, November 17, 2009), gray whale (*Eschrichtius robustus*) (59 FR 31094, June 16, 1994), Steller sea lion (*Eumetopias jubatus*) (62 FR 24345, May 5, 1997), Columbian white-tailed deer (*Odocoileus virginianus leucurus*) (68 FR 43647,

July 24, 2003; 80 FR 60850, October 8, 2015), American crocodile (*Crocodylus acutus*) (72 FR 13027, March 20, 2007), loggerhead sea turtle (*Caretta caretta*) (76 FR 58868, September 22, 2011), green sea turtle (*Chelonia mydas*) (81 FR 20058, April 6, 2016), and humpback whale (*Megaptera novaeangliae*) (81 FR 93639, December 21, 2016). Although some of these examples predate the DPS policy, the authority to list and delist DPSs had already been clearly established with the 1978 amendments to the ESA.

Our authority to make these determinations and to revise the list accordingly is a reasonable interpretation of the language of the Act, and our ability to do so is an important component of the Service's program for the conservation of endangered and threatened species. Our authority to revise the existing listing of a species (the grizzly bear in the lower 48 States) to identify a GYE DPS and determine that it is healthy enough that it no longer needs the Act's protections is found in the precise language of the Act. Moreover, even if that authority were not clear, our interpretation of this authority to make determinations under section 4(a)(1) of the Act and to revise the endangered and threatened species list to reflect those determinations under section 4(c)(1) of the Act is reasonable and fully consistent with the Act's text, structure, legislative history, relevant judicial interpretations, and policy objectives.

On December 12, 2008, a formal opinion was issued by the Solicitor, "U.S. Fish and Wildlife Service Authority Under Section 4(c)(1) of the Endangered Species Act to Revise Lists of Endangered and Threatened Species to 'Reflect Recent Determinations'" (M-37018, U.S. DOI 2008). The Service fully agrees with the analysis and conclusions set out in the Solicitor's Memorandum opinion. This final action is consistent with the

opinion. The complete text of the Solicitor's opinion can be found at *https://www.doi.gov/sites/doi.opengov.ibmcloud.com/files/uploads/M-37018.pdf*.

We recognize that our interpretation and use of the DPS policy to revise and delist distinct population segments has been challenged in *Humane Society of the United States* v. *Jewell*, 76 F.Supp.3d 69 (D. D.C. 2014). Partly at issue in that case was our application of the DPS policy to Western Great Lakes wolves in a delisting rule (76 FR 81666, December 28, 2011). Our rule was vacated by the district court's decision. We respectfully disagree with the district court's interpretation of the DPS policy, and the United States has appealed that decision. *Humane Society of the United States* v. *Jewell*, case no. 15-5041 (D.C. Cir.). No decision has been issued on that litigation.

In the 1993 Grizzly Bear Recovery Plan, the Service identifies six grizzly bear ecosystems and identifies unique demographic recovery criteria for each one (see map at *http://www.fws.gov/mountain-prairie/es/grizzlyBear.php*). The 1993 Recovery Plan states that "grizzly bear populations may be listed, recovered, and delisted separately" and that it is the intent of the Service to delist individual populations as they achieve recovery (USFWS 1993, pp. ii, 16–17). The Service has proceeded in a manner consistent with the Recovery Plan with respect to individual population treatment. For example, grizzly bears in the Cabinet-Yaak, Selkirk, and North Cascades Ecosystems, all included in the original grizzly bear listing, were petitioned for reclassification from threatened to endangered. Although already listed as threatened, we determined that reclassifying those grizzly bears to endangered was warranted but precluded by higher priorities beginning in 1991 for the North Cascades (56 FR 33892, July 24, 1991), 1993 for the Cabinet-Yaak (58 FR 8250, February 12, 1993), and 1999 for the Selkirk

Ecosystems (64 FR 26725, May 17, 1999). In 2014, the Service determined that the Cabinet-Yaak and Selkirk Ecosystems had recovered to the point that they were no longer warranted but precluded from listing as endangered; they remain listed as threatened (79 FR 72487, December 5, 2014). Grizzly bears in the North Cascades Ecosystem are still warranted but precluded for reclassification from threatened to endangered (80 FR 80606, December 24, 2015). The Bitterroot Ecosystem now has status under section 10(j) of the Act (65 FR 69624, November 17, 2000), which addresses the Service's proposal to release an experimental population of grizzly bears in that ecosystem.

Distinct Vertebrate Population Segment Analysis

Analysis of Discreteness in Relation to Remainder of Taxon

Under our DPS Policy, a population of a vertebrate taxon may be considered discrete if it satisfies either one of the following conditions: (1) It is markedly separated from other populations of the same taxon (i.e., *Ursus arctos horribilis* in the GYE) as a consequence of physical, physiological, ecological, or behavioral factors (quantitative measures of genetic or morphological discontinuity may provide evidence of this separation); or (2) it is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) ("the inadequacy of existing regulatory mechanisms") of the Act. The taxon (*U. a. horribilis*) is currently distributed throughout Alaska, northwestern and western Canada, and the six ecosystems in the lower 48 States (Schwartz *et al.* 2003, pp. 557–558). The DPS Policy does not require complete separation of one DPS from another, and occasional

interchange does not undermine the discreteness of potential DPSs. If complete separation is required, the loss of the population has little significance to other populations (61 FR 4722, 4724, February 7, 1996). The DPS policy requires only that populations be "markedly separated" from each other. Thus, if occasional individual grizzly bears move between populations, the population could still display the required level of discreteness per the DPS Policy. The standard adopted allows for some limited interchange among population segments considered to be discrete, so that loss of an interstitial population could well have consequences for gene flow and demographic suitability of a species as a whole.

Although the DPS Policy does not allow State or other intra-national governmental boundaries to be used as the basis for determining the discreteness of a potential DPS, an artificial or human-made boundary may be used to clearly identify the geographic area included within a DPS designation. Easily identified human-made objects, such as the center line of interstate highways, Federal highways, and State highways are useful for delimiting DPS boundaries. Thus, the GYE grizzly bear DPS consists of: that portion of Idaho that is east of Interstate Highway 15 and north of U.S. Highway 30; that portion of Montana that is east of Interstate Highway 15 and south of Interstate Highway 90; and that portion of Wyoming that is south of Interstate Highway 90, west of Interstate Highway 25, west of Wyoming State Highway 220, and west of U.S. Highway 287 south of Three Forks (at the 220 and 287 intersection, and north of Interstate Highway 80 and U.S. Highway 30) (see DPS boundary in figure 1). Due to the use of highways as easily described boundaries, large areas of unsuitable habitat are included in the DPS boundaries.

The core of the GYE grizzly bear DPS is the Yellowstone PCA (24,000 km^2 (9,200 mi^2)) (USFWS 1993, p. 39). The Yellowstone PCA includes YNP; a portion of GTNP; JDR; sizable contiguous portions of the Shoshone, Bridger-Teton, Caribou-Targhee, Custer Gallatin, and Beaverhead-Deerlodge National Forests; BLM lands; and surrounding State and private lands (USFWS 1993, p. 39). As grizzly bear populations have rebounded and densities have increased, bears have expanded their current range beyond the PCA, into other suitable habitat in the DMA. Grizzly bears now occupy about 44,624 km^2 (17,229 mi^2) or 89 percent of the GYE DMA (Haroldson 2015, *in litt.*), with occasional occurrences well beyond this estimate of current range. No grizzly bears originating from the GYE have been suspected or confirmed beyond the borders of the GYE grizzly bear DPS described above. Similarly, no grizzly bears originating from other ecosystems have been detected inside the borders of the GYE grizzly bear DPS (Wildlife Genetics International 2014, *in litt.*).

The GYE grizzly bear population is the southernmost population remaining in the conterminous United States and has been physically separated from other areas where grizzly bears occur for at least 100 years (Merriam 1922, pp. 1–2; Miller and Waits 2003, p. 4334). The nearest population of grizzly bears is found in the NCDE approximately 115 km (70 mi) to the north. Although their current range continues to expand north (Bjornlie *et al.* 2014a, p. 185), grizzly bears from the GYE have not been documented north of Interstate 90 outside the DPS boundaries (Frey 2014, *in litt.*). Over the last few decades, the NCDE grizzly bear population has been slowly expanding to the south, and there have been several confirmed grizzly bears from the NCDE within 32 to 80 km (20 to 50 mi) of the GYE grizzly bear DPS boundaries near Butte, Deerlodge, and Anaconda,

Montana (Jonkel 2014, *in litt*.). However, there is currently no known connectivity between these two grizzly bear populations.

Genetic data also support the conclusion that grizzly bears from the GYE are separated from other grizzly bears. Genetic studies estimating heterozygosity (which provides a measure of genetic diversity) show 60 percent heterozygosity in the GYE grizzly bears compared to 67 percent in the NCDE grizzly bears (Haroldson *et al.* 2010, p. 7). Heterozygosity is a useful measure of genetic diversity, with higher values indicative of greater genetic variation and evolutionary potential. High levels of genetic variation are indicative of high levels of connectivity among populations or high numbers of breeding animals. By comparing heterozygosity of extant bears to samples from Yellowstone grizzly bears of the early 1900s, Miller and Waits (2003, p. 4338) concluded that gene flow and, therefore, population connectivity between the GYE grizzly bear population and populations to the north was low even 100 years ago. The reasons for this historic limitation of gene flow are unclear, but we do know increasing levels of human activity and settlement in this intervening area over the last century further limited grizzly bear movements into and out of the GYE, likely resulting in the current lack of connectivity (Proctor *et al*. 2012, p. 35).

Based on the best available scientific data about grizzly bear locations and movements, we find that the GYE grizzly bear population and other remaining grizzly bear populations are markedly, physically separated from each other. Therefore, the GYE grizzly bear population meets the criterion of discreteness under our DPS Policy. Occasional movement of bears from other grizzly bear populations into the GYE grizzly bear population would be beneficial to its long-term persistence (Boyce *et al.* 2001, pp.

25, 26). While future connectivity is desirable and will be actively managed for, this would not undermine discreteness, as all that is required is "marked separation," not absolute separation. Even if occasional individual grizzly bears disperse among populations, the GYE grizzly bear population would still display the required level of discreteness per the DPS Policy. And, as stated in the 1993 Recovery Plan, we recognize that natural connectivity is important to long-term grizzly bear conservation, and we will continue efforts to work toward this goal independent of the delisting of the GYE grizzly bear DPS (USFWS 1993, p. 53). This issue is discussed further under *Factor E* below.

Analysis of Significance of Population Segment to Taxon

If we determine that a population segment is discrete under one or more of the conditions described in the Service's DPS policy, its biological and ecological significance will then be considered in light of Congressional guidance that the authority to list DPS's be used "sparingly" while encouraging the conservation of genetic diversity (see Senate Report 151, 96th Congress, 1st Session). In carrying out this examination, we consider available scientific evidence of the population's importance to the taxon (i.e., *Ursus arctos horribilis*) to which it belongs. As noted previously, grizzly bears once lived throughout the North American Rockies from Alaska and Canada, and south into central Mexico. Grizzly bears have been extirpated from most of the southern portions of their historic range and the Canadian plains (Schwartz *et al.* 2003, pp. 557–558). Since precise circumstances are likely to vary considerably from case to case, the DPS policy does not describe all the classes of information that might be used in determining the biological and ecological importance of a discrete population. However, the DPS policy

describes four possible classes of information that provide evidence of a population segment's biological and ecological importance to the taxon to which it belongs.

As specified in the DPS policy (61 FR 4722, February 7, 1996), this consideration of the population segment's significance may include, but is not limited to, the following: (1) persistence of the discrete population segment in an ecological setting unusual or unique for the taxon; (2) evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon; (3) evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; or (4) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics. To be considered significant, a population segment needs to satisfy only one of these conditions, or other classes of information that might bear on the biological and ecological importance of a discrete population segment, as described in the DPS policy (61 FR 4722, February 7, 1996). Below we address Factors 1, 2, and 4. Factor 3 does not apply to the GYE grizzly bear population because there are several other naturally occurring populations of grizzly bears in North America.

Unusual or Unique Ecological Setting

In the 2007 final rule, we concluded that the GYE was a unique ecological setting because GYE grizzly bears were more carnivorous than in other ecosystems where the taxon occurs and they still used whitebark pine seeds extensively while other populations no longer did. New research shows that meat constitutes approximately the same percentage of annual grizzly bear diets in the NCDE (38 and 56 percent for females and males, respectively) (Teisberg *et al.* 2014b, p. 7) and the GYE (44 percent of all GYE

grizzly bears) (Schwartz *et al*. 2014a, p. 75). We also now have information suggesting that whitebark pine has been reduced in the GYE since 2002 and, therefore, may not be as major of a food source as previously concluded (see 72 FR 14866, March 29, 2007). Although consumption of meat and whitebark pine by GYE grizzly bears individually may not be exceptional, we believe that the combination of food sources in the GYE grizzly bear, including army cutworm moths, whitebark pine, cutthroat trout, and ungulates (bison, elk, moose (*Alces alces*), and deer (*Odocoileus* species)) (Schwartz *et al.* 2003, p. 568) comprises a unique ecological setting because we are unaware of any other population of *Ursus arctos horribilis* that utilizes this combination.

In addition to the unique combination of food sources available in the GYE, there is a gradient of foraging strategies across the ecosystem with bears in different parts of the GYE having access to different combinations of these food sources (see figure 2 in Gunther *et al.* 2014, p. 68). Mealey (1980, entire) documented three "feeding economies" within YNP alone. Grizzly bears in the core (i.e., around Yellowstone Lake) of the GYE consume ungulates (primarily elk and bison, winter killed or usurped from wolf kills), cutthroat trout, whitebark pine, and army cutworm moths as a regular part of their diets (Fortin *et al.* 2013a, pp. 271, 275–276; see figure 2 in Gunther *et al.* 2014, p. 68). We are not aware of other populations that contain this combination of food sources. As the population extends out from the core, bears have access to some but not all of the main foods in the core. While elk are available to grizzly bears throughout most of the GYE, army cutworm moths are only available on the east side and whitebark pine is only available to two-thirds of grizzly bears (Costello *et al.* 2014, p. 2009; see figure 2 in Gunther *et al.* 2014, p. 68).

Although grizzly bears in other ecosystems consume meat in similar quantities as the GYE, grizzly bears in the GYE are unique in their consumption of bison (Mattson 1997, p. 167; Fortin *et al.* 2013a, p. 275; Gunther 2017, *in litt.*) and in their interactions with wolves to obtain carcasses (Ballard *et al*. 2003, pp. 261–262; Smith et al. 2003, p. 336; Metz et al. 2012, p. 556). In addition, GYE grizzly bears have been documented to consume unique food items such as geothermal soil (Mattson *et al.* 1999, p. 109) and false-truffles (Fortin *et al.* 2013a, p. 277; Gunther *et al.* 2014, p. 64). We are not aware of other grizzly bear populations that consume these food items. GYE grizzly bears opportunistically feed on more than 260 species of food to supplement their diets (Gunther *et al.* 2014, entire), which is more than other populations of grizzly bears of which we are aware. This unique combination of food sources utilized by grizzly bears in the GYE is significant because of the potential conservation value provided by variation in food availability and use by grizzly bears in light of potential environmental changes (Lesica and Allendorf 1995, p. 756; Bunnell *et al.* 2004, p. 2242).

In light of these new data indicating that grizzly bears in the GYE consume a unique combination of food sources compared to other grizzly bear populations, where we have considerable information about the taxon's diet, we consider the GYE grizzly bear population to meet the DPS policy standard for significance based on its persistence in an ecological setting unusual or unique for the taxon.

Significant Gap in the Range of the Taxon

Historically, grizzly bears were distributed throughout the North American Rockies from Alaska and Canada, and south into central Mexico. Grizzly bears have been extirpated from most of the southern portions of their historic range and the

Canadian plains (Schwartz *et al.* 2003, pp. 557–558). Given the grizzly bear's historic occupancy of the conterminous United States and the portion of the taxon's historic range the conterminous United States represent, recovery in the lower 48 States where the grizzly bear existed in 1975 when it was listed has long been viewed as important to the taxon (40 FR 31734, July 28, 1975). The GYE grizzly bear population is significant in achieving the Recovery Plan objectives, as it is one of only five known occupied areas and one unoccupied area and constitutes approximately half of the estimated number of grizzly bears remaining in the conterminous 48 States. Today, the GYE grizzly bear population represents the southernmost reach of the taxon. The loss of this population would significantly impact representation of the species because it would substantially curtail the range of the grizzly bear in North America by moving the range approximately 3 degrees of latitude or 200 mi (350 km) to the north. The extirpation of peripheral populations, such as the GYE grizzly bear population, is concerning because of the potential conservation value that peripheral populations can provide to the subspecies (Lesica and Allendorf 1995, p. 756; Fraser 2000, p. 50; Bunnell *et al.* 2004, p. 2242). Specifically, peripheral populations can possess slight genetic or phenotypic divergence from the core populations, which may be central to the survival of the subspecies in the face of environmental changes (Lesica and Allendorf 1995, p. 756; Bunnell *et al.* 2004, p. 2242). Therefore, we find that the GYE population of grizzly bears meets the significance criterion under our DPS policy because its loss would represent a significant gap in the range of the taxon.

Marked Genetic Differences

Several studies have documented some level of genetic differences between grizzly bears in the GYE and other populations in North America (Paetkau *et al.* 1998, pp. 421–424; Waits *et al.* 1998, p. 310; Proctor *et al.* 2012, p. 12). The GYE population has been isolated from other grizzly bear populations for 100 years or more (Miller and Waits 2003, p. 4334). However, Miller and Waits (2003, p. 4334) could only speculate as to the reasons behind this historical separation or how long it had been occurring. Proctor *et al*. (2012, p. 35) concluded that observed differences in heterozygosity among grizzly bear populations in southern Canada and the United States were an artifact of human-caused habitat fragmentation, not the result of different evolutionary pressures selecting for specific traits. We do not know whether these differences in heterozygosity levels are biologically meaningful, and we have no data indicating they are. Because we do not know the biological significance (if any) of the observed differences, we cannot say with certainty that the GYE grizzly bear population's genetics differ "markedly" from other grizzly bear populations. Therefore, we do not consider these genetic differences to meet the DPS policy's standard for significance.

In summary, while we no longer consider the GYE grizzly bear population to be significant due to marked genetic differences, we still conclude that the GYE grizzly bear population is significant due to its persistence in an ecological setting unique for the taxon and because the loss of this population would result in a significant gap in the range of the taxon.

Summary of Distinct Population Segment Analysis

Based on the best scientific and commercial data available, as described above, we find that the GYE grizzly bear population is discrete from other grizzly bear

populations and significant to the remainder of the taxon (i.e., *Ursus arctos horribilis*). Because the GYE grizzly bear population is discrete and significant, it meets the definition of a DPS under the Act. Therefore, the GYE grizzly bear DPS is a listable entity under the Act, and we now assess this DPS's conservation status in relation to the Act's standards for listing, delisting, or reclassification (i.e., whether this DPS meets the definition of an endangered or threatened species under the Act).

Summary of Factors Affecting the Species

Section 4 of the Act and its implementing regulations (50 CFR part 424) set forth the procedures for listing species, reclassifying species, or removing species from listed status. "Species" is defined by the Act as including any species or subspecies of fish or wildlife or plants, and any distinct vertebrate population segment of fish or wildlife that interbreeds when mature (16 U.S.C. 1532(16)). A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act: (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. We must consider these same five factors in delisting a species. We may delist a species according to 50 CFR 424.11(d) if the best available scientific and commercial data indicate that the species is neither endangered nor threatened for the following reasons: (1) the species is extinct; (2) the species has recovered and is no longer endangered or threatened; and/or (3) the original scientific data used at the time the species was classified were in error.

A recovered species is one that no longer meets the Act's definition of endangered or threatened. A species is endangered for purposes of the Act if it is in danger of extinction throughout all or a significant portion of its range (SPR) and is threatened if it is likely to become endangered in the foreseeable future throughout all or a significant portion of its range. The word "range" in "significant portion of its range" refers to the range in which the species currently exists at the time of this status review. Determining whether a species is recovered requires consideration of the same five categories of threats specified in section 4(a)(1) of the Act. For species that are already listed as endangered or threatened, this analysis of threats is an evaluation of both the threats currently facing the species and the threats that are reasonably likely to affect the species in the foreseeable future following the removal of the Act's protections. For the purposes of this analysis, we first evaluate the status of the species throughout all of its range, then consider whether the species is in danger of extinction or likely to become so in any significant portion of its range.

In considering what factors might constitute threats, we must look beyond the exposure of the species to a particular factor to evaluate whether the species may respond to the factor in a way that causes actual impacts to the species. If there is exposure to a factor and the species responds negatively, the factor may be a threat, and during the five-factor threats analysis, we attempt to determine how significant a threat it is. The threat is significant if it drives or contributes to the risk of extinction of the species such that the species warrants listing as endangered or threatened as those terms are defined by the Act. However, the identification of factors that could affect a species negatively may not be sufficient to justify a finding that the species warrants listing. The information must

include evidence sufficient to suggest that the potential threat is likely to materialize and that it has the capacity (i.e., it should be of sufficient magnitude and extent) to affect the species' status such that it meets the definition of endangered or threatened under the Act. The following analysis examines the five factors affecting, or likely to affect, the GYE grizzly bear population within the foreseeable future. We previously concluded that GYE grizzly bears are recovered and warranted delisting (72 FR 14866, March 29, 2007). In this final rule, we make a determination as to whether the distinct population segment of GYE grizzly bears is an endangered or threatened species, based on the best scientific and commercial information available. In so doing, we address the issues raised by the Ninth Circuit in *Greater Yellowstone Coalition* v. *Servheen*, 665 F.3d 1015 (9th Cir. 2011), which were briefly discussed above.

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range.

Factor A requires the Service to consider present or threatened destruction, modification, or curtailment of grizzly bear habitat or its range. Here, the following considerations warrant discussion regarding the GYE grizzly bear population, effects due to: (1) motorized access management, (2) developed sites, (3) livestock allotments, (4) mineral and energy development, (5) recreation, (6) snowmobiling, (7) vegetation management, (8) climate change, and (9) habitat fragmentation.

Habitat destruction and modification were contributing factors leading to the listing of the grizzly bear as a threatened species under the Act in 1975 (40 FR 31734, July 28, 1975). Both the dramatic decreases in historical range and land management practices in formerly secure grizzly bear habitat led to the 1975 listing (40 FR 31734,

July 28, 1975). For consideration under the Act's listing provisions in this final rule, the word range applies to where the species currently exists. To address this source of population decline, the IGBST was created in 1973, to collect, manage, analyze, and distribute science-based information regarding habitat and demographic parameters upon which to base management and recovery. Then, in 1983, the IGBC was created to coordinate management efforts across multiple Federal lands and different States within the various ecosystems ultimately working to achieve recovery of the grizzly bear in the lower 48 States. Its objective was to change land management practices on Federal lands that supported grizzly bear populations at the time of listing to provide security and maintain or improve habitat conditions for the grizzly bear. Since 1986, National Forest and National Park plans have incorporated the Interagency Grizzly Bear Guidelines (USDA FS 1986, pp. 1–2) to manage grizzly bear habitat in the Yellowstone PCA.

Management improvements made as a result of the Interagency Grizzly Bear Guidelines include, but are not limited to: (1) Federal and State agency coordination to produce nuisance bear guidelines that allow a quick response to resolve and minimize grizzly bear–human confrontations; (2) reduced motorized access route densities through restrictions, decommissioning, and closures; (3) highway design considerations to facilitate population connectivity; (4) seasonal closure of some areas to all human access in National Parks that are particularly important to grizzly bears; (5) closure of many areas in the GYE to oil and gas leasing, or implementing restrictions such as no surface occupancy; (6) elimination of six active and four vacant sheep allotments on the Caribou-Targhee National Forest since 1998, resulting in an 86 percent decrease in total sheep animal months inside the Yellowstone PCA; and (7) expanded information and

education (I&E) programs in the Yellowstone PCA to help reduce the number of grizzly bear mortalities caused by big-game hunters (outside National Parks). Overall, adherence to the Interagency Grizzly Bear Guidelines has changed land management practices on Federal lands to provide security and to maintain or improve habitat conditions for the grizzly bear. Implementation of these guidelines has led to the successful rebound of the GYE grizzly bear population, allowing it to significantly increase in size and distribution since its listing in 1975.

In December 2016, the YES released the final 2016 Conservation Strategy for the grizzly bear in the GYE to guide management and monitoring of the habitat and population of GYE grizzly bears after delisting. The 2016 Conservation Strategy is the most recent iteration of the Conservation Strategy, which was first published in final form in 2007 (see our notice of availability published on March 13, 2007, at 72 FR 11376). The 2016 Conservation Strategy incorporates the explicit and measurable habitat criteria established in the "Recovery Plan Supplement: Habitat-based Recovery Criteria for the Greater Yellowstone Ecosystem" (USFWS 2007*b*). Whereas the Interagency Grizzly Bear Guidelines helped to guide successful recovery efforts, the 2016 Conservation Strategy will help guide the recovered GYE population post-delisting. The 2016 Conservation Strategy identifies and provides a framework for managing two areas, the PCA and adjacent areas of the DMA, where occupancy by grizzly bears is anticipated to continue in the foreseeable future. What follows is an assessment of present or threatened destruction, modification, or curtailment of the grizzly bear's habitat within the PCA and adjacent areas of the DMA.

Habitat Management Inside the Primary Conservation Area

As per the 2016 Conservation Strategy and the habitat-based recovery criteria discussed above, the PCA will be a core secure area for grizzly bears where human impacts on habitat conditions will be maintained at or below levels that existed in 1998 (YES 2016a, pp. 54–73). Specifically, the amount of secure habitat will not decrease below 1998 levels while the number and capacity of developed sites and the number and acreage of livestock allotments will not increase above 1998 levels. The majority of land, all suitable habitat, within the PCA is managed by the NPS (39.4 percent (9,409 of 23,853 km^2 (3,632 of 9,210 mi^2)) and the USFS (58.5 percent (13,942 of 23,853 km^2 (5,383 of 9,210 mi^2)). The 1998 baseline standards have been incorporated into the National Park Compendia (YNP 2014b, p. 18; GTNP and JDR 2016, p. 3) and the USFS Amendment for Grizzly Bear Habitat Conservation for the Greater Yellowstone Area National Forests (USDA FS 2006b, entire). The 1998 baseline for habitat standards was chosen because the levels of secure habitat and developed sites on public lands remained relatively constant in the 10 years preceding 1998 (USDA FS 2004, pp. 140–141), and the selection of 1998 ensured that habitat conditions existing at a time when the population was increasing at a rate of 4 to 7 percent per year (Schwartz *et al.* 2006b, p. 48) would be maintained. For each of the 40 bear management subunits, located in the PCA, the 1998 baseline was determined through a GIS analysis of the amount of secure habitat, open and closed road densities, the number and capacity of livestock allotments, and the number and capacity of developed sites on public lands.

Motorized Access Management: When we listed the grizzly bear in 1975, we identified land management practices that create new ways for humans to access formerly secure grizzly bear habitat as the mechanism that resulted in bears being more susceptible

to the threat of human-caused mortality and human-bear conflicts (40 FR 31734, July 28, 1975). We recognized early on that managing this human access to grizzly bear habitat would be the key to effective habitat management, and an extensive body of literature supports this approach. Specifically, unmanaged motorized access impacts grizzly bears by: (1) increasing human interaction and potential grizzly bear mortality risk; (2) increasing displacement from important habitat; (3) increasing habituation to humans; and (4) decreasing habitat where energetic requirements can be met with limited disturbance from humans (Mattson *et al.* 1987, pp. 269–271; McLellan and Shackleton 1988, pp. 458–459; McLellan 1989, pp. 1862–1864; Mace *et al.* 1996, pp. 1402–1403; Schwartz *et al.* 2010, p. 661).

Motorized access affects grizzly bears primarily through increased human-caused mortality risk (Schwartz *et al.* 2010, p. 661). Secondarily, motorized access may affect grizzly bears through temporary or permanent habitat loss due to human disturbance. Managing motorized access by providing large proportions of secure habitat helps ameliorate the impacts of displacement and increased human-caused mortality risk in grizzly bear habitat. Secure habitat refers to those areas with no motorized access that are at least 4 ha (10 ac) in size and more than 500 m (1,650 ft) from a motorized access route or recurring helicopter flight line (USDA FS 2004, p. 18). In the 1998 baseline, secure habitat comprised 45.4 to 100 percent of the total area within a given subunit with an average of 85.6 percent throughout the entire PCA (YES 2016b, Appendix E). These levels of secure habitat have been successfully maintained and will continue to be maintained or improved, as directed by the 2016 Conservation Strategy and the MOU signed by all State and Federal partner agencies (YES 2016a, pp. 13–14). Thirty-seven

subunits were determined to have sufficient levels of secure habitat. Three subunits were identified as in need of improvement from 1998 levels. These subunits have shown on average a 7.5 percent increase in secure habitat, and these improved levels will serve as the new baseline for these three subunits with the implementation of the 2006 Gallatin National Forest Travel Management Plan (Gallatin NF 2006, pp. 30, 83–84). Because of the positive effect that secure habitat has on grizzly bear survival and reproduction, one of the 2016 Conservation Strategy objectives is no net decrease in the 1998 baseline levels of secure habitat inside the PCA so that the PCA can continue to function as a source area for grizzly bears in the GYE. Therefore, motorized access management inside the PCA does not currently pose a threat to the GYE grizzly bear DPS, and we do not foresee that motorized access management will pose a threat in the foreseeable future.

Developed Sites: The National Parks and National Forests within the PCA will manage developed sites at 1998 levels within each bear management subunit, with some exceptions for administrative and maintenance needs (YES 2016a, pp. 54–73). These exceptions to the 1998 baseline for administrative and maintenance needs are narrow in scope and require mitigation (i.e., food storage structures) to reduce potential detrimental impacts to grizzly bears (see the 2016 Conservation Strategy for a detailed description of the exception guidance, which are referred to as application rules; YES 2016a, pp. 64–66). "Developed sites" refer to those sites or facilities on public land with features intended to accommodate public use or recreation. Such sites are typically identified or advertised via visitor maps or information displays as identifiable destination sites promoted by the agency. Examples of developed sites include, but are not limited to, campgrounds, picnic areas, trailheads, boat launches, rental cabins, summer homes,

lodges, service stations, restaurants, visitor centers, administrative sites, and permitted resource exploration or extraction sites such as oil and gas exploratory wells, production wells, plans of operation for mining activities, and work camps.

"Administrative sites" are those sites or facilities constructed for use primarily by government employees to facilitate the administration and management of public lands. Administrative sites are counted toward developed sites, and examples include headquarters, ranger stations, patrol cabins, park entrances, Federal employee housing, and other facilities supporting government operations. In contrast to developed or administrative sites, "dispersed sites" are those not associated with a developed site, such as a front-country campground. These sites are typically characterized as having no permanent agency-constructed features, are temporary in nature, have minimal to no site modifications, have informal spacing, and possibly include primitive road access. Dispersed sites are not counted toward developed sites. Developed sites on public lands are currently inventoried and tracked in GIS databases. As of 1998, there were 593 developed sites on public land within the PCA (YES 2016b, Appendix E). As of 2014, the number of developed sites on public lands had decreased to 578 (Greater Yellowstone Area Grizzly Bear Habitat Modeling Team 2015, p. 90).

The primary concern related to developed sites is direct mortality from bear–human encounters and unsecured attractants. Secondary concerns include temporary or permanent habitat loss and displacement due to increased length of time of human use and increased human disturbance to surrounding areas. In areas of suitable habitat inside the PCA, the NPS and the USFS enforce food storage rules aimed at decreasing grizzly bear access to human foods (YES 2016a, pp. 30–31, 84–85). These regulations will

continue to be enforced and are in effect for nearly all currently occupied grizzly bear habitat within the GYE grizzly bear DPS boundaries (YES 2016a, pp. 30–31, 84–85). Developed sites inside the PCA do not currently constitute a threat to the GYE grizzly bear DPS. Additionally, because the National Parks and National Forests within the PCA will continue to manage developed sites at 1998 levels within each bear management subunit, with some exceptions as per the application rules (YES 2016a, pp. 65–67), and because food storage rules will be enforced on these public lands, we do not expect developed sites inside the PCA to pose a threat to the GYE grizzly bear DPS in the foreseeable future.

Livestock Allotments: When grizzly bears were listed in 1975, the Service identified "livestock use of surrounding national forests" as detrimental to grizzly bears "unless management measures favoring the species are enacted" (40 FR 31734, July 28, 1975). Impacts to grizzly bears from livestock operations potentially include: (1) direct mortality from control actions resulting from livestock depredation; (2) direct mortality due to control actions resulting from grizzly bear habituation and/or learned use of bear attractants, such as livestock carcasses and feed; (3) increased chances of a grizzly bear livestock conflict; (4) displacement due to livestock or related management activity; and (5) direct competition for preferred forage species.

Approximately 14 percent (45 of 311) of all human-caused grizzly bear mortalities in the GYE between 2002 and 2014 were due to management removal actions associated with livestock depredations. This human-caused mortality is the main impact to grizzly bears in the GYE associated with livestock. Increased chances of grizzly bear conflict related to livestock have been minimized through requirements to securely store

and/or promptly remove attractants associated with livestock operations (e.g., livestock carcasses, livestock feed, etc.). The effects of displacement and direct competition with livestock for forage are considered negligible to grizzly bear population dynamics because, even with direct grizzly bear mortality, current levels of livestock allotments have not precluded grizzly bear population growth and expansion.

The Recovery Plan Supplement: Habitat-based Recovery Criteria for the Yellowstone Ecosystem (USFWS 2007*b*, entire) and the USFS Record of Decision implementing their forest plan amendments (USDA FS 2006b, entire) established habitat standards regarding livestock allotments. The number of active livestock allotments, total acres affected, and permitted sheep animal months within the PCA will not increase above 1998 levels (USDA FS 2006b, p. 5; YES 2016a, pp. 56, 67–68). Due to the higher prevalence of grizzly bear conflicts associated with sheep grazing, existing sheep allotments will be phased out as the opportunity arises with willing permittees (USDA FS 2006b, p. 6; YES 2016a, pp. 67–68).

A total of 106 livestock allotments existed inside the PCA in 1998. Of these 1998 allotments, there were 72 active and 13 vacant cattle allotments and 11 active and 10 vacant sheep allotments, with a total of 23,090 sheep animal months (YES 2016b, Appendix E). Sheep animal months are calculated by multiplying the permitted number of animals by the permitted number of months. Any use of vacant allotments will be permitted only if the number and net acreage of allotments inside the PCA does not increase above the 1998 baseline (YES 2016a, p. 68). Since 1998, the Caribou-Targhee National Forest has closed six sheep allotments within the PCA, while the Shoshone National Forest has closed two sheep allotments and the Gallatin National Forest has

closed four (Greater Yellowstone Area Grizzly Bear Habitat Modeling Team 2015, p. 86). This situation has resulted in a reduction of 21,120 sheep animal months, a 91 percent reduction, from the total calculated for 1998 within the PCA, and is a testament to the commitment that land management agencies have to the ongoing success of the grizzly bear population in the GYE. As of 2014, there is only one active sheep allotment within the PCA, on the Caribou-Targhee National Forest.

The mandatory restriction on creating new livestock allotments and the voluntary phasing out of livestock allotments with recurring conflicts further ensure that the PCA will continue to function as source habitat. Although it is possible to reopen closed allotments, such an action would be subject to NEPA and the majority of allotments would have a low probability of reopening because the rationale behind closing them is still applicable (e.g., limited forage). Livestock allotments do not currently constitute a threat to the GYE grizzly bear DPS. Additionally, because there will continue to be no net increase above 1998 levels in cattle or sheep allotments allowed on public lands inside the PCA, we do not expect that livestock allotments inside the PCA will constitute a threat in the foreseeable future.

Mineral and Energy Development: Management of oil, gas, and mining are tracked as part of the developed site standard (YES 2016a, pp. 64–67). There were no active oil and gas leases inside the PCA as of 1998 (USDA FS 2006a, p. 209). Based on Forest Plan direction, there are approximately 243 km^2 (94 mi^2) of secure habitat that could allow surface occupancy for oil and gas projects within the PCA (USDA FS 2006a, figures 48 and 96). This comprises less than 4 percent of all suitable habitat within the PCA. Additionally, 1,354 preexisting mining claims were located in 10 of the subunits

inside the PCA (YES 2016b, Appendix E), but only 28 of these mining claims had operating plans. These operating plans are included in the 1998 developed site baseline.

Under the conditions of the 2016 Conservation Strategy, any new oil, gas, or mineral project will be approved only if it conforms to secure habitat and developed site standards (USFWS 2007*b*, pp. 5–6; YES 2016a, pp. 61–67). For instance, any oil, gas, or mineral project that reduces the amount of secure habitat permanently will have to provide replacement secure habitat of similar habitat quality (based on our scientific understanding of grizzly bear habitat), and any change in developed sites will require mitigation equivalent to the type and extent of the impact, and such mitigation must be in place before project initiation or be provided concurrently with project development as an integral part of the project plan (YES 2016a, p. 62). For projects that temporarily change the amount of secure habitat, only one project is allowed in any subunit at any time (YES 2016a, p. 63). Mitigation of any project will occur within the same subunit and will be proportional to the type and extent of the project (YES 2016a, p. 62). In conclusion, because any new mineral or energy development will continue to be approved only if it conforms to the secure habitat and developed site standards set forth in the 2016 Conservation Strategy, we do not expect that such development inside the PCA will constitute a threat to the GYE grizzly bear DPS now, or in the foreseeable future.

Recreation: At least 3 million people visit and recreate in the National Parks and National Forests of the GYE annually (USDA FS 2006a, pp. 176, 184; Cain 2014, p. 46; Gunther 2014, p. 47). Based on past trends, visitation and recreation are expected to increase in the future. For instance, YNP has shown an approximate 15 percent increase in the number of people visiting each decade since the 1930s (USDA FS 2006a, p. 183);

however, the number of people recreating in the backcountry there has remained relatively constant from the 1970s through 2010s (Gunther 2014, p. 47). The concern related to increased recreation is that it may increase the probability of grizzly bear–human encounters, with subsequent increases in human-caused mortality (Mattson *et al.* 1996, p. 1014).

Recreation in the GYE can be divided into six basic categories based on season of use (winter or all other seasons), mode of access (motorized or non-motorized), and level of development (developed or dispersed) (USDA FS 2006a, p. 187). Inside the PCA, the vast majority of lands available for recreation are accessible through non-motorized travel only (USDA FS 2006a, p. 179). Motorized recreation during the summer, spring, and fall inside the PCA will be limited to existing roads as per the standards in the 2016 Conservation Strategy that restrict increases in roads or motorized trails. Current and projected levels of non-motorized recreation, including mountain biking, do not occur at a level that requires limitations. Recreation at developed sites such as lodges, downhill ski areas, and campgrounds will be limited by the developed sites habitat standard described in the 2016 Conservation Strategy. Ongoing I&E efforts are an important contributing factor to successful grizzly bear conservation and will continue under the 2016 Conservation Strategy (YES 2016a, pp. 92–95). The number and capacity of existing developed sites on Federal lands has not increased from the 1998 baseline and will not increase once delisting occurs. For a more complete discussion of projected increases in recreation in the GYE National Forests, see the Final Environmental Impact Statement for the Forest Plan Amendment for Grizzly Bear Habitat Conservation for the GYE National Forests (USDA FS 2006a, pp. 176–189).

In conclusion, because the few motorized access routes inside the PCA will not increase, because the number and capacity of developed sites on public lands within the PCA will not increase, and because the National Parks and National Forests within the PCA will continue to educate visitors on their lands about how to recreate safely in bear country and avoid grizzly bear–human conflicts, the current level of recreation does not currently constitute a threat to the GYE grizzly bear DPS, and we do not expect recreation to constitute a threat in the foreseeable future.

Snowmobiling: Snowmobiling has the potential to disturb bears while in their dens and after emergence from their dens in the spring. Because grizzly bears are easily awakened in the den (Schwartz *et al*. 2003, p. 567) and have been documented abandoning den sites after seismic disturbance (Reynolds *et al.* 1986, p. 174), the potential impact from snowmobiling should be considered. We found no studies in the peer-reviewed literature documenting the effects of snowmobile use on any denning bear species, and the information that is available is anecdotal in nature (USFWS 2002, entire; Hegg *et al.* 2010, entire).

Disturbance in the den could result in increased energetic costs (increased activity and heart rate inside the den) and possibly den abandonment, which, in theory, could ultimately lead to a decline in physical condition of the individual or even cub mortality (Swenson *et al*. 1997, p. 37; Graves and Reams 2001, p. 41). Although the potential for this type of disturbance while in the den certainly exists, Reynolds *et al.* (1986, p. 174) found that grizzly bears denning within 1.4 to 1.6 km (0.9 to 1.0 mi) of active seismic exploration and detonations moved around inside their dens but did not leave them. Harding and Nagy (1980, p. 278) documented two instances of den abandonment during

fossil fuel extraction operations. One bear abandoned its den when a seismic vehicle drove directly over the den (Harding and Nagy 1980, p. 278). The other bear abandoned its den when a gravel mining operation literally destroyed the den (Harding and Nagy 1980, p. 278). Reynolds *et al.* (1986, entire) also examined the effects of tracked vehicles and tractors pulling sledges. In 1978, there was a route for tractors and tracked vehicles within 100 m (328 ft) of a den inhabited by a female with three yearlings. This family group did not abandon their den at any point (Reynolds *et al.* 1986, p. 174). Reynolds *et al*. (1986, p. 174) documented one instance of possible den abandonment due to detonations for seismic testing within 200 m of a den. This bear was not marked, but an empty den was reported by seismic crews.

Swenson *et al*. (1997, entire) monitored 13 different grizzly bears for at least 5 winters each and documented 18 instances of den abandonment, 12 of which were related to human activities. Four of these instances were hunting related (i.e., gunshots fired within 100 m (328 ft) of the den), two occurred after "forestry activity *at* the den site," one had moose and dog tracks within 10 m (33 ft) of a den, one had dog tracks *at* the den site, one had ski tracks within 80 to 90 m (262 to 295 ft) from a den, one had an excavation machine working within 75 m (246 ft) of a den, and two were categorized as "human related" without further details (Swenson *et al.* 1997, p. 37). Swenson *et al.* (1997) found that most den abandonment (72 percent) occurred early in the season before pregnant females give birth. However, there still may be a reproductive cost of these early den abandonments: 60 percent (sample size of 5) of female bears that abandoned a den site before giving birth lost at least one cub whereas only 6 percent (sample size of 36) of pregnant females that did not abandon their dens lost a cub in or near their den

(Swenson *et al.* 1997, p. 37). In the GYE, the one documented observation of snowmobile use at a known den site found the bear did not abandon its den, even though snowmobiles were operating directly on top of it (Hegg *et al.* 2010, p. 26). We found no records of litter abandonment by grizzly bears in the lower 48 States due to snowmobiling activity. Additionally, monitoring of den occupancy for 3 years on the Gallatin National Forest in Montana did not document any den abandonment (Gallatin NF 2006, entire).

In summary, the available data about the potential for disturbance while denning and den abandonment from nearby snowmobile use are extrapolated from studies examining the impacts of other human activities and are identified as "anecdotal" in nature (Swenson *et al.* 1997, p. 37), with sample sizes so small they cannot be legitimately applied to assess population-level impacts (in their entirety: Harding and Nagy 1980; Reynolds *et al.* 1986; Hegg *et al.* 2010). Because there are no data or information suggesting snowmobile use in the GYE is negatively affecting the grizzly bear population, or even individual bears, we determine that snowmobiling does not constitute a threat to the GYE grizzly bear DPS now, or in the foreseeable future. Yet, because the potential for disturbance and impacts to reproductive success exists, monitoring will continue to support adaptive management decisions about snowmobile use in areas where disturbance is documented or likely to occur.

Vegetation Management: Vegetation management occurs throughout the GYE on lands managed by the USFS and NPS. Vegetation management projects typically include timber harvest, thinning, prescribed fire, and salvage of burned, diseased, or insect-infested stands. If not implemented properly, vegetation management programs can

negatively affect grizzly bears by: (1) removing hiding cover; (2) disturbing or displacing bears from habitat during the logging period; (3) increasing grizzly bear–human conflicts or mortalities as a result of unsecured attractants; and (4) increasing mortality risk or displacement due to new roads into previously roadless areas and/or increased vehicular use on existing restricted roads, especially if roads remain open to the public after vegetation management is complete.

Conversely, vegetation management may result in positive effects on grizzly bear habitat once the project is complete, provided key habitats such as riparian areas and known food production areas are maintained or enhanced. For instance, tree removal for thinning or timber harvest and prescribed burning can result in localized increases in bear foods through increased growth of grasses, forbs, and berry-producing shrubs (Zager *et al.* 1983, p. 124; Kerns *et al.* 2004, p. 675). Vegetation management may also benefit grizzly bear habitat by controlling undesirable invasive species, improving riparian management, and limiting livestock grazing in important food production areas.

Changes in the distribution, quantity, and quality of cover are not necessarily detrimental to grizzly bears as long as they are coordinated on a BMU or subunit scale to ensure that grizzly bear needs are addressed throughout the various projects occurring on multiple jurisdictions at any given time. Although there are known, usually temporary, impacts to individual bears from timber management activities, these impacts have been adequately mitigated using the Interagency Grizzly Bear Guidelines in place since 1986, and will continue to be managed at levels acceptable to the grizzly bear population under the 2016 Conservation Strategy. Therefore, we do not expect that vegetation

management inside the PCA will constitute a threat to the GYE grizzly bear DPS now, or in the foreseeable future.

Climate Change: The effects of climate change may result in a number of changes to grizzly bear habitat, including a reduction in snowpack levels, which may shorten the denning season (Leung *et al.* 2004, pp. 93–94), shifts in denning times (Craighead and Craighead 1972, pp. 33–34; Van Daele *et al.* 1990, p. 264; Haroldson *et al.* 2002, pp. 34–35), shifts in the abundance and distribution of some natural food sources (Rodriguez *et al.* 2007, pp. 41–42), and changes in fire regimes (Nitschke and Innes 2008, p. 853; McWethy *et al.* 2010, p. 55). 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). These effects may even make habitat more suitable and food sources more abundant. However, these ecological changes may affect the timing and frequency of grizzly bear–human interactions and conflicts (Servheen and Cross 2010, p. 4) and are discussed below under *Factor E* (*Other Natural or Manmade Factors Affecting Its Continued Existence*).

Habitat Fragmentation: The GYE grizzly bear population is currently a contiguous population across its range, and there are no data to indicate habitat fragmentation within this population is occurring. Although currently not occurring, habitat fragmentation can cause loss of connectivity and increase human-caused mortalities, and thus is a potential threat to grizzly bears. To prevent habitat fragmentation and degradation, the evaluation of all highway construction projects in suitable habitat on Federal lands throughout the GYE DMA will continue to include the impacts of the project on grizzly bear habitat connectivity. This evaluation would go

through an open and public planning process (USFWS 2007*b*, pp. 38–41; YES 2016a, pp. 82–83). By identifying areas used by grizzly bears, officials can mitigate potential impacts from road construction both during and after a project. Federal agencies will continue to identify important crossing areas by collecting information about known bear crossings, bear sightings, ungulate road mortality data, bear home range analyses, and locations of game trails.

Potential advantages of this data collection requirement include reduction of grizzly bear mortality due to vehicle collisions, access to seasonal habitats, maintenance of traditional dispersal routes, and decreased risk of fragmentation of individual home ranges. For example, work crews will place temporary work camps in areas with lower risk of displacing grizzly bears, and food and garbage will be kept in bear-resistant containers. Highway planners will incorporate warning signs and crossing structures such as culverts or underpasses into projects when possible to facilitate safe highway crossings by wildlife. Additionally, the conflict prevention, response, and outreach elements of the 2016 Conservation Strategy play an important role in preventing habitat fragmentation by keeping valleys that are mostly privately owned from becoming mortality sinks to grizzly bears attracted to human sources of foods. In conclusion, because these activities that combat habitat fragmentation will continue to occur under the 2016 Conservation Strategy, we do not expect that fragmentation within the GYE grizzly bear DPS boundaries will constitute a threat to the GYE grizzly bear DPS now, or in the foreseeable future.

Habitat Management Outside the Primary Conservation Area

In suitable habitat outside of the PCA within the DPS boundaries, the USFS, BLM, and State wildlife agencies will monitor habitat and population criteria to prevent potential threats to habitat, ensuring that the measures of the Act continue to be unnecessary (Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, pp. 2–3; MFWP 2013, p. 5; USDA FS 2006a, pp. 44–45; WGFD 2016, p. v; YES 2016a, pp. 1–12). Factors impacting suitable habitat outside of the PCA in the future are similar to those inside the PCA and may include projects that involve road construction, livestock allotments, developed sites, and increased human-caused grizzly bear mortality risk.

Of the 22,783 km^2 (8,797 mi^2 or 5.6 million acres) of suitable habitat outside of the PCA within the DPS boundaries, the USFS manages 17,292 km^2 (6,676 mi^2), or 76 percent. Of the 76 percent of suitable habitat outside of the PCA but within the DMA that the USFS manages, nearly 80 percent (13,685 km^2 (5,284 mi^2)) is Designated Wilderness (6,799 km^2 (2,625 mi^2)), Wilderness Study Area (WSA) (708 km^2 (273 mi^2)), or Inventoried Roadless Area (IRA) (6,179 km^2 (2,386 mi^2)). These designations provide regulatory mechanisms outside of the Act and the 2016 Conservation Strategy that protect grizzly bear habitat from new road construction, new oil and gas development, new livestock allotments, and timber harvest. This large area of widely distributed habitat allows for continued population expansion and provides additional resiliency to environmental change.

Specifically, the Wilderness Act of 1964 (16 U.S.C. 1131 *et seq.*) does not allow for timber harvest, new road construction, new livestock allotments, new developed sites, and new mining claims in designated Wilderness areas (6,799 km^2 (2,625 mi^2)), with the exception of valid existing rights. This secure suitable habitat is biologically significant

to the GYE grizzly bear DPS because it allows for population expansion into these areas that are minimally affected by humans. If preexisting valid mining claims are pursued, the plans of operation are subject to reasonable regulation to protect wilderness values with mitigation to offset potential impacts from development.

Wilderness Study Areas (WSAs) (Wilderness Study Act of 1977) have been designated by Congress as areas having wilderness characteristics and warranting further study by Federal land management agencies (e.g., USFS or BLM) and consideration by Congress as formally designated Wilderness. Individual National Forests manage the 708 km^2 (273 mi^2) of WSAs to maintain their wilderness characteristics, generally until Congress acts to either designate them as permanent Wilderness or release them to multiple use management. This generally means that individual WSAs are protected from timber harvest, new road construction, new livestock allotments, and new developed sites by the legislation creating them, subject to valid existing rights. If mining claims are pursued, the plans of operation are subject to reasonable regulations to protect wilderness values with mitigation to offset potential impacts from development. Existing uses at the time of creation of the WSAs are generally allowed to continue so long as the wilderness characteristics of the area are maintained.

Inventoried Roadless Areas (IRAs) currently provide 4,891 km^2 (1,888 mi^2) of secure habitat for grizzly bears outside of the PCA within the DPS boundaries. This amount of secure habitat is less than the total area contained within IRAs (6,179 km^2 (2,386 mi^2)) because some motorized use occurs due to roads that existed before the area was designated as roadless. The 2001 Roadless Areas Conservation Rule (66 FR 3244, January 12, 2001; hereafter referred to as the "Roadless Rule") prohibits new road

construction, road re-construction, and commercial timber harvest in IRAs. If mining claims are pursued, the plans of operation are subject to reasonable regulations to protect roadless characteristics with mitigation to offset potential impacts from development. Motorized roads and trails may exist within IRAs subject to forest travel management plans. Potential changes in the management of these areas are not anticipated because the Roadless Rule was upheld by the Tenth Circuit Court of Appeals in 2011. (See *Wyoming* v. *USDA*, 661 F.3d 1209 (10th Cir. 2011).)

Based on the amount of Wilderness, WSA, and IRA, an estimated 71 percent (12,396 of 17,291 km^2 (4,786 of 6,676 mi^2)) of suitable habitat outside the PCA on USFS lands within the DPS is currently secure habitat and is likely to remain secure habitat. Upon delisting of the GYE grizzly bear, the USFS will evaluate GYE grizzly bear management as a Regional Forest Sensitive Species, and a determination of whether this status is warranted will be made at that time (USDA FS 2005). The USFS will consider the GYE grizzly bear as a potential species of conservation concern during any plan revision within the range of the GYE grizzly bear as required by FSH 1909.12 Ch. 10, 12.52(d)(2)(b), which requires consideration for any species that was removed from the Federal lists of endangered and threatened species within the past 5 years.

Additional protections occur on suitable habitat on Federal (BLM and NPS) and Tribal lands outside of the PCA but inside the DMA. The BLM manages an additional 22 percent (5,064 km^2 (1,955 mi^2)) of suitable habitat outside of the PCA. Upon delisting of the GYE grizzly bear, the BLM in Idaho, Montana, and Wyoming will classify the grizzly bear as a Sensitive Species in the GYE for at least 5 years post-delisting. Grizzly bears and their habitats on BLM lands will then be managed consistent with Manual 6840

(BLM 2008, entire). GTNP manages 837 km^2 (323 mi^2) of suitable habitat outside of the PCA. Protections for grizzly bears throughout NPS lands, including but not limited to seasonal area closures and food storage orders, are provided through the National Park compendium (GTNP and JDR 2016, pp. 6, 13, 21–22). The Eastern Shoshone and Northern Arapaho Tribes manage the 1,360 km^2 (525 mi^2) of suitable habitat within the boundaries of the Wind River Reservation (WRR), all of which is outside the PCA. The Tribes' Grizzly Bear Management Plan (Eastern Shoshone and Northern Arapaho Tribes 2009) will facilitate grizzly bear occupancy in areas of suitable habitat and allow grizzly bears access to high-elevation whitebark pine and army cutworm moth aggregation sites. The WRR Forest Management Plan calls for no net increase in roads in the Wind River Roadless Area and the Monument Peak area of the Owl Creek Mountains. In the remaining lands occupied by grizzly bears, open road densities of 1.6 km/km^2 (1 mi/ mi^2) or less will be maintained (Eastern Shoshone and Northern Arapaho Tribes 2009, p. 11).

Federal, State, and Tribal agencies are committed to managing habitat so that the GYE grizzly bear DPS remains recovered and is not likely to become endangered throughout all or a significant portion of its range in the foreseeable future (Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, pp. 2–3; USDA FS 2006b, entire; Eastern Shoshone and Northern Arapaho Tribes 2009, p. 11; MFWP 2013, p. 6; YNP 2014b, p. 18; GTNP and JDR 2016, p. 3; WGFD 2016, p. v; YES 2016a, pp. 54–85). In suitable habitat outside of the PCA, restrictions on human activities are more flexible, but the USFS, BLM, and Tribal and State wildlife agencies will still carefully manage these lands, monitor bear–human conflicts in these areas, and respond with management as necessary to reduce such conflicts to account for the complex needs of

both grizzly bears and humans (Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, pp. 16–17; USDA FS 2006b, pp. A1–A27; Eastern Shoshone and Northern Arapaho Tribes 2009, pp. 9–11; MFWP 2013, pp. 53–59; WGFD 2016, pp. 20–25; YES 2016a, pp. 86–91).

By and large, habitat management on Federal public lands is directed by Federal land management plans, not State management plans. However, the three State grizzly bear management plans recognize the importance of areas that provide security for grizzly bears in suitable habitat outside of the PCA within the DPS boundaries on Federal lands. For example, the Montana and Wyoming plans recommend limiting average road densities to 1.6 km/2.6 km^2 (1 mi/mi^2) or less in these areas (MFWP 2013, pp. 37–39; WGFD 2016, p. 19). Both States have similar standards for elk habitat on State lands and note that these levels of motorized access benefit a variety of wildlife species while maintaining reasonable public access. Similarly, the Idaho State plan recognizes that management of motorized access outside the PCA should focus on areas that have road densities of 1.6 km/2.6 km^2 (1 mi/mi^2) or less. The area most likely to be occupied by grizzly bears outside the PCA in Idaho is on the Caribou-Targhee National Forest. The 1997 Targhee Forest Plan includes motorized access standards and management prescriptions outside the PCA that provide for long-term security in 59 percent of existing secure habitat outside of the PCA (USDA FS 2006a, pp. 78, 109).

In 2004, there were roughly 150 active cattle allotments and 12 active sheep allotments in suitable habitat outside the PCA within the DPS boundaries (USDA FS 2004, p. 129). The Targhee National Forest closed two of these sheep allotments in 2004, and there have not been any new allotments created since then (USDA FS 2006a,

p. 168; Landenburger 2014, *in litt*.). The USFS is committed to working with willing permittees to retire allotments with recurring conflicts that cannot be resolved by modifying grazing practices (USDA FS 2006b, p. 6). Although conflicts with livestock have the potential to result in mortality for grizzly bears, the 2016 Conservation Strategy's specific total mortality limits will preclude population-level impacts. The 2016 Conservation Strategy directs the IGBST to monitor and spatially map all grizzly bear mortalities (both inside and outside the PCA), causes of death, and the source of the problem, and alter management to maintain a recovered population and prevent the need to relist the population under the Act (YES 2016a, p. 48).

There are over 500 developed sites on the five National Forests in the areas identified as suitable habitat outside the PCA within the DPS boundaries (USDA FS 2004, p. 138). While grizzly bear–human conflicts at developed sites on public lands do occur, the most frequent reason for management removals are conflicts on private lands (Servheen *et al.* 2004, p. 21). Existing USFS food storage regulations for these areas will continue to minimize the potential for grizzly bear–human conflicts through food storage requirements, outreach, and education. The number and capacity of developed sites will be subject to management direction established in Forest Plans. Should the IGBST determine developed sites on public lands are related to increases in mortality beyond the sustainable limits discussed above, managers may choose to close specific developed sites or otherwise alter management in the area in order to maintain a recovered population and prevent the need to relist the population under the Act. Due to the USFS's commitment to manage National Forest lands in the GYE to maintain a recovered population (USDA FS 2006b, pp. iii, A–6; YES 2016a, pp. 54–83), we do not

expect livestock allotments or developed sites in suitable habitat outside of the PCA to reach densities that are likely to be a threat to the GYE grizzly bear DPS in the foreseeable future.

According to current Forest Plan direction, less than 19 percent (3,213 km^2 (1,240 mi^2)) of suitable habitat outside the PCA within the DPS boundaries on USFS land allows surface occupancy for oil and gas development, and 17 percent (3,967 km^2 (1,532 mi^2)) has both suitable timber and a management prescription that allows scheduled timber harvest. The primary impacts to grizzly bears associated with timber harvest and oil and gas development are increases in road densities, with subsequent increases in human access, grizzly bear–human encounters, and human-caused grizzly bear mortalities (McLellan and Shackleton 1988, pp. 458–459; McLellan and Shackleton 1989, pp. 377–379; Mace *et al.* 1996, pp. 1402–1403). Although seismic exploration associated with oil and gas development or mining may disturb denning grizzly bears (Harding and Nagy 1980, p. 278; Reynolds *et al.* 1986, pp. 174–175), actual den abandonment is rarely observed, and there has been no documentation of such abandonment by grizzly bears in the GYE. Additionally, only a small portion of this total land area will contain active projects at any given time, if at all. For example, among the roughly 3,967 km^2 (1,532 mi^2) identified as having both suitable timber and a management prescription that allows timber harvest, from 2003 to 2014, an average of only 4.7 km^2 (1.8 mi^2) was actually logged annually (Jackson 2017, *in litt.*). Similarly, although nearly 3,213 km^2 (1,240 mi^2) of suitable habitat on National Forest lands inside the DPS boundaries allow surface occupancy for oil and gas development, there currently are no active wells inside these areas (Vaculik 2017, *in litt.*).

Ultimately, the five affected National Forests (the Beaverhead-Deerlodge, Bridger-Teton, Caribou-Targhee, Custer Gallatin, and Shoshone) will manage the number of roads, livestock allotments, developed sites, timber harvest projects, and oil and gas wells outside of the PCA in the DMA to allow for a recovered grizzly bear population. Under the National Forest Management Act of 1976, the USFS will consider all potential impacts of projects to the GYE grizzly bear population in the NEPA planning process and then ensure that activities will provide appropriate habitat to maintain the population's recovered status.

Rapidly accelerating growth of human populations in some areas outside of the PCA continues to define the limits of grizzly bear range, and will likely limit the expansion of the GYE grizzly bear population onto private lands in some areas outside the PCA. Urban and rural sprawl (low-density housing and associated businesses) has resulted in increasing numbers of grizzly bear–human conflicts with subsequent increases in grizzly bear mortality rates. Private lands account for a disproportionate number of bear deaths and conflicts (USFWS 2007*c*, figures 15 and 16). Nearly 9 percent of all suitable habitat outside of the PCA is privately owned. As private lands are developed and as secure habitat on private lands declines, State agencies will work to balance impacts from private land development (Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, p. 10; MFWP 2013, p. 37; WGFD 2016, p. 15). Outside the PCA, State agencies will assist nongovernmental organizations (NGOs) and other entities to identify and prioritize potential lands suitable for permanent conservation through easements and other means as much as possible (USFWS 2007*c*, p. 54). Due to the large areas of widely distributed suitable habitat on public lands that are protected by Federal

legislation and managed by agencies committed to the maintenance of a recovered grizzly bear population, we do not consider human population growth on private lands to constitute a threat to the GYE grizzly bear DPS now or in the foreseeable future.

Summary of Factor A

In summary, the following factors warranted consideration as possible threats to the GYE grizzly bear DPS under *Factor A*: Effects due to (1) motorized access management, (2) developed sites, (3) livestock allotments, (4) mineral and energy development, (5) recreation, (6) snowmobiling, (7) vegetation management, (8) climate change, and (9) habitat fragmentation. Restrictions on motorized access, developed sites, and livestock allotments ensure that they will be maintained at or below 1998 levels, a time when the population was increasing at a rate of 4 to 7 percent per year (Schwartz *et al.* 2006b, p. 48). Additionally, secure habitat will be maintained at or above 1998 levels. The primary factors related to past habitat destruction and modification have been reduced through changes in management practices that have already been formally incorporated into regulatory documents.

Within suitable habitat, different levels of management and protection are applied to areas based on their level of importance. Within the PCA, habitat protections for grizzly bear conservation are in place across the current range where 75 percent of the females with cubs-of-the-year live most or all of the time (Schwartz *et al.* 2006a, p. 66; Haroldson 2014a, *in litt.*). For this area, the Service developed objective and measurable habitat-based recovery criteria to limit habitat degradation and human-caused mortality risk related to motorized access, developed sites, and livestock allotments (i.e., the 1998 baseline). When delisting occurs, the GYE National Forests and National Parks will

continue their 15-year history of implementation by legally implementing the appropriate planning documents that incorporate the 1998 baseline values as habitat standards (USDA FS 2006b, p. 26). Together, these two Federal agencies manage 98 percent of lands within the PCA and 88 percent of all suitable habitat within the DPS boundaries. As it has done for the last decade, the IGBST will continue to monitor compliance with the 1998 baseline values and will also continue to monitor grizzly bear body condition, fat levels, and diet composition. Accordingly, the PCA, which comprises 51 percent of the suitable habitat within the DPS boundaries and contains 75 percent of all females with cubs-of-the-year (Schwartz *et al.* 2006a, p. 64; Haroldson 2014a, *in litt*.), will remain a highly secure area for grizzly bears, with habitat conditions maintained at or above levels documented in 1998. Maintenance of the 1998 baseline values inside the PCA will continue to adequately ameliorate the multitude of stressors on grizzly bear habitat such that they do not become threats to the GYE grizzly bear DPS in the foreseeable future.

Suitable habitat outside the PCA provides additional ecological resiliency and habitat redundancy to allow the population to respond to environmental changes. Habitat protections specifically for grizzly bear conservation are not necessary here because other binding regulatory mechanisms are in place for nearly 60 percent of the area outside the PCA. In these areas, the Wilderness Act, the Roadless Areas Conservation Rule, and National Forest Land Management Plans limit development and motorized use. Management of individual projects on public land outside the PCA will continue to consider and minimize impacts on grizzly bear habitat. Efforts by NGOs and Tribal, State, and county agencies will seek to minimize bear–human conflicts on private lands (YES 2016a, pp. 86–91). These and other conservation measures ensure threats to the

GYE grizzly bear population's suitable habitat outside the PCA will continue to be ameliorated and will not be a threat to this population's long-term persistence (USDA FS 2006b).

Other management practices on Federal lands have been changed to provide security and to maintain or improve habitat conditions for grizzly bears. All operating plans for oil and gas leases must conform to secure habitat and developed site standards, which require mitigation for any change in secure habitat. Recreation inside the GYE is limited through existing road and developed site standards. Additionally, I&E campaigns educate visitors about how to recreate safely in bear country and avoid bear–human conflicts. There are no data available on the impacts of snowmobiling on grizzly bears to suggest an effect on grizzly bear survival or recovery of the population. Although vegetation management may temporarily impact individual grizzly bears, these activities are coordinated on a BMU or subunit scale according to the Interagency Grizzly Bear Guidelines to mitigate for any potentially negative effect. As a result of vegetation management, there may also be positive effects on grizzly bears where key habitats are maintained or enhanced. The habitat changes that are predicted under climate change scenarios are not expected by most grizzly bear biologists to directly threaten grizzly bears. The potential for changes in the frequency and timing of grizzly bear–human interactions is discussed below under *Factor E*. Finally, there are no data to indicate that habitat fragmentation is occurring within the GYE.

In summary, the factors discussed under *Factor A* continue to occur across the current range of the GYE grizzly bear population but are sufficiently ameliorated so they affect only a small proportion of the population. Despite these factors related to habitat,

the population has increased and stabilized while its current range has expanded. Therefore, based on the best available information and on continuation of current regulatory commitment, we do not consider the present or threatened destruction, modification, or curtailment of its habitat or range to constitute a threat to the GYE grizzly bear DPS now, or in the foreseeable future.

B and C. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes; Disease or Predation.

Factors B and C require the Service to consider overutilization, disease, or predation affecting the continued existence of a species. In addition to disease and natural predation, we consider here human-caused mortality including legal hunting, illegal kills (see *Glossary*), defense of life and property mortality, accidental mortality, and management removals.

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.* 2003, p. 571), eventually leading to their listing as a threatened species in 1975 (40 FR 31734, July 28, 1975). Grizzly bears were seen as a threat to livestock and human safety and, therefore, an impediment to westward expansion. Both the Federal Government and most early settlers were dedicated to eradicating large predators. Grizzly bears were shot, poisoned, trapped, and killed wherever humans encountered them (Servheen 1999, p. 50). By the time grizzly bears were listed under the Act in 1975, there were only a few

hundred remaining in the lower 48 States in less than 2 percent of their former range (USFWS 1993, pp. 8–10).

Human-caused Mortality

From 1980 to 2002, 66 percent (191) of the 290 known grizzly bear mortalities were human-caused (Servheen *et al.* 2004, p. 21). The main types of human-caused mortality were human site conflicts, self-defense, and illegal kills, all of which can be partially mitigated for through management actions (Servheen *et al.* 2004, p. 21). In our March 29, 2007, final rule (72 FR 14866), we report that despite these mortalities, this period corresponds to one during which the GYE grizzly bear population experienced population growth and range expansion. Since then, the IGBST has updated these demographic analyses using data from 2002–2011 (IGBST 2012, entire). Below, we evaluate human-caused mortality for 2002–2014, as it represents the most recent and best available information on the subject. For more information on the demographic vital rates for 2002–2011, please see *Population and Demographic Recovery Criteria* in the **Recovery Planning and Implementation** section, above. In this section, we discuss impacts from human-caused mortality, including legal hunting, illegal kills, defense of life and property, accidental mortality, and management removals.

We define poaching as intentional, illegal killing of grizzly bears. People may kill grizzly bears for several reasons, including a general perception that grizzly bears in the area may be dangerous, frustration over livestock depredations, or to protest land-use and road-use restrictions associated with grizzly bear habitat management (Servheen *et al.* 2004, p. 21). Regardless of the reason, poaching continues to occur. We are aware of at least 22 such killings in the GYE between 2002 and 2014 (Haroldson 2014b, *in litt*.;

Haroldson and Frey 2015, p. 26). This constituted 7 percent of known grizzly bear mortalities from 2002 to 2014. This level of take occurred during a period when poaching was subject to Federal prosecution. We do not expect poaching to significantly increase upon implementation of this final rule because State and Tribal designation as a game animal means poaching will remain illegal and prosecutable (W.S. 23-1-101 (a)(xii)(A); MCA 87-2-101 (4); IC 36-2-1; IDAPA 13.01.06.100.01(e); Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, pp. 18–21; MFWP 2013, p. 6; Eastern Shoshone and Northern Arapahoe Tribes 2009, p. 9; WGFD 2016, p. 9; YES 2016a, pp. 104–116).

State and Federal law enforcement agents have cooperated to ensure consistent enforcement of laws protecting grizzly bears. Currently, State and Federal prosecutors and enforcement personnel from each State and Federal jurisdiction work together to make recommendations to all jurisdictions, counties, and States on uniform enforcement, prosecution, and sentencing relating to illegal grizzly bear kills. This cooperation means illegal grizzly bear mortalities are often prosecuted under State statutes instead of the Act. We have a long record of this enforcement approach being effective, and no reason to doubt its effectiveness in the absence of the Act's additional layer of Federal protections.

When this final rule becomes effective, all three affected States and the Eastern Shoshone and Northern Arapaho Tribes of the WRR will classify grizzly bears in the GYE as game animals, which cannot be taken without authorization by State or Tribal wildlife agencies (W.S. 23-1-101(a)(xii)(A); W.S. 23-3-102(a); MCA 87-2-101(4); MCA 87-1-301; MCA 87-1-304; MCA 87-5-302; IC 36-2-1; IDAPA 13.01.06.100.01(e); IC 36-1101(a); Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, pp. 18–

21; MFWP 2013, p. 6; Eastern Shoshone and Northern Arapahoe Tribes 2009, p. 9; WGFD 2016, p. 9; YES 2016a, pp. 104–116). In other words, it will still be illegal for private citizens to kill grizzly bears unless it is in self-defense (as is currently allowed under the Act's protections), or if they have a hunting license issued by State or Tribal wildlife agencies.

In addition, in the Montana portion of the DPS, a grizzly bear may be killed if it is caught in the act of attacking or killing livestock (87-6-106 MCA). With respect to this exception, there must be injured or dead livestock associated with any grizzly bear killed in defense of livestock in Montana. There are no documented cases of livestock owners or herders actually observing a grizzly bear depredating on livestock since records began to be kept in 1975. Before that time, it would have been legal for a livestock operator to kill a grizzly bear just for being present. A similar exception that occurs in the Idaho portion of the DPS allows a grizzly bear to be killed if it is "molesting or attacking livestock or domestic animals" (Senate Bill 1027: Section 7: 36-1107(d)). Because Idaho contains only 6.6 percent of the DMA and has experienced low numbers of conflicts and management removals from 2002 to 2014 (9.9 and 0.3 per year, respectively, inside the DMA), we do not expect Idaho Senate Bill 1027 to be a significant source of mortality to the GYE grizzly bear.

The States will continue to enforce, prosecute, and sentence poachers as they do for any game animal such as elk, black bears, and cougars (W.S. 23-3-102(d); W.S. 23-6-202; W.S. 23-6-206; W.S. 23-6-208; MCA 87-6-301; IC 36-1404). Although it is widely recognized that poaching still occurs, this illegal source of mortality is not significant

enough to hinder population stability for the GYE grizzly bear population (IGBST 2012, p. 34) or range expansion (Pyare *et al.* 2004, pp. 5–6; Bjornlie *et al*. 2014a, p. 184).

I&E campaigns (described in detail in *Factor E*) have a long record of implementation, have helped minimize the potential threat of poaching and will continue after delisting under the 2016 Conservation Strategy. More specifically, these programs address illegal killing by working to change human perceptions and beliefs about grizzly bears, and lack of tolerance to some restrictions on use of Federal lands that are designed for grizzly bear protection (Servheen *et al.* 2004, p. 27). To address the concerns of user groups who have objections to land use restrictions that accommodate grizzly bears, Federal and State agencies market the benefits to multiple species of restricting motorized access. For example, both Montana and Wyoming have recommendations for elk habitat security similar to those for grizzly bears (less than 1.6 km/2.6 km^2 (1 mi/mi^2)). This level of motorized access meets the needs of a variety of wildlife species, while maintaining reasonable opportunities for public access. I&E programs also reduce the threat of poaching and defense kills by teaching people about bear behavior and ecology so that they can avoid encounters and conflicts or respond appropriately if encounters do occur. In this way, we can correct common misconceptions and lessen the perceived threat grizzly bears pose. Additionally, I&E programs foster relationships and build trust between the general public and the government agencies implementing them by initiating communication and dialogue.

From 2002 to 2014, 31 percent (97) of human-caused grizzly bear mortalities in the GYE were self-defense or defense of other persons kills (Haroldson 2014b, *in litt*.; Haroldson and Frey 2015, p. 26). This type of grizzly bear mortality is currently allowed

under regulations issued under the provisions of section 4(d) of the Act (50 CFR 17.40(b)). These grizzly bear mortalities occurred primarily with elk hunters on public lands during the fall, but also at other times and locations (IGBST 2009, p. 18). These self-defense situations with elk hunters occur during surprise encounters, at hunter-killed carcasses or gut piles, or when packing out carcasses. Federal and State agencies have many options to potentially reduce conflicts with hunters (IGBST 2009, pp. 21–31), but self-defense mortalities will always be a reality when conserving a species that is capable of killing humans. By promoting the use of bear spray and continuing I&E programs pertaining to food and carcass storage and retrieval, many of these grizzly bear deaths can be avoided. Through its enabling legislations, the NPS authorizes an elk reduction program in GTNP. Elk hunters in GTNP are required to carry bear spray in an accessible location, thus reducing the potential for an encounter that results in grizzly bear mortality. Outside GTNP, carrying bear spray is strongly encouraged through hunter education programs and other I&E materials.

Another primary source of human-caused mortality is agency removal of conflict bears following grizzly bear–human conflicts. Between 2002 and 2014, agency removals resulted in 135 mortalities, accounting for 43 percent of human-caused mortalities. This type of grizzly bear mortality is allowed under the Act through a section 4(d) rule (50 CFR 17.40(b)). While lethal to the individual grizzly bears involved, these removals promote conservation of the GYE grizzly bear population by minimizing illegal killing of bears, providing an opportunity to educate the public about how to avoid conflicts, and promoting tolerance of grizzly bears by responding promptly and effectively when bears pose a threat to public safety or repeatedly depredate livestock.

Conflicts at developed sites (on either public or private lands) were responsible for 90 of the 135 agency removals between 2002 and 2014. These conflicts usually involve attractants, such as garbage, human foods, pet/livestock/wildlife foods, livestock carcasses, and wildlife carcasses, but also are related to attitudes, understanding, and tolerance toward grizzly bears. Mandatory food storage orders on public lands decrease the change of conflicts while State and Federal I&E programs reduce grizzly bear–human conflicts on both private and public lands by educating the public about potential grizzly bear attractants and how to store them properly. Accordingly, the majority of grizzly bear budgets of the agencies responsible for implementing the 2016 Conservation Strategy and managing the GYE grizzly bear population post-delisting is for grizzly bear–human conflict management, outreach, and education. To address public attitudes and knowledge levels, I&E programs present grizzly bears as a valuable public resource while acknowledging the potential dangers associated with them and ways to avoid conflicts (for a detailed discussion of I&E, see *Factor E*, below). These outreach programs have been successful, as evidenced by a 4.2 to 7.6 percent per year population growth rate from 1983 to 2002 (Harris *et al.* 2006, p. 48) and a relatively flat grizzly bear population trajectory since 2002, despite large increases in people living and recreating in the GYE over the last 3 decades. I&E programs are integral components of the 2016 Conservation Strategy and will continue to be implemented by all partners whether the GYE grizzly bear is listed or not (YES 2016a, pp. 92–95).

Agency removals due to grizzly bear conflicts with livestock accounted for nearly 33 percent (45/135) of agency removals (Haroldson 2014b, *in litt.*; Haroldson and Frey 2015, p. 26). Only 1 of these 45 mortalities occurred inside the PCA where several

measures to reduce livestock conflicts are in place. The USFS phases out sheep allotments within the PCA as opportunities arise and, currently, only one active sheep allotment remains inside the PCA (USDA FS 2006a, p. 167; Landenburger 2014, *in litt*.). The USFS also has closed sheep allotments outside the PCA to resolve conflicts with species such as bighorn sheep as well as grizzly bears. Additionally, the alternative chosen by the USFS during its NEPA process to amend the five National Forest plans for grizzly bear habitat conservation includes direction to resolve recurring conflicts on livestock allotments through retirement of those allotments with willing permittees (USDA FS 2006b, pp. 16–17; YES 2016a, pp. 67–68). Livestock grazing permits include special provisions regarding reporting of conflicts, proper food storage and attractant storage procedures, and carcass removal. The USFS monitors compliance with these special provisions associated with livestock allotments annually (Servheen *et al.* 2004, p. 28). We consider these measures effective at reducing this threat, as evidenced by the rarity of livestock depredation removals inside the PCA. Upon delisting, the USFS will continue to implement these measures that minimize grizzly bear conflicts with livestock. The 2016 Conservation Strategy also recognizes that removal of individual conflict bears is sometimes required, as most livestock depredations are done by a few individuals (Jonkel 1980, p. 12; Knight and Judd 1983, p. 188; Anderson *et al.* 2002, pp. 252–253).

The 2016 Conservation Strategy and State grizzly bear management plans will guide decisions about agency removals of conflict bears post-delisting and keep this source of human-caused mortality within the total mortality limits for each age/sex class as per tables 2 and 3. The 2016 Conservation Strategy is consistent with current protocols (USDA FS 1986, pp. 53–54), emphasizing the individual's importance to the

entire population. Females will continue to receive a higher level of protection than males. Location, cause of incident, severity of incident, history of the bear, health, age, and sex of the bear, and demographic characteristics are all considered in any relocation or removal action. Upon delisting, State, Tribal, and NPS bear managers will continue to coordinate and consult with each other and relevant Federal agencies (i.e., USFS, BLM) about conflict bear relocation and removal decisions, but coordination with the Service during each incident will no longer be required (50 CFR 17.40). The 2016 Conservation Strategy emphasizes removal of the human cause of the conflict when possible, or management and education action to limit such conflicts (YES 2016a, pp. 86–91). In addition, the I&E team will continue to coordinate the development, implementation, and dissemination of programs and materials to aid in preventative management of bear–human conflicts. The 2016 Conservation Strategy recognizes that successful management of grizzly bear–human conflicts requires an integrated, multi-agency approach to continue to keep human-caused grizzly bear mortality within sustainable levels.

Overall, we consider agency management removals a necessary component of grizzly bear conservation. Conflict bears can become a threat to human safety and erode public support if they are not addressed. Without the support of the people that live, work, and recreate in grizzly bear country, conservation will not be successful. Therefore, we do not consider management removals a threat to the GYE grizzly bear population now, or in the foreseeable future. However, we recognize the importance of managing these sanctioned removals within sustainable levels, and Federal, Tribal, and

State management agencies are committed to working with citizens, landowners, and visitors to address unsecured attractants to reduce the need for grizzly bear removals.

Humans kill grizzly bears unintentionally in a number of ways. From 2002 to 2014, there were 34 accidental mortalities and 23 mortalities associated with mistaken identification (totaling 18 percent of human-caused mortality for this time period) (Haroldson 2014b, *in litt.*; Haroldson and Frey 2015, p. 26). Accidental sources of mortality during this time included road kills, electrocution, and mortalities associated with research trapping by the IGBST. For the first time since 1982, there were grizzly bear mortalities possibly associated with scientific research capture and handling in 2006. That year, four different bears died within 4 days of being captured, most likely from clostridium infections but the degraded nature of the carcasses made the exact cause of death impossible to determine. Then in 2008, two more grizzly bear mortalities suspected of being related to research capture and handling occurred. A necropsy was able to confirm the cause of death for one of these bears as a clostridium infection at the anesthesia injection site. Once the cause of death was confirmed, the IGBST changed its handling protocol to include antibiotics for each capture (Haroldson and Frey 2009, p. 21). There has not been a research-related capture mortality since. Because of the IGBST's rigorous protocols and adaptive approach dictating proper bear capture, handling, and drugging techniques, this type of human-caused mortality is not a threat to the GYE grizzly bear population. Measures to reduce vehicle collisions with grizzly bears include removing roadkill carcasses from the road so that grizzly bears are not attracted to the roadside (Servheen *et al.* 2004, p. 28). Cost-effective mitigation efforts to facilitate safe crossings by wildlife will be voluntarily incorporated in highway

construction or reconstruction projects on Federal lands within suitable grizzly bear habitat (YES 2016a, pp. 82–83).

Mistaken identification of grizzly bears by black bear hunters is a manageable source of mortality. The 2016 Conservation Strategy identifies I&E programs targeted at hunters that emphasize patience, awareness, and correct identification of targets to help reduce grizzly bear mortalities from inexperienced black bear and ungulate hunters (YES 2016a, pp. 92–95). Beginning in license year 2002, the State of Montana required that all black bear hunters pass a Bear Identification Test before receiving a black bear license (see *http://fwp.mt.gov/education/hunter/bearID/* for more information and details). Idaho and Wyoming provide a voluntary bear identification test online (MFWP 2013, p. 65; WGFD 2016, p. 16). In addition, all three States include grizzly bear encounter management as a core subject in basic hunter education courses.

The IGBST prepares annual reports analyzing the causes of conflicts, known and probable mortalities, and proposed management solutions (Servheen *et al.* 2004, pp. 1–29). The IGBST will continue to use these data to identify where problems occur and compare trends in locations, sources, land ownership, and types of conflicts to inform proactive management of grizzly bear–human conflicts. As directed by the 2016 Conservation Strategy, upon delisting, the IGBST will continue to summarize conflict bear control actions in annual reports and the YGCC will continue the YES's role reviewing and implementing management responses (IGBST 2009, entire; YGCC 2009, entire; YES 2016a, pp. 86–91). The IGBST and YGCC implemented this adaptive management approach when the GYE grizzly bear population was delisted between 2007 and 2009. After high levels of mortality in 2008, the IGBST provided management

options to the YGCC about ways to reduce human-caused mortality. In fall 2009, the YGCC provided updates on what measures they had implemented since the report was released the previous spring. These efforts, conducted through I&E and State fish and game agencies, included: increased outreach on the value of bear spray; development of a comprehensive encounter, conflict, and mortality database; and increased agency presence on USFS lands during hunting season. For a complete summary of agency responses to the IGBST's recommendations, see pages 9–18 of the fall YGCC 2009 meeting minutes (YGCC 2009). Because human-caused mortality has been reduced through I&E programs (e.g., bear identification education to reduce grizzly bears killed by black bear hunters as a result of mistaken identity kills) and management of bear removals (e.g., reduction in livestock predation), we conclude this source of mortality does not constitute a threat to the GYE grizzly bear DPS now, or in the foreseeable future.

No grizzly bears have been removed from the GYE since 1975 for commercial, recreational, scientific, or educational purposes. While there have been some mortalities related to research trapping since 1975, these were accidental as discussed above. The only commercial or recreational take anticipated post-delisting is a limited, controlled hunt, discussed below.

The population has stabilized inside the DMA since 2002, with the model-averaged Chao2 population estimate for 2002–2014 being 674 (95% CI = 600–747). This stabilization over 13 years is strong evidence that the population is exhibiting density-dependent population regulation inside the DMA, and this has recently been documented (van Manen *et al.* 2016, entire). The fact that the population inside the

DMA has stabilized is probably due to density-dependent effects and is further evidence that the population has achieved recovery within the DMA.

Accordingly, the agencies implementing the 2016 Conservation Strategy have decided that the population in the DMA will be managed to maintain the population around the long-term average population size for 2002–2014 of 674 (95% CI = 600–747) (using the model-averaged Chao2 population estimate), consistent with the revised demographic recovery criteria (USFWS 2017, entire) and the Tri-State Memorandum of Agreement (MOA) (Wyoming Game and Fish Commission *et al.* 2016). The population inside the DMA has stabilized at this population size, and density-dependent regulation may be a contributing factor (van Manen *et al.* 2016, entire). The model-averaged Chao2 population estimator will be used by the IGBST to annually estimate population size inside the DMA (in their entirety: Wyoming Game and Fish Commission *et al.* 2016; YES 2016a), as this currently represents the best available science. To achieve a population in the DMA that remains around the 2002–2014 average of 674, total mortality is limited to <7.6 percent for independent females when the population is at or below 674, with higher mortality limits when the population is higher than 674 (as per tables 2 and 3). A total mortality rate of 7.6 percent for independent females is the mortality level that the best available science shows results in population stability (IGBST 2012, entire). Annual estimates of population size in the DMA will be derived each fall by the IGBST from the model-averaged Chao2 estimate of females with cubs-of-the-year (i.e., the model-averaged Chao2 population estimate). These annual estimates will normally vary as in any wild animal population. The annual model-averaged Chao2 population estimate for a given year within the DMA will be used to set the total

mortality limits from all causes for the DMA for the following year as per tables 2 and 3. Mortalities will be managed on a sliding scale within the DMA as set forth in table 2.

When this final rule is made effective, grizzly bears will be classified as a game species throughout the GYE DPS boundaries outside National Parks and the WWR in the States of Wyoming, Montana, and Idaho (W.S. 23-1-101 (a)(xii)(A); MCA 87-2-101 (4); IC 36-2-1; IDAPA 13.01.06.100.01(e); Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, pp. 18–21; MFWP 2013, p. 6; Eastern Shoshone and Northern Arapahoe Tribes 2009, p. 9; WGFD 2016, p. 9; YES 2016a, pp. 104–116). While the States may choose to institute a carefully regulated hunt with ecosystem-wide coordinated total mortality limits (Wyoming Game and Fish Commission *et al.* 2016, p. 5; YES 2016a, p. 46), we do not expect grizzly bear trapping to occur due to public safety considerations and the precedent that there has never been public grizzly bear trapping in the modern era. The States of Montana, Idaho, and Wyoming do not permit public trapping of any bears currently, and there is no information to indicate they will begin. Public trapping is not identified as a possible management tool in any of their State management plans. Even if the States were to allow trapping in the future, the mortality limits would apply, as described in table 3. Hunting on the WRR will be at the discretion of the Tribes and only be available to Tribal members (Title XVI Fish and Game Code, Eastern Shoshone and Northern Arapaho Tribes 2009, p. 9). The NPS will not allow grizzly bear hunting within National Park boundaries. Within the DMA (see figure 1), the NPS, the MFWP, the WGFD, the IDFG, and the Tribes of the WRR will manage total mortality to ensure all recovery criteria continue to be met.

TABLE 3.—Framework to manage mortality limits inside the DMA.

Management Framework	Background and Application Protocol			
1. Area within which mortality limits apply	49,928 km^2 (19,279 mi^2) DMA (see figure 1).			
2. 2016 Conservation Strategy Goal/ Recovery Criteria	To ensure the continuation of a recovered grizzly bear population in accordance with the established Recovery Criteria. See *Demographic Recovery Criteria* in the **Recovery Planning and Implementation** section, above.			
3. Population estimator	The model-averaged Chao2 population estimator will be used as the population measurement tool for the foreseeable future. The model-averaged Chao2 population estimate for 2002–2014 was 674 (95% CI = 600–747).			
4. Mortality limit setting protocol	Each fall the IGBST will annually produce a model-averaged Chao2 population estimate for the DMA. That population estimate will be used to establish the total mortality limit percentages for each age/sex class for the following year as per #8, #9, and #10 (below).			
5. Allocation process for managed mortalities	As per the Tri-State MOA, the States* will meet annually in the month of January to review population monitoring data supplied by IGBST and collectively establish discretionary mortality within the total mortality limits per age/sex class available for regulated harvest for each jurisdiction (MT, ID, WY) in the DMA, so DMA thresholds are not exceeded. If requested, the WRR will receive a portion of the available mortality limit based on the percentage of the WRR geographic area within the DMA. Mortalities outside the DMA are the responsibility of each State and do not count against total mortality limits.			
6. State regulatory mechanisms specific to discretionary sport take	For specific State regulatory mechanisms, please see the discussion below regarding the Tri-State MOA and State regulations for ID, MT, and WY.			
7. Management review by the IGBST	A demographic review will be conducted by the IGBST every 5 to 10 years at the direction of the YGCC. This management review will assess if the management system is achieving the desired goal of ensuring a recovered grizzly bear population in accordance with recovery criteria. The management review is a science-based process that will be led by the IGBST (which includes all State and Federal agencies and the WRR Tribes) using all recent available scientific data to assess population numbers and trend against the recovery criteria. Age/sex-specific survival and reproductive rates will also be reevaluated using the most recent data to adjust total mortality levels as necessary.			
8. Total mortality limit % for independent FEMALES	Pop. Size**	≤674	675–747	>747
	Mort. %	<7.6%	9%	10%
9. Total mortality limit % for independent MALES	Pop. Size**	≤674	675–747	>747
	Mort. %	15%	20%	22%
10. Total mortality limit % for dependent	Pop. Size**	≤674	675–747	>747

young	Mort. %	<7.6%	9%	10%
*The States will confer with the NPS, the USFS, and the BLM annually and will invite representatives of both GYE National Parks, the NPS regional office, the GYE USFS Forest Supervisors, and a representative from the BLM to attend the annual meeting. ** Using the model-averaged Chao2 estimate.				

The States have enacted the following regulatory mechanisms by law and regulations that address human-caused mortality, including mortality from hunting. The State regulatory mechanisms include: Grizzly Bear Management Hunting Regulations; Wyoming Game and Fish Commission Chapter 67 Grizzly Bear Management Regulation; Proclamation of the Idaho Fish and Game Relating to the Limit of the Take of Grizzly Bear in the Greater Yellowstone Ecosystem; Montana Fish, Wildlife & Parks Grizzly Bear Montana Hunting Regulations; and the Memorandum of Agreement Regarding the Management and Allocation of Discretionary Mortality of Grizzly Bears in the Greater Yellowstone Ecosystem (the Tri-State MOA) (in their entirety: Idaho Fish and Game Commission 2016; MFWP 2016; Montana Fish and Wildlife Commission Resolution, July 13, 2016, pp. 753–761; approving the Tri-State MOA; Wyoming Game and Fish Commission 2016; Wyoming Game and Fish Commission *et al.* 2016). These regulatory mechanisms include:

- Suspend all discretionary mortality inside the DMA, except if required for human safety, if the model-averaged Chao2 population estimate falls below 600 (Montana Fish and Wildlife Commission Resolution, July 13, 2016, pp. 753–761; approving the Tri-State MOA; Tri-State MOA: Section IV(2)(c)(i), Section IV (2)(a)(i); Chapter 67 of WY Game and Commission Regulations: Section 4(c); Idaho Fish and Game Commission Proclamation: Section 2);

- Suspend grizzly bear hunting inside the DMA if total mortality limits for any sex/age class (as per tables 2 and 3) are met at any time during the year (Montana Fish and Wildlife Commission Resolution, July 13, 2016, pp. 753–761; approving the Tri-State MOA; Tri-State MOA: Section IV(2)(c), Section IV(4)(a), Section IV(6); Chapter 67 of WY Game and Commission Regulations: Section 4(d); Idaho Fish and Game Commission Proclamation: Section 5);

- Prohibit hunting of female grizzly bears accompanied by young (Montana Fish and Wildlife Commission Resolution, July 13, 2016, pp. 753–761; approving the Tri-State MOA; Tri-State MOA: Section IV(4)(b); MT State Hunting Regulations pp. 4, 7; Chapter 67 of WY Game and Commission Regulations: Section 4(e); Idaho Fish and Game Commission Proclamation: Section 4);

- In a given year, discretionary mortality will be allowed only if non-discretionary mortality does not meet or exceed total mortality limits for that year (Montana Fish and Wildlife Commission Resolution, July 13, 2016, pp. 753–761; approving the Tri-State MOA; Tri-State MOA: Section IV(2)(c), Section IV(4)(a), Section IV(6); Chapter 67 of WY Game and Commission Regulations: Section 4(d), Section 4(k); Idaho Fish and Game Commission Proclamation: Section 5); and

- Any mortality that exceeds allowable total mortality limits in any year will be subtracted from that age/sex class allowable total mortality limit for the following year to ensure that long-term mortality levels remain within prescribed limits inside the DMA (Montana Fish and Wildlife Commission Resolution, July 13, 2016; approving the Tri-State MOA; Tri-State MOA: Section IV(2)(c); Chapter 67 of WY Game and

Commission Regulations: Section 4(g), Section 4(k), and Section 4(l); Idaho Fish and Game Proclamation: Section 6).

The Tri-State MOA was signed by Idaho, Montana, and Wyoming wildlife agencies in July/August 2016. In it, the three States commit to manage grizzly bears consistent with the 2007 Conservation Strategy and all revisions associated with delisting (which includes the 2016 Conservation Strategy approved by all three States), to use the best science to collectively manage grizzly bears, and to manage discretionary mortality consistent with the model-average Chao2 population estimate from 2002 to 2014. The Service believes the Tri-State MOA will be implemented because all parties have approved it. In addition to their signatures on the MOA, the States have either adopted the entire MOA or key parts of it via regulatory mechanisms. The Idaho Fish and Game Commission adopted a proclamation agreeing to the MOA mortality limits (Idaho Fish and Game Commission 2016; Trever 2017, *in litt*.). Montana adopted the Tri-State MOA by resolution (Resolution of the Montana Fish and Game Commission, July 13, 2016, pp. 753–761). Wyoming regulations require Wyoming to coordinate management of grizzly bears in the DMA through the Tri-State MOA (Wyo. Code R. Ch. 67, Section 4(k)).

The States' authorities to implement important aspects of the Tri-State MOA are set forth in Attachment B of the Tri-State MOA. These regulatory mechanisms include the authority to suspend hunting seasons, prohibit the take of females with young, and to enact emergency closures for other reasons, e.g., mortality, habitat changes. State staffing and funding are expected to be consistent with the State's long-term track records of effectively managing other big game species. The Service believes the Tri-State MOA will be effective because it implements population goals, including mortality limits, set

forth in the 2016 Conservation Strategy. These objectives are based on successful management criteria from the 2007 Conservation Strategy, and are largely responsible for stable to increasing populations within the GYE. The States also have a strong incentive to manage within the recovery criteria to maintain management flexibility to respond to conflict bears. As reflected in the Tri-State MOA, if the grizzly bear population estimate falls below 600, discretionary mortality (including conflict bears) is prohibited, unless necessary for human safety.

In addition to the regulatory mechanism above, the IGBST will complete a Biology and Monitoring Review to evaluate the impacts of these total mortality levels on the population and present it to the YGCC and the public if any of the following conditions are met: (1) exceeding independent female mortality limits in 3 consecutive years, or (2) exceeding independent male mortality limits in 3 consecutive years, or (3) exceeding dependent young mortality limits in 3 consecutive years (YES 2016a, pp. 100–102). The States will coordinate via the Tri-State MOA to manage total mortalities within the DMA to be within the age/sex mortality limits as per tables 2 and 3.

The number of grizzly bears available for discretionary mortality in a given year is based on the model-averaged Chao2 population estimate inside the DMA from the previous year, the total annual allowable mortality rate (see table 2), the total annual allowable mortality numbers, and the non-discretionary mortality from the previous year. Total annual allowable mortality numbers are calculated each year by multiplying the total annual mortality rate by the size of each sex/age cohort, which varies with population size, from the previous year. Total mortality includes documented known and probable grizzly bear mortalities from all causes, including but not limited to:

management removals, illegal kills, mistaken identity kills, self-defense kills, vehicle kills, natural mortalities, undetermined-cause mortalities, grizzly bear hunting, and a statistical estimate of the number of unknown/unreported mortalities (Cherry *et al*. 2002). The number of non-discretionary mortalities for independent females and males from the previous year will then be subtracted from the total number of allowable mortalities for the most recent population estimate resulting in the number of independent female and male bears available for discretionary mortality (hunting allocation or management removals). If the previous year's total mortality exceeded total allowable mortality, then any exceedance will be subtracted from allowable discretionary mortality for the current year. The example (table 4) serves to demonstrate how the expected number of bears available for hunting mortality will be calculated and the number of independent female and male bears available for hunting inside the DMA.

TABLE 4.—Example calculation of allowable total annual mortality inside the DMA and expected number of independent female and male bears available for hunting inside the DMA in 2016 based on the 2015 estimated population size of 717 and mortality that occurred during 2015.

	Independent females	Independent males
Size of sex/age cohort at this population size from 2015	250	250
Total annual mortality rate	9%	20%
Allowable total annual mortality number for 2016	22	50
Non-discretionary mortality from 2015 (to be subtracted)	22	19
Exceedance of total mortality resulting from discretionary actions, if any, from 2015 (to be subtracted)	3	0
Bears available for discretionary mortality (hunting or management removals) inside the DMA for 2016	0	31

This example serves to explain the process that the States will use to determine allowable discretionary mortality. State fish and wildlife agencies, or their Wildlife Commissions, have discretion to determine whether they intend to propose a grizzly bear hunting season in any year and, if so, how much discretionary mortality they will authorize to allocate to discretionary mortality while remaining within the limits that maintain a recovered population.

Other regulations, such as timing and location of hunting seasons, should seasons be implemented, would be devised by the States to minimize the possibility of exceeding total mortality limits of independent females within the DMA (Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, p. 20; MFWP 2013, p. 61; WGFD 2016, p. 16).

To ensure that the distribution criterion (16 of 18 bear management units within the Recovery Zone must be occupied by females with young, with no 2 adjacent bear management units unoccupied, during a 6-year sum of observations) is maintained, the IGBST will annually monitor and report the current distribution of reproducing females. If the necessary distribution of reproducing females is not met for 3 consecutive years, the IGBST will complete a Biology and Monitoring Review to evaluate the impacts of reduced distribution of reproducing females on the population and present it to the YGCC. This Biology and Monitoring Review will consider the significance of the reduced distribution of reproducing females and make recommendations to increase their current distribution as necessary.

The Service will initiate a formal status review and could emergency re-list the GYE grizzly bear population until the formal status review is complete under any of the following conditions:

(1) If there are any changes in Federal, State, or Tribal laws, rules, regulations, or management plans that depart significantly from the specifics of population or habitat management detailed in this final rule or the 2016 Conservation Strategy that would significantly increase the threat to the GYE grizzly bear population. The Service will promptly conduct such an evaluation of any change in a State or Federal agency's regulatory mechanisms to determine if such a change represents a threat to the GYE grizzly bear population. As the Service has done for the Rocky Mountain DPS of gray wolf, such an evaluation will be documented for the record and acted upon if necessary.

(2) If the population falls below 500 in any year using the model-averaged Chao2 population estimator, or counts of females with cubs-of-the-year fall below 48 for 3 consecutive years.

(3) If fewer than 16 of 18 bear management units are occupied by females with young for 3 consecutive 6-year sums of observations. Monitoring and status review provisions are discussed in detail later in this final rule.

In areas of the GYE grizzly bear DPS outside the DMA boundaries, respective States and Tribes may establish hunting seasons independent of the total mortality limits inside the DMA. Hunting mortality outside the DMA boundary would not threaten the GYE grizzly bear DPS because total mortality limits are in place as per tables 2 and 3 for the source population within the DMA boundary.

To increase the likelihood of occasional genetic interchange between the GYE grizzly bear population and the NCDE grizzly bear population, the State of Montana has indicated they will manage discretionary mortality in this area in order to retain the opportunity for natural movements of bears between ecosystems (MFWP 2013, p. 9). Maintaining the presence of non-conflict grizzly bears in areas between the NCDE management area and the DMA of the GYE, such as the Tobacco Root and Highland Mountains, would likely facilitate periodic grizzly bear movements between the NCDE and GYE.

To ensure total mortality rates remain consistent with population objectives after delisting, the IGBST will conduct a demographic review of population vital rates (table 3, item #7) at least every 5 to 10 years for the foreseeable future. The results of these reviews will be used to make appropriate adjustments to ensure that the population remains recovered in accordance with the recovery criteria. The 5- to 10-year time interval was selected based on life-history characteristics of bears and methodologies in order to obtain estimates with acceptable levels of uncertainty and statistical rigor (Harris *et al.* 2011, p. 29).

In the period 2002–2014, 76 percent of known or probable grizzly bear mortalities in the GYE DMA (311/410) were human-caused (Haroldson 2014b, *in litt*.; Haroldson and Frey 2015, p. 26). Human-caused mortalities of independent female grizzly bears have increased gradually each year; however, human-caused mortality of these females as a proportion of the estimated population size (i.e., mortality rate) has remained relatively constant in the fall when bears are at an increased risk of conflicts involving hunters (van Manen 2015, *in litt*.). Overall, human-caused mortality rates have been low enough to

allow the GYE grizzly bear population to increase in numbers and range (Schwartz *et al.* 2006a, pp. 64–66; Schwartz *et al.* 2006b, p. 48; Bjornlie *et al.* 2014a, p. 184). Total mortality limits and State regulations to manage within agreed-upon limits as per tables 2 and 3 will ensure that mortality will continue to be managed at levels that avoid persistent population decline. Therefore, we conclude that human-caused mortality does not constitute a threat to the GYE grizzly bear DPS now, or in the foreseeable future.

Disease

Although grizzly bears have been documented with a variety of bacteria and other pathogens, parasites, and disease, fatalities 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). Researchers have found grizzly bears with brucellosis (type 4), clostridium, toxoplasmosis, canine distemper, canine parvovirus, canine hepatitis, and rabies (LeFranc *et al.* 1987, p. 61; Zarnke and Evans 1989, p. 586; Marsilio *et al.* 1997, p. 304; Zarnke *et al.* 1997, p. 474). However, based on nearly 40 years of research by the IGBST, natural mortalities in the wild due to disease have never been documented (IGBST 2005, pp. 34–35; Craighead *et al.* 1988, pp. 24–84). 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 in the GYE and are likely to remain an insignificant factor in population dynamics into the foreseeable future. Therefore, we conclude that this source of mortality does not constitute a threat to the GYE grizzly bear DPS now or in the foreseeable future.

Natural Predation

Grizzly bears are occasionally killed by other wildlife. Adult grizzly bears kill dependent young, subadults, or other adults (Stringham 1980, p. 337; Dean *et al.* 1986, pp. 208–211; Hessing and Aumiller 1994, pp. 332–335; McLellan 1994, p. 15; Schwartz *et al.* 2003, pp. 571–572). This type of intraspecific killing seems to occur rarely (Stringham 1980, p. 337) and has only been observed among grizzly bears in the GYE 28 times between 1986 and 2012 (Haroldson 2014b, *in litt*.). Wolves and grizzly bears often scavenge similar types of carrion and, sometimes, will interact with each other in an aggressive manner. Since wolves were reintroduced into the GYE in 1995, we know of 339 wolf-grizzly bear interactions with 6 incidents in which wolf packs likely killed grizzly bear cubs-of-the-year and 2 incidents in which wolves likely killed adult female grizzly bears (Gunther and Smith 2004, pp. 233–236; Gunther 2014, *in litt*.). Overall, these types of aggressive interactions among grizzly bears or with other wildlife are rare and are likely to remain an insignificant factor in population dynamics into the foreseeable future. Therefore, we conclude this source of mortality does not constitute a threat to the GYE grizzly bear DPS now, or in the foreseeable future.

Summary of Factors B and C Combined

In summary, the following factors warranted consideration as possible threats to the GYE grizzly bear DPS under *Factors B and C Combined*: (1) human-caused mortality, including legal hunting; (2) natural disease; and (3) natural predation. Both natural disease and natural predation are rare occurrences and, therefore, are not considered a threat to the GYE grizzly bear population. Human-caused mortality includes legal hunting, illegal kills, defense of life and property mortality, accidental mortality, and management removals. I&E programs reduce human-caused mortality by:

(1) changing human perceptions and beliefs about grizzly bears; (2) educating recreationists and hunters on how to avoid encounters and conflicts, how to react during a bear encounter, use of bear spray, and proper food storage; and (3) educating black bear hunters on bear identification.

Overall, from 2002 to 2014, the GYE grizzly bear population incurred an average of 23.9 human-caused mortalities per year (Haroldson 2014b, *in litt.*; Haroldson and Frey 2015, p. 26). Despite these mortalities, the GYE grizzly bear population has continued to increase in size and expand its 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). Although humans are still directly or indirectly responsible for the majority of grizzly bear deaths, this source of mortality is effectively mitigated through science-based management, monitoring, and outreach efforts. The agencies have institutionalized the careful management and monitoring of human-caused mortality through the 2016 Conservation Strategy, National Forest and National Park management plans, State grizzly bear management plans, and State wildlife commission rules and regulations (Idaho Fish and Game Commission 2016; MFWP 2016; Wyoming Game and Fish Commission 2016; Wyoming Game and Fish Commission *et al*. 2016; YES 2016a). Because a section 4(d) rule (50 CFR 17.40(b)) currently allows grizzly bears to be killed in self-defense, defense of others, or by agency removal of conflict bears, management of human-caused mortality post-delisting will not differ significantly once protections of the Act are no longer in place.

If grizzly bear hunting occurs, hunting mortality would be within the total mortality limits for independent females and males noted in tables 2 and 3 that ensure the

population remains recovered within the DMA as measured by adherence to total mortality limits and annual population estimates. Hunting will not occur if other sources of mortality exceed the total mortality limits (see table 3). The States have incorporated the total mortality limits for each age/sex class based on annual IGBST model-averaged Chao2 population estimates set forth in table 2 in the Tri-State MOA and State regulations (Idaho Fish and Game Commission 2016; MFWP 2016; Wyoming Game and Fish Commission 2016; Wyoming Game and Fish Commission *et al*. 2016). The States have also implemented laws and regulations that will guide management responses to any departures from total mortality limits for independent females, independent males, and dependent young to maintain the population inside the DMA around the average population size from 2002–2014 (Idaho Fish and Game Commission 2016; MFWP 2016; Wyoming Game and Fish Commission 2016; Wyoming Game and Fish Commission *et al*. 2016). In addition, the State of Montana will manage discretionary mortality in the area between the GYE and the NCDE in order to retain the opportunity for natural movements of bears between ecosystems (MFWP 2013, p. 14).

In addition, as discussed above, the Service will initiate a status review with possible emergency re-listing pursuant to the Act if: (1) there are any changes in Federal, State, or Tribal laws, rules, regulations, or management plans that depart significantly from the specifics of population or habitat management detailed in this final rule or the 2016 Conservation Strategy that would significantly increase the threat to the GYE grizzly bear population. The Service will promptly conduct such an evaluation of any change in a State or Federal agencies change in regulatory mechanisms to determine if such a change represents a threat to the GYE grizzly bear population. As the Service has

done for the Rocky Mountain DPS of gray wolf, such an evaluation will be documented for the record and acted upon if necessary; or (2) the population falls below 500 in any year using the model-averaged Chao2 population estimator, or counts of females with cubs-of-the-year fall below 48 for 3 consecutive years; or (3) fewer than 16 of 18 bear management units are occupied by females with young for 3 consecutive 6-year sums of observations.

These commitments have been implemented into regulations and ameliorate impacts related to potential commercial and recreational hunting such that hunting will not threaten the GYE grizzly bear DPS in the foreseeable future. In addition to State laws and regulations, the IGBST will conduct a demographic review of the population vital rates every 5 to 10 years on which allowable total mortality limits are based to ensure adherence to the population objective. We consider the regulatory commitment by State and Federal agencies outlined above to reasonably ensure conservation of the GYE grizzly bear DPS.

Therefore, based on the best available scientific and commercial information, detailed State and Federal regulatory and other commitments, application of mortality management detailed in this final rule and the 2016 Conservation Strategy, and the expectation that these bear management practices will continue into the foreseeable future, we conclude that natural disease, predation, and human-caused mortality do not constitute threats to the GYE grizzly bear DPS now and are not anticipated to constitute threats in the foreseeable future.

D. The Inadequacy of Existing Regulatory Mechanisms.

Under this factor, we examine the stressors identified within the other factors as ameliorated or exacerbated by any existing regulatory mechanism or conservation effort designed to address threats to a species or pertain to the overall State management of a species. Section 4(b)(1)(A) of the Act requires that the Service take into account "those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation, to protect such species…." We consider relevant Federal, State, and Tribal laws, regulations, and other binding legal mechanisms that may ameliorate or exacerbate any of the threats we describe in threat analyses under the other four factors or otherwise enhance the species' conservation. Our consideration of regulatory mechanisms is described in detail within the discussion of each of the threats or stressors to the species (*see* discussion under each of the other Factors).

The following existing regulatory mechanisms are specifically considered and discussed as they relate to the stressors, under the applicable Factors, affecting the GYE grizzly bear DPS. Under *Factor A*:

- 2006 Forest Plan Amendment for Grizzly Bear Habitat Conservation for the Greater Yellowstone Area National Forests,
- Wilderness Act of 1964, the 2001 Roadless Rule, and
- YNP and GTNP Compendia implemented under the National Park Service Organic Act. The Organic Act of 1916, 16 U.S.C. Section 1, created the NPS and assigned it the responsibility to manage the national parks. The Organic Act requires the NPS to manage park units to conserve scenery, natural and historic objects within parks, and wildlife, and to provide for their enjoyment in a manner that leaves them unimpaired for the enjoyment of future generations.

Under *Factors B and C Combined*:

- State of Idaho Yellowstone Grizzly Bear Management Plan,
- Proclamation of the Idaho Fish and Game Commission Relating to the Limit of the Take of Grizzly Bear in the Greater Yellowstone Ecosystem,
- Grizzly Bear Management Plan for Southwestern Montana,
- Montana Hunting Regulations for Grizzly Bear,
- Montana Fish and Wildlife Commission Resolution approving the Tri-State MOA (July 13, 2016),
- Wyoming Grizzly Bear Management Plan,
- Wyoming Game and Fish Commission Chapter 67 Grizzly Bear Management Regulation, and
- Memorandum of Agreement Regarding the Management and Allocation of Discretionary Mortality of Grizzly Bears in the GYE.

Therefore, based on the best available information and on continuation of current regulatory commitment, we do not consider inadequate regulatory mechanisms to constitute a threat to the GYE grizzly bear DPS now or in the foreseeable future.

E. Other Natural or Manmade Factors Affecting Its Continued Existence.

Factor E requires the Service to consider other natural or manmade factors affecting the continued existence of a species. Here, five other considerations warrant additional discussion regarding the GYE grizzly bear DPS: Effects due to: (1) genetic health; (2) changes in food resources; (3) climate change; (4) catastrophic events; and (5) human attitudes toward grizzly bear conservation.

Genetic Health

The isolated nature of the GYE grizzly bear population was identified as a potential threat when listing occurred in 1975. Declines in genetic diversity are expected in isolated populations (Allendorf *et al.* 1991, p. 651; Burgman *et al.* 1993, p. 220). For the GYE grizzly bear population, decreases in genetic diversity would occur gradually over decades due to long generational time and relatively large population size (Miller and Waits 2003, p. 4338). Indicators of fitness in the GYE grizzly bear population demonstrate that the current levels of genetic diversity are capable of supporting healthy reproductive and survival rates, as evidenced by normal litter size, no evidence of disease, high survivorship, an equal sex ratio, normal body size and physical characteristics, and a relatively constant population size within the DMA (van Manen 2016a, *in litt.*). These indicators of fitness will be monitored annually for the foreseeable future. Because current levels of genetic diversity are adequate and heterozygosity values have increased slightly over the last few decades from 0.55 (Paetkau *et al*. 1998, p. 421), to 0.56 (Miller and Waits 2003, p. 4337), to 0.60 using more recent data and larger sample sizes (Haroldson *et al*. 2010, p. 7), we know there is no immediate need for new genetic material (Miller and Waits 2003, p. 4338). Heterozygosity is a measure of genetic diversity, which when low can negatively impact demographic rates and reduce the species' ability to respond to environmental change.

Effective population size is a metric used by geneticists to distinguish between total population size and the actual number of individuals available to reproduce at any given time. For example, many individuals in a population may be too young to reproduce and, therefore, are not part of the "effective population size." For short-term fitness (i.e., evolutionary response), the effective population size of the GYE grizzly bear

population should remain above 100 animals (Miller and Waits 2003, p. 4338). In grizzly bears, Miller and Waits (2003, p. 4337) reported that an effective population size is approximately 25 to 27 percent of total population size, so an effective population size of 100 corresponds to a total population size of about 400 animals. However, reported ratios of effective population size to census size for grizzly bear populations vary widely from 0.04 to 0.6 (Paetkau *et al*. 1998; Miller and Waits 2003; Schregel *et al*. 2012). The ratio of effective population size to census size of 0.42 reported by Kamath *et al.* (2015) falls towards the upper middle of that range and most likely reflects the underestimation bias of the Chao2 population estimator.

To further ensure this minimum number of animals in the population necessary for genetic health is always maintained, the revised demographic recovery criteria as well as the 2016 Conservation Strategy established a standard to maintain the total population size above 500 animals to ensure short-term genetic fitness (YES 2016a, pp. 33–53; USFWS 2017, pp. 2–3). Recent work (Kamath *et al.* 2015, p. 5512) demonstrates that the effective population size (N_e) of the GYE population has increased from 102 (95% CI = 64–207) in 1982, to 469 (95% CI= 284–772) in 2010. The current effective population is more than four times the minimum effective population size suggested in the literature (Miller and Waits 2003, p. 4338).

While this current estimated effective population size of approximately 469 animals (Kamath *et al.* 2015, p. 5512) is adequate to maintain genetic health in this population, 1 to 2 effective migrants from other grizzly bear populations every 10 years would maintain or enhance this level of genetic diversity and, therefore, ensure genetic health in the long term (Mills and Allendorf 1996, pp. 1510, 1516; Newman and Tallmon

2001, pp. 1059–1061; Miller and Waits 2003, p. 4338) and benefit its long-term persistence (Boyce *et al.* 2001, pp. 25, 26; Kamath *et al*. 2015, p. 5517). We have defined an effective migrant as an individual that immigrates into an isolated population from a separate area, survives, breeds, and whose offspring survive.

Based on Miller and Waits (2003, p. 4338), the 2007 Conservation Strategy recommended that if no movement or successful genetic interchange was detected by 2020, grizzly bears from the NCDE would be translocated into the GYE grizzly bear population to achieve the goal of two effective migrants every 10 years (i.e., one generation) to maintain current levels of genetic diversity (USFWS 2007*c*, p. 37). In light of new information in Kamath *et al.* (2015, entire) documenting stable levels of heterozygosity and a current effective population size of 469 animals (Kamath *et al*. 2015, p. 5512), the deadline of 2020 for translocation is no longer contained in the 2016 Conservation Strategy. As stated by Kamath *et al.* (2015, p. 5517), the current effective population size is sufficiently large to avoid substantial accumulation of inbreeding depression, thereby reducing concerns regarding genetic factors affecting the viability of GYE grizzly bears. However, the Service recognizes that the long-term viability of the GYE grizzly bear population will benefit from occasional gene flow from nearby grizzly bear populations like that in the NCDE. Thus, efforts will continue to facilitate occasional movement of male bears between the NCDE and GYE (WGFD 2016, p. 13).

To increase the likelihood of occasional genetic interchange between the GYE grizzly bear population and the NCDE grizzly bear population, the State of Montana has indicated they will manage discretionary mortality in this area in order to retain the opportunity for natural movements of bears between ecosystems. Translocation of bears

between these ecosystems will be a last resort and will be implemented only if there are demonstrated effects of lowered heterozygosity among GYE grizzly bears or other genetic measures that indicate a decrease in genetic diversity, as monitored by the IGBST (WGFD 2016, p. 13).

To document natural connectivity between the GYE and the NCDE, Federal and State agencies will continue to monitor bear movements on the northern periphery of the GYE grizzly bear DPS boundaries and the southern edges of the NCDE using radio-telemetry and will collect genetic samples from all captured or dead bears to document possible gene flow between these two ecosystems (YES 2016a, pp. 51–53). These genetic samples will detect migrants using an "assignment test" to identify the area from which individuals are most likely to have originated based on their unique genetic signature (Paetkau *et al.* 1995, p. 348; Waser and Strobeck 1998, p. 43; Paetkau *et al.* 2004, p. 56; Proctor *et al.* 2005, pp. 2410–2412). This technique also identifies bears that may be the product of reproduction between GYE and NCDE grizzly bears (Dixon *et al.* 2006, p. 158). In addition to monitoring for gene flow and movements, the signatories to the 2016 Conservation Strategy will continue interagency efforts to provide and maintain movement opportunities for grizzly bears, and reestablish natural connectivity and gene flow between the GYE grizzly bear DPS and other grizzly bear populations. To promote natural connectivity, there are attractant storage rules on public lands between the GYE and other grizzly bear Recovery Zones in the NCDE and Bitterroot to minimize the grizzly bear–human conflicts. We do not consider connectivity to the east, west, or south a relevant issue to the GYE grizzly bear population's long-term persistence because there are no extant populations in these directions to enhance the genetic diversity of the GYE

population. However, we recognize the GYE grizzly bear population could be a possible source population to re-colonize the Bitterroot Ecosystem to the west.

In summary, genetic concerns are not currently a threat to the GYE grizzly bear population (Miller and Waits 2003, p. 4338; Kamath *et al.* 2015, entire). Attractant storage orders on public lands, through a reduction in conflict situations, and careful regulation of hunting in key connectivity areas provide adequate measures to promote natural connectivity and prevent reductions in genetic diversity. The IGBST will carefully monitor movements and the presence of alleles from grizzly bear populations outside the GYE grizzly bear DPS boundaries (YES 2016a, pp. 51–53). The IGBST will continue to monitor genetic diversity of the GYE grizzly bear population so that a possible reduction in genetic diversity due to the geographic isolation of the GYE grizzly bear population will be detected and responded to accordingly with translocation of outside grizzly bears into the GYE. This approach ensures that long-term genetic diversity is not a continued threat to the GYE grizzly bear DPS. Therefore, based on the best available scientific information, we conclude that genetic diversity does not constitute a threat to the GYE grizzly bear DPS now, nor is it anticipated to in the foreseeable future.

Changes in Food Resources

A comprehensive study of the GYE grizzly bear diet documented over 266 distinct plant and animal species ranging from grasses, fungi, berries, and seeds, to fish, carrion, and other meat sources (e.g., young and weakened animals). Monitoring foods comprising such a diverse diet is challenging, which is why efforts have focused on four foods with relatively high energetic value and for which abundance (or use by bears) is

relatively easy to measure. The IGBST currently monitors the productivity or grizzly bear use of four grizzly bear foods in the GYE: whitebark pine seeds, army cutworm moths, ungulates, and spawning cutthroat trout. While these are some of the highest calorie food sources available to grizzly bears in the GYE (Mealey 1975, pp. 84–86; Pritchard and Robbins 1990, p. 1647; Craighead *et al.* 1995, pp. 247–252), only whitebark pine seeds are known to have an influence on grizzly bear mortality risk and reproduction. There is no known relationship between grizzly bear mortality risk or reproduction and any other individual food (Schwartz *et al.* 2010, p. 662).

Grizzly bears consume elk and bison as winter-killed carrion in the early spring, kill calves opportunistically, consume hunter-killed carcasses or gut piles, and prey upon adults weakened during the fall breeding season. Ungulate populations are threatened by brucellosis (*Brucella abortus*) and resulting management practices resulting in bison removal, chronic wasting disease (CWD), competition with other top predators for ungulates, and decreasing winter severity. Brucellosis does not affect bison as a food source for grizzly bears, and the subsequent removal program is managed to "maintain a wild, free-ranging population of bison" (USDOI NPS and USDA Animal and Plant Health Inspection Service 2000, p. 22). CWD is fatal to deer and elk but has not been detected in the GYE, and, as transmission is density-dependent (Schauber and Woolf 2003, pp. 611–612), CWD would not result in local extinction of deer or elk populations. The availability of ungulate carcasses is not anticipated to be impacted by either of these diseases such that they are a threat to the GYE grizzly bear population now or in the foreseeable future. The reintroduction of gray wolves (*Canis lupus*) to the GYE in 1995 has created competition between grizzly bears and wolves for carrion; however, there has

been no documentation of negative influence on the GYE grizzly bear population (Servheen and Knight 1993, p. 36). Decreasing winter severity and length as a result of climate change could reduce spring carrion availability (Wilmers and Getz 2005, p. 574; Wilmers and Post 2006, p. 405). A reduction of winter-killed ungulates may be buffered by an increase of availability of meat to adult grizzly bears during the active season as a result of grizzly bears usually prevailing in usurping wolf-killed ungulate carcasses (Ballard *et al.* 2003, p. 262). Therefore, fluctuations in the availability of ungulates are not a threat to the GYE grizzly bear population now or in foreseeable future.

A decline in the Yellowstone cutthroat trout population has resulted from a combination of factors: the introduction of nonnative lake trout (*Salvelinus naymaycush*), a parasite that causes whirling disease (*Myxobolus cerebralis*), and several years of drought conditions in the Intermountain West (Koel *et al.* 2005, p. 10). Although there has been a corresponding decrease in grizzly bear use of cutthroat trout, only a small portion of the GYE grizzly bear population uses cutthroat trout (Haroldson *et al.* 2005, p. 175), and grizzly bears that fish in spawning streams only consume, on average, between 8 and 55 trout per year (Felicetti *et al.* 2004, p. 499). Therefore, potential declines in cutthroat trout are not currently, nor are they likely to become, a threat in the foreseeable future to the GYE grizzly bear population.

Army cutworm moths aggregate on remote, high-elevation talus slopes where grizzly bears forage on them from mid- to late summer. Grizzly bears could potentially be disturbed by backcountry visitors (White *et al.* 1999, p. 150), but this has not been documented in the GYE. The situation is monitored by the IGBST and the WGFD, who will take appropriate management action as necessary. Climate change may affect army

cutworm moths by changing the distribution of plants that the moths feed on or the flowering times of the plants (Woiwod 1997, pp. 152–153). However, the GYE plant communities have a wide elevational range that would allow for distributional changes (Romme and Turner 1991, p. 382), and army cutworm moths display foraging plasticity (Burton *et al.* 1980, pp. 12–13). Therefore, potential changes to army cutworm moth availability are not likely to threaten the GYE grizzly bear population in the foreseeable future.

More details on the specific ways in which changes in ungulates, cutthroat trout, and army cutworm moths could affect the GYE grizzly bear population are discussed in detail in the 2007 final rule (72 FR 14866, March 29, 2007, 14928–14933). Our analysis focuses on the potential impacts that the loss of whitebark pine could have on the GYE grizzly bear population. While we discussed notable declines in whitebark pine due to mountain pine beetle in the 2007 final rule, the data used to estimate population growth only went through 2002. The Ninth Circuit Court of Appeals questioned our conclusions about future population viability based on data gathered before the sharp decline in whitebark pine began (*Greater Yellowstone Coalition, Inc.* v. *Servheen, et al.*, 665 F.3d 1015, 1030 (9th Cir. 2011)). To assess the population's vital rates since 2002, the IGBST completed a comprehensive demographic review using data from 2002–2011 (IGBST 2012, p. 7) and extensive analyses to determine if the decline in whitebark pine is driving observed changes in grizzly bear population vital rates (IGBST 2013, entire).

The threats to whitebark pine reported in our 2007 final rule and reiterated in our 12-month finding for whitebark pine are currently being analyzed in a Species Status Assessment (76 FR 42631, July 19, 2011). Whitebark pine is currently warranted for

protected status under the Act, but that action is precluded by higher priority actions. This status is primarily the result of direct mortality due to white pine blister rust and mountain pine beetles but also less obvious impacts from climate change and fire suppression. For more details on the status of whitebark pine, please see the 2013 candidate notice of review (78 FR 70104, November 22, 2013).

Whitebark pine is a masting species, which means it produces large seed crops in some years and poor crops in other years. In the GYE, a good seed crop occurs approximately every 2 to 3 years. During years of low availability of whitebark pine seeds, grizzly bear–human conflicts tend to increase as bears use lower elevations, and when those areas are within less secure habitats (Gunther *et al.* 2004, pp. 13–15; Schwartz *et al.* 2010, pp. 661–662). Approximately six more independent females and six more independent males die across the ecosystem in poor versus good whitebark pine years (IGBST 2013, p. 25, figure 5). These mortalities are primarily due to defense of life encounters and wildlife management agency removals of conflict bears (Gunther *et al.* 2004, pp. 13–14; IGBST 2009, p. 4). Additionally, litter size and the likelihood of producing a litter may decrease slightly in years following poor whitebark pine crops (Schwartz *et al.* 2006b, p. 21). Therefore, an important question was whether decline of whitebark pine would make most years similar to years with poor seed crops.

Using data from 2002 to 2011, the IGBST documented an average annual population growth rate for the GYE grizzly bear population between 0.3 and 2.2 percent (IGBST 2012, p. 34). Although the population was still increasing in this more recent time period, it was increasing at a slower rate than in the previous time period (1983–2001) and coincided with the rapid decline of whitebark pine that began in the early

2000s. Therefore, the IGBST examined the potential influence of whitebark pine decline on the change in population growth rate. Because extrinsic, density-independent factors (e.g., availability of whitebark pine seeds) and intrinsic, density-dependent factors (i.e., a population with high bear density) can produce similar changes in population vital rates, the IGBST conducted several analyses to clarify and tease apart these two similar effects. The results of these analyses were summarized in a report titled "Response of Yellowstone grizzly bears to changes in food resources: a synthesis" (hereafter referred to as "the Food Synthesis Report") (IGBST 2013). Regardless of whether these changes are being driven by declines in whitebark pine or are simply an indication of the population reaching high densities, the management response would be the same: to carefully manage human-caused mortality based on scientific monitoring of the population.

For the Food Synthesis Report, the IGBST developed a comprehensive set of research questions and hypotheses to evaluate grizzly bear responses to changes in food resources. Specifically, the IGBST asked eight questions:

(1) How diverse is the diet of GYE grizzly bears?

(2) Has grizzly bear selection of whitebark pine habitat decreased as tree mortality increased?

(3) Has grizzly bear body condition decreased as whitebark pine declined?

(4) Has animal matter provided grizzly bears with an alternative food resource to declining whitebark pine?

(5) Have grizzly bear movements increased during the period of whitebark pine decline (2000–2011)?

(6) Has home range size increased as grizzly bears sought alternative foods, or has home-range size decreased as grizzly bear density increased?

(7) Has the number of human-caused grizzly bear mortalities increased as whitebark pine decreased?

(8) Are changes in vital rates during the last decade associated more with decline in whitebark pine resources than increases in grizzly bear density?

The preliminary answers to these questions are contained in the Synthesis Report and the final results have been (or will be) published in peer-reviewed journals (in their entirety: Bjornlie *et al*. 2014a; Costello *et al*. 2014; Gunther *et al*. 2014; Schwartz *et al*. 2014a and 2014b; van Manen *et al.* 2016; Ebinger *et al.* 2016; Haroldson *et al. in prep*.).

Key findings of the Synthesis Report are summarized below. To address the first question about how diverse diets of grizzly bears in the GYE are, Gunther *et al.* (2014, entire) conducted an extensive literature review and documented over 260 species of foods consumed by grizzly bears in the GYE, representing four of the five kingdoms of life (for more information, please see the proposed rule, 81 FR 13174, March 11, 2016). Regarding the second research question, if whitebark pine seeds were highly selected over other fall foods, grizzly bears would continue to seek this food even if availability declined. Costello *et al.* (2014, p. 2013) found that grizzly bear selection of whitebark pine habitat and duration of use decreased between 2000 and 2011. Additionally, (regarding the third research question) if grizzly bears were dependent on whitebark pine to meet their nutritional requirements, body condition would be expected to have decreased. Schwartz *et al.* (2014a, p. 75) and the IGBST (2013, p. 18) found body mass and percent body fat in the fall had not changed from 2000 to 2010. When they

examined trends in females only, the data showed a moderate decline in female body fat during the fall, starting around 2006 (Schwartz *et al*. 2014a, p. 72). However, they suggested it could be the result of small sample sizes (n = 2.6 bears/year) and noted the data for 2011 (not included in their published paper) showed an increase in fall body fat for females, ultimately cautioning that more data were needed before it could be determined if there was truly a trend (Schwartz *et al*. 2014a, p. 76). In the Food Synthesis Report, the IGBST revisited the previous analysis with data collected since 2010, and concluded that body condition was not different between poor and good years of whitebark pine production (IGBST 2013, p. 18).

In response to the fourth research question, in years with poor whitebark pine seed production, grizzly bears shifted their diets and consumed more meat (Schwartz *et al.* 2014a, p. 68). These results were consistent with previous findings (Mattson 1997, p. 169). Given these observations of diet shifts, Ebinger *et al.* (2016, p. 705) examined whether grizzly bear use of ungulate carcasses in the fall had increased during the period of whitebark pine decline. This was indeed the case, supporting the interpretation that responses to changing food resources were primarily behavioral. In response to the fifth and sixth questions, if overall food resources were declining, one would expect daily movements, fall movements, and home range sizes to increase if bears were roaming more widely in search of foods. However, movement rates did not change during 2000 to 2011, suggesting that grizzly bears were finding alternate foods within their home range as whitebark pine seeds became less available over the past decade (Costello *et al.* 2014, p. 2013). For females, home ranges actually decreased in size from the period before (1989–1999) to the period after (2007–2012) whitebark pine decline. This decrease was

greater in areas with higher grizzly bear densities but showed no relationship with the amount of live whitebark pine in the home range (Bjornlie *et al*. 2014b, pp. 4–6). Male home ranges did not change in size (Bjornlie *et al.* 2014b, pp. 4–6). Finally, at the population level, bear density, but not whitebark pine decline, was associated with lower cub survival and reproductive suppression, factors contributing to the slowing of population growth since the early 2000s. Combined, these findings suggest that changes in population vital rates since the early 2000s are more indicative of the population approaching carrying capacity than a shortage of resources (van Manen *et al.* 2016, p. 310).

In response to the seventh question, while land managers have little influence on how calories are spread across the landscape, we have much more influence on human-caused mortality risk. Consistent with findings from earlier studies, the IGBST (2013, p. 24) found that grizzly bear mortalities increased in poor compared to good whitebark pine seed production years. Assuming the poorest observed whitebark pine cone production, the IGBST (2013, p. 25) predicted an increase of 10 annual mortalities ecosystem-wide of independent females comparing 2000 with 2012, encompassing the period that coincided with whitebark pine decline (IGBST 2013, p. 25). The greatest increase in predicted mortality occurred outside the PCA, which may be partially attributable to range expansion and continued population increase (IGBST 2013, p. 25). However, increased mortality numbers during poor whitebark pine cone production years have not led to a declining population trend (IGBST 2012, p. 34), and total mortality will be maintained within the total allowable mortality limits set forth in table 3.

In response to the eighth question, the IGBST found that while whitebark pine seed production can influence reproductive rates the following year, the overall fecundity rates during the last decade (2002–2011) did not decline when compared with data from 1983–2001 (IGBST 2013, p. 32). This is important because fecundity rates are a function of both litter size and the likelihood of producing a litter, the two ways in which whitebark pine seed production may affect reproduction. Although Schwartz *et al.* (2006a, p. 21) found one-cub litters were more common in years following poor whitebark pine seed production, one-cub litters are still adequate for population growth. Furthermore, one-cub litters are still relatively uncommon following poor whitebark pine years, as evidenced by a very consistent average litter size around two since the IGBST began reporting this metric. Fecundity and mean litter size did not change between the two monitoring periods (1983–2001 versus 2002–2011) examined by the IGBST even though the availability of whitebark pine seeds declined (IGBST 2013, pp. 33–34).

In contrast to previous studies that concluded increased mortality in poor whitebark pine cone production years led to population decline in those years (Pease and Mattson 1999, p. 964), the IGBST found the population did not decline despite increased mortality in poor whitebark pine cone production years. Therefore, we determined that the conclusions of Pease and Mattson (1999, p. 964) are inaccurate. First and foremost, estimating population growth for individual, non-consecutive years, as Pease and Mattson (1999, p. 962) did, is "not legitimate" and results in an "incorrect estimate" (Eberhardt and Cherry 2000, p. 3257). Even assuming their methods of separating out individual, non-consecutive years of data for a species whose reproduction and survival are inextricably linked to multiple, consecutive years (e.g., reproductive status in 1 year

affects status in the following year), many other aspects of their analysis do not reflect the best available science. An important difference between Pease and Mattson (1999, p. 964) and other population growth rate estimates (Eberhardt *et al*. 1994, p. 362; Boyce 1995, entire; Schwartz *et al*. 2006b, p. 48; IGBST 2012, p. 34) is related to their treatment of conflict bears. Pease and Mattson (1999, p. 967) assumed that grizzly bears with any history of conflict would experience lower survival rates associated with conflict bears for the rest of their lives.

The findings of Schwartz *et al*. (2006b, p. 42) challenge this assumption, finding that while survival of conflict bears decreases during the year of the conflict and the next year, survival returns to approximately normal within 2 years. In other words, management-trapped bears often return to foraging on naturally occurring food sources, away from human developments. Another assumption made by Pease and Mattson (1999, p. 967) was that 73 percent of the GYE grizzly bear population were conflict bears, with correspondingly lower survival rates. However, Schwartz *et al*. (2006b, p. 39) found only about 28 percent of the GYE grizzly bear population were ever involved in conflicts. Together, these two erroneous assumptions by Pease and Mattson (1999, p. 967) resulted in a gross underestimation of population trend. As a result, we do not consider Pease and Mattson (1999) to be the best available science.

Earlier studies suggested that increased grizzly bear mortalities in poor whitebark pine cone production years are a result of bears roaming more widely in search of foods and exposing themselves to higher mortality risk in roaded habitats at lower elevations. However, Costello *et al.* (2014, p. 2014) showed that grizzly bears did not roam over larger areas or canvass more area within their fall ranges as whitebark pine declined

rapidly starting in the early 2000s, and suggested bears found alternative foods within their fall ranges. Furthermore, Bjornlie *et al.* (2014b, p. 4) found that home range size has not increased after whitebark pine declined, and Schwartz *et al.* (2010, p. 662) found that when bears use lower elevations in poor whitebark pine seed production years, it is the amount of secure habitat that determines mortality risk. Meaning, in both good and poor whitebark pine seed years, survival is determined primarily by levels of secure habitat. Therefore, our approach of maintaining these levels of secure habitat on Federal lands, which comprise 98 percent of lands within the PCA and 60 percent of suitable habitat outside the PCA, provides strong mitigation against any impacts the decline of whitebark pine may have on this grizzly bear population because the mechanism driving the increased mortality risk is secure habitat, not the presence or absence of whitebark pine.

Evidence suggests that observed changes in population vital rates were driven by density-dependent effects and have resulted in a relatively flat population trajectory (van Manen 2016a, *in litt.*). Van Manen *et al.* (2016, entire) found cub survival, yearling survival, and reproductive transition (see *Glossary: transition probability*) from no young to cubs all changed from 1983 to 2012, with lower rates evident during the last 10 years of that time period. Cub survival and reproductive transition were negatively associated with an index of grizzly bear density, indicating greater declines of those parameters where bear densities were higher. Their analysis did not support a similar relationship with estimates of decline in whitebark pine tree cover. Moreover, changes in vital rates started in the late 1990s and early 2000s (van Manen *et al.* 2016, pp. 307–308), which preceded the beginning and peak time period of whitebark pine decline. The

results of van Manen *et al.* (2016, entire) support the interpretation that slowing of population growth during the last decade was associated more with increasing grizzly bear density than the decline in whitebark pine.

We recognize that changes in food resources can also influence population vital rates. These research questions and results do not refute that possibility, but the preponderance of evidence supports the conclusion that bears so far are finding alternative food resources and that those resources are sufficient to maintain body mass and body condition (IGBST 2013, p. 20; Costello *et al.* 2014, p. 2013; Schwartz *et al.* 2014a, p. 75; Ebinger *et al.* 2016, p. 705). In other words, evidence for density dependence suggests that the population may be approaching carrying capacity (van Manen *et al*. 2016, entire). The combined evidence from these recent studies further supports the recovered status of the GYE grizzly bear population. This status has remained unchanged over the last 15 years despite significant changes in food resources in the GYE.

While there was some concern that the rapid loss of whitebark pine could result in mortality rates similar to those experienced after the open-pit garbage dumps were closed in the early 1970s (Schwartz *et al.* 2006b, p. 42), we now know this has not been the case. This is most likely due to the fact that whitebark pine has never been a spatially or temporally predictable food source on the landscape like the open-pit garbage dumps were. The dumps were open year round and provided high-calorie foods the entire time. They were in the exact same location every year and for the entire season. Grizzly bears congregated at these known locations in large numbers and in very close proximity to

each other and to people. None of these circumstances are true for grizzly bears foraging on whitebark pine seeds.

GYE grizzly bears have high diet diversity (Gunther *et al.* 2014, p. 65) and use alternate foods in years of low whitebark pine seed production (Schwartz *et al.* 2014a, pp. 75–76). Nearly one third of grizzly bears in the GYE do not have whitebark pine in their home range, so they do not use this food (Costello *et al.* 2014, p. 2013). Grizzly bears in the GYE that do use whitebark pine are accustomed to successfully finding alternative natural foods in years when whitebark pine seeds are not available, and body mass and body fat are not different between good and poor whitebark pine seed years (Schwartz *et al.* 2014a, pp. 72–73, 75).

The IGBST will continue to monitor annual production of common foods, grizzly bear–human conflicts, survival rates, reproductive rates, and the causes and locations of grizzly bear mortality, as detailed in the 2016 Conservation Strategy (YES 2016a, pp. 33–91). These data provide the 2016 Conservation Strategy's signatory agencies with the scientific information necessary to inform and implement adaptive management (Holling 1978, pp. 11–16) actions in response to ecological changes that may impact the future of the GYE grizzly bear population. These management responses may involve increased habitat protection, increased mortality management, or a status review and emergency re-listing of the population if management actions are unable to address the problems.

Grizzly bears are resourceful omnivores that will make behavioral adaptations regarding food acquisition (Schwartz *et al.* 2014a, p. 75). Diets of grizzly bears vary among individuals, seasons, years, and where they reside within the GYE (Mealey 1980, pp. 284–287; Mattson *et al.* 1991*a*, pp. 1625–1626; Felicetti *et al.* 2003, p. 767; Felicetti

et al. 2004, p. 499; Koel *et al.* 2005, p. 14; Costello *et al.* 2014, p. 2013; Gunther *et al.* 2014, pp. 66–67), reflecting their ability to find adequate food resources across a diverse and changing landscape. In other nearby areas such as the NCDE (100 miles north of the GYE), whitebark pine has been functionally extinct as a bear food for at least 40 years (Kendall and Keane 2001, pp. 228–232), yet the NCDE grizzly bear population has continued to increase and thrive with an estimated 765 bears in 2004, and a subsequent average 3 percent annual rate of growth (Kendall *et al.* 2009, p. 9; Mace *et al.* 2012, p. 124). Similarly, although whitebark pine seed production and availability of cutthroat trout in the Yellowstone Lake area varied dramatically over the last 3 decades due to both natural and human-introduced causes (Reinhart and Mattson 1990, pp. 345–349; Podruzny *et al*. 1999, pp. 134–137; Felicetti *et al.* 2004, p. 499; Haroldson *et al*. 2005, pp. 175–178; Haroldson 2015, p. 47; Teisberg *et al*. 2014a, pp. 375–376), the GYE grizzly bear population has continued to increase and expand during this time period despite these changes in foods (Schwartz *et al.* 2006a, p. 66; IGBST 2012, p. 34; Bjornlie *et al.* 2014a, p. 184).

The GYE grizzly bear population has been coping with the unpredictable nature of whitebark pine seed production for millennia. Grizzly bears are not dependent upon whitebark pine seeds for survival, nor do they have a diet that is specialized on consumption of these seeds. While we know whitebark pine seed production can influence reproductive and survival rates, it has not caused a negative population trend, as evidenced by a relatively constant population size between 2002 and 2014 (IGBST 2012, p. 34; van Manen 2016a, *in litt.*). As articulated in the Food Synthesis Report by the IGBST (IGBST 2013, pp. 32–35) and supporting studies (in their entirety: Bjornlie *et al.*

2014b; Costello *et al.* 2014; Gunther *et al.* 2014), the demonstrated resiliency to declines in whitebark pine seed production and other high-calorie foods such as cutthroat trout shows that changes in food resources are not likely to become substantial impediments to the long-term persistence of the GYE grizzly bear population.

In *Greater Yellowstone Coalition* v. *Servheen*, 665 F.3d 1015 (9th Cir. 2011), the Ninth Circuit faulted the Service's conclusion that whitebark pine losses did not pose a threat to grizzly bears. First, the Ninth Circuit noted that grizzly bears' adaptability and resourcefulness increased the threat from whitebark pine loss because it raised the risk of conflicts with humans as bears looked for other food sources. The Service acknowledges this component of the threat from whitebark pine loss, but despite increased mortality during poor whitebark pine cone production years, the population trend has maintained a relatively flat trajectory (IGBST 2012, p. 34; van Manen 2016a; *in litt.*). Additionally, during years of poor whitebark pine seed availability, grizzly bears did not roam over larger areas (Costello *et al.* 2014, p. 2014); rather, the increased risk of mortality was related to the use of lower elevations and less secure habitat within their home range (Schwartz *et al.* 2010, p. 662).

Second, the court noted that the Service's data on long-term population growth came from 2002, before the pine beetle epidemic began. The population growth rate slowed from the 4 to 7 percent that occurred from 1983 to 2001 (Eberhardt *et al.* 1994, p. 362; Knight and Blanchard 1995, pp. 18–19; Schwartz *et al.* 2006b, p. 48), to 0.3 to 2.2 percent from 2002 to 2011 (IGBST 2012, p. 34). The population trajectory that includes the most recent data indicates no statistical trend (i.e., relatively flat population trajectory) within the DMA for the period 2002 to 2014 (van Manen 2016a, *in litt.*).

Third, the court faulted the Service for using a study of NCDE bears to prove GYE grizzly bears continued to increase despite whitebark pine losses, even though GYE bears were reported to be unique because of their reliance on whitebark pine seeds. Current data show that the GYE bear population has stabilized or increased despite the loss of whitebark pine seeds (IGBST 2012, p. 34; van Manen 2016b, *in litt.*). A recent study found that nearly one third of collared grizzly bears in the GYE did not even have whitebark pine within their home ranges and those that did made use of other foods within their home ranges during poor whitebark pine years (Costello *et al.* 2014, pp. 2009, 2013).

Fourth, the Ninth Circuit observed that the Service contradicted itself by stating that the entire PCA was necessary to support a recovered population, yet acknowledged that whitebark pine would persist in only a small part of the PCA. New data show that, despite the decline in whitebark pine, the GYE population has been relatively constant, is close to carrying capacity, and is exhibiting density-dependent regulation inside the DMA (van Manen *et al.* 2016, entire; van Manen 2016b, *in litt.*). Fifth, the court determined it was arbitrary and capricious for the Service to rely on scientific uncertainty about whitebark pine loss in a delisting decision. Any uncertainty about the loss of whitebark pine has been resolved by GYE population numbers that show a relatively stable population size despite loss of whitebark pine seeds (IGBST 2012, p. 34; van Manen 2016b, *in litt.*) and no long-term changes in vital rates (IGBST 2012, pp. 32–34). Furthermore, whitebark pine tree mortality has significantly slowed since 2009, suggesting that the current beetle outbreak may have run its course (Haroldson 2015, p. 47). Finally, the Ninth Circuit faulted the Service for relying on adaptive management

and monitoring without describing management responses and specific triggering criteria. The population objectives that will be incorporated into regulations provide specific triggers for management action (see *Factors B and C Combined* discussion, above). The Service continues to believe that adaptive management will play a role in future management decisions because new data and new information will require appropriate management responses.

In summary, the best scientific and commercial data available regarding grizzly bear responses to food losses suggest this issue is not a threat to the GYE grizzly bear population and is not an impediment to long-term population persistence. Therefore, we conclude that changes in food resources do not constitute a threat to the GYE grizzly bear DPS now, nor are such changes anticipated to constitute a threat in the foreseeable future.

Climate Change

Our analyses under the Act include consideration of observed or likely environmental changes resulting from ongoing and projected changes in climate. As defined by the Intergovernmental Panel on Climate Change (IPCC), the term "climate" refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2013a, p. 1450). The term "climate change" thus refers to a change in the state of the climate that can be identified by changes in the mean or the variability of relevant properties, which persists for an extended period, typically decades or longer, due to natural conditions (e.g., solar cycles), or human-caused changes in the composition of the atmosphere or in land use (IPCC 2013a, p. 1450).

Scientific measurements spanning several decades demonstrate that changes in climate are occurring. In particular, warming of the climate system is unequivocal, and many of the observed changes in the last 60 years are unprecedented over decades to millennia (IPCC 2013b, p. 4). The current rate of climate change may be as fast as any extended warming period over the past 65 million years and is projected to accelerate in the next 30 to 80 years (National Research Council 2013, p. 5). Thus, rapid climate change is adding to other sources of extinction pressures, such as land use and human-caused mortality, which will likely place extinction rates in this era among just a handful of the severe biodiversity crises observed in Earth's geological record (American Association for the Advancement of Sciences 2014, p. 17).

Examples of various other observed and projected changes in climate and associated effects and risks, and the bases for them, are provided for global and regional scales in recent reports issued by the IPCC (in their entirety: 2013b, 2014), and similar types of information for the United States and regions within it are available via the National Climate Assessment (Melillo *et al*. 2014, entire). Results of scientific analyses presented by the IPCC show that most of the observed increase in global average temperature since the mid-20th century cannot be explained by natural variability in climate and is "extremely likely" (defined by the IPCC as 95–100 percent likelihood) to be due to the observed increase in greenhouse gas concentrations in the atmosphere as a result of human activities, particularly carbon dioxide emissions from fossil fuel use (IPCC 2013b, p. 17).

Scientists use a variety of climate models, which include consideration of natural processes and variability, as well as various scenarios of potential levels and timing of

greenhouse gas emissions, to evaluate the causes of changes already observed and to project future changes in temperature and other climate conditions. Model results yield very similar projections of average global warming until about 2030, and thereafter the magnitude and rate of warming vary through the end of the century depending on the assumptions about population levels, emissions of greenhouse gases, and other factors that influence climate change. Thus, absent extremely rapid stabilization of greenhouse gas emissions at a global level, there is strong scientific support for projections that warming will continue through the 21st century, and that the magnitude and rate of change will be influenced substantially by human actions regarding greenhouse gas emissions (IPCC 2013b, p. 19; IPCC 2014, entire).

Global climate projections are informative, and, in some cases, the only or the best scientific information available for us to use. However, projected changes in climate and related impacts can vary substantially across and within different regions of the world (in their entirety: IPCC 2013b, 2014), and within the U.S. (Melillo *et al.* 2014, entire). Therefore, we use "downscaled" projections when they are available and have been developed through appropriate scientific procedures, because such projections provide higher resolution information that is more relevant to spatial scales used for analyses of a given species (see Glick *et al*. 2011, pp. 58–61, for a discussion of downscaling).

The hydrologic regime in the Rocky Mountains has changed and is projected to change further (Bartlein *et al.* 1997, p. 786; Cayan *et al.* 2001, p. 411; Leung *et al.* 2004, p. 75; Stewart *et al.* 2004, pp. 223–224; Pederson *et al.* 2011, p. 1666). The western United States may experience milder, wetter winters with warmer, drier summers and an

overall decrease in snowpack (Leung *et al.* 2004, pp. 93–94). While some climate models do not demonstrate significant changes in total annual precipitation for the western United States (Duffy *et al.* 2006, p. 893), an increase in "rain on snow" events is expected (Leung *et al.* 2004, p. 93; McWethy *et al.* 2010, p. 55). The amount of snowpack and the timing of snowmelt may also change, with an earlier peak stream flow each spring (Cayan *et al.* 2001, p. 410; Leung *et al.* 2004, p. 75; Stewart *et al.* 2004, pp. 223–224). Although there is some disagreement about changes in the water content of snow under varying climate scenarios (Duffy *et al.* 2006, p. 893), reduced runoff from decreased snowpack could translate into decreased soil moisture in the summer (Leung *et al.* 2004, p. 75). However, Pederson *et al.* (2011, p. 1682) found that increased spring precipitation in the northern Rocky Mountains is offsetting these impacts to total annual stream flow from expected declines in snowpack thus far.

The effects related to climate change may result in a number of changes to grizzly bear habitat, including a reduction in snowpack levels, shifts in denning times, shifts in the abundance and distribution of some natural food sources, and changes in fire regimes. 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). These changes may even make habitat more suitable and food sources more abundant (Servheen and Cross 2010, Appendix D). However, these ecological changes may affect the timing and frequency of grizzly bear–human interactions and conflicts (Servheen and Cross 2010, p. 4).

Because timing of den entry and emergence is at least partially influenced by food availability and weather (Craighead and Craighead 1972, pp. 33–34; Van Daele *et al.*

1990, p. 264), less snowpack would likely shorten the denning season as foods become available later in the fall and earlier in the spring. In the GYE, Haroldson *et al.* (2002, pp. 34–35) reported later den entry dates for male grizzly bears, corresponding with increasing November temperatures from 1975 to 1999. This increased time outside of the den could increase the potential for conflicts with humans (Servheen and Cross 2010, p. 4).

The effects related to climate change could create temporal and spatial shifts in grizzly bear food sources (Rodriguez *et al.* 2007, pp. 41–42). Changes in plant communities have already been documented, with species' ranges shifting farther north and higher in elevation due to environmental constraints (Walther *et al.* 2002, pp. 390–391; Walther 2003, pp. 172–175; Walther *et al.* 2005, p. 1428) and increases in outbreaks of insects that reduce survival (Bentz *et al.* 2010, entire). It is unclear whether avalanche chutes, an important habitat component to grizzly bears, will decrease, possibly as a result of decreased snowpack, or increase, as a result of increases in "rain on snow" events that may decrease the stability of snowpack. Changes in vegetative food distributions also may influence other mammal distributions, including potential prey species like ungulates. While the extent and rate to which individual plant species will be impacted is difficult to foresee with any level of confidence (in their entirety: Walther *et al.* 2002; Fagre *et al.* 2003), there is general consensus that grizzly bears are flexible enough in their dietary needs that they will not be impacted directly by ecological constraints such as shifts in food distributions and abundance (Servheen and Cross 2010, p. 4; IGBST 2013, p. 35).

Fire regimes can affect the abundance and distribution of some vegetative bear foods (e.g., grasses, berry-producing shrubs) (LeFranc *et al.* 1987, p. 150). For instance, fires can reduce canopy cover, which usually increases berry production. However, on steep south or west slopes, excessive canopy removal due to fires or vegetation management may decrease berry production through subsequent moisture stress and exposure to sun, wind, and frost (Simonin 2000, entire). Fire frequency and severity may increase with late summer droughts predicted under climate change scenarios (Nitschke and Innes 2008, p. 853; McWethy *et al.* 2010, p. 55). Increased fire frequency has the potential to improve grizzly bear habitat, with low to moderate severity fires being the best. For example, fire treatment most beneficial to huckleberry shrubs is that which results in damage to stems, but does little damage to rhizomes (Simonin 2000, entire). High-intensity fires may reduce grizzly bear habitat quality immediately afterwards by decreasing hiding cover and delaying regrowth of vegetation, although Blanchard and Knight (1996, p. 121) found that increased production of forbs and root crops in the years following the high-intensity, widespread Yellowstone fires of 1988 benefited grizzly bears. Because grizzly bears have shown resiliency to changes in vegetation resulting from fires, we do not anticipate altered fire regimes predicted under most climate change scenarios will have significant negative impacts on grizzly bear survival or reproduction, despite the potential effects on vegetation. Therefore, we conclude that the effects of climate change do not constitute a threat to the GYE grizzly bear DPS now, nor are they anticipated to in the foreseeable future.

Catastrophic Events

Here we analyze a number of possible catastrophic events including fire, volcanic activity, and earthquake. Fire is a natural part of the GYE system; however, 20th century forest management, which included extensive wildfire suppression efforts, promoted heightened potential for a large fire event. The 1988 fires, the largest wildfires in YNP's recorded history, burned a total of 3,213 km^2 (1,240 mi^2) or 36 percent of the Park. However, large mobile species such as grizzly bears and their ungulate prey usually were not meaningfully adversely affected. Surveys after the 1988 fires found that 345 elk, 36 deer, 12 moose, 6 black bears, and 9 bison died in GYE as a direct result of the conflagration (YNP 2011, p. 3). Regarding impacts to grizzly bears, YNP concluded, "Grizzly bears have evolved in association with landscapes strongly influenced by fire, the primary forest disturbance agent within the GYE, are highly vagile, and are adaptable to changing ecological conditions. Wildland fires will provide significant long-term benefits to grizzly bears by maintaining natural ecosystem processes" (YNP 2005, Appendix H). YNP's fire management policy (YNP 2014a, entire) indicates natural wildfires should be allowed to burn, so long as parameters regarding fire size, weather, and potential danger are not exceeded. Those fires that do exceed the standards set forth in the fire management policy, as well as all human-caused fires, are to be suppressed (YNP 2014a, entire). National Forests manage natural wildfires to allow them to play their "natural ecological role" while "minimizing negative effects to life, investments and valuable resources" (Caribou-Targhee NF 2005, p. 11; USDA FS 2011, pp. 3–4; Shoshone NF 2012, p. 2; Bridger-Teton NF 2015, p. 8). Future fires are likely in the GYE system. Overall, we agree with the YNP conclusion (YNP 2005, Appendix H) that grizzly bears are adaptable and will benefit from fires in the long term. Wildfires often

lead to an increase in ungulate food supplies and an increase in ungulate numbers. While minor, localized, short-term impacts are likely, fire will not threaten the viability of the grizzly bear population in the GYE.

The GYE has also experienced several exceedingly large volcanic eruptions in the past 2.1 million years. Super eruptions occurred 2.1 million, 1.3 million, and 640,000 years ago (Lowenstern *et al.* 2005, pp. 1–2). Such a similar event would devastate the GYE. While one could argue "we are due" for such an event, scientists with the Yellowstone Volcano Observatory maintain that they "see no evidence that another cataclysmic eruption will occur at Yellowstone in the foreseeable future… [and that] recurrence intervals of these events are neither regular nor predictable" (Lowenstern *et al.* 2005, p. 6). We agree and do conclude that such an event is not likely within the foreseeable future.

More likely to occur is a nonexplosive lava flow eruption or a hydrothermal explosion. There have been 30 nonexplosive lava flows in YNP over the last 640,000 years, most recently 70,000 years ago (Lowenstern *et al.* 2005, p. 2). During such an eruption, flows ooze slowly over the surface, moving a few hundred feet per day for several months or several years (Lowenstern *et al.* 2005, p. 2). Any renewed volcanic activity at YNP would most likely take this form (Lowenstern *et al.* 2005, p. 3). In general, such events would have localized impacts and be far less devastating than a large eruption (although such an event could also cause fires; fire as a threat is discussed above). Hydrothermal explosions, triggered by sudden changes in pressure of the hydrothermal system, also occasionally affect the region. More than a dozen large hydrothermal explosion craters formed between 14,000 and 3,000 years ago (Lowenstern

et al. 2005, p. 4). The largest hydrothermal-explosion crater documented in the world is along the north edge of Yellowstone Lake in an embayment known as Mary Bay; this 2.6-km (1.5-mi) diameter crater formed about 13,800 years ago (Lowenstein *et al.* 2005, p. 4). We do not consider either nonexplosive lava flow eruptions or a hydrothermal-explosion likely within the foreseeable future, but even if one of these did occur, the impact to grizzly bears would likely be localized, temporary, and would not threaten the viability of the grizzly bear population in the GYE.

Earthquakes also occur in the region. The most notable earthquake in YNP's recent history was a magnitude 7.5 in 1959 (Lowenstern *et al.* 2005, p. 3). Similarly, a magnitude 6.5 earthquake hit within YNP in 1975 (Lowenstern *et al.* 2005, p. 3). The 1959 earthquake killed 28 people, most of them in a massive landslide triggered by the quake (Lowenstern *et al.* 2005, p. 3). Such massive landslides and other earthquake-related impacts could also affect wildlife. But as with other potential catastrophic events, the impact of a large earthquake to grizzly bears would be localized, temporary, and would not threaten the viability of the grizzly bear in the GYE.

We considered catastrophic and stochastic (random probability) events that might reasonably occur in the GYE within the foreseeable future, to the extent possible. Most catastrophic events discussed above are unpredictable and unlikely to occur within the foreseeable future. Other events that might occur within the foreseeable future would likely cause only localized and temporary impacts that would not threaten the GYE grizzly bear population.

Public Support and Human Attitudes

Public support is paramount to any successful large carnivore conservation program (Servheen 1998, p. 67). Historically, human attitudes played a primary role in grizzly bear population declines by promoting a culture and government framework that encouraged excessive, unregulated, human-caused mortality. Through government-endorsed eradication programs and perceived threats to human life and economic livelihood, humans settling the Western United States were able to effectively eliminate most known grizzly bear populations after only 100 years of westward expansion.

We have seen a change in public perceptions and attitudes toward the grizzly bear in the last several decades. The same government that once financially supported active extermination of the bear now uses its resources to protect the great symbol of American wildness. This change in government policy and practice is a product of changing public attitudes about the grizzly bear. Although attitudes about grizzly bears vary geographically and demographically, there has been a revival of positive attitudes toward the grizzly bear and its conservation (Kellert *et al.* 1996, pp. 983–986).

Public outreach presents a unique opportunity to effectively integrate human and ecological concerns into comprehensive programs that can modify societal beliefs about, perceptions of, and behaviors toward grizzly bears. Attitudes toward wildlife are shaped by numerous factors including basic wildlife values, biological and ecological understanding of species, perceptions about individual species, and specific interactions or experiences with species (Kellert 1994, pp. 44–48; Kellert *et al.* 1996, pp. 983–986). I&E programs teach visitors and residents about grizzly bear biology, ecology, and behavior, and enhance appreciation for this large predator while dispelling myths about

its temperament and feeding habits. Effective I&E programs have been an essential factor contributing to the recovery of the GYE grizzly bear population since its listing in 1975. By identifying values common to certain user groups, the I&E working group can disseminate appropriate materials and provide workshops catered to these values. By providing general information to visitors and targeting specific user groups about living and working in grizzly bear country, we believe continued coexistence between grizzly bears and humans will be accomplished.

Traditionally, residents of the GYE involved in resource extraction industries, such as loggers, miners, livestock operators, and hunting guides, were opposed to land-use restrictions that were perceived to place the needs of the grizzly bear above human needs (Kellert 1994, p. 48; Kellert *et al.* 1996, p. 984). Surveys of these user groups have shown that they tolerate large predators when they are not seen as direct threats to their economic stability or personal freedoms (Kellert *et al.* 1996, p. 985). Delisting could increase acceptance of grizzly bears by giving local government and private citizens more discretion in decisions that affect them. Increased flexibility regarding livestock depredating bears in areas outside of the PCA may increase tolerance for the grizzly bear by landowners and livestock operators by potentially reducing the number of conflict situations.

Ultimately, the future of the grizzly bear will depend on the people who live, work, and recreate in grizzly bear habitat and the willingness and ability of these people to learn to coexist with the grizzly bear and to accept this animal as a cohabitant of the land. Other management strategies are unlikely to succeed without effective and innovative public I&E programs. The objective of the I&E is to proactively address

grizzly bear–human conflicts by informing the public about the root causes of these conflicts and providing suggestions on how to prevent them (YES 2016a, pp. 92–95). By increasing awareness of grizzly bear behavior and biology, we hope to enhance public involvement and appreciation of the grizzly bear. In addition to public outreach programs, the States have implemented other programs to help reduce conflicts with the people that are directly affected by grizzly bears. These efforts include livestock carcass removal programs, electric fencing subsidies for apiaries and orchards, and sharing costs of bear-resistant garbage bins where appropriate.

Although some human-caused grizzly bear mortalities are unintentional (e.g., vehicle collisions, trap mortality), intentional deaths in response to grizzly bear–human conflicts are responsible for the majority of known and probable human-caused mortalities. Fortunately, this source of mortality can be reduced significantly if adequate I&E are provided to people who live, work, and recreate in occupied grizzly bear habitat and proper management infrastructure is in place (Linnell *et al.* 2001, p. 345). For example, even though more than 3 million people visit the National Parks and National Forests of the GYE each year, (USDA FS 2006a, pp. 176, 183, 184; Cain 2014, p. 46; Gunther 2014, p. 47), the average number of conflicts per year between 1992 and 2010 was only 150 (Gunther *et al.* 2012, p. 51). The current I&E working group has been a major component contributing to the successful recovery of the GYE grizzly bear population over the last 30 years. Both Federal and State management agencies are committed to continuing to work with citizens, landowners, and visitors within the GYE grizzly bear DPS boundaries to address the human sources of conflicts.

From 1980 through 2002, at least 36 percent (72 out of 196) of human-caused mortalities may have been avoided if relevant I&E materials had been presented, understood, and used by involved parties (Servheen *et al.* 2004, p. 15). Educating back- and front-country users about the importance of securing potential bear attractants can reduce grizzly bear mortality risk. Similarly, adhering to hiking recommendations, such as making noise, hiking with other people, and hiking during daylight hours, can further reduce grizzly bear mortalities by decreasing the likelihood that hikers will encounter bears. Hunter-related mortalities may involve hunters defending their life because of carcasses that are left unattended or stored improperly. Grizzly bear mortalities also occur when hunters mistake grizzly bears for black bears. All of these circumstances can be further reduced through I&E programs.

Outside the PCA, State wildlife agencies recognize that the key to preventing grizzly bear–human conflicts is providing I&E to the public. State grizzly bear management plans also acknowledge that this is the most effective long-term solution to grizzly bear–human conflicts and that adequate public outreach programs are paramount to ongoing grizzly bear survival and successful coexistence with humans in the GYE so that the measures of the Act continue not to be necessary. All three States have been actively involved in I&E outreach for over a decade, and their respective management plans contain chapters detailing efforts to continue current programs and expand them when possible. For example, the WGFD created a formal grizzly bear–human conflict management program in July 1990 and has coordinated an extensive I&E program since then. Similarly, since 1993, MFWP has implemented countless public outreach efforts to minimize bear–human conflicts, and the IDFG has organized and implemented education

programs and workshops focused on private and public lands on the western periphery of the grizzly bear's range.

Compensating ranchers for losses caused by grizzly bears is another approach to build support for coexistence between livestock operators and grizzly bears. In cases of grizzly bear livestock depredation that have been verified by USDA Animal and Plant Health Inspection Service's Wildlife Services, IDFG, MFWP, or WGFD, affected livestock owners are compensated. Since 1997, compensation in Montana and Idaho has been provided primarily by private organizations, principally Defenders of Wildlife. Since the program's inception in 1997, the Defenders of Wildlife Grizzly Bear Compensation Trust paid over $400,000 to livestock operators in the northern Rockies for confirmed and probable livestock losses to grizzly bears (Edge 2013, entire). In 2013, the State of Montana passed legislation establishing a compensation program for direct livestock losses caused by grizzly bears (MCA 2-15-3113). In light of this legislation, Defenders of Wildlife stopped their compensation program in Montana and redirected funds to other conflict prevention programs.

In Wyoming, compensation has always been paid directly by the State. Upon delisting, both Idaho and Wyoming's grizzly bear management plans call for State funding of compensation programs (Idaho's Grizzly Bear Delisting Advisory Team 2002, p. 16; WGFD 2016, pp. 53–55). In Idaho, compensation funds would come from the secondary depredation account, and the program would be administered by the appropriate IDFG Regional Landowner Sportsman Coordinators and Regional Supervisors (Idaho's Grizzly Bear Delisting Advisory Team 2002, p. 16). In Wyoming, the WGFD will pay for all compensable damage to agricultural products as provided by

State law and regulation (WGFD 2016, p. 58). The WGFD will continue efforts to establish a long-term funding mechanism to compensate property owners for livestock and apiary losses caused by grizzly bears. In Montana, long-term funding to compensate livestock owners for direct kills has been secured through the general fund. A long-term funding source has not been identified for conflict prevention projects but is being actively pursued. Based on the analysis provided above, we conclude that, through the positive influence of the I&E program, public support and attitude does not constitute a threat to the GYE grizzly bear DPS now, nor is it anticipated to in the foreseeable future.

Summary of Factor E

Factor E requires the Service to consider other natural or man-made factors affecting a species' continued existence. The following factors warranted consideration as possible threats to the GYE grizzly bear population: Effects due to: (1) genetic health, (2) potential changes in food resources, (3) climate change, (4) catastrophic events, and (5) human attitudes toward grizzly bear recovery. We do not consider genetic concerns to be a threat for the following reasons: We have an effective population size more than four times that recommended by the best available science; we know levels of genetic diversity have not declined in the last century; we know current levels of genetic diversity are sufficient to support healthy reproduction and survival; and we know that genetic contribution from individual bears outside of the GYE will not be necessary for the next several decades (Miller and Waits 2003, p. 4338; Kamath *et al.* 2015, entire). We do not anticipate that genetic issues will affect grizzly bears in the future because of ongoing efforts to restore natural connectivity and a commitment to translocate animals in the future, if needed, as provided in the 2016 Conservation Strategy.

Because the GYE grizzly bear population has increased or remained relatively constant in size during declines in whitebark pine seed production and other high-calorie foods since the early 1990s, there is no evidence that changes in food resources will become substantial impediments to the long-term persistence of the GYE grizzly bear population. Changing climate conditions have the potential to affect grizzly bear habitat with subsequent implications for grizzly bear–human conflicts. While we do not consider the effects of climate change to be a direct threat to grizzly bear habitat in the GYE, it could influence the timing and frequency of some grizzly bear–human conflicts with possible increases in grizzly bear mortality. This possible increase in grizzly bear mortality risk is not expected to be a threat because of coordinated total mortality limits within the DMA (see table 3 and *Factors B and C Combined* discussion, above). Catastrophic fires, volcanic eruptions, and earthquakes are unlikely to occur in the foreseeable future or would likely cause only localized and temporary impacts to the GYE grizzly bear population. Finally, we do not anticipate human attitudes becoming a threat to the GYE grizzly bear population due to effective outreach programs and established regulatory frameworks.

Essentially, the management response to all of these potential threats would be to limit human-caused mortality through conflict prevention and management to limit discretionary mortality (see table 3 and *Factors B and C Combined* discussion, above). Because of the manageable nature of these potential threats through conflict prevention and response efforts and the large area of suitable, secure habitat within the GYE, we do not consider them to be a threat to the GYE grizzly bear DPS now or in the foreseeable future.

Cumulative Effects of Factors A Through E.

Many of the threats faced by grizzly bears are interrelated and could be synergistic. Principal threats discussed above include habitat loss through road building and the resulting increased human access to grizzly bear habitat, human-caused mortality of grizzly bears, and the legal mechanisms that direct habitat and population management. The principal threats assessed in previous sections may cumulatively impact the GYE grizzly bear population beyond the scope of each individual threat. For example, the loss of whitebark pine could lead to lower survival rates at the same time of the year when grizzly bears are vulnerable to human-caused mortality from elk hunting. Alternatively, expected increases in human populations across the Western United States and climate change both have the potential to increase grizzly bear conflicts and human-caused mortality. Historically, each of these factors impacted grizzly bears in the GYE and cumulatively acted to reduce their range and abundance over time. Today, these stressors have been adequately minimized and ameliorated and do not impact the GYE grizzly bear population with the same intensity.

While these numerous stressors on grizzly bear persistence are challenging to conservation, our experience demonstrates that it is possible for large carnivore conservation to be compatible with them (Linnell *et al.* 2001, p. 48). Despite these risks, the best available data indicate the GYE grizzly bear population's trend has been relatively constant with no evidence to date of a decline, and range extent has continued to expand. We consider estimates of population trend (i.e., "lambda") to be the ultimate metric to assess cumulative impacts to the population. It reflects all of the various stressors on the population. This calculation reflects total mortality, changes in habitat

quality, changes in population density, change in current range, displacement effects, and so forth. In other words, there will always be stressors acting on the GYE grizzly bear population that lead to human-caused mortality or displacement, but if these are not causing the population to decline, we cannot consider them substantial.

Summary of Factors Affecting the Greater Yellowstone Ecosystem Grizzly Bear Population

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. Maintenance of the 1998 baseline values for secure habitat, developed sites on public lands, and livestock allotments inside the PCA will adequately ameliorate the multitude of stressors on grizzly bear habitat such that they do not become threats to the GYE grizzly bear population in the foreseeable future. We expect many of the threats discussed under *Factor A* to continue to occur at some level, but they are sufficiently ameliorated so they affect only a small proportion of the population.

Upon delisting, the GYE National Forests and National Parks will continue to implement and maintain the 1998 baseline. Together, these two Federal agencies manage 98 percent of lands within the PCA and 88 percent of all suitable habitat within the DPS boundaries. Suitable habitat outside the PCA provides additional ecological resiliency and habitat redundancy to allow the population to respond to environmental changes. Habitat protections specifically for grizzly bear conservation are not necessary here because other regulatory mechanisms that limit development and motorized use are already in place for nearly 60 percent of suitable habitat outside the PCA. These and other conservation measures discussed in the USFS's Record of Decision (2006b) ensure

threats to the GYE grizzly bear population's habitat outside the PCA will not become substantial enough to threaten this population's long-term persistence. Therefore, based on the best available information and expectation that current management practices will continue into the foreseeable future, we conclude that the present or threatened destruction, modification, or curtailment of its habitat or range does not constitute a threat to the GYE grizzly bear DPS and is not expected to become a threat in the foreseeable future.

When grizzly bears were listed in 1975, we identified human-caused mortality, mainly "indiscriminate illegal killing" and management removals, as threats to the population under *Factors B and C Combined*. In response, we implemented demographic recovery criteria to maintain a minimum population size and a well-distributed population and to establish total mortality limits based on scientific data and direct monitoring of the population. Since implementing these criteria, the GYE grizzly bear population has tripled in size and range (Eberhardt *et al.* 1994, pp. 361–362; Knight and Blanchard 1995, pp. 2–11; Boyce *et al.* 2001, pp. 1–11; Schwartz *et al.* 2006b, p. 48; Pyare *et al.* 2004, pp. 5–6; Schwartz *et al.* 2006a, pp. 64–66; IGBST 2012, p. 34; Bjornlie *et al.* 2014a, p. 184). Inside the DMA, the population has stabilized since 2002 and is exhibiting density-dependent population regulation (van Manen *et al.* 2016, entire). Although humans are still directly or indirectly responsible for the majority of grizzly bear deaths, this source of mortality is effectively mitigated through science-based management, State regulations, careful population monitoring, and outreach efforts. Since 1975, no grizzly bears have been removed from the GYE for commercial, recreational, scientific, or education purposes. Although the States may choose to

institute carefully regulated grizzly bear hunting outside of the national parks, 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. Therefore, based on the best available information and State regulatory mechanisms that will limit total mortality levels within the levels detailed in tables 2 and 3 and that these regulatory mechanisms will continue into the foreseeable future, we conclude that disease, natural predation, and human-caused mortality do not constitute threats now or in the foreseeable future.

The importance of regulatory mechanisms and effective wildlife management infrastructure to large carnivore conservation cannot be understated, as described under *Factors A and B and C Combined* (see Linnell *et al.* 2001, p. 348). Before publication of this final rule, the regulatory mechanisms in place include National Park Superintendent's Compendia, the USFS Amendment for Grizzly Bear Habitat Conservation for the GYE National Forests, and State and Tribal commission regulations controlling mortality as described under *Factors A and B and C Combined*. The management infrastructure is already in place and described in the 2016 Conservation Strategy. Because the signatory agencies to the 2016 Conservation Strategy are the same agencies that have been managing grizzly bear habitat, population, and monitoring for the last 40 years, the management transition would be minimal. Existing regulatory mechanisms will ensure the GYE grizzly bear population continues to meet the recovery criteria. Therefore, we conclude that the existing regulatory mechanisms are adequate to maintain a healthy and recovered population of grizzly bears into the foreseeable future and do not pose a threat now, or in the foreseeable future.

Other factors under *Factor E* we considered that could become threats to the GYE grizzly bear population included: (1) genetic health, (2) potential changes in food resources, (3) climate change, (4) catastrophic events, and (5) human attitudes toward grizzly bear recovery. Essentially, the management response to all of 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 other natural or manmade factors to become threats to the GYE grizzly bear population.

Many of the threats faced by grizzly bears are interrelated and could cumulatively impact the GYE grizzly bear population 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 (Linnell *et al*. 2001, p. 48), particularly given the rigorous scientific monitoring protocols established for the GYE grizzly bear population. There will always be stressors to the GYE grizzly bear population, but if these are not causing the population to decline, we do not consider them to threaten the long-term persistence of the population.

Summary of and Responses to Peer Review and Public Comment

In the proposed rule published on March 11, 2016 (81 FR 13174), we requested that all interested parties submit written comments on the proposal by May 10, 2016. We also contacted appropriate Federal and State agencies, Tribes, scientific experts and organizations, and other interested parties and invited them to comment on the proposal.

A newspaper notice inviting general public comment was published in the Bozeman Chronicle on March 27, 2016, the Cody Enterprise and the Casper Star-Tribune on March 29, 2016, and the Jackson Hole News & Guide on March 30, 2016. On September 7, 2016 (81 FR 61658), we reopened the comment period on the proposed rule until October 7, 2016, to make available comments from five peer reviewers and additional supplemental material. We held two public meetings followed by public hearings, one in Cody, Wyoming (April 11, 2016), and another in Bozeman, Montana (April 12, 2016). All substantive information provided during the comment periods has either been incorporated directly into this final determination or addressed in the more specific responses to comments below.

A number of commenters, including peer reviewers, Federal agencies, and the States, provided new information or clarifications on information presented in the GYE proposed delisting rule (81 FR 13174, March 11, 2016) and its supporting documents. Categories of new or clarified information include corrections of discrepancies between the proposed rule and draft 2016 Conservation Strategy (e.g., table 2 clarifies that mortality limits apply to total mortality), the discussion of carrying capacity, our analysis of density-independent and density-dependent effects on GYE grizzly bear population dynamics, our use of "cause" versus "association" in our density-dependent analysis, and range versus distribution (please see the *Population Ecology–Background* section above). This new or clarified information has been incorporated, as appropriate, into this final rule, the 2016 Conservation Strategy (YES 2016a, entire), and the Recovery Plan supplement (USFWS 2017, entire). In the proposed and final rules, we presented data as of 2014, and did not update in the five-factor threats assessment because: (1) we would

not have been able to update all of the data given the amount of time available to do so between the proposed rule and this final rule, and (2) intensive monitoring has been ongoing since prior to 2014 (e.g., habitat management has been in compliance with the 1998 baseline, the three demographic recovery criteria have been maintained, and monitoring has not detected a change in the population trajectory); therefore, including data since 2014 would not have changed our assessment. In response to specific public comments, we did respond using the most recent available data. When talking about data, we mean raw data that has not been published. We did, however, include all relevant peer-reviewed publications since 2014 and up to this final rule.

General Issues

Issue 1—Several commenters submitted comments on topics related to other issues not specific to the GYE delisting proposal. These issues include (a) general criticism of the Act (litigation driving regulatory decisions, failure to delist species exceeding recovery criteria could jeopardize the Act, suggested updates to the Act, funding of the Act should be reconsidered); (b) a desire for removing colonial occupation and restoring the continent to self-sufficiency, which would allow wildlife to flourish; (c) simpler methods for uploading comments on regulations.gov; (d) the potentially negative impact of delisting on tourism and the local economy; (e) the negative impact to ecosystem function if grizzly bears decline and the resulting trophic cascade, and other species' conservation; and (f) delisting means the GYE is no longer a true wilderness and true wilderness areas must be protected in perpetuity.

Response—All of these comments are outside the scope of this final delisting rule and will not be addressed here. Substantive comments related to the conservation of

the other grizzly bear populations would be addressed during the Recovery Plan revision process for those populations, should we decide revisions are necessary.

Issue 2—Several commenters expressed general concerns related to grizzly bear management including: (a) consideration, analyses, and commitments to recovery of grizzly bear populations elsewhere in the lower 48 States; (b) ethical concerns related to hunting generally or "trophy hunting" of grizzly bears; and (c) delisting could prematurely halt the current development of local tolerance towards grizzly bears and their habitat expansion.

Response—This listing action is specific to the grizzly bear population in the GYE and, therefore, affects only the legal status of grizzly bears within the GYE. In other words, when this regulation takes effect, grizzly bear populations occurring outside of the boundary of the GYE DPS will remain listed as a threatened species under the ESA. Therefore, consideration and analyses of grizzly bear populations elsewhere in the lower 48 States is outside the scope of this rulemaking.

While we respect the values and opinions of all commenters, the Act does not allow us to factor ethical objections to hunting into our delisting decision. Section 4(a)(1) of the Act specifies that we shall determine whether any species is threatened or endangered 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. Section 4(b)(1)(A) further specifies that we

shall make such determinations based solely on the best scientific and commercial data available.

The best scientific and commercial data available indicate that the GYE grizzly bear population is recovered and no longer meets the definition of a threatened or endangered species. However, we acknowledge tolerance of grizzly bears remains a concern in some areas. The 2016 Conservation Strategy contains a strong Information and Education (I&E) program component that will continue efforts to improve local tolerance towards the species.

Delisting Process and Compliance with Applicable Laws, Regulations, and Policies

Issue 3—Several commenters expressed concern that the opportunity for public involvement was inadequate. Specifically, the commenters requested longer public comment periods, more public hearings at additional locations across the country, timely access to all necessary data and materials presented at an appropriately accessible level, and accommodations for the visually impaired and those without internet access to ensure their ability to provide comments on the rule.

Response—We appreciate the time and thought put into comments on the proposed rule to delist the GYE grizzly bear. Collectively, we believe the public had ample opportunity for input, as explained below. We followed Service practice and policy in managing the public comment process. We provided multiple opportunities and avenues for public involvement. Notifications of comment periods, meetings, and hearings were provided in the proposed rule, which was published in the *Federal Register*, posted on our website, and publicized in newspapers. These postings were compliant with the requirements of Section 508 of the Rehabilitation Act of 1973, as

amended (29 U.S.C. 794(d)). We also provided access information for persons using a telecommunications device.

The public comment period on the proposed rule was open for a total of 90 days, during which time we received more than 665,000 comments. We offered a variety of options for submitting comments; the public could submit their comments electronically, using a specified website, or in hard copy, via U.S. mail or hand delivery.

As mentioned above, we also held two public meetings and public hearings in Cody, WY, and Bozeman, MT, where verbal or written comments could be submitted. These two cities were selected because of their proximity to the GYE. We declined to hold additional public hearings because we satisfied section 4(b)(5)(E)'s statutory requirement that we hold at least one public hearing and the substantial cost associated with conducting public hearings. Although we appreciate the public's desire to give public testimony, oral and written comments are given the same consideration in our process. We again provided access information for persons using a telecommunications device. In our notifications of comment periods, meetings, and hearings, we stated that persons with disabilities wanting to participate in a public meeting or hearing, including the need for American Sign Language or English as a second language interpreter, could be accommodated.

Issue 4—Commenters suggested that a second round of peer review and additional public comment period was needed once a final 2016 Conservation Strategy and final regulatory mechanisms were available; they noted that reviewers were asked to answer questions about the adequacy of regulatory mechanisms without these final documents, casting doubt on the "utility and accuracy" of their review and that

"significant changes" being made to the draft 2016 Conservation Strategy released in March 2016 could alter the opinion of peer reviewers and the public on the adequacy of the management described in these documents. Some commenters referred to previous promises at Yellowstone Ecosystem Subcommittee (YES) meetings for additional public comment on the final 2016 Conservation Strategy. Finally, one commenter could not understand why the Service re-released a proposed rule for additional public comment with "fundamental issues still in debate and unresolved."

Response—We gave the public two opportunities to comment on the proposed rule, including an opportunity to comment on its content in light of the revised State regulatory mechanisms, the draft 2016 Conservation Strategy, and the peer review. The public and peer reviewers also had an opportunity to provide feedback on the draft 2016 Conservation Strategy during the same public comment periods as the proposed rule. We made no promises to allow additional comment from the public at the YES meetings. Changes to the draft 2016 Conservation Strategy took into account public comments. The final rule and the final 2016 Conservation Strategy are a logical outgrowth of the considerations in the peer review and in the more than 665,000 public comments we received. Changes to the 2016 Conservation Strategy were made to remove inconsistency with the proposed rule and to improve clarity, but there were not significant changes to the tenets of the strategy from the draft to final. We do not believe that fundamental issues are still in debate; we believe the best available science clearly shows that the GYE population is recovered.

Issue 5—Commenters expressed concerns that the consideration the Service gives public comments is a flawed process designed to ensure that only some comments are

considered. They stated that the Service considers only comments that are based on a scientific rationale and ignores those that were based on general public opinion or contained insubstantial content, and further suggested we did not consider these comments because we disagreed with their content. Other commenters requested a more prominent role in the recovery and delisting process and more opportunity to communicate concern for the future of the species.

Response—We fully considered and evaluated all public comments received during the comment periods and public hearings, and evaluated all comments, whether they agree with or disagree with our proposal.

The Act requires the Service to make a decision based solely on the best available scientific and commercial information available (section 4(b)(1)(A)) when determining if a species meets the definition of endangered or threatened. Substantive comments raising scientific, legal, and policy issues are the most relevant for consideration in our determination. We focused our attention on unique comments that provide substantive feedback on potential errors or oversights in our analyses. We appreciate and consider additional data or substantive remarks, with supporting documentation, that broaden our understanding of whether grizzly bears meet the definition of a threatened or endangered species under the Act. We considered all scientific and commercial information included in the public comments, and incorporated this information into this final rule as appropriate.

Issue 6—We received public comments that the public opposed the previous delisting effort and encouraged us to address all claims made in challenges to the 2007 proposed delisting including issues related to: habitat loss, current habitat protections,

funding for post-delisting conservation efforts, lag effects, failure to account for hunting mortality, political interference, peer review, and disease and predation.

Response—All relevant topics related to these comments are addressed in the specific issues below.

Issue 7—Multiple commenters requested we release the National Environmental Policy Act (NEPA) documentation associated with the proposed rule to delist the GYE population of grizzly bears.

Response—This delisting rule is promulgated under section 4(a) of the Act and consequently is exempt from NEPA procedures. Our decision that NEPA does not apply under section 4(a) is based on the reasoning in *Pacific Legal Foundation* v. *Andrus*, 657 F.2d 829 (6th Cir. 1981) that we cannot consider environmental impacts beyond those addressed by the five factors described in section 4(a) and must use only the best scientific and commercial data available in evaluating those factors. After this ruling, we published a determination in the *Federal Register* (48 FR 49244, October 25, 1983). Therefore, this delisting decision is based solely on the five-factor analysis described in section 4(a), and there is no NEPA documentation required.

Issue 8—Several commenters expressed concerns over a perceived lack of collaboration among the Service and other stakeholders in the delisting process and requested increased collaboration among the Service, NGOs, general public, Tribes, States, Interagency Grizzly Bear Study Team (IGBST), National Park Service (NPS), U.S. Forest Service (USFS), and Canada. Commenters suggested that increased collaboration would allow for the synchronization of multiple conservation efforts prior to delisting, ensure the concerns of all associated organizations are addressed, and

enhance support for the proposal. Commenters expressed concerns that the long-term conservation efforts will be diminished if the species is delisted on the current timeline without sufficient collaboration among partners. They especially expressed that we should more adequately address the NPS' concerns, that the NPS should have a larger role in the delisting decision, and that the NPS should have greater involvement in species management outside of (and especially adjacent to) park boundaries.

Response—The Service has regularly coordinated with a wide variety of stakeholders through the more than 40 years of the grizzly bear recovery program. Please see the *Recovery Planning and Implementation* section of this rule for a description of the role of Federal, Tribal, State, and local agencies involved in the formal interagency groups that collaboratively help guide grizzly bear management in the GYE. In addition, these agencies worked with local landowners, NGOs, and other interested parties to implement the 1993 Recovery Plan. It is through these successful partnerships that the GYE has recovered and no longer meets the definition of a threatened or endangered species. These important partnerships will continue through the implementation of the 2016 Conservation Strategy.

The Service appreciates the long-standing efforts of all of our partners in the GYE's recovery; however, the decision on whether or not to list, delist, or reclassify species under the Act remains the sole regulatory responsibility of our agency. The NPS only has jurisdiction to manage natural resources within the Park boundaries, but often collaborates with adjacent landowners on wildlife-specific issues. NPS manages approximately 39 percent of lands within the PCA. Please see Issue 65 for a discussion

about hunting on and adjacent to NPS lands and Issue 82 about inclusion of the NPS in annual meetings with the States allocating discretionary mortality.

Issue 9—Commenters expressed confusion and concerns over the functionality and role of the YES and the YGCC. Commenters were concerned that the role and influence in the delisting process given to these committees far outweighed that of the public and other organizations.

Response—Upon delisting, the YGCC will take the place of YES. Whereas the primary objective of YES was interagency coordination to achieve recovery, the primary objective of the YGCC will be interagency coordination to maintain a recovered grizzly bear population in the GYE through implementation of the 2016 Conservation Strategy. The IGBST will continue their monitoring of the GYE grizzly bear population and provide this information to the YGCC and the States so that the States may make scientifically informed decisions regarding population management. Please see the 2016 Conservation Strategy (YES 2016a, pp. 96–103) at *https://www.fws.gov/mountain-prairie/species/mammals/grizzly/ConservationStrategygrizzlybearGYA.pdf* for further details about membership and primary activities of the YGCC. Although the proposed and final rules are solely within the purview of the Service, conservation strategies serve as guiding documents for post-delisting management and monitoring by the multiple State and Federal agencies responsible for these tasks. The Conservation Strategy ensures that the regulatory mechanisms and coordinated management that led to recovery will be maintained following delisting. Post delisting, mortality management will be the responsibility of State fish and wildlife agencies.

Accordingly, it is appropriate that they would be responsible for articulating their post-delisting management plans. Likewise the Federal land management agencies will be responsible for habitat management. Our role is to analyze these commitments and ensure they will allow the species to remain recovered. Please see Issue 5 for further discussion about the processing and consideration of public comments.

Issue 10—Many commenters raised concerns about our peer review process. First, commenters expressed doubt as to the five peer reviewers' professional ability to comment on the proposed rule since only one peer reviewer specialized in grizzly bears, while the other four focused on polar bears or black bears, which differ ecologically and behaviorally. One commenter asked why Dr. David Mattson was not asked to review.

Second, commenters expressed concern about peer reviewer selection and suggested we had not adequately disclosed this process. Some commenters suggested that our peer reviewers had a conflict of interest because the Service's contractor who facilitated their selection works in the oil and gas industry rather than wildlife science, while other commenters suggested that the peer reviewers had a conflict of interest since they all hunt or trap. Some commenters claimed that documents released under the Freedom of Information Act indicated we "hand-picked reviewers" to ensure a favorable review, subverting the validity and independence of the peer review process, and that we purposefully selected reviewers that were not grizzly bear experts, since the majority of grizzly bear experts would have been opposed to our proposed action, according to a survey from Ohio State University. Another commenter suggested that we could not legally use a contractor for the peer review process because: (1) the contractor is not disclosing the process to the public; (2) we cannot outsource the preparation of the

Administrative Record; and (3) it violates a 2004 OMB policy, “Final Information Quality Bulletin for Peer Review” (70 FR 2664, January 14, 2005), and a 1994 Service policy, “Interagency Policy for Peer Review in ESA Activities” (59 FR 34270, July 1, 1994). One commenter suggested that only a National Academy of Sciences panel would be adequate for performing review of the rule.

Third, commenters stated that we did not follow up with the peer reviewers to ask them additional questions, noting that not doing so suggested that we did not give the peer review or our delisting decision enough thought. Another commenter suggested that this situation implied the need for another round of peer review (see Issue 4). Fourth, one commenter took issue with the fact that we did not share with the public which peer reviewer authored each review. Finally, one commenter thought we did not give the peer reviewers enough time to review the proposed rule and associated documents.

Response—To ensure the quality and credibility of the scientific information we use to make decisions, we follow a formal "peer review" process for influential scientific documents. This process follows the guidelines for Federal agencies spelled out in the Office of Management and Budget (OMB) "Final Information Quality Bulletin for Peer Review" (70 FR 2664, January 14, 2005). The Service updated its policy guidance for conducting such scientific peer reviews on listing and recovery actions in August 2016; however, the proposed rule was sent out for peer review prior to that new policy. The 2005 guidelines leave selection of an appropriate peer review mechanism up to the agency’s discretion, but require the process to be transparent, that reviewers possess the necessary expertise, and that the process addresses reviewers’ potential conflicts of interest and independence from the agency. The names of reviewers may be disclosed

publicly or may remain anonymous; however, anonymous reviews are standard practice within the Service in order to encourage candor.

We chose to contract the peer review out due to the controversial nature of our decision. Nothing in the current Service peer review guidance and policy prohibits the Service from doing so. As part of this process, we drafted a statement of work to the peer-review contractor, which included criteria: "The independent peer reviewers shall be experienced senior-level ecologists, bear biologists, or population modelers, and bear managers who have previously conducted similar reviews or regularly provided reviews of research and conservation articles for the scientific literature. Reviewers must be well-versed in the demographic management of mammals, preferably bears or other carnivores." We also identified potential conflicts of interest, including: employment or affiliation with the Service, the States of Montana, Wyoming, or Idaho, the IGBST, or the Western Governors Association; those who have offered a public opinion or a statement either for or against delisting; and those who are directly or indirectly employed by or associated in any way with any organization that has either litigated the Federal Government concerning grizzly bears or wolves or taken a position on one side or the other about recovery and delisting of grizzly bears or wolves. Our statement of work also included topics and questions for the reviewers to consider and deliverables, including a proposed timeline, original scientific reviews, and a Complete Official Record.

The contractor then selected the reviewers based on our statement of work. We do not know why any particular person was not chosen, such as Dr. David Mattson; however, we do know that those reviewers chosen did meet the above criteria. Neither we nor the contractor handpicked reviewers hoping to get a favorable review, as that

would be counterproductive to the Act's requirements that we base our decisions based on the best available data.

Peer reviewers are generally selected for their expertise on the particular species, closely related species, relevant threats or conservation actions, or other relevant topics (e.g., landscape ecology). To the extent that a member of the National Academy of Science has relevant expertise, they could be a peer reviewer, but that organization is not the only source of adequate or appropriate peer review. Peer reviewers were asked not to provide recommendations on the species' listing determination; rather they were asked to comment specifically on the quality of any information and analyses used or relied on in the document; identify oversights, omissions, and inconsistencies; provide advice on reasonableness of judgments made from the scientific evidence; ensure that scientific uncertainties are clearly identified and characterized, and that potential implications of uncertainties for the technical conclusions drawn are clear; and provide advice on the overall strengths and limitations of the scientific data used in the document.

The peer reviewers were asked to provide comments within the open public comment period to allow for the public to access and comment on, should they choose, the peer reviewers' comments. No peer reviewers requested additional time for review. The peer reviewer comments were posted in regulations.gov under the docket for this rulemaking. As previously noted, the first comment period was open for 60 days, and a second comment period was open for an additional 30 days, which provided ample time for the public to review the proposed rule and supplemental documents and provide comments. Once the process is complete, we take into consideration the context of all

comments, including those from peer reviewers, in our evaluation of the substantive information provided.

Using a contractor for peer review does not indicate we are outsourcing the administrative record for this decision, as the administrative record comprises many documents throughout the listing determination process and compilation of the administrative record remains the Service's obligation. The Service is maintaining the decision file and will be preparing an administrative record per the Department of the Interior's guidance for compiling decision files and administrative records (282 FW 5).

Issue 11—Many commenters expressed general concern that this rule to delist the GYE grizzly bear population allowed "politics and private interests to trump science," that we have been "bought," that we are "biased," that our process is "politically driven," and that we have rushed the process for the purposes of political expediency (e.g., by forgoing public involvement on the 2016 Conservation Strategy and sacrificing needed updates to state management plans). Commenters suggested the need for a "scientific integrity review" into potentially undue political influence on the Service's decision-making process. Claims of this inappropriate influence included that: (1) the Service's Director and State governors used "under the table agreements" to set the mortality limits in the rule, recovery plan supplement, and 2016 Conservation Strategy; (2) the former grizzly bear recovery coordinator's studies were biased and not open to peer or public review and that he was unable to be objective regarding the delisting; (3) Service managers bullied staff biologists to delist the GYE grizzly bear population; (4) there was political interference with the 2015 IGBST report on grizzly bear mortality; (5) the Service is a pro-hunting organization and Service staff involved in the delisting process

have ties to hunting organizations, oil and gas companies, or initiatives working to exterminate wolves; (6) the States pressured the Service to use population estimates that produce the maximum number of bears; (7) the Service is only proposing to delist the GYE population (and not the "larger northern population") because of the influence of hunting, oil, gas, mining, and property development lobbies; (8) industrial interests on the YES/YGCC inappropriately influenced the delisting proposal and will inappropriately influence any future changes to the 2016 Conservation Strategy; and (9) a 2015 Union of Concerned Scientists Report suggested a dearth of "scientific integrity" at the FWS due to "political interference."

Lastly, some commenters suggested that the delisting decision was a "political stunt to weaken the Endangered Species Act," referencing recently proposed legislation that would prevent litigation from overturning delisting decisions, thus "denying opponents [of delisting] due process." On the other hand, one commenter suggested that delisting the grizzly bears was a stunt to save the Act from legislative destruction.

Conversely, a number of commenters expressed support for the Service's scientific integrity and the validity and breadth of the data the Service used in the decision-making process.

Response— There is no data or evidence of political interference or bias. While we respect and understand that some members of the public disapprove of this decision, it is the appropriate decision because the GYE grizzly bear no longer meets the definition of a threatened or endangered species, based on a thorough analysis of the best available scientific and commercial information. We are compelled to make this delisting decision under the statutory requirements of the Act. Furthermore, the IGBST, as well as senior

scientists in the agency, recommended to senior leadership within the agency that moving forward with delisting was scientifically appropriate. We will respond to each specific claim of undue influence below.

First, commenters claimed that the Service's Director and State governors used "under the table agreements" to set the mortality limits in the rule, recovery plan supplement, and 2016 Conservation Strategy. The mortality limits are set in the recovery plan supplement (demographic recovery criterion #3) and carried over into this rule and the 2016 Conservation Strategy. Section 4 of the Act provides direction for developing and implementing endangered species recovery. The Section gives the Service the ability to procure the services of appropriate public and private agencies and institutions, and other qualified persons. We discussed mortality limits with the States because they are the agencies that will be directly responsible for implementing them. More importantly, the mortality limits in the recovery criteria are scientifically defensible and will insure that the GYE grizzly bear population within the DMA will be maintained around the 2002 to 2014 population size (see Issue 66 for further discussion on the mortality rates). Throughout the more than 40 years of grizzly bear recovery, the Service has collaborated closely with state agencies to ensure positive conservation outcomes for grizzly bears and effective, coordinated management. This collaboration is partly responsible for a recovered GYE grizzly bear population. This collaboration continued throughout the delisting process to ensure effective post-delisting management and will persist after delisting through the Yellowstone Grizzly Bear Coordinating Committee.

Second, commenters suggested that the former grizzly bear coordinator's studies were biased and not open to peer or public review and that he was unable to be objective

regarding the delisting. The delisting determination used the best available scientific and commercial data to come to the conclusion that grizzly bears should be removed from the list of threatened and endangered wildlife and plants. The Service relied on literature from a broad range of scientists; this literature included peer-reviewed studies from Dr. Chris Servheen, former grizzly bear recovery coordinator for the Service, but also research from other scientists. This broad range of peer-reviewed sources indicated that grizzly bears in the GYE were recovered and would remain so after delisting.

Third, commenters claimed that Service managers bullied staff biologists to delist the GYE grizzly bear population. Commenters provided no evidence of any alleged "bullying" of staff biologists. The Service acknowledges that its former grizzly bear coordinator, Dr. Chris Servheen, may have concluded that the Service did not always agree with his recommendations. However, there was no "bullying." The delisting recommendation came from staff biologists. There were a number of issues worked out between Serve staff and management. Internal agency disagreement and debate are expected with a delisting rule for a controversial species like grizzly bears. The decision to delist the GYE population of grizzly bears was based on the best available scientific and commercial data available. Service biologists presented this information, including data on grizzly population trends and State management regulations, to Service leadership to inform their decision-making about the status of grizzly bears in the GYE. The Service's decision-making process provides opportunity for staff biologists who are species experts to outline all relevant information, ask questions, and provide recommendations.

Fourth, commenters claimed that there was political interference with the 2015 IGBST report on grizzly bear mortality because publication of the report was delayed. There is no annual due date for this report, and while it is usually published midsummer, sometimes there are delays. The delays in the release of the 2015 IGBST report on grizzly bear mortality were not a result of political interference but a combination of the IGBST team leader being on detail as the Acting Center Director of the USGS Northern Rocky Mountain Science Center for three months, transitions within the IGBST, and scientific presentations, which delayed finalization of the report. We had all relevant data from this report available to inform our decision-making process about the status of grizzly bears. Considering the relevant content of this report, we believe that grizzly bears are recovered and will remain so for the foreseeable future.

Fifth, commenters suggested that the Service is a pro-hunting organization and Service staff involved in the delisting process have ties to hunting organizations, oil and gas companies, or initiatives working to exterminate wolves. The Service supports hunting as a form of wildlife-dependent recreation and as a useful element in a suite of management strategies. However, the Service is not an agency whose purpose is to promote hunting or hunting interests; the Service mission is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. While hunting can be an essential element of conserving wildlife and their habitats and can be a benefit that wildlife provide to the American people, the Service considers a broad range of factors and benefits when managing species and making decisions supportive of this mission. Furthermore, very little of the Service's budget and none of the Endangered Species program's budget comes from

hunting revenue. While many Service staff support or contribute to a variety of causes in their personal capacity, Service ethics rules and guidelines (for example, 212 FW 1 through11), Departmental Regulations (for example, 5 CFR 3501.105), and government-wide laws and regulations (for example, 18 U.S.C. Sections 201-209; 5 CFR 2635.502) ensure these affiliations do not impact or bias their decision-making and management.

Sixth, commenters claimed that the States pressured the Service to use population estimates that produce the maximum number of bears. This unsupported accusation is false. The population estimates the Service used in its delisting determination (the model-averaged Chao2 population estimator) is based on the best available commercial and scientific data available and not States' individual preferences. Moreover, the model-averaged Chao2 population estimator is a relatively conservative estimate of the number of bears on the landscape in the GYE and likely underestimates the actual number of bears (Schwartz et al. 2008, figure 5). Other population estimators considered by the Service (see Issues 28 and 31), but determined not to be accurate in detecting population trend, yielded higher population numbers.

Seventh, commenters claimed that the Service is only proposing to delist the GYE population (and not the "larger northern population") because of the influence of hunting, oil, gas, mining, and property development lobbies. The recovery of grizzly bears has always been focused around six different recovery zones. Each recovery zone has different recovery needs and criteria based on the biology of the species in that area and the relevant stressors. Thus, delisting of the bears in each recovery zone may occur on a different timeline as the populations meet unique recovery criteria. Based purely on the best available scientific and commercial data available, the population of grizzly bears in

the GYE was the first to achieve recovery and warrant delisting. As other populations achieve this milestone, as determined by the best available scientific and commercial data available, the Service will proceed with proposing to delist these populations.

Eighth, commenters suggested that industrial interests on the YES/YGCC inappropriately influenced the delisting proposal and will inappropriately influence any future changes to the 2016 Conservation Strategy. The Service has regularly coordinated with a wide variety of stakeholders through the more than 40 years of the grizzly bear recovery program. Please see the *Recovery Planning and Implementation* section of the final rule for a description of the role of Federal, Tribal, State, and local agencies involved in the formal interagency groups that collaboratively help guide grizzly bear management in the GYE. In addition, these agencies worked with local landowners, NGOs, and other interested parties to implement the 1993 Recovery Plan. The Service also met with a broad variety of stakeholders throughout the delisting process, including environmental NGOs. It is through these successful partnerships that the GYE has recovered and no longer meets the definition of a threatened or endangered species. These important partnerships will continue through the implementation of the 2016 Conservation Strategy to ensure a wide variety of interested parties can contribute to the continued success of grizzly bear management following delisting. In addition, any changes to the 2016 Conservation Strategy will be open to public comment.

Ninth, commenters referenced a 2015 Union of Concerned Scientists Report, which suggested a dearth of "scientific integrity" at the FWS due to "political interference." The Union of Concerned Scientists surveyed scientists at four federal agencies, including the Service, on "the state of scientific integrity at their agencies, their

ability to communicate with colleagues and the public, and overall agency effectiveness" (Union of Concerned Scientists 2015, p. 4). This survey included biologists Service wide and did not include information on the particular work being conducted by survey participants. It did not directly address grizzly bears. The Service has a rigorous policy on scientific integrity that guides the agency's work and decision-making (212 FW 7). The policy states, "Scientific and scholarly information that we consider in our decision-making must be robust, of the highest quality, and the result of the most rigorous scientific and scholarly processes as can be achieved. Most importantly, it must be trustworthy. We must establish and maintain integrity in our scientific and scholarly activities because this information is a critical factor for making public policies." In addition, delisting decisions are subject to scientific peer review according to the Service's peer review policy set forth in the Office of Management and Budget "Final Information Quality Bulletin for Peer Review" (70 FR 2664, January 14, 2005). The Service is committed to using the best available scientific and commercial data available in our delisting decisions, as required by the Endangered Species Act. For all of these reasons, the Service does not believe a scientific integrity review is needed.

The Service has been considering delisting of the GYE grizzly bear population for over a decade and previously published a final rule to delist this population in 2007 (72 FR 14866, March 29, 2007). As described in the Background section, that final determination was vacated by the Montana district court in *Greater Yellowstone Coalition* v. *Servheen, et al.,* 672 F.Supp.2d 1105 (D. Mont. 2009), and the vacatur was affirmed by the Ninth Circuit Court of Appeals in *Greater Yellowstone Coalition v. Servheen, et al.*, 665 F.3d 1015 (9th Cir. 2011). During those intervening years, the

Service has continued to work with its partners and the public to ensure GYE grizzly recovery. This delisting rule is the culmination of a process that began over a decade ago, and it is by no means rushed.

Geographic Scope of Recovery and Delisting Issues

Issue 12—The Service received comments indicating that the proposed habitat protections and demographic standards are too limited in geographic scope. Commenters took specific issue with the scope of our threats, or "five factor" analysis. They claimed that we failed to fulfill the requirements in section 4(a)(1) of the Act since we only analyzed the importance of threats inside the DMA; commenters suggested that the threats analysis should not be "limited to suitable habitat." These commenters requested we provide a more thorough analysis that considers threats and their impact on grizzly bears in the entire GYE DPS because invisible boundaries cannot be used to classify the health of a population.

Response—Our threats analysis focused on those portions of grizzly bear range that currently contribute meaningfully to the GYE grizzly bear population or have the potential to contribute in the foreseeable future (i.e., suitable habitat, as defined and discussed in the Suitable Habitat section). In total, grizzly bears currently occupy 58,314 km^2 (22,515 mi^2) of land within the GYE DPS boundaries. Seventy-two percent of the area occupied occurs within areas we consider suitable habitat, 28 percent of the area occupied is in unsuitable habitat, and 77 percent of occupancy is within the DMA boundaries. The DMA provides more than enough suitable habitat for a large, robust, healthy, and viable population and will continue to do so for the foreseeable future. Put another way, the DMA contains sufficient numbers and distribution of reproductive

individuals to maintain the population's recovered status (i.e., does not meet the definition of a threatened or endangered species). Additional occupancy beyond this area is above what is needed to maintain recovery. Therefore, we believe focusing on this area is a reasonable and biologically rational approach.

To the extent that this comment requests consideration of threats outside of the suitable habitat, we respond as follows (considering Factors A, B, C, D, and E). Although grizzly bears once occurred throughout the area within the GYE DPS boundaries (Stebler 1972, pp. 297–299), records indicate that even in the early 19th century, grizzly bears were less common in these eastern prairie habitats than in mountainous areas to the west and south (Rollins 1935, p. 191; Wade 1947, p. 444). Today, these habitats are no longer biologically suitable for grizzly bears as they lack adequate natural food resources and land use changes have altered the suitability of the habitat for grizzly bear persistence (considering Factors A, B, C, D, and E). These marginal, peripheral areas are either unoccupied or might in some instances have limited occupancy due to dispersal from core source population within the PCA, DMA, and suitable habitat. While grizzly bears that do establish or move into these unsuitable habitats will face a reduced probability of persistence (considering Factors A, B, C, D, and E), these bears will constitute a small percentage of the population and, thus, are of minimal importance to the sustainability of the overall population. Such peripheral impacts will not compromise the viability of the GYE population. Impacts to GYE bears in unsuitable habitat will not and do not singularly, or in combination with other factors, cause the GYE population to become in danger of extinction nor likely to become so within the foreseeable future in all or a significant portion of its range.

Issue 13—Many commenters, including some with differing viewpoints on the status of the Northern Continental Divide Ecosystem (NCDE) grizzly bear population, wanted clarification on what delisting for the GYE would mean for other grizzly bear populations. One commenter requested clarification on how this rule would distinguish grizzly bears that are a part of the GYE population from those who might be part of a different population located in Idaho, Montana or Wyoming.

Response—Upon delisting of the GYE grizzly bear population, all grizzly bears in the lower 48 outside of the GYE DPS boundaries will continue to be fully protected under the Act. DNA samples are opportunistically collected from all grizzly bears trapped for research or management and all known mortalities. Genetic differences between GYE grizzly bears and other grizzly bear populations allow us to detect immigration and emigration from the GYE. As stated in Issue 2, the management and potential status of other grizzly bear populations is outside the scope of this final rule. That said, a draft Environmental Impact Statement (EIS) that examines recovery options for grizzly bears in the North Cascades was published in the *Federal Register* on January 13, 2017 (82 FR 4336). Between 1993 and 1999, we issued warranted but precluded findings to reclassify grizzly bears as endangered in the Cabinet-Yaak (58 FR 8250–8251, February 12, 1993; 64 FR 26725–26733, May 17, 1999), and the Selkirk Ecosystems (64 FR 26725–26733, May 17, 1999). However, as of 2014, both the Selkirk and Cabinet-Yaak populations were reclassified as threatened (79 FR 72440, December 5, 2014) because of improving population trends (79 FR 72488). However, the Service's determination about Cabinet-Yaak bears has been challenged in *Alliance for the Wild Rockies* v. *Jewell, et al.*, case no 9:16-cv-00021 (D. Mont.) The NCDE grizzly bear

population is likely biologically recovered; the IGBC NCDE subcommittee drafted a Conservation Strategy in 2013 that was published by the Service in the *Federal Register* for public comment and peer review.

Issue 14—One commenter requested additional clarification on how we define range and distribution of grizzly bears. He asked how heavily an area needs to be used to be considered part of a species' range and what disqualifies an area from being part of a species' range (e.g., when Colorado was removed from the species' identified range a few decades ago). This commenter also asked whether the term "distribution" is synonymous with "range," how distribution is defined, and how much of the current GYE population is contained within the current distribution.

Response—The term range generally encompasses the outer limits of a species' historical or current occupancy based on the data from reliable published scientific literature, submitted manuscripts, and species' experts; occurrence data; and analysis. In the proposed rule we used distribution, occupancy, occurrence, and current range interchangeably, and for this final rule we consistently use current range. We also discuss historical range in this final rule. A species may be distributed in greater or lesser numbers within its current range, depending on season, food availability, or other biological needs. Therefore, we continue to use the term distribution as it relates to food resources and in reference to recovery criterion #2 (relating to the number of bear management units occupied by females with young).

Working with Tribes and Tribal Issues

Issue 15—A number of commenters stated that (a) Native American interests and concerns were not adequately addressed in the rule; (b) more than 100 Tribal nations

oppose the delisting; (c) we did not adequately consider the cultural, spiritual, and ecological significance of the grizzly bear to Native American Tribes, thus violating Executive Orders, Secretarial Orders, and Federal laws (including the American Indian Religious Freedom Act); (d) we did not appropriately analyze the significance of Tribal territory and treaty rights in the GYE, thus violating Tribal sovereignty; and (e) we did not fulfill our obligation under Executive Order 13175 to consult with the Tribes on the proposed rule. In addition, several commenters questioned whether all Federally recognized Tribes west of the Mississippi River (including Canadian Tribes) had been properly contacted, asserting that communications through form letters, emails, etc., are not sufficient to meet the intent of and requirement for face-to-face and government-to-government consultation. Furthermore, commenters stated that all consultations should have been conducted prior to publishing the proposed rule; commenters suggested that the delisting process should be halted until these formal consultations are completed. One commenter suggested the Service collaborate with Tribal nations prior to delisting to develop cooperative management plans for grizzly bear conservation and reintroduction on Tribal lands.

Response—We take our relationships with Tribes very seriously. In accordance with the President's memorandum of April 29, 1994, Government-to-Government Relations with Native American Tribal Governments (59 FR 22951), E.O. 13175, and the DOI manual at 512 DM 2, we readily acknowledge our responsibility for meaningful communication with Federal Tribes. In accordance with Secretarial Order 3206 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we also acknowledge and continuously work to fulfill our

responsibilities to Tribes to solicit and consider information from Tribes in our decision-making processes, to develop programs for healthy ecosystems, to recognize that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Tribal culture, and to make information available to Tribes. We did consider the American Indian Religious Freedom Act, and while we understand the concerns tribes have voiced about the potential hunting of grizzly bears, we do not agree that this final rule will burden religious practice to the extent that religious freedoms are violated because bears will still exist on the landscape and will be managed by Tribes on Tribal lands.

We regularly work with directly affected Tribes as active participants in recovery and management of the GYE grizzly bear. The Northern Arapahoe and Eastern Shoshone Tribes are participants in the YES of the IGBC as they manage nearly 4 percent of suitable habitat (1,360 km^2 (525 mi^2), although no Tribally managed land occurs within the PCA (Primary Conservation Area). The Shoshone-Bannock Tribes also participate in the YES, although they do not manage any suitable habitat. We also recognized our partnership with Tribal agencies and others in the 2016 Conservation Strategy. The YGCC will be the interagency group coordinating implementation of the 2016 Conservation Strategy and will include representatives from the Shoshone-Bannock, Northern Arapahoe, and Eastern Shoshone Tribes. Grizzly bear hunting on the Wind River Reservation will be at the discretion of these sovereign Tribes.

Beginning in April 2014, the Service sent consultation invitation letters via registered mail to the four Tribes having treaty interests in the proposed GYE grizzly bear delisting area: the Northern Arapaho, Eastern Shoshone, Northwestern Band of the

Shoshone Nation, and Shoshone-Bannock Tribes. Over the next year the Service was made aware of many more Tribes having an interest in the GYE grizzly bear and expanded our efforts in explaining the status of the grizzly bear and offering government-to-government consultation to Tribes.

On February 17, 2015, the Service sent letters offering government-to-government consultation to 26 Tribes. On June 15, 2015, the Service sent out a second round of letters to 48 tribes, offering another opportunity for consultation, followed by personal phone calls or emails from Service leadership to the 48 tribes, personally inviting them to engage in government-to-government consultation. On August 13, 2015, the Service met with the Rocky Mountain Tribal Leaders Council in Billings, Montana and invited tribal representative to engage in consultation concerning the GYE grizzly bear.

On October 29, 2015, the Service sent letters to 53 tribes, which included all Tribes, Tribal Councils, and First Nations in Canada that have contacted the Service regarding the GYE grizzly bear population. The letters invited all Federal Tribes to engage in government-to-government consultation. In addition, the letter invited Tribes to participate in an informational webinar and conference call held on November 13, 2015.

On March 3, 2016, the Service announced its proposal to delist grizzly bears in the GYE. The announcement was disseminated to all Tribes west of the Mississippi River with Tribes being notified by both email and hard copy mail. In addition, the Service announced two consultation meeting opportunities in the *Federal Register* and in

the Tribal leader letters at the same time the proposed rule published. The two meetings were hosted in Bozeman, Montana and in Rapid City, South Dakota.

On March 10, 2016, the Service hosted a tribal conference call to provide an overview of the proposed delisting and discuss any questions or concerns. It was not considered government-to-government consultation. The announcement for this call was included in the March, 3rd notifications sent to Tribes.

To date, the Service has conducted ten Tribal consultations with the following Tribes: June 10, 2015: Confederated Salish and Kootenai Tribes; June 18, 2015: Blackfeet Nation Wildlife Committee; July 21, 2015: Northern Arapahoe Tribal Council; July 21, 2015: Eastern Shoshone Tribal Council; July 30, 2015: Shoshone Bannock Tribal Council; April 28, 2016: Bozeman Montana (Tribes Present at meeting: Shoshone Bannock Tribes, Northern Cheyenne Tribe, Eastern Shoshone Tribe, Northwest Band of the Shoshone); May 5, 2016: Rapid City, South Dakota (Northern Arapaho, Rosebud Sioux); November 2, 2016: Eastern Shoshone Tribe; November 16, 2016: Shoshone Bannock Tribe; April 07, 2017: Northern Cheyenne Tribal Council.

We considered issues of cultural, spiritual, and ecological importance that Tribes raised and we are sensitive to those concerns. However, the Act requires the Service to make decisions based on the biological status of the species as informed solely by the best scientific and commercial data available. That said, once this action becomes effective, Tribes will have the right to manage grizzly bears on their Tribal lands in accordance with their spiritual, cultural, and historic traditions.

Recovery Criteria and Management Objective Issues

Issue 16—Several commenters provided general concerns about the recovery criteria, which included: (1) desires for additional discussion as to how any new population estimation method would be calibrated; (2) claims that the 1993 Recovery Plan is outdated and should be updated with the best available science; (3) suggestions that the Service consider Pyare and Berger (2003) in updating the demographic criteria; (4) concerns that any update to the Recovery Plan involved moving the "goal post" for recovery; (5) emphasis that the recovery criteria should be interpreted as minimums and not population goals; and (6) opinions that only the mortality limits in criterion #3 are necessary to maintain a stable population size post-delisting and the content of criteria #1 and #2 will just restrict adaptive management. Both commenters and a peer reviewer wondered whether the criteria are tied to the model-averaged Chao2 estimate or if the Service retains the discretion to change the method. Some commenters suggested additional recovery criteria be added, including: (1) a criterion to monitor the changes in food resources; and (2) a criterion linked to a declining population trend.

Response—Recovery plans are not regulatory documents; rather, they are intended to provide guidance to the Service and our partners on methods to ameliorate threats to listed species and on criteria that may be used to determine when recovery is achieved. We have updated portions of the 1993 Recovery Plan using the best available science, including a supplement to the demographic recovery criteria for the GYE grizzly bear concurrent with this rule, and agencies implementing the 2016 Conservation Strategy will continue to update it as new science and resources allow. Despite varied suggestions of additional recovery criteria (i.e., consideration of Pyare and Berger (2003, pp. 70–72), criteria linked to food resources), peer reviewers largely supported the

science-based approach of the recovery criteria for the GYE grizzly bear population and believe that these criteria will maintain a recovered grizzly bear population in the GYE.

Criteria #1 and #2 are important as they set forth minimums by which to measure genetic health and adequate distribution of females with young to maintain a recovered population. The 2016 Conservation Strategy commits to using the model-averaged Chao2 population estimator, for the foreseeable future, to measure the population size for criterion #3 (see Issue 28 for details regarding the Chao2 method and Issue 31 for discussion on the implementation of a new population estimator). We specify that criterion #1 is no longer dependent on a single population estimate method. Despite these updates, we note here that, as discussed above, delisting determinations are based solely on an evaluation of whether the species meets the definition of endangered or threatened due to one or more of the five factors as per section 4(a) of the Act, and while recovery criteria can inform that analysis, we do not need to update a species' recovery plan prior to the species' delisting. However, we have revised the Demographic Recovery Criteria for the GYE grizzly bear population concurrent with this final rule.

Issue 17—We received several public comments that expressed confusion and concern about specific demographic recovery criteria. On criterion #1, commenters stated: (1) a desire for further biological justification for a population objective of 500 bears, with some concerns that it too low for a population objective; (2) a request for greater emphasis that 500 grizzly bears was based on the number of individuals needed for short-term genetic health (Miller and Waits 2003) and is not a population target; (3) confusion surrounding the fact that the minimum of 500 bears applies within the entire DPS while the higher minimum of 600 bears in criterion #3 applies within the smaller

DMA, with some commenters suggesting that this criterion be changed to require at least 600 bears in order to align with criterion #3, thus eliminating the confusion from setting two different population objectives, and to be consistent with the fact that 48 females with cubs (the second part of this criterion) currently equates to 600, not 500, bears; (4) concerns that both "and" and "or" are used when referring to 500 bears and/or 48 females with cubs; (5) confusion as to why 3 consecutive years of non-compliance led to violation of the criterion in the supplement to the Recovery Plan, while only 2 consecutive years of non-compliance leads to violation of the criterion in the 2016 Conservation Strategy; (6) concerns that there are no mechanisms to prevent further decline if the population falls below 500; and (7) suggestions that the GYE population may not meet the 48 females with cubs-of-the-year requirement if bears respond to a stabilizing population through decreased reproduction and that the criterion should be less than 48 females with cubs. Both commenters and the States suggested that 500 bears was an arbitrary inflation of the minimum number suggested by Miller and Waits (2003) and may not be as conservative as proposed (Waples and Yokota 2007; Luikart et al. 2010). Additionally, the States requested we remove any reference to genetic fitness from criterion #1.

Response—In reference to criterion #1, 500 grizzly bears is not a population objective but a minimum population size to ensure short-term genetic health only. Further discussion about the biological basis for 500 individuals as a minimum population size is provided in the final demographic recovery criteria supplement to the Recovery Plan. All criteria are measured within the same demographic monitoring area. Criterion #1 specifies that both minimums of 500 bears and 48 females with cubs-of-the-year must be maintained, and that if the population size drops below either of those

minimums in three consecutive years, the criterion will be violated. The Conservation Strategy, the Recovery Plan supplement, and this final rule have been edited for consistency, with all three documents now reading 'three consecutive years.'

If the population estimate falls below 500 in any year, the Service will conduct a status review to determine if re-listing may be warranted. The 2016 Conservation Strategy establishes a process through which corrections to population and habitat management can be made if any new scientific information or change in status arise that suggests the need to revise. The IGBST will conduct demographic reviews of the vital rates for the GYE grizzly bear population every 5 to 10 years and be able to detect if decreased reproduction occurred as a result of a stabilized population. Upon completion of a demographic review, the IGBST will provide the information to the YGCC, who will revise or amend the 2016 Conservation Strategy (2016 YES, p. 96) based on the best biological data and the best available science. Any such amendments will be subject to public review. In the 2007 revision to the Yellowstone demographic recovery criteria, YES advised the Service that maintaining a minimum population size of 500 individuals would be a conservative approach to ensure that the population stayed above the minimum of 400 bears recommended by Miller and Waits (2003, p. 4338) for genetic health.

Commenters suggested that Waples and Yokota (2007, entire) and Luikart *et al*. (2010, entire) support the idea that 500 bears may be conservative. However, those authors do not address the 50/500 rule but rather potential biases with estimates of effective population size (N_e) and how to address those biases. Please see Issue 96 for further discussion about the appropriateness of the 50/500 rule to ensure genetic fitness

(in their entirety: Franklin 1980; Franklin *et al*. 2014) and current estimates of N_e (Kamath *et al*. 2015, entire) and the necessary minimum population size for genetic health. Although 48 females with cubs currently equates to 600 individuals, that number is dependent on the ratio of males to females in the population, which has varied in the past and is assessed by the IGBST as part of its demographic monitoring. We maintain in our discussion of criterion 1, in both this final rule and the revised demographic recovery criteria, that criterion 1 is not a population goal and that it refers to short-term genetic health (i.e., genetic health over the next several generations (see *Demographic Recovery Criterion 1* under the *Recovery Planning and Implementation* section of this final rule).

Issue 18—Commenters also supplied feedback on criterion #2 including: (1) confusion as to how the three consecutive 6-year sums are calculated and whether this would require 18 years before this criterion is assessed; (2) concerns that a 6-year sum of observations is a long time to wait to assess the criterion if female occupancy standards are not being met; (3) requests for clarification as to how occupancy is defined; and (4) suggestions that this criterion should apply to the whole DMA, not just the PCA.

Response—Clarifying language was added to criterion #2 in the final Recovery Plan supplement and this rule to demonstrate how three consecutive 6-year sums are measured (table 1). The running 6-year sum is designed to evaluate whether adequate dispersion of females exists most of the time, while allowing for an anomalous year where a unit might be unoccupied temporarily. Occupancy of a BMU is defined as the documented presence of females with young (all age classes of offspring), which is a conservative measure because the lack of confirmation of females with young from sightings in a particular BMU does not imply absence. Criterion #2 is measured based on

the Recovery Zone (which equates to the PCA under a delisted scenario) because that area represents the core of the population where presence of females with young is an effective indicator to ascertain that reproductive females occupy the majority of the Recovery Zone and are not concentrated in a particular area of the ecosystem.

Issue 19—Commenters suggested that the standards in recovery criterion #3 were too low or too lenient, while others suggested it was too conservative and that the Service did not adequately justify the minimum numbers. Some public commenters and the States suggested that the criterion creates confusion on whether the population objective is 500, 600, 612, or 674. In addition, the States suggested the wording of the criterion creates confusion (1) that it could be interpreted as requiring the States to keep bears within a range of 612–735 bears; and (2) about the biological purpose of this 90% confidence interval. One commenter expressed confusion as to why the revised criterion now applies only to the DMA (as opposed to the entire DPS) and requested an explanation as to the potential consequences of the change. Another commenter requested clarification as to when and how the mortality rates in this criterion would be adjusted.

A number of commenters provided suggestions for how to change this criterion, including: (1) making exceedance of mortality limits independent of a population minimum; (2) eliminating the 3-year wait between the population dropping below 612 and determining that the criterion is not met; (3) using an annual index of observed females with cubs-of-the-year to total observed mortality instead of proposed population measurement methods; (4) raising the average around which the population will be maintained (to be more precautionary); (5) halting discretionary mortality at populations

of 674 bears, rather than 600 bears; (6) allowing the States more management flexibility for bear removal at populations below 600 (i.e., not limiting these removals to "human safety reasons"); (7) increasing the male mortality limit to account for the decrease in females with cubs; and (8) eliminating the mortality limit for dependent young, since it is not currently being measured. State agencies also provided suggestions for changes to this last criteria, including: (1) removing the explanatory paragraph on how background and discretionary mortality will be calculated and simply stating that annual mortality limits for independent females, independent males, and dependent young will be as shown in table 1 (table 2 of this final rule); (2) consistently stating whether mortality for independent females at population levels less than or equal to 674 bears would be less than 7.6 percent or less than or equal to 7.6 percent; and (3) removing mention of the requirement to halt discretionary mortality at populations less than 600 bears since this is the Tri-State MOA and does not belong in the recovery criteria.

Response—The objective of criterion #3 is to maintain the GYE grizzly bear population within the DMA around the average population estimate during the period of 2002 to 2014 as measured by the model-averaged Chao2 population estimator. Because populations naturally fluctuate through time (see figure 2), it is not reasonable to manage to an exact population target. The minimum population size for short-term genetic fitness did not increase from the 500 identified in criterion #1 as described in the 2007 delisting rule (72 FR 14866, March 29, 2007), our 2016 proposed delisting rule (81 FR 13174, March 11, 2016), and this final rule. The population objective in the 2007 delisting rule was to maintain a stable or increasing population within the GYE; the revised recovery

criterion calls for maintaining the population around the average estimate from 2002 to 2014, a period during which natural stability was achieved.

We recognize the confusion created by the multiple numbers in criterion #3. In this final rule, the 2016 Conservation Strategy, and the revised demographic recovery criteria, we clarify that the criterion calls for maintaining the population within the DMA around the 2002 to 2014 model-averaged Chao2 population estimate (average = 674; 95% confidence interval (CI) = 600–747; 90% CI = 612–735). The lower bounds of the 90% and the 95% CIs are presented as the thresholds at which management changes would occur (i.e., implementing a Biology and Monitoring Review and halting discretionary mortality except for "human safety reasons," respectively). The demographic monitoring area is based on suitable habitat plus potential mortality sinks and was established to monitor mortality rates in the same area in which the population size is estimated. The suitable habitat contained within the DMA is sufficiently large to support a long-term, viable population such that mortalities outside of the DMA can be excluded from consideration.

Some have criticized the population objectives in the Conservation Strategy and proposed rule because the States could in theory manage below the long-term model-averaged Chao2 estimate from 2002 to 2014 of 674 bears. Importantly, this criticism misses the intent of criterion #3 as outlined in the 2016 Conservation Strategy and in the Recovery Plan Supplement (USFWS 2017, p. 5). The long-term model-averaged Chao2 estimate, 674 bears, is not a minimum recovery threshold. Rather, this number represents a population level that is at or near carrying capacity (van Manen et al. 2016, entire). Under the Act, species recovery is considered to be the return of a species to the point

where it is no longer threatened or endangered. Recovery under the Act does not require restoring a species to carrying capacity, historic levels, or even maximizing density, distribution, or genetic diversity. While the goal of the 2016 Conservation Strategy and recovery criterion #3 is to maintain the population around this long-term average population target of 674 bears, a population below this number does not mean recovery has not been achieved. By attempting to manage within the 95 percent confidence interval (600–747) in accordance with criterion #3, the confidence interval provides a sufficient buffer to ensure that recovery is achieved, while also acknowledging that populations fluctuate naturally and it is not reasonable to manage to an exact population target.

The adjustable mortality limits set forth in table 2 provide a mechanism for maintaining the population within this confidence interval and serve as a buffer to ensure the population does not drop and remain below the lower bound of 600 bears. For example, a population estimate of fewer than 674 would trigger mortality limits of less than 7.6 percent for independent females. The best available science indicates that this population will increase in size at a mortality limit of less than 7.6 percent. Thus, if the population is estimated to be fewer than 600 bears, there would be no discretionary mortality, likely producing a total mortality rate less than 7.6 percent, which means the population would increase in size and return to the 95 percent confidence interval (600–747).

The Service recognizes it is at least theoretically possible that, even with a mortality limit of 7.6 percent, a population could drop below 600 bears for a certain amount of time while the population is increasing in size; however, we do not anticipate

that it will remain below 600 bears for an extended length of time during this rebuilding period because of the other mechanisms (e.g., Management Framework in table 3, additional safety margins listed below). The Service believes this is consistent with the recovery criterion. In addition, if the population falls below 612 individuals and the mortality limits are exceeded for three consecutive years, IGBST will conduct a Biology and Monitoring Review to inform the appropriate management response. And if the population drops below 600, all discretionary mortality will be halted, except as necessary for human safety. Additionally, if the limit is exceeded in any year, discretionary mortality the following year would be reduced by the number of mortalities that exceeded the limit. Non-discretionary mortality (e.g., natural causes, vehicle strikes) varies from year to year, and we expect that there may be years when non-discretionary mortality alone reaches the limits based on population size, and there would be no discretionary mortality allowed. Reduced discretionary mortality would reduce the ability of the States to manage the grizzly bear population, and, therefore, we believe that the States have a strong incentive to manage above 600 bears.

Further buffering our recovery criteria is the fact that the Service and the States agreed on a counting methodology, the model-averaged Chao2 estimate, that is conservative, i.e., it undercounts the number of bears. Schwartz et al. (2008, figure 5) concluded that at the model-averaged Chao2 estimate of approximately 700 bears, there are likely 350 other bears that remain uncounted. In other words, a Chao2 model-averaged estimate of 700 bears means that there are approximately 1,050 bears. As with Northern Rocky Mountain wolves, the Service is taking a conservative approach to counting bears to ensure bears remain recovered.

We provided additional safety margins to assure that the recovery criteria will be met. Four scenarios could lead us to initiate a status review and analysis of threats to determine if re-listing is warranted including: (1) if there are any changes in Federal, State, or Tribal laws, rules, regulations, or management plans that depart significantly from the specifics of population or habitat management detailed in this final rule or the 2016 Conservation Strategy that would significantly increase the threat to the GYE grizzly bear population; or (2) a total population estimate is less than 500 inside the DMA in any year using the model-averaged Chao2 population estimator, or counts of females with cubs-of-the-year fall below 48 for 3 consecutive years; or (3) if fewer than 16 of 18 bear management units are occupied by females with young for 3 consecutive 6-year sums of observations; and/or (4) if the Service determines a petition to re-list from an individual or organization is substantial.

The Service has reviewed and revised the GYE grizzly bear demographic recovery criteria to ensure they are adequate under the requirements of the Act and that they have been fully achieved, and determined that a population at or above 600 individuals, by managing for a safety margin of 674 bears, together with criterions #1 and 2, is biologically recovered. States have committed to maintain the GYE population to within these goals. Collectively, these commitments indicate that the entire GYE population is likely to remain recovered.

Although there were many suggestions of slight modifications to this criterion, peer reviewers were supportive that this recovery criterion was scientifically sound and would maintain a recovered grizzly bear population. The mortality limit for dependent young is based only on human-caused mortality, which is what is currently measured and

reported in the IGBST Annual Reports. The 2016 Conservation Strategy, this final rule, and the supplement to the Recovery Plan now consistently reflect each other and the Tri-State MOA: at population levels less than or equal to 674, independent female mortality would be less than 7.6 percent.

We disagree with comments that request we remove mention of the agreement to halt discretionary mortality at populations less than 600 bears because listing actions (including this final rule) are required to describe threats and the measures that address those threats. Discretionary mortality is a potential threat to grizzly bears, and we must explain how that threat has been addressed in this final rule. The main threat of human-caused mortality has been addressed through carefully monitored and controlled total mortality limits established in the Grizzly Bear Recovery Plan and incorporated into the 2016 Conservation Strategy (YES 2016a, pp. 33–53) and into State regulations as per tables 2 and 3 and *Factors B and C Combined* in this rule. The Tri-State MOA is not a replacement for our threats evaluation in this final rule.

Issue 20—We received comments from peer reviewers and the public that expressed confusion about the population management objectives and their scientific basis. Some commenters and peer reviewers suggested that it is unrealistic to manage the population to a single number when the confidence intervals are large and do not account for all sources of variation; moreover, commenters suggested that managing to a single number could jeopardize connectivity to other populations. The States requested removal of any language that indicates a population objective of exactly 674 bears and instead suggested language that implies managing for a population around the average of 674 bears or between the bounds of the 95 percent confidence intervals. Some commenters

believed that the population objective should instead be a "stable" or "increasing" population, which would allow the population to continue to expand into currently unoccupied lands within the DMA; they requested that all documents contain an explicit reference to "stability" as the population objective. However, a few commenters expressed concerns with an explicit goal of managing for stability including: (1) that managing for stability is contrary to the Act's provisions; (2) that managing for stability could become challenging if the GYE's carrying capacity were to ever decrease (i.e., additional habitat would need to be provided to allow for a stable population in this circumstance); and (3) that the objective of stability could allow mortality that is high enough to preclude opportunities to grow and expand the population of grizzly bears into other ecosystems. The States suggested that the Service remove all references to "stability" and instead "refer to growth rate, reaching apparent carrying capacity, and population fluctuation."

One peer reviewer recommended that the population goals be periodically reevaluated to allow for consideration of natural and anthropogenic changes in the ecosystem. Another commenter suggested starting with a very protective management objective that can be made more liberal if State management proves to be effective.

Response—The Service and our partners have all agreed to maintain the total population size around the average population estimate achieved during 2002 to 2014, otherwise known as the "period of stability" (YES 2016a, p. 35; YES 2016b, Appendix O). This recovery criterion was selected because: It represents a population level that is sufficiently robust to provide for the viability of the species; and it represents a period where the ecosystem was likely at or near long-term carrying capacity. As measured by

the model-averaged Chao2 population estimator, this equated to 674 grizzly bears with a 95% confidence interval of 600 to 747. However, we agree that it is not practical or even possible to manage for an exact population target as populations naturally and inevitably fluctuate through time. The States' agreement to manage within the confidence intervals around 674 bears provides reasonable management flexibility in recognition of the complexities of the system and of managing grizzly bears.

The Service and the States understand that the actual population will vary around 674, and that mortality will be managed to ensure that the population does not drop and remain below 600. In our best professional judgement, management within this range will maintain recovery, as required by the Act, and a large, robust, healthy and viable population. We further conclude that the ecosystem can and will continue to support such populations. Put another way, habitat quality and management (discussed further under *Factors A and D*) provide us with sufficient assurance that habitat is unlikely to be the limiting factor in determining whether these targets are met now or within the foreseeable future.

With this as the backdrop, we set human-caused mortality limits that the best scientific and commercial information available indicated would help maintain the population around the 2002–2014 average. With more liberal mortality rates above 674, and more restrictive mortality rates below that, the population should fluctuate around that average. We anticipate that managers will further limit mortality the closer they get to 600 grizzly bears, as measured by the model-averaged Chao2 population estimator, at which point all discretionary mortality would be halted except as necessary for human safety. For further discussion, see Issue 19.

While some expressed concern that managing for stability may preclude population expansion and connectivity with other ecosystems, the State of Montana has indicated that they will manage discretionary mortality in the area between the GYE and the NCDE to maintain the opportunity for natural movement between the ecosystems (MFWP 2013, p. 9). Please see Issues 50 and 53 for further discussions on connectivity.

We recognize that some parties support continued population growth in perpetuity. We conclude that this is impractical, that the system has biological limits, that the average population estimate for the period of stability likely approximates or approaches those limits, that expansion into unsuitable habitat is largely unsustainable, and that continued population growth goes beyond the requirements of the Act for delisting. That is, the population no longer meets the definition of threatened or endangered even without population growth in perpetuity.

Issue 21—Many commenters expressed concern about the States' "management objective for the DMA of at least a range between 600 and 747 (based on the 95% confidence interval of the estimated average population size between 2002 and 2014) and upon mortality rates to keep the population within this range," compared to the Service's reference to a management objective of a stable population around 674 bears within the DMA. Many commenters interpreted State management objectives as retracting "any commitment to manage for a stable population of 674 bears" and as intentions to reduce the population to only 500 or 600 bears, regardless of the method used to estimate the population size; conversely, the State agencies requested the Service emphasize in its final rule that the Tri-State management objective of managing for "at least a range between 600 and 747" in the DMA is "at levels well above the population recovery

criterion" of 500 bears in the entire DPS. The States also requested that the final rule "identify the States' agreed upon management objectives in relation to the recovery criteria." A peer reviewer noted that instead of "establish[ing] population targets and associated specific harvest criteria," the States only identified a minimum population size for the total GYE grizzly bear population; the peer reviewer was concerned this oversight could lead to "overharvest" and that "a lag in management response could drive the population below the desired minimum."

Response—The Act requires the Service to ensure that all threats to the species have been removed or sufficiently ameliorated such that the species no longer meets the definition of threatened or endangered; meeting or exceeding established recovery criteria assists the Service in determining that the species may no longer need the Act's protection. Specific to the demographic recovery criterion 3 (USFWS 2017, p. 5), the States have made a number of clearly articulated commitments through the 2016 Conservation Strategy and Tri-State MOA to maintain a recovered bear population as measured by the established demographic recovery criteria. For example, in the Tri-State MOA (Wyoming Game and Fish Commission *et al*. 2016, pp. 4, 2.a.i.), the States have agreed to manage the GYE grizzly bear population within the DMA, to *at least* within the 95% confidence intervals associated with the 2002 to 2014 long-term average grizzly bear population estimate calculated using the model-averaged Chao2 estimator (i.e., 600 to 747). This commitment does not preclude the States from managing above this recovery criterion using the best available science and current population information. Agreed-upon mortality thresholds, as described in the 2016 Conservation Strategy and criterion 3 in the Recovery Plan Supplement, ensure this commitment will be realized

because those threshold limits are self-regulating. At higher population levels (e.g., greater than 747), higher allowed mortality could cause the population to decline. However, once the population dropped below 747, a lower (more conservative) mortality rate would apply. If the population continued to drop and fell below 674, then a mortality rate would be reduced again, to a level that should result in an increasing population, as portrayed in table 2 in the rule.

At any population level below 674, mortality limits would be low, and thus, hunting or other discretionary mortality would be managed within these limits. In addition, all discretionary mortality would be halted if the population within the DMA dropped to 600, except as necessary for human safety. This increases the likelihood of maintaining a stable population around 674 bears. See Issues 19 and 66 for more information.

Issue 22—We received comments both supporting and objecting to our conclusion that the grizzly bear is biologically recovered. Some public and State commenters agreed that the GYE grizzly bear population is recovered because density-dependent factors are most influential in current population demographics, the population has consistently met the recovery criteria in recent years, and threats have been sufficiently ameliorated.

Conversely, other commenters presented reasons for disagreeing with our conclusions regarding recovery, including: (1) confusion regarding our definition of "recovered" and our determination of how the GYE population has met demographic recovery criteria; (2) suggestions that higher grizzly bear numbers (ranging from 700–5,000 bears) are more indicative of a stable, recovered GYE population and that a

metapopulation in the lower 48 States of 2,500–5,000 bears is necessary before recovery is achieved; (3) determination of recovery should consider age and sex structure, in addition to the number of bears; (4) concern that grizzly bears currently inhabit less than two percent of their historical range and that populations are less than three percent of their historical abundance; thus, we must further expand their range, connect to other healthy grizzly bear populations, and conduct additional reintroductions/reestablishment of populations before we can declare recovery; (5) the GYE population still meets the criteria to be listed as "vulnerable" by the IUCN Red List, and thus cannot be considered recovered; and (6) assertions, based on mortality rates exceeding mortality limits and the need to transplant bears, that threats have not been adequately addressed. In addition, some commenters suggested that recovery will not be achieved until carrying capacity is met, while one State suggested that carrying capacity is not a proper metric for assessing recovery.

Response—The Service has determined that the GYE grizzly bear population has increased in size and more than tripled its occupied range since being listed as threatened under the Act in 1975 and that threats to the population are sufficiently minimized. The participating States of Idaho, Montana, and Wyoming and Federal agencies have adopted the necessary post-delisting management objectives, which adequately ensure that the GYE population of grizzly bears remains recovered in the foreseeable future. The Service concludes, based on the best available scientific and commercial data, that the GYE population of grizzly bears is recovered and no longer meets the definition of a threatened or endangered species under the Act. While grizzly bears currently occupy only a fraction of historical habitat in the lower 48 States, the Service concludes that

restoration of grizzly bears to all historical habitats (particularly those no longer capable of supporting grizzly bear populations) within the DPS boundaries or within the lower 48 States is not necessary or possible. The information presented in this rule supports the conclusion that the GYE grizzly bear population has recovered and no longer meets the definition of endangered or threatened under the Act.

Although grizzly bears historically occurred throughout the area of the proposed GYE grizzly bear DPS (Stebler 1972, pp. 297–298), many of these habitats are not, today, biologically suitable for grizzly bears because of land conversion and a lack of natural food sources (i.e., bison). For further information, please refer to our discussion of Suitable Habitat. Grizzly bear recovery in these areas of the species' historical range (unsuitable habitat) is unnecessary, because there is more than enough suitable habitat (e.g., mainly public lands containing abundant natural food sources) to support a recovered grizzly bear population without grizzly bear occupancy of all historical habitat within the DPS boundaries. Therefore, additional recovery efforts in these areas are beyond what the Act requires.

We disagree with the suggestion that there must be 2,500 to 5,000 grizzly bears throughout the lower 48 States for recovery to be achieved in the GYE, and the United States District Court, District of Montana agreed with us, stating "it would be nonsensical to require the Service to consider the grizzly bears' historic range throughout the United States as significant in relation to the Yellowstone grizzly bear" if the GYE DPS does not remain threatened by these historical losses within its own boundaries (*Greater Yellowstone Coalition* v. *Servheen, et al.*, 672 F.Supp.2d 1105, 1125 (D. Mont. 2009), *aff'd on other grounds, Greater Yellowstone Coalition* v. *Servheen, et al*., 665 F.3d 1015

(9th Cir. 2011) (the Montana District Court decision vacated the Service's 2007 delisting rule on other grounds). The fact that grizzly bears do not currently occupy all suitable habitat within the DPS boundaries does not threaten the population. To the contrary, it allows for ecological resiliency and population expansion in response to changing environmental conditions while maintaining consistency with the court's interpretation of the phrase, "significant portion of its range" (*Servheen*, 672 F.Supp.2d at 1125). Other issues such as habitat linkage are relevant to this rulemaking only to the extent that they affect the GYE DPS. For example, connectivity or a lack thereof, has the potential to affect this population's genetic fitness. As such, this issue is discussed and addressed in our five-factor analysis (see *Factor E*, above), in the 2016 Conservation Strategy, and in more detail in the response to Issue 96.

We measure the demographic recovery criteria as set out in the current revisions to the Recovery Plan, Demographic Recovery Criteria for the GYE (USFWS 2017, entire). The IGBST will conduct demographic reviews of the vital rates (including sex ratio and survival) for the GYE grizzly bear population every 5 to 10 years. Upon completion of a demographic review, the IGBST would provide the information to the YGCC who could then advise States and Federal land management partners if modifications to the 2016 Conservation Strategy are necessary. We disagree with the claim that we have focused only on demographic recovery. While demographic factors such as mortality control and population monitoring are critical to recovery, we have also established habitat-based recovery criteria to address habitat security (i.e., motorized access), developed sites on public lands, and livestock allotments, while implementing extensive habitat monitoring programs for grizzly bear foods, human recreational use,

and elk hunter numbers. Additionally, the IGBST annually monitors genetic diversity and trends in grizzly bear conflicts throughout the ecosystem. This comprehensive approach to recovery has led to reduced mortality, increased population numbers, and significant increases in range, and has allowed grizzly bears to reoccupy habitat they have been absent from for decades while ensuring demographic and habitat security into the foreseeable future, such that the species no longer meets the definition of a threatened or endangered species.

As previously stated, under section 4 of the Act, a species shall be delisted if it does not meet the definition of a threatened or endangered species, considering solely the best available scientific and commercial data. We may not adopt the conservation classification criteria of other agencies or organizations, such as the IUCN. However, we do evaluate and consider the underlying data other agencies or organizations have relied upon in making their own conservation classifications. While it is true the GYE grizzly bear population meets one of the IUCN criteria for vulnerable (population size estimated at less than 1,000 mature individuals), our recovery and post-delisting management goals were designed to provide for the long-term conservation of the GYE grizzly bear population by ensuring sufficient control of human-caused mortality and maintenance of suitable habitat.

Finally, regarding carrying capacity, this has never been one of our recovery criteria. While there are multiple lines of evidence suggesting the population is at or near carrying capacity (e.g., decreased cub and yearling survival, increased generation interval, decreased home range size), we have not used this information to assess recovery. Instead, this information has helped us understand some of the more recent

demographic changes the IGBST has documented, such as a lower population growth rate between 2002 and 2011 than that documented between 1982 and 2001. See Issue 37 for further discussion on carrying capacity.

Other Comments on Whether to Delist

Issue 23—Multiple commenters believed our description of the taxonomy of grizzly bears in the GYE is no longer the best available science. They presented that the GYE grizzly bears are "part of a clade (Clade 4) with an ancient and unique history, a restricted distribution, and warranting consideration as evolutionarily unique and threatened genetic linkage." They asserted that because this unique taxonomic classification includes, and is limited to, the entire lower 48 grizzly bear metapopulation, recovery must address grizzly bears in the entire lower 48 States as a whole unit, instead of splitting out the GYE.

Response—The Act allows consideration for listing, reclassification, and delisting of species, subspecies, and DPSs. As part of the process to designate one or more units as a DPS, we evaluate their discreteness and significance to the taxon (61 FR 4722, February 7, 1996). While this analysis is often informed by genetics, we are not limited to large genetic units such as clades. After a comprehensive analysis in both our 2007 delisting determination (72 FR 14866, March 29, 2007) and an updated analysis in the proposed delisting rule (81 FR 13174, March 11, 2016), and after review of peer and public comments addressed in this final rule, we have determined that the GYE population of grizzly bears is discrete and significant, meeting the definition of a DPS under the Act (61 FR 4722, February 7, 1996). Therefore, the GYE grizzly bear is a listable entity under the Act, and may be considered and classified separately from other

listable entities. Our recognition that the GYE grizzly bear population qualifies as a DPS and its separate listing or delisting is also consistent with the 1993 Recovery Plan's (which predates the Service's 1996 DPS policy) stated intention to delist each of the remaining populations as they achieve their recovery targets and an associated five-factor analysis under section 4 of the Act indicates that they no longer meet the definition of a threatened or endangered species (USFWS 1993, p. ii).

There is disagreement among geneticists as to the conclusion that the genetic evidence suggests four different evolutionarily significant units (ESU) in North America (Waits *et al*. 1998, p. 414), with Clade IV representing brown bears in Southern Canada and the coterminous lower 48. Clades based on mitochondrial DNA may be evidence of a historical event but do not accurately reflect genetic divisions in current populations as gene flow is disproportionately affected by males as a result of their larger movements (Paetkau *et al*. 1997, p. 1950).

In the event that a taxonomic change is eventually accepted as the best available science based on genetic differentiation between brown bears in North America (Waits *et al*. 1998, p. 414), the GYE population's discreteness would be unchanged and the significance of this population relative to a smaller taxonomic unit would continue to meet the standards of the DPS policy (loss of GYE relative to this smaller unit would continue to represent a significant gap in the range of the taxon) (61 FR 4722, February 7, 1996). Furthermore, such a hypothetical finding would not alter the recovered status of this population.

Issue 24—We received comments both agreeing and disagreeing with our determination that the GYE grizzly bear should be delisted. Those who supported

delisting, including State commenters, suggested that: (1) States would allocate more money towards grizzly bear conservation and management, post-delisting; (2) funds could be allocated to other at-risk species in greater need; (3) delisting was appropriate, even if future impacts to the population cannot be predicted with certainty because recovery criteria had been meet and the population was not at risk of declining; and (4) there are too many bears in the GYE, resulting in increased conflict with livestock and hunters, posing a safety issue, and potentially causing eventual collapse of the entire ecosystem.

Conversely, other commenters asserted that delisting: (1) was premature because we based it primarily on population size or "social carrying capacity," or on insufficient time to measure success, public input, and inadequate or unreliable data; (2) contradicts the precautionary approach to wildlife management mandated under the Act, especially considering potential threats from climate change, implementation of hunting, and the low reproductive rates of bears; (3) contradicts opinions of grizzly bear biologists cited in an Ohio State University study; and (4) could lead to population declines or extinction of the GYE grizzly bear. Other commenters suggested that Federal protections be increased, rather than removed, while another suggested that excess bears should be culled rather than be delisted. Some commenters asserted that the goal of the Act is to recover a species, not delist it: We should ensure that re-listing will not be necessary in the foreseeable future, rather than delisting as soon as a population meets minimum goals.

Many commenters recommended delaying delisting until we can demonstrate successful reproduction outside of National Parks and effective dispersal and connection between grizzly populations.

Some commenters opposed delisting because they suggested that management would revert to the States and hunting would likely follow, with bears classified as predators and then shot, poisoned, or killed on sight. One commenter thought that proposed State replacements for section 7 consultations, section 9 take prohibitions, and an ability to bring legal challenge against management actions were inadequate. Another commenter asserted that, after the 2007 delisting, GYE grizzly bears were placed back on the List of Endangered and Threatened Wildlife because we failed to protect the species. One commenter suggested delisting could not be justified given the intrinsic values of the species.

Response—The principal goal of the Act is to return listed species to a point at which protection under the Act is no longer required (50 CFR 424.11(d)(2)). A species may be delisted on the basis of recovery only if the best scientific and commercial data available indicate that it is no longer endangered or threatened within all or a significant portion of its range (50 CFR 424.11(d)). As described later in this rule, we determine that, based on the best available data, the GYE DPS meets neither of these definitions for listing, thereby justifying delisting due to recovery.

To be clear, the Act does not contain a mandate or requirement that we institute a "precautionary approach to wildlife management." Instead, the Act mandates that we make decisions about conservation status based on the best available scientific and commercial data, which informs the Act's definitions of threatened and endangered

species. We remain confident that this population has long been recovered and will remain so after delisting.

Furthermore, this final rule, the 2016 Conservation Strategy, and the protective measures in Montana, Wyoming, and Idaho implement a conservative management approach by establishing science-based population criteria tied to the demographic recovery criteria, while also maintaining distributional recovery criteria. In addition, the adaptive management system in the 2016 Conservation Strategy incorporates the results from intensive monitoring of population vital rates, habitat standards, and major foods into management decisions and ensures the GYE grizzly bear DPS will remain recovered under the management frameworks now in place in Wyoming, Idaho, and Montana. In short, the regulatory frameworks now in place give us great confidence that this success story for American conservation and the Act will be maintained and that future generations will be able to see and enjoy grizzly bears in the GYE.

Strict regulations and regulatory mechanisms within State statute or codified regulation are in place to protect grizzly bears within the DPS boundaries. The States of Wyoming, Montana, and Idaho have classified grizzly bears throughout the entire GYE DPS boundaries as a game animal and have never suggested they will be classified as predators (W.S. 23-1-101(a)(xii)(A); W.S. 23-3-102(a); MCA 87-2-101(4); MCA 87-1-301; MCA 87-1-304; MCA 87-5-302; IC 36-2-1; IDAPA 13.01.06.100.01(e); IC 36-1101(a)). Game animal status is much more protective than predator status. Any grizzly bear found outside of the DPS boundaries would be protected under the Act as a threatened species. If any of the three States decided to classify grizzly bears as predators (an outcome that has not been proposed or even discussed to our knowledge), we would

consider this a significant departure from current State laws and regulations and we would immediately initiate a status review.

Lastly, while we respect the moral and ethical reasons some members of the public may have for disapproving of this decision, delisting is the appropriate decision based on the current status of the DPS and the statutory requirements of the Act.

Issue 25—One commenter claimed we inappropriately conclude that threats become irrelevant when they "can be managed." This commenter suggested that threats we and others successfully manage (such as genetic health) should still be regarded as a threat during our evaluation.

Response—In our five-factor analysis of threats to the GYE population of grizzly bears, we do not claim that managed stressors are irrelevant but rather that these threats have been eliminated or sufficiently ameliorated such that the DPS no longer meets the definition of a threatened or endangered species. We considered all of the factors under section 4(a)(1) of Act and assessed the cumulative effect that any threats identified within the factors—as ameliorated by any existing regulatory mechanisms or conservation efforts—will have on the GYE grizzly bear population now and in the foreseeable future. Based on our analysis, we have determined that the GYE grizzly bear population no longer requires the Act's protection. Please see the *Determination* section at the end of the threats analysis for more information.

Issue 26—Some commenters expressed skepticism towards our data, analysis, and cited research. Commenters claimed that our rule was not based on the best available science because: It is contrary to Dr. David Mattson's ideas; NPS leaders have questioned our analysis and conclusions; much of the published research we cited in our

proposed rule was not adequately reviewed, thus this research is not reliable because it is still undergoing "post-publication" scrutiny; our process has seemed "convoluted"; and an email from the Service's former Director released under the Freedom of Information Act (FOIA) contained the phrase "this recommendation seem[s] at odds with the best available science standard of the ESA." Commenters opined that the raw data used in our analysis was not made available for independent review, even though it belongs to the public since taxpayers paid for the research. They expressed concern that the "monopoly" the IGBST has on grizzly bear population data prompts groupthink and a general lack of transparency. One commenter requested we "establish a review panel of independent, academically qualified scientists who are not involved in current grizzly bear research in the GYE." Another commenter claimed that the peer review process does not sufficiently detect error or bias and that it is no more likely to detect error or bias than by random chance. The same commenter took issue with the proposed rule's reliance on models because there is never one correct model, claiming that model building is "the most bias-prone form of analysis." Another commenter cautioned against committing Type II errors in analysis (a "false negative").

Response—The Act requires us to make our listing determinations based upon the best scientific and commercial data available. In this case, we relied upon numerous peer-reviewed and published documents that were readily available either through regulations.gov in this rulemaking's docket, at *http://www.fws/gov/mountain-prairie/es/grizzlybear.php*, or by appointment with the Service's Grizzly Bear Recovery Coordinator. This information was publicly available when we published our proposed rule and during our public comment period. For example, mortality information,

including date of death, sex, age, certainty of death, if the bear was marked or not, and drainage location, are published annually in the IGBST's annual reports, available at *https://www.usgs.gov/centers/norock/science/igbst-annual-reports?qt-science_center_objects=1#qt-science_center_objects*. It is important to note that we did not rely upon any of these raw data to make our decisions, but rather on the peer-reviewed published interpretations of that raw data. We did not have any additional data than what was available to the public.

The IGBST approach to scientific studies involves extensive collaborations and contracts with independent academic and agency researchers who do not serve on the IGBST. Data used to calculate population size are available in the tables provided by Keating *et al*. (2002, p. 171), included in the Supplement to the Reassessing Methods Document (IGBST 2006, p. 7), as well as the annual reports produced by the IGBST. Estimates of sustainable mortality limits recommended in the Reassessing Methods Document are based on survival and associated population growth rates presented by Harris *et al*. (2006, p. 50). All results of Harris *et al*. (2006, p. 48) where estimates of population growth were made can be duplicated from data available in the other chapters of the Monograph. Data used to calculate transition probabilities are included in the Supplement to the Reassessing Methods Document (IGBST 2006, pp. 19–21). The IGBST also released the raw data files and digital records from 1975–1998 in response to a FOIA request. The IGBST replied to a later request for such data but has not yet received a formal FOIA request. We have released data that was in our possession and not otherwise prohibited from release by law (i.e., exact locations of grizzly bears obtained via VHF or GPS telemetry (i.e., "raw data") were not in our possession, and the

Omnibus Parks and Public Lands Act of 1998 (16 U.S.C. 5937) exempts release of specific locations of threatened species within National Parks units).

As discussed under Issue 10, we have followed our peer review policies. Peer review is a widely accepted approach within the scientific community to maintain the highest standards of quality and provide credibility. It is designed to detect biases and flawed assumptions by allowing objective and anonymous reviewers, when appropriate and applicable, to examine the methods, results, interpretation, and conclusions of colleagues to identify weaknesses and suggest improvements before publication. Peer review provides a critical evaluation of the subject work by similarly qualified experts and constitutes a form of self-regulation by qualified members of a profession within the relevant field. In short, peer review is an integral part of the scientific process, and publication in a peer-reviewed journal is often a key consideration in our assessment of what constitutes best available science. The GYE grizzly bear population is the most studied in the world, and the peer-reviewed scientific journal articles used in the proposed and final rules represent the best available science.

Models are never perfect, but are crucial to the scientific process. Models can be reliable and informative as we consider the best scientific and commercial data available. Modeling typically requires a set of assumptions and can be prone to error, including Type II errors. Incorrect inputs or failure to account for certain variables or assumptions can result in inaccurate outputs and conclusions. By design, scientific peer review identifies and corrects potential concerns with modeling. Models used by IGBST and other scientists are based on commonly used and broadly accepted approaches in wildlife science. To suggest that models should not be used or relied upon is too generalized a

conclusion and, in our view, unfounded. Not using scientific inference from modeling would reject the role of science. Ignoring available modeling could be directly counter to the Act's requirement that we base our decisions on the best available science.

We are aware of and considered ideas that are contrary to our conclusions, including those of Dr. David Mattson, who contends that the population is declining due to declining food sources, drought, invasive species, and habitat loss. However, the peer-reviewed research does not support this idea. Please see *Factor E: Changes in Food Resources* for further discussion.

Issue 27—Commenters expressed concerns with the methodology used in population viability modeling, model selection, and modeling timeframe. Commenters suggested that the Service is basing decisions on a modeling effort that failed to investigate the relationship between population and habitat data that used a 100-year modeling timeframe that was too short for a long-lived species, and that used an improper modeling endpoint. Commenters thought we used modeling to determine the timeframe required for the population to drop to zero rather than the timeframe that would result in an inadequate number of individuals to maintain the population. Commenters also requested clarity on specific model parameters we used in decision-making. These include the specific threshold used to determine extinction probability (e.g., 5 percent risk of extinction), whether the model results were based on density-dependent or independent data, and whether we included habitat change data.

Response—The proposed rule (81 FR 13174, March 11, 2016) referenced key findings of a population viability analysis conducted by Boyce *et al*. (2001, entire), which represents the primary peer-reviewed source for this type of analysis for the GYE grizzly

bear population. The details of the model parameters were provided in Boyce *et al*. (2001, p. 8), which should be consulted as the original literature source.

Opinions vary regarding what criteria should be evaluated (i.e., population of zero versus some other threshold level), but the proposed rule used a commonly applied metric of population viability, the probability of extinction (or its reverse, probability of population persistence) over certain timeframes. A 100-year timeframe is commonly used for viability analyses of many species, including long-lived vertebrates. The final rule for delisting of the Louisiana black bear (81 FR 13174, March 11, 2016), for example, also referenced population viability analyses with the probability of persistence measured over a 100-year timeframe (Laufenberg and Clark 2014, p. 2). Moreover, the GYE proposed rule also refers to a 500-year timeframe for the GYE grizzly bear population.

The GYE proposed rule clearly cautioned the reader that the analyses of Boyce *et al*. (2001, p. 34) did not consider possible changes in vital rates due to habitat changes. Vital rates have indeed changed since the time of the analysis (although the preponderance of evidence indicates these changes in vital rates were associated with increased population density, rather than changes in food resources). The GYE proposed rule recognized that the outcome of the population viability analyses could change with different vital rates, but also emphasized that further research (Nielsen *et al*. 2006, p. 227; Schwartz *et al*. 2010, p. 665) indicated the key importance of secure habitat as an effective management tool to ensure population persistence.

Measurement of and Interpretation of Population Parameters Issues

Issue 28—We received comments from peer reviewers and the public that expressed concern about the use of the Chao2 estimate method to estimate the grizzly

bear population size, asked for additional details, declared the Chao2 method "outdated," and questioned whether the Chao2 method is the best available science, while the States supported our use of Chao2 and suggested it represents "the best available science for monitoring and evaluation of population trends." Peer reviewers expressed confusion about what the Chao2 estimation methodology entails, including: (1) questions as to whether the Chao2 estimator is an estimate of the total number of females with cubs or an estimate of overall grizzly bear abundance; and (2) requests for additional details on how model averaging is used with the Chao2 estimator, given the potential issues with model-averaging (Cade 1995). In addition, commenters suggested that we provide more details regarding the demographic inputs and how they are determined; the model assumptions; how the initial population size was estimated; how the sex-age class distributions were estimated; why the current ratio of 1 independent male to each independent female is used as opposed to the previous ratio of 0.635; how cumulative uncertainty in the population model inputs are carried over into final uncertainty of the estimated population size; how natural mortalities were estimated and included; and whether the population size is based on unique number of females with cubs or litter size. Peer reviewers asked if the Chao2 estimator was published in a single paper in its entirety or had been subject to peer review.

Commenters also cast doubt on the accuracy and reliability of the Chao2 population estimation method, especially considering the research of Doak and Cutler (2014a, 2014b). These concerns included: (1) concerns that Chao2 becomes less accurate with time; (2) confusion about the wide range of estimated population sizes (according to Thuermer (2016), the number of bears, based on the Chao2 method, could

range anywhere from 552 bears to 1,110 bears); (3) suggestions that 40 percent variance (the apparent variance associated with the Chao2 estimate) is unacceptable; and (4) suspicions about the fact that, in 2007, the population estimate jumped from the long-time estimate of 260–600 bears to 700 bears because delisting was under consideration. One commenter wondered how the raw counts and Chao2 estimates of females with cubs differ in Keating *et al*. (2002, table 5) and records from the mortality workshop for the years 1999 to 2001. Another commenter suggested that the Chao2 estimate is only conservative if the population is indeed increasing; this commenter noted that, if the vital rates and mortality rates are incorrectly estimated, then the population could decline undetected. On the other hand, one commenter worried that the Chao2 estimator was too conservative "when the population is continuing to increase and expand beyond its biologically suitable and socially acceptable habitats."

Several comments were concerned with the measurement and interpretation of unique females with cubs, and how potential biases in these counts could lead to overestimation of the Chao2 population estimate (which is based on counts of females with cubs). The first source of bias commenters cited stems from increased sightability; over time, as bears have increased their use of moth sites, which are easier to monitor, it has become easier to find and count individual bears. These commenters claimed that the increasing trend of the number of females with cubs in IGBST monitoring data could stem from the fact that it has become easier to count bears and not from the fact that there are actually more bears in the GYE. The second source of bias commenters cited relates to increased unreliability of unique sightings of females with cubs. Based on the guidelines for how the IGBST counts females with cubs, females sighted with differing

numbers of cubs are considered unique (e.g., a female spotted with two cubs near where a female with three cubs was also spotted is counted as an additional unique female). However, increased cub mortality increases the difficulty in distinguishing between unique females with cubs; between multiple survey flights, a female could lose a cub and thus be counted twice (once as a unique female when she has three cubs and again as a unique female when she is spotted with only two cubs). This situation can again cause overestimation of the number of females with cubs. The third source of bias comes from increased search effort; variable efforts in surveys could lead to artificially higher counts of females with cubs. One commenter suggested that courts have ruled our use of a population estimator based on "females with cubs" illegal (*Funds for Animals* v. *Babbitt*, 903 F. Supp. 96, 114 (D.D.C. 1995)). Commenters asked that we discuss potential methods for managing these biases associated with counts of females with cubs (and thus with Chao2), such as specifying that population monitoring will continue indefinitely at the same intensity, the same distribution, and under the same design to account for potential biases from variable search effort and conditions.

Commenters raised concerns about other sources of bias in the Chao2 estimator. First, some commented that the population estimate is influenced and potentially biased by the multipliers used for dependent young, pre-reproductive independent females, and independent males, and by changing survival rates (i.e., the increase in the population estimate as a result of the increased survival rate used for adult males after 2012). Second, commenters claimed that the Knight Rule (the rule we use for distinguishing unique females with cubs) could reduce the ability of Chao2 to detect changes in population size. Under these rules, we consider two females spotted within 30 km (19

mi) of each other as the same bear. As grizzly bear populations become denser, there will eventually be a maximum number of bears that surveyors can possibly count given these rules (i.e., one bear in every 30 km (19 mi) radius); they referred to this maximum number of bears countable under the Knight Rule as the "density threshold." One commenter worried that once the population exceeds this threshold, managers will not be able to detect declines in the population between the actual number of bears and this threshold, since the counts of bears will be artificially stagnant. Another commenter worried that managers could misinterpret reaching the density threshold as reaching the carrying capacity of the population. Commenters suggested that we should use the methods in Ordiz *et al*. (2007) instead of the Knight Rule. Third, one commenter suggested that the method is insensitive to rapidly changing conditions.

Response—The Chao2 estimate method is the best science that is currently available and that can apply under the current monitoring schemes. Whereas many other and newer estimation techniques exist, they do not necessarily provide the best available science for the desired monitoring objectives, as described below. Furthermore, the Chao2 technique is one of several that the IGBST uses to monitor population size and trend. Although there are other methods that would likely result in greater precision and lower bias (e.g., DNA sampling), not only are they currently not available with the data we have, the annual implementation of these methods would be prohibitive both in costs and logistics. The IGBST estimated that the costs for a *single* DNA-based population estimate for the entire GYE would be approximately $11 million. The IGBST will continue to investigate cost-effective techniques that may result in relatively unbiased estimates with greater precision. We have provided clarifications in this final rule (see

Population and Demographic Recovery Criteria) and the 2016 Conservation Strategy (see Chapter 2) to address comments concerning the application and transparency of the definition of the Chao2 estimator. The model-averaged Chao2 provides an estimate of the number of females with cubs-of-the-year, rather than an estimate of the overall grizzly bear abundance, which is then used to derive a total population estimate. In response to a comment about potential issues with model-averaging, our interpretation of Cade (2015, entire) and others (e.g., Fieberg and Johnson 2015, entire) is that model-averaging of the regression coefficients is not recommended, but that model-averaging of predictions (i.e., in this instance, annual estimates of the number of females with cubs-of-the-year based on a linear and quadratic model) is appropriate. Thus, the term "model-averaged Chao2 estimate" is appropriate and should be continued.

We have provided clarifications in the final rule (see *Population and Demographic Recovery Criteria*) and the 2016 Conservation Strategy (YES 2016a, pp. 33–53) to address comments concerning the transparency of the definition of the Chao2 estimator. Although the details of the Chao2 estimator are not published in their entirety in a single article, we have expanded the description of the Chao2 estimator to include all relevant peer-reviewed literature. All of the details are provided in the literature regarding the application of the Chao2 estimator and the inputs and would be too technical and cumbersome to include in the final rule and 2016 Conservation Strategy, which were revised to provide all relevant references for the Chao2 estimate technique.

The derivation of total population size introduces additional uncertainty into the total population estimate, but we have no data that suggest that bias would increase. Indeed, the vital rates (i.e., survival and fecundity) derived from the IGBST's large

sample of radio-marked bears monitored annually, which form the basis for the multipliers, have been published in multiple peer-reviewed papers using well-established techniques (e.g., in their entirety: Schwartz *et al*. 2006b; van Manen *et al*. 2016). The most recent analyses by van Manen *et al*. (2016, p. 305) showed that male survival rates increased from 1983–2001 to 2002–2012.

The survival estimates are not inflated and, in fact, may be underestimates because IGBST assigns the month of death as the last month an individual bear was known to be active when a bear was lost from monitoring and the date of death was unknown. If some of these individuals were lost the following month, the overall estimate of survival would be higher (Haroldson *et al*. 2006, p. 40). Regarding insensitivity to rapidly changing conditions, IGBST is currently investigating the power of the current population estimation protocol to detect a declining trend (see Issue 29). One commenter referred to the findings of the demographic review conducted by IGBST in 2011, which was triggered by the monitoring system indicating a change in population trend had occurred. That demographic review was based on 2002–2011 data and indicated that population growth had slowed starting in the early 2000s and, importantly, also indicated that several vital rates had changed (e.g., lower survival of cubs and yearlings, greater survival of independent males). Because IGBST uses vital rates to extrapolate population estimates of females with cubs-of-the-year to a total population estimate, the relative proportions of different population segments changed. Due to the increase in survival of independent males, the sex ratio of independent males and females is now 1:1, rather than the previous ratio of 0.635, which means the independent male

segment in the population is now proportionally greater than what was documented in 1983–2001.

Thus, while population growth indeed slowed down, a given estimate of the number females with cubs-of-the-year based on 2002–2011 vital rates translates into a larger total population compared to 1983–2001 data because of the greater proportion of independent males in the population. These observations are not an indicator of the "high uncertainty in the monitoring of this population." In fact, the IGBST concluded that the monitoring system was effective: (1) the IGBST developed a population monitoring system and established triggers that indicate when a change has occurred; (2) the IGBST noted when a change in population growth was detected; (3) the IGBST studied the demographic factors (i.e., vital rates) associated with that change (e.g., lower cub and yearling survival, greater independent male survival; slight reduction in fecundity); (4) the IGBST tested hypotheses regarding these changes in vital rates (effects of change in food resources versus density dependence); and (5) the findings were published in peer-reviewed journals and other outlets so that managers can adjust management accordingly. The biases associated with the Chao2 method and how they are carried through were identified in IGBST (2012, p. 20). The population size is based on the unique number of females with cubs-of-the-year; litter size is only a factor in separating unique females with cubs.

In response to doubts on the accuracy and reliability of the Chao2 population estimation method: (1) We acknowledge an underestimation bias in Chao2 that increases as the population grows (i.e., underestimation is greater as the number of females with cubs in the population increases); however, this bias translates into a conservative

approach to management of the GYE population. (2) We also acknowledge that other methods yield higher population estimates (e.g., Thuermer 2016, entire); however, the higher population estimates mentioned by Thuermer (2016, entire) were based on the Mark-Resight technique, which also yields low precision when utilized for trend detection. (3) Keating *et al*. (2002, pp. 172–172) discusses the coefficient of variation associated with the Chao2 method. (4) In 2007, the IGBST implemented the model-averaging technique, which resulted in a slight increase in population estimates. The IGBST decided not to apply this technique retroactively to population estimates in years prior to 2007. In addition, population estimates increased with increasing male survival, which resulted in more males in the estimated population (IGBST 2012, p. 33). These decisions were made independently by the IGBST and had no connection with the delisting under consideration. The raw counts and Chao2 estimates of females with cubs differed in Keating *et al.* (2002, p. 166) because they used only females with cubs seen without the aid of telemetry in the Yellowstone Recovery Zone plus the 10-mile perimeter, whereas the IGBST (2006, p. 5) assessment included females throughout the GYE. It is possible that the population is growing and expanding beyond the DMA while the Chao2 method is showing a stable population because the population is only estimated for within the DMA and the Chao2 technique results in a conservative estimate and the underestimation bias increases with population size.

Schwartz *et al*. (2008, entire) demonstrated that the bias associated with the measurement and interpretation of unique females with cubs-of-the-year results in an underestimation of the population estimate, with increasing negative bias as the number of females with cubs in the population increases. Doak and Cutler (2014a, entire)

critiqued the approach taken by the IGBST of using the model-averaged Chao2 estimator of females with cubs-of-the-year to derive the total population estimate. They claim that increases in grizzly bear population estimates from 1983 to 2001 can be attributed to factors other than actual increases in population size, primarily observation effort and sightability of female grizzly bears with cubs-of-the-year. However, in a rebuttal, van Manen *et al.* (2014, entire) demonstrated that the simulations of Doak and Cutler (2014a, entire) were not reflective of the true observation process nor did their results provide statistical support for their own conclusions. In addition, van Manen *et al*. (2014, pp. 326–328) found that there was no justification to account for "bias associated with the method or disagreements in the scientific community about the population estimate of ~700"; particularly given the demonstrated underestimation bias of the rule set (Schwartz *et al*. 2008, entire) and the Chao2 estimator (Cherry *et al*. 2007, entire). Both sources of known negative bias contribute to conservative population estimates. The related comment disregards the notion of the central tendency of data and mischaracterizes the scientific concept of uncertainty. We answer this using a relevant quote from Schwartz *et al*. (2006b, p. 62), who addressed the issue of uncertainty in demographic estimates as they relate to management: *"*Thus, we see no escape from uncertainty. To claim that no decision about what has occurred should be adopted until uncertainty is removed or to claim that the only acceptable decision adopts some lower confidence limit as truth is to reject the role of science. If the possibility of population decline is treated as the fact of population decline (even where overwhelming evidence suggests otherwise), there is no need to spend money on research or monitoring because the management approach would be identical regardless of what data were produced. Because it is impossible to absolutely

reject the hypothesis of decline, one would always manage as though a decline had occurred. To us this would seem poor policy."

The critique of increased search effort and sightability were addressed in substantial detail in the response by van Manen *et al*. (2014, pp. 324–325) to the critique article by Doak and Cutler (2014a, entire). Specifically, in figure 1 of the Supplemental file from van Manen *et al*. (2014), they demonstrated that the number of flight hours increased as flight observation areas were added to accommodate range expansion from 1986–2010. The correlation coefficient suggested this was a near 1-to-1 relationship. One key aspect of the Chao2 estimator is that it reduces bias due to variation in sightability among different females with cubs-of-the-year. Additionally, model averaging smooths annual variations in counts that are due to both sampling and process variation, with the process variation coming from the proportion of females that have cubs at the side in any particular year. If anything, changes in litter size would increase underestimation bias and thus be conservative. Moreover, while cub mortality has increased, the geographic distribution of observed litter size has not.

The suggestion that we continue the current method of population monitoring indefinitely, including intensity, distribution, and design, is addressed in this final rule (see *Population and Demographic Recovery Criteria*) and in the 2016 Conservation Strategy (YES 2016a, pp. 33–53). In response to the suggestion that we review Ordiz *et al*. (2007, entire) as an alternative to the Knight rule, there are multiple techniques and different rule sets that can be developed to estimate unique females with cubs-of-the-year. The Ordiz *et al*. (2007, entire) paper does not describe a rule set but examines relationships among distances and number of days of individual females with cubs-of-

the-year; data on litter size were not incorporated. Schwartz *et al*. (2008, entire) investigated similar distance and time relationships for GYE female grizzly bears with cubs-of-the-year, but no adjustments to Knight *et al*. (1995) were made to reduce the probability of Type I errors (i.e., mistakenly identifying sightings of the same family as different families). The IGBST may consider alternatives to the existing rule set in the future; if those alternatives are deemed to improve the best available science, new procedures will be adopted per the process outlined in this final rule and the 2016 Conservation Strategy. Although it is true that changes in the estimates of females with cubs-of-the-year may be more difficult to detect once above a density threshold, this is again a conservative approach. The analogy is a thermometer that does not register temperatures above 102 degrees; as long as the value of interest is below 102, it registers only when it drops to that point.

The rule set used in the Chao2 estimate for identifying unique females with cubs-of-the-year is conservative and becomes increasingly conservative with greater numbers of unique females with cubs-of-the-year (i.e., population level determines the level of bias, not population growth). Although the Chao2 estimate does become increasingly negatively biased with increasing density, the IGBST uses additional data for demographic inference (i.e., to determine the population trend and if the population is reaching carrying capacity). Please see Issue 29 for further discussion on population trend. Combined with recent analyses (van Manen *et al*. 2016, entire), these data suggest that density-dependent factors may be operating and are an indicator of the population at or near carrying capacity. Lastly, efforts are currently under way by the IGBST to: (1) address the underestimation bias of Chao2, and (2) examine the ability of the Chao2

technique to detect a change in population trend over time. However, given the detailed discussion above, the Chao2 method remains the best available data upon which to answer the question at hand.

Issue 29—Commenters expressed concern about how population trend is measured, including: (1) a desire for justification for the use of linear and quadratic models; (2) that we should not use observations of females with cubs to estimate population trend because this measure is unreliable at high population densities; (3) confusion as to whether we use number of unique females with cubs or litter size to estimate population growth; (4) that we should only use data since 2000 when estimating population trend since the smoothing approach employed in the Chao2 method is highly sensitive to the time period being modelled (and major changes occurred in the GYE in 2000); (5) that the population trend declines significantly to a 0.8 percent annual increase if modelers only use data from 2007 to the present; (6) that the IGBST methods overestimate the growth rate because they do not adequately account for senescence in birth and death rates of females (Doak and Cutler 2014a, 2014b); and (7) questions as to how cumulative uncertainty in the population models are carried over into final uncertainty of estimated population growth. Some commenters were concerned with a potential lag effect (i.e., that the model-averaged approach is insensitive to rapidly changing conditions and that a negative population trend would not be detected until it is too late); Doak (1995) and McLellan (2015) have reported lag effects between habitat decline and population decline.

Several commenters suggested additional or alternative methods to apply in detecting the population trend including: (1) comparing the annual uncertainty in the

population estimates to long-term averages; and (2) using capture-recapture data to estimate population trend rather than the trapping effort data used by van Manen *et al*. (2016) and Bjornlie *et al*. (2014b). A peer-reviewer also suggested using an independent measure, such as independent sampling, to verify model trends.

One commenter expressed concern with our population trend projections from Harris *et al*. (2005) because they: used only around 20 years of data to develop growth projections for the next decade; did not account for transfer between "management classes" of bears (i.e., habituated versus non-habituated or problem versus nonproblem); and did not account for migration between geographic zones with vastly different mortality risk (i.e., Schwartz *et al*. (2006b) analysis of vital rates in three different zones).

Response—In response to a previous request for a justification of our use of linear and quadratic models in population trend estimation, a detailed explanation and justification was provided in the peer-reviewed publication (Harris *et al*. 2007, entire). Linear and quadratic regression models are fitted as an initial estimate of trend (Harris *et al.* 2007, pp. 171–172). Regression smooths variation to provide an estimate of trend representative of the population if the age distribution is relatively stable (Harris *et al.* 2007, pp. 171–172). Support for linear versus quadratic models is assessed using Akaike's Information Criterion (AIC_c; Hurvich and Tsai 1989, entire; Burnham and Anderson 2002, entire). Respective AIC_c weights of the linear and quadratic models are then used to obtain a model-averaged Chao2 estimate of the total number of females with cubs-of-the-year, using the model-averaged endpoint in the time series as the estimate for the current year. Change in trend since 1983 is assessed by examining support for the linear versus the quadratic model using AIC_c weights. Finally, a total population estimate

is derived based on the estimated proportion of the total population that is represented by the estimated number of females with cubs-of-the-year. For this final step, data on vital rates (i.e., survival of different sex and age classes, fecundity), as estimated from known-fate monitoring of radio-marked bears, are required. Please see Issue 28 for a detailed discussion on the estimate of unique females with cubs-of-the-year.

The IGBST is currently investigating the power of the current population estimation protocol to detect a declining trend. Primary findings will be submitted to a peer-reviewed journal later in 2017. An overview of how cumulative uncertainty in the population models are carried over into final uncertainty of estimated population growth is provided in table 2.1 of the IGBST's Demographic Workshop Report (2012, p. 20). In a rebuttal to the critique by Doak and Cutler (2014a, 2014b), van Manen *et al*. (2014, p. 328) showed that Doak and Cutler's choice of extreme mortality risk beyond age 20 and their incompatible estimate of baseline fecundity led to erroneous conclusions. We assume that the commenter is actually referring to Harris *et al*. (2006, entire). If so, these issues were addressed in that publication and other sections, of Schwartz *et al*. (2006b, entire). Twenty years of concerted efforts provides a substantial dataset for population projections, particularly for large vertebrates (few other projects on large vertebrates have such extensive datasets). We now have over 30 years of such data. The issue of management versus research bears was addressed in another chapter (see p. 9, Study Area and Methods for Collecting and Analyzing Demographic Data on Grizzly Bears in GYE) of the Monograph. Migration between the three different geographic zones used in the analyses of Schwartz *et al*. (2006b) is unknown and difficult to estimate, but radio-telemetry data do not suggest movements among the zones are common, other than the

fact that some home ranges of male bears may straddle two zones. Thus, IGBST estimates of survival and lambda for the three zones are reflective of the sampled resident bears.

For large vertebrate populations, lag effects can occur, if there is indeed habitat decline and animals are affected by that decline. With 2016 being approximately 10 years after the peak years of whitebark pine decline and about 20 years since the decline of cutthroat trout, there is currently little evidence of a lag effect either at the GYE grizzly bear population level (population remains stable) or at the individual level (lack of evidence of changes in survival, litter size, fecundity, etc. during the last 10 to 15 years). It should be noted that observed changes in vital rates (i.e., lower cub and yearling survival, slight suppression of reproduction) occurred during the late 1990s and early 2000s. Even without a lag effect, these changes in vital rates occurred prior to, or close to, the onset of whitebark pine decline; thus, there is little support for a lag effect due to changes in food resources.

The IGBST investigated the influence of "anchoring" the time series in 1983 versus 2002. The difference in model-averaged Chao2 estimates was negligible. For example, the 2014 estimate of females with cubs-of-the-year using the time series of 1983–2014 was 60, whereas the 2002–2014 time series resulted in an estimate of 57 for 2014. Similarly, the 2015 estimate of females with cubs-of-the-year based on the 1983–2015 time series was 56, whereas the 2002–2015 time series produced an estimate of 54 (van Manen 2016b, *in litt.*). It should be noted that there is no statistical trend based on the 2002–2015 data, supporting the interpretation of the population being stable during this time period.

In response to the comment that suggests we use additional methods to detect population trend and size, although the proposed rule (81 FR 13174, March 11, 2016) describes use of only the Chao2 method to detect population size, the IGBST uses three additional and independent methods: (1) Mark-Resight estimator (i.e., capture-recapture data (IGBST annual reports)); (2) population projections from known-fate analysis (in their entirety: Schwartz *et al*. 2006b; IGBST 2012); and (3) population reconstruction (IGBST, unpublished data). Together, these four methods support the interpretation that the GYE grizzly bear population experienced robust population growth from the mid to late 1980s through the late 1990s, followed by a slowing of population growth since the early 2000s. None of these methods indicate a decline. The assertion that the bear population may be actually declining is thus not supported by data. Neither van Manen *et al*. (2016, entire) nor Bjornlie *et al*. (2014b, entire) estimated population size. van Manen *et al*. (2016, entire) used radio-monitored bears in their analysis of known-fate data to estimate vital rates, and Bjornlie *et al*. (2014b, entire) was based on home-range data of grizzly bears. Thus, the four methods currently used to estimate population trend, and upon which we base our determination, remain the best available data. Of these four methods, the model-averaged Chao2 method is currently the only method used to estimate population size and to assess recovery criterion #3.

The IGBST's primary estimates of population trajectory (i.e., growth or decline) have been based on population projections using known-fate estimates of vital rates derived from radio-monitoring a representative sample of grizzly bears in the GYE (e.g., see Schwartz *et al*. 2006b; IGBST 2012). Those vital rates include annual survival rates for independent male and female grizzly bears, age of first reproduction, litter size, and

survival of dependent young (i.e., cubs of the year and yearlings) that accompany their radio-marked mothers. The number of unique females with cubs-of-the-year estimated to be present in the ecosystem annually from IGBST observation flights and other opportunistic verified sightings do not enter into those known-fate projections. However, we can also estimate trend using the Chao2-corrected annual counts of unique females with cubs. The end point for the model-averaged result of the linear and quadratic regressions of the Chao2-corrected counts with year, along with information from our known-fate analyses, is used to derive annual population estimates. Although not a primary IGBST method for assessing trend, a key assumption for doing this based on the number of unique females with cubs-of-the-year is that the trend for this observable segment of the population (i.e., females with cubs-of-the-year) is representative of trend for the whole population.

Issue 30—Several commenters offered alternative explanations of the population trend, including that: (1) any population growth after listing occurred because of concurrent increases in food sources and road closures, rather than implementation of 1986 guidelines; (2) the population has not grown since 2000 and may even be declining below population objectives; (3) lower cub survival rates and mortalities from conflicts with hunters and livestock caused a 6 percent population decline between 2014 and 2015; and (4) further population declines are impending due to the age structure in the GYE (more older bears and fewer younger bears).

Response—We agree that implementation of the 1986 Guidelines was only one factor that increased the population trend in the GYE. However, implementation of the 1986 Guidelines by the National Forest and the National Parks improved habitat quality

(i.e., reduced motorized access and livestock allotments) and reduced human-bear conflicts. There is no biological way to define "baseline" levels for various foods because the natural foods for grizzly bears naturally fluctuate, annually and spatially, across the ecosystem. Commenters make a valid point that the number of older bears in the GYE population is increasing while the number of cubs and younger bears is decreasing, and supports the notion that GYE grizzly bears may be nearing carrying capacity in portions of the ecosystem. As van Manen *et al*. (2016, pp. 308–309) note, observations of more, older bears and suppression of recruitment support the notion of density-dependence in the GYE grizzly bear population. One consequence of density dependence indeed is that trends stabilize or possibly even decline. In response to comments that there was a 6 percent population decline between 2014 and 2015, for a long-lived vertebrate, such as grizzly bears, inference of trend based on model-averaged Chao2 estimates from one year to the next is inappropriate. Trends should be investigated over longer time periods; based on unpublished IGBST analyses of 2000 to 2015 data, analyses do not indicate a population decline (van Manen 2016b, *in litt.*). Trend analyses and population projections based on known-fate data indicate the population has indeed remained stable to slightly increasing since the early 2000s. The best available data do not indicate evidence of a population decline.

Issue 31—Several commenters and a peer-reviewer raised concerns over utilizing a new population estimation method in the future in lieu of the current methodology (Chao2). Suggestions for alternative, potentially less-biased, methods included: (1) the Mark-Resight method; (2) a model "based on a running average of annual growth rate over" the six preceding years; (3) a census that includes the age, sex, and location of each

bear; or (4) a DNA assessment (including options that involve hair snares as done in the NCDE (Kendall *et al*. 2009), rubbing trees (Stetz *et al*. 2010), or using combined data types to increase precision (Boulanger *et al*. 2008; Abadie *et al*. 2010)). Proponents of DNA methods argued that projected costs are comparable to those of current methods and could be significantly lower than the expensive estimates in Kendall *et al*. (2009).

Some public commenters requested that any new population estimation methodology be open to public comment prior to implementation. Some commenters and peer-reviewers were concerned that implementation of a new method could make interpretation of estimates and trends difficult and raised questions about how new estimates would be reconciled with previous estimates that used the Chao2 methodology, including a need to calibrate the mortality limits, population estimates, status review triggers, and population objectives. Commenters worried that, without this recalibration, adoption of a more accurate population estimation method would allow the States to kill hundreds of bears, while other commenters noted that new population estimation methodology should not be used to re-define what the recovered bear numbers are for future management decisions.

We received several comments about the recalibration language in Appendix C of the draft 2016 Conservation Strategy, some suggested that the same language needed to not only remain in Appendix C of the 2016 Conservation Strategy but also be included in the MOA and State plans, while others were concerned that it restricted the adaptability of future management by dictating how a new population estimator would be applied. Some commenters expressed that the lack of recalibration language in the State regulations and plans meant that adequate regulatory mechanisms were not in place.

Response—The IGBST frequently reviews their protocols and techniques for population estimation and population trend analysis. They currently use four different techniques for inference. As new techniques or approaches are reviewed for potential adoption, the technique's cost, field sampling logistics, utility to managers, and the ability to retroactively apply population estimates to previous years of data are considered. In response to specific methods raised in public comment: (1) The IGBST developed the Mark-Resight method for this purpose, and recently determined that, although the estimates are relatively unbiased, the power to detect changes in population trend was not sufficient. (2) It is unclear to what model this commenter is referring, thus we are unable to provide a more detailed response. However, the IGBST is planning to annually update vital rate estimates over the previous 10- or 15-year period (i.e., temporal moving window). (3) It is impossible to truly census bear populations, especially in remote and inaccessible areas such as the GYE. The IGBST does use population reconstruction (minimum number of known live) based on an extensive dataset of capture and mortality records. (4) The IGBST considered the use of DNA sampling about 10 years ago but determined that logistics and costs (at the time, estimated at $11 million) were prohibitive. Recent advances in population estimation techniques and study design may allow for more efficient sampling, and the IGBST is currently investigating the feasibility of DNA sampling for density estimation.

The final 2016 Conservation Strategy commits to using the model-averaged Chao2 population estimator for the foreseeable future to maintain the population around the average population size from 2002 to 2014. The implementation of a new method to estimate population size within the GYE DMA would be evaluated by the IGBST and

constitute a change to the Conservation Strategy, which requires approval by the YGCC and a public comment period.

The recalibration language in Appendix C was removed because it was determined to be too prescriptive as it would require data from 2002 to 2014, the period for which the model-averaged Chao2 population estimate is used as the population objective. It is likely that any new method would require data that are not currently collected, and, therefore, retroactive estimation using the new method would not be possible. The States have made a number of clearly articulated commitments through the 2016 Conservation Strategy and Tri-State MOA to maintain a recovered bear population as measured by the established demographic recovery criteria. For example, in the Tri-State MOA (Wyoming Game and Fish Commission *et al*. 2016, pp. 4, 2.a.i.), the States have agreed to manage the GYE grizzly bear population within the DMA, to *at least* within the 95% confidence intervals associated with the 2002 to 2014 long-term average grizzly bear population estimate calculated using the model-averaged Chao2 estimator (i.e., 600 to 747). See Issue 21 for further discussion.

Issue 32—Several State and public commenters raised questions about the definitions of the types of mortality discussed in the proposed rule (i.e., background mortality, hunting mortality, discretionary mortality, non-discretionary mortality, total mortality, unknown/unreported mortality). These commenters found the multiple terms confusing and asked for thorough definitions of each type of mortality. One commenter suggested using "management mortality" (mortality from hunting and management removals) and "other mortality" instead of our terms. The States suggested using only the term "discretionary mortality."

Some commenters suggested that the definitions and example calculations (e.g., table 3 from the proposed rule and the example calculations for the number of individual grizzly bears that could be available for hunting harvest) included in the proposed rule should also be included in the 2016 Conservation Strategy for clarity. However, the States requested the removal of table 3 from the proposed rule.

Commenters also expressed concern about "background mortality" including that background mortality must take into account unknown and unreported mortalities, that we need to account for the uncertainty in the calculation of background mortality, and that we need to define the period over which the moving average of background mortality will be calculated.

Response—The proposed rule defines "discretionary mortality" as "mortalities that are the result of hunting or management removals;" thus, hunting is a form of discretionary mortality. We made changes to the discussion of human-caused mortality in *Factors B and C Combined* of the final rule to clarify this issue. As table 3 and the explanation of background mortality in the proposed rule was only an example, the YES concluded it was unnecessary to include in the 2016 Conservation Strategy. In response to comments about table 3 in the proposed rule and the definitions (i.e., total mortality, background mortality, and discretionary mortality), we revised the example (table 4 in this final rule) and explanatory language to clarify. To reduce confusion, the 2016 Conservation Strategy and the final rule no longer refer to background mortality but rather total, discretionary (including hunting and management removals), and non-discretionary mortality. As stated in the Tri-State MOA, the States will annually

calculate allowable discretionary mortality using the previous year's population estimate and the previous year's total mortality.

Issue 33—Commenters asserted that the methods we use to estimate unknown/unreported mortality, presented in Cherry *et al*. (2002), underestimate mortality, are outdated, are susceptible to bias, have wide confidence intervals (which were not included in reports), and would not adequately account for deaths of bears orphaned by hunting. These commenters claimed that bias originates from: (1) the fact that the cause of a grizzly bear death changes the probability of the death being reported; and (2) variable effort in bear capture and radio-collaring. Commenters suggested that we need to account for the uncertainty in the number of unknown/unreported mortalities. In addition, a peer-reviewer suggested that we should use a sex assignment of 50 percent male and 50 percent female when determining the sex of probable or unrecorded mortalities (or assign any probable mortality as female) in order to more conservatively estimate female mortality.

Some commenters expressed concern about our ability to accurately track natural death and predation, claiming that most cub and yearling deaths are due to predation and are undocumented. One commenter disagreed with the estimates of natural death and predation provided in the proposed rule; but did not provide alternative supporting documentation.

Response—The IGBST uses the methods in Cherry *et al*. (2002, entire) to estimate unknown/unreported mortality, as it is the best available science. The IGBST does not report credible intervals for the estimate of unknown/unreported mortalities because this would substantially complicate implementation (i.e., a range of mortality

thresholds is not practical for managers); instead, they rely on the central tendency of the data. For decision-making, relying on the central tendency of the data is justified. Uncertainty is often interpreted to reflect a possibility of worst-case scenarios (e.g., the low end of the credible interval that underestimates unknown/unreported mortality in this instance), but the tendency is towards the median and about 50 percent of estimates will be conservative (i.e., above the median and, thus, overestimating unknown/unreported mortality). In the estimate of unknown/unreported mortality for independent-aged bears (i.e., bears 2 years or older), all reported mortalities, including those from natural cause, are used. The method of estimating unknown/unreported mortalities indeed has a slight underestimation bias. However, all other estimations associated with calculation of mortality rates are conservative, and in several cases very conservative, such as the Knight *et al*. (1995, entire) rule set (see Schwartz *et al*. 2008, entire). Thus, the slight low bias associated with estimation of unknown/unreported mortalities is relatively inconsequential.

While there is uncertainty around estimates of unknown/unreported mortality, there is no inherent bias. The cause of death is indeed important. For example, the IGBST makes the reasonable assumption that deaths of radio-collared bears and those due to management removals are known with certainty and thus can be excluded from the Bayesian procedure that is used to estimate unknown/unreported mortalities from those documented mortalities that are discovered and reported (again excluding management removals and loss of radio-marked bears). The IGBST capture and radio-collaring efforts have been very consistent over time; while sampling this large ecosystem with its many remote and inaccessible areas is challenging, the combined effort of IGBST partner

agencies is based on a well-distributed spatial sample with very little variation in annual effort over several decades of sampling. The sex ratio in the overall population is 50M:50F, and since 2002, the sex ratio for mortalities of independent-aged bears within the Recovery Zone is 51M:49F, which statistically is not different from 50M:50F (IGBST, unpublished data). However, the sex ratio of mortalities outside the Recovery Zone is biased towards males (70M:30F) and reflects the fact that range expansion is driven by males. The overall average M:F mortality ratio for the ecosystem is approximately 59M:41F and is appropriate when assigning sex to documented mortalities for which sex of the animal could not be determined.

Natural deaths of cubs and yearlings (i.e., dependent young) are difficult to document, which is why the proposed rule only tracks the human-caused mortality for dependent young. Although current calculations for unknown/unreported mortality do not account for young potentially orphaned by hunting, it is extremely likely that evidence of lactation would be present on any female grizzly bear hide presented to State fish and game offices for sealing.

Regarding natural deaths of independent-aged bears, the IGBST accounts for four sources in the estimate of total mortality: (1) documented natural mortality from radio telemetry; (2) reported natural mortality; (3) a portion of the estimated unknown/unreported mortality previously described; and (4) a portion of reported grizzly bear mortalities for which a specific cause of death was undetermined but are likely from natural causes. These mortalities from undetermined causes are also used for the estimation of unknown/unreported mortalities, which is then included in the annual estimate of total mortality.

Annual estimates of total mortality for independent female and male bears are subsequently used to assess annual mortality rates for each of those two segments of the population. Since 2010, annual estimated mortality rates (as derived from the Chao2 estimator) averaged 7.5 percent and 9.8 percent for independent female and male bears, respectively, in the DMA. These estimates are slightly higher than the average mortality rates of 5 to 6 percent derived from known-fate monitoring of radio-marked bears (IGBST 2012). The difference is likely attributable to the fact that mortality rates derived from Chao2 estimates are biased low. Using an unbiased population estimator, such as the Mark-Resight method, would result in lower mortality rates that are more in line with those derived from known-fate monitoring, suggesting that estimates of total mortality are reasonable and, therefore, estimates of natural mortalities are also reasonable.

Issue 34—We received several public comments and concerns from peer-reviewers regarding the measurement and calculation of grizzly bear mortality. Commenters asserted that using known fate monitoring to measure grizzly bear mortality (with large data sets covering long time periods) reduces the ability to detect short-term trends and produces death rates that do not match reality. Another commenter asked if our calculation of unknown/unreported mortalities includes "possible mortalities."

Commenters also expressed concerns about our measurement of total mortality including: (1) that the IGBST reports do not include confidence intervals on mortality rates; (2) that the IGBST does not include natural deaths in their mortality estimations; (3) that the method the IGBST uses to calculate total deaths underestimates the number of total deaths with an unknown and inconsistent degree of bias; (4) that actual total mortality is twice as high as reported levels because analysts are not accurately capturing

mortality from unreported poaching and road kills; and (5) that emigration out of the DMA does not, but should, count towards total allowable mortality in the DMA or towards background mortality when calculating allowable discretionary mortality limits. One commenter suggested we use the upper bound of the 95 percent confidence interval to determine the value of unreported mortality we include in our calculation of total mortality.

Other commenters requested that the rule include information on geographic locations of factors associated with mortality risk (e.g., attractants, cover, roads, etc.), seasonal and annual distribution of these factors, and analysis on if these factors are likely to change in the foreseeable future, with or without delisting, or that detailed mortality information be publicly reported.

Response—Annual mortality rates are determined from Chao2-derived population estimates and *not* from known-fate modeling. Therefore, the comment regarding the limited ability to detect short-term trends is incorrect. Please see Issue 29 for further discussion on methods used to estimate population trend. For every reported mortality, our estimate is close to two unreported mortalities. In addition, grizzly bear mortalities are classified based on the definitions provided by Craighead *et al.* (1988), and mortality estimations include probable mortalities; however, they do not include possible mortalities.

The IGBST does not report credible intervals for estimates of unknown/unreported mortalities, which includes natural deaths, because it would substantially complicate implementation (see Issue 33 for further discussion). The IGBST includes all sources of mortality, including natural deaths, in their calculations of

total mortality for independent females and males. Although the method used for estimating unknown/unreported mortalities slightly underestimates mortality, it is inconsequential because other estimations associated with calculation of mortality rates are conservative (in their entirety: Knight *et al*. 1995; Schwartz *et al*. 2008). While there is uncertainty around estimates of mortality, there is no inherent bias (see Issue 33). There is no evidence that an increase in poaching (which has remained low for several decades) has occurred. Please see Cherry *et al*. (2002, entire) for further discussion on how poaching and other causes are accounted for in calculations of unreported/unknown mortality. The assertion that emigration out of the DMA should count towards total allowable or background mortality is incorrect. Emigration out of the DMA, if it occurred, would result in a lower population estimate, which would subsequently result in a higher mortality rate if the number of mortalities stayed the same. As discussed above in Issue 33, it is reasonable to rely on the central tendency of data.

We did not find it necessary to include detailed geographic locations of factors associated with mortality risk in the proposed or final rule because the IGBST maintains the GYE grizzly bear mortality database, which is available at *https://www.usgs.gov/science/interagency-grizzly-bear-study-team?qt-science_center_objects=3#qt-science_center_objects* (last accessed on February 22, 2017), with the basic information of location, date, sex, age, certainty, and cause of death. Additional information can be already attributed, as necessary, to the grizzly bear mortality records. In addition, the availability and quality of geographic information that can be attributed to mortalities and the analytical techniques are advancing rapidly. The IGBST routinely investigates geographic, temporal, and other relationships of

demographic parameters, particularly when monitoring data indicate potential changes are occurring. Therefore, if changes in mortality patterns are observed, research can be initiated to examine patterns over time for certain geographic areas, as well as potential causes, such as the study by Schwartz *et al*. (2010, entire), who developed a spatially explicit model of hazards affecting survival of grizzly bears.

Issue 35—Commenters expressed concern regarding recent increases in human-caused mortality, citing such statistics as: (1) hunter-caused mortalities increased over the past 11 years from 3.7 bears to 10.2 bears per year; (2) total human-caused mortality has increased since 1994; (3) mortality limits for males and/or females were exceeded in 5 out of the last 7 years; and (4) the number of mortalities grew 9 to 11 percent annually between 2002 and 2011, leading to an average of 50 bears dying each year in the past 10 years, despite implementation of I&E programs in 2008. Many commenters specifically expressed concern with the "record high" levels of mortality in 2015, claiming that 10 percent of the GYE population died; that human-caused mortalities increased in 2015, with 61 known mortalities and at least 30 additional unknown mortalities (numbers that may underestimate total mortality by 50 percent); and that the limit for female mortality was exceeded. Many commenters provided input on the causes of these recent high mortality levels: road/railroad mortality, poaching, and lethal control from conflicts with livestock and hunters.

Commenters also suggested that 2016 mortality levels are "unsustainable" and could exceed the 2015 records, which reduces public confidence that mortality levels will improve upon delisting. One commenter contended that mortality could approach 200 bears annually after delisting, if bears are also killed in trophy hunts. Commenters

worried if bears could withstand this additional mortality from hunting considering current high mortality levels without a hunt; many thought any additional mortality could lead to population decline. Commenters asserted that if the grizzly bear population has stabilized since 2002 while mortality rates have simultaneously increased, then the bear population is actually declining.

Many commenters also expressed concerns that the IGBST is no longer reporting violations of mortality thresholds, which the Service is required to publicly announce.

Response—First, it is important to understand that the proportion of mortalities outside the DMA is steadily increasing over time and that any population inference should be based on mortalities inside the DMA (e.g., 50 bear mortalities within the DMA in 2015 vs. 61 mortalities within the entire GYE, including 50 inside the DMA and 11 outside the DMA). Second, although the total number of human-caused mortalities has increased since the early 1990s, so has the grizzly bear's population size, which is why IGBST estimates mortality rates to determine if these rates are sustainable. Third, while mortality rates within the DMA have been above mortality thresholds in several years (e.g., 2015), the average has remained under the threshold over the recent period of 2010 to 2015 with 7.5 percent for independent females and 9.8 percent for independent males. And finally, causes of mortality have indeed changed over time as conservation measures were implemented and the population increased and expanded. For example, grizzly bear mortalities related to livestock depredations were almost eliminated within the Grizzly Bear Recovery Zone as livestock allotments were closed or retired during the 1980s. However, with the population expanding well beyond the boundaries of the Recovery Zone, where livestock grazing remains common, these type of mortalities have again

increased. The increase in hunter-related incidents may similarly be associated with range expansion. Human access in core areas of the ecosystem is generally lower compared with the periphery. Consequently, with range expansion the probability of grizzly bear encounters with hunters during fall ungulate hunts has increased.

Regarding concerns over the level of mortality in 2015, the estimated number of annual mortalities was 25 independent females and 32 independent males, including unknown/unreported mortalities (Haroldson and Frey 2016, pp. 29–30). The mortality rate for independent females was 10.1 percent, which exceeded the allowable mortality rate of 9 percent. Importantly, the demographic recovery criterion states that this rate is not to be exceeded for *3 consecutive years* (USFWS 2017, p. 5). We documented only one year of exceedance; therefore, the criterion was not violated. The independent male mortality rate (13 percent) was under the allowable limit of 20 percent.

Total mortality from any cause, including hunting, shall not exceed thresholds as defined in the final rule and 2016 Conservation Strategy; therefore, if hunting was allowed, it would be an inclusive instead of additive source of mortality. Although independent male mortality was higher in 2016 than in 2015 (37 individuals v. 32, respectively), the mortality rate (15.5 percent (Haroldson and Frey, *in press*)) did not exceed the annual mortality threshold of 20 percent (not to be exceeded for 3 consecutive years), as outlined in the demographic recovery criteria (USFWS 2017, pp. 5–6). The independent female mortality rate for 2016 (5 percent) was also below the threshold of 9 percent. Mortality rates are currently well below the agreed upon limits set out in the revised demographic recovery criteria (USFWS 2017, pp. 5–6) and committed to by

States in the Tri-State MOA. Therefore, we expect that, even if a grizzly bear hunt should occur, mortality rates will be maintained below the total mortality limits (table 2).

The assertion that the bear population may be actually declining is not supported by data. See Issue 29 for additional detail.

The IGBST did not include in their Annual Report for 2015 whether mortality thresholds were exceeded because the demographic recovery criteria were under revision. They will report if mortality rates are under or over sustainable rates, as measured by the revised demographic recovery criteria, in future annual reports, which will be available at *https://www.usgs.gov/centers/norock/science/igbst-annual-reports?qt-science_center_objects=1#qt-science_center_objects*.

Issue 36—Both commenters and peer-reviewers raised concerns over our ability to detect trends in vital rates and our interpretation of these trends. A peer-reviewer noted that monitored individuals may be more susceptible to capture and may not serve as an accurate representative sample in regards to the measurement of vital rates. Commenters also noted that negative trends in vital rates, and thus population declines, may not be detected until it is too late, citing that there has been a decrease in cub and yearling survival since the early 2000's, and that there is uncertainty associated with the ecological factors that may be contributing to this decline in vital rates. Finally, one commenter asked if the various reproductive parameters co-vary and, if they do, is it in a linear or non-linear manner.

Response—Sampling the GYE grizzly bear population for known-fate monitoring is challenging. Long-term capture efforts are not perfect but are designed to obtain a representative sample of the population and represent the best available scientific method

for the question at hand. While some individuals may be more susceptible to capture, there is no indication that this factor has caused a bias in estimation of vital rates. There are no studies or data suggesting that bears which are more susceptible to capture have lower or higher survival compared with bears that are less susceptible. On the contrary, population projections derived from vital rates for the period from 1983 to 2001 indicated robust population growth of 4 to 7 percent (Harris *et al*. 2006, p. 48), which was similar to the 4 to 5 percent trend obtained for counts of unique females with cubs-of-the-year for the same period (Harris *et al*. 2007, p. 175). Similarly, when a change in trajectory and a slowing of growth for counts of females with cubs-of-the-year was detected in the early 2000s, a reanalysis of vital rates for the period from 2002 to 2011 corroborated the slowing of population growth, producing population projections based on known-fate data indicating a 0 to 2 percent growth. The concordance between these two unrelated and distinct methods (i.e., estimates of females with cubs-of-the-year and population projections based on known-fate data) used to estimate trend, and as applied during the two different periods, lends confidence that vital rates derived from known-fate monitoring are reasonable and unbiased. Additionally, we have found no evidence that the number of captures per individual bear affected survival estimates of independent-aged bears (IGBST, unpublished data).

There is a lag time between when a change in trend occurs and when it may be detected. However, the current monitoring system effectively identified that a change in the population trajectory had occurred, which triggered the IGBST to conduct a comprehensive biology and monitoring review; this review led to the finding that cub and yearling survival and a reproductive parameter had declined, which led to further

investigations about the potential causes for these changes. Those potential causes were investigated in detail as part of the IGBST's Food Synthesis project and indicated associations with bear density (cub survival and reproductive transition decreased as bear density increased), but not with decline of whitebark pine. Regardless, the issues of trend detection are important. The IGBST is currently investigating the ability to detect (based on the Chao2 estimator) when population estimates have reached specific population thresholds and the degree to which population thresholds may be exceeded, both in time and population size, before they are detected. Reproductive parameters in wildlife populations, including bear populations, typically co-vary and often in a non-linear manner. Depending on the complexity of these relationships, the covariance of parameters may be difficult to accurately estimate.

Issue 37—Both the public and peer-reviewers presented comments about our discussion and analysis of the GYE's carrying capacity for grizzly bears, including raising concerns that figure 1 of the proposed rule is an oversimplification of a population at carrying capacity and requesting that an explanation of the additional variables influencing carrying capacity (e.g., food availability and emigration in search of food, mates, or territory) be included. One commenter noted that a graph illustrating how the Chao2 estimate of the GYE grizzly bear population is leveling off might provide a clearer demonstration of carrying capacity.

Some commenters questioned whether carrying capacity has been reached since (1) grizzly bears occupy only 25 percent of the GYE; (2) there is inherent difficulty in calculating carrying capacity; and (3) a population that is increasing at a rate of 3 to 4 percent per year and for which harvest needs to be adjusted to maintain mortality levels at

10 to 22 percent are not parameters characteristic of a population at carrying capacity. In addition, a few commenters questioned if our conclusion that the GYE grizzly bear population has reached carrying capacity applied within the PCA, the DMA, or the entire GYE. Conversely, other commenters expressed support that carrying capacity has been reached based on: (1) the preponderance of the best available science; (2) the stability of reproduction inside YNP; and (3) increased grizzly bear attacks on humans in recent years. Commenters worried that these attacks would increase and that male grizzly bears would start to kill dependent grizzly bears if the population keeps growing.

One commenter and several peer-reviewers suggested alternative hypotheses to our claim that the GYE population is approaching carrying capacity: (1) that a decrease in food availability (as mentioned in van Manen *et al*. (2016, p. 309)) may be the driver behind a slowing growth rate in the GYE grizzly bear population, the increase in grizzly distribution, and the increase in human-caused mortalities; and (2) that grizzly bears in the GYE may have reached a human *social* carrying capacity. These commenters also suggested increasing habitat to allow for population expansion and recovery.

Response—We have made clarifications in the carrying capacity discussion of the final rule (see *Population Ecology—Background*; *Population and Demographic Recovery Criteria*; and *Changes in Food Resources*) and the 2016 Conservation Strategy (see Population Trend). Although figure 1 of the proposed rule was a simplification of a population at carrying capacity (expressed as K), it is necessary to explain the general principles behind the concept of K. In addition, the narrative of carrying capacity addresses the complexity of this issue, including an explanation of the variables that some commenters proposed we include (i.e., density-dependent and density-independent

effects) and the difficulty in measuring carrying capacity. We disagree that a graph illustrating how the Chao2 estimate of the GYE population is leveling off may be a clearer demonstration of carrying capacity, because the population has only recently approached carrying capacity compared to a population that has been fluctuating around carrying capacity as conveyed in figure 1 of the proposed rule.

While one commenter noted that grizzly bears occupy only 25 percent of the GYE, we note that suitable habitat is roughly 24 percent of the total area within the GYE DPS boundaries, of which grizzly bears occupy 90 percent (see Issue 22). We acknowledge in the proposed rule the inherent difficulty in calculating carrying capacity. As the population has approached carrying capacity, the population growth rate has naturally slowed with the most recent trajectory using the Chao2 estimator showing no statistical trend within the DMA for the period 2002 to 2014 (van Manen 2016a, *in litt.*). The conclusion that the GYE grizzly bear population has reached carrying capacity applies within the DMA, as that is the area in which the population is monitored for population size, population trend, and mortality.

Studies by the IGBST provide strong support for a density-dependent effect for the leveling off of the population. Discussion of the Food Synthesis Report (see *Factor E*, above) addresses comments that suggested that a decrease in food availability may be the driver behind the slowing growth rate of the GYE grizzly bear population. Although van Manen *et al.* (2016, p. 309) recognized that a decreased carrying capacity was an alternative explanation for demographic changes in the GYE population, they also indicate the scientific evidence is not strong:

> "If bears were responding to a decline in carrying capacity, however, we would have expected home-range size and movements to have increased (McLoughlin et

> al. 2000), bears to have relied on lower energy food resources (McLellan 2011), and body condition to have declined as a consequence (Rode et al. 2001, Robbins et al. 2004, Zedrosser et al. 2006). To date, there is little support for these conditions in the Yellowstone Ecosystem: female home ranges have decreased in size and are less variable in areas with greater bear densities (Bjornlie et al. 2014b), daily movement rates and daily activity radii have not changed for either sex during fall (Costello et al. 2014), bears continue to use high-quality foods (Fortin et al. 2013), and body mass has not declined (Schwartz et al. 2014). As we discussed previously, percent body fat among adult females has not declined since the early 2000s (IGBST 2013, Schwartz et al. 2014) and, regardless, this effect would be consistent with either interference or exploitation competition and would not explain the changes in vital rates that occurred much earlier than the declines in foods. Current evidence indicates bears showed a functional response to declines in whitebark pine (Costello et al. 2014) and cutthroat trout (Fortin et al. 2013) and compensated for the loss of these particular foods through diet shifts Schwartz et al. 2014)."
>
> The IGBST data does not support the alternative hypothesis that human social carrying capacity has been reached and is contributing to the slowing of population growth. On average, total mortality rates over the last 10 to 15 years have not exceeded established mortality thresholds and there is no evidence of an increase in poaching, which has remained low for several decades. The DMA is based on an IGBT assessment of an area "sufficiently large to support a viable population in the long term" (IGBST 2012, p. 42). The 2016 Conservation Strategy incorporates adaptive management and monitoring of population vital rates, habitat standards, and major foods into management decisions to ensure that the GYE grizzly bear DPS remains recovered.

Issue 38—Some commenters questioned our interpretation of bear density in the GYE. Many commenters claimed that bear density is actually decreasing in the GYE because the population has stabilized or decreased since the early 2000s while grizzly bear range has simultaneously increased by as much as 40 percent (i.e., the same number of bears are spread across an ever-increasing area) and that such declines in density are suggestive of habitat decline and decreased carrying capacity. One commenter took issue

with the methods we used to assess density, stating that researchers have not reviewed our density index to confirm its reliability.

Commenters also raised concerns about the factors we used to evaluate the relative influence of density-independent and density-dependent effects on grizzly bear population dynamics in the GYE, suggesting: (1) that of the four factors we analyzed, only one factor (home range size) differed between the analyses of density-dependence and density-independence, and, therefore, the other three factors (decreased cub and yearling survival, increased age of first reproduction, and decreased reproduction) cannot be used to distinguish between the influence of density-dependent and density-independent effects; (2) that we only explained one of these four factors (cub survival); and (3) that we did not account for temporal changes in the abundance of key foods and habitat. Commenters thus questioned the causal link we suggested between density-dependence and declining vital rates, and one peer-reviewer suggested we review our use of any words suggesting causality, as opposed to association, in our density-dependence analysis.

Response—The hypothesis that population density in the core area has decreased and that the same number of bears is spread across an increasing area is not supported by the best available data, including that:

(1) The number of females with cubs-of-the-year in YNP showed a gradual but steady increase from 1973 through 2015, while the number of females with cubs-of-the-year observed outside of YNP increased at a much higher rate starting in the late 1980s (IGBST, unpublished data) (see figure 4 in the 2016 Conservation Strategy).

(2) Home-range and movement data do not support the interpretation that bears are leaving the core of the ecosystem; additionally, from a life-history aspect, range fidelity for adult female grizzly bears is high and female offspring also tend to establish their ranges adjacent to or near their maternal ranges.

(3) Recent range expansion has occurred beyond the DMA, and thus beyond the area where the IGBST conducts population monitoring. However, we believe the population is close to carrying capacity inside the DMA and expect continued range expansion through bear dispersal.

(4) The IGBST uses four independent methods to estimate population size and/or trend (see Issue 29).

In regard to the density index, it was peer-reviewed (contrary to the comment submitted that it was not), published, and presented in detail in both Bjornlie *et al.*'s (2014b) Supplemental Materials and in van Manen *et al*. (2016, pp. 303–304). The basis for the density index is a spatially explicit population reconstruction—thus, it incorporates capture and home range information from much more than bears trapped in any one year.

In response to comments about our conclusions from our analysis of density-independent and density-dependent effects on grizzly bear population dynamics in the GYE we added clarifying language in this rule (see *Population Ecology—Background* and *Changes in Food Resources*) and 2016 Conservation Strategy (YES 2016a, pp. 49–50).

In response to the comment suggesting we review our use of words suggesting "causality" as opposed to "association" in our density-dependent analysis, we clarified

that density-dependent effects are the likely cause of the recent slowing in population growth factors rather than "associated with".

Habitat Management Issues (Factor A)

Issue 39—Regarding the delineation of boundaries, particularly for the DMA and PCA, some commenters: (1) questioned why some currently occupied habitat was excluded from the DMA; (2) recommended that DMA and PCA boundaries be expanded to accommodate more potential habitat, including all designated wilderness lands adjacent to the proposed DMA; (3) suggested that the DMA boundaries should not be changed post-delisting; or (4) noted that the PCA is based on early, rough estimates of the grizzly bear recovery zone, which provided habitat for 229 bears and was never updated. Lastly, some commenters suggested that the Service should first determine how many bears are needed for recovery, then delineate enough suitable habitat to meet those needs.

Response—The DMA boundaries are based on the best available science from the IGBST (2012, pp. 41–44). While the Recovery Plan identified the Recovery Zone as the "area within which the population and habitat criteria…will be measured" (USFWS 1993, p. 17), the IGBST recommended that maintenance of a grizzly bear population that extends outside of those boundaries into adjacent suitable habitat would help "ensure the long-term viability of this population" (IGBST 2012, p. 41). The IGBST then examined the Service's suitable habitat boundary, population monitoring data, and mortality data to identify boundaries that would be "…sufficiently large to support a viable population in the long term, such that mortalities beyond it could be excluded from consideration" (IGBST 2012, p. 42). Because the Service's suitable habitat line is based largely on mountainous ecoregions, the IGBST recommended including valley floors surrounded by

suitable habitat in the DMA so that the disproportionate mortality that may occur in those areas (i.e., the 'edge effect') is not excluded from the overall picture of population health and monitoring.

The IGBST used the average annual activity radii of independent female grizzly bears to buffer and smooth the boundaries of suitable habitat so that the DMA would encompass areas outside of suitable habitat that were likely to be used by grizzly bears on a regular basis. This is the process by which areas such as the Upper Green River were included within the DMA boundaries. Conversely, because this quantitative technique smoothed the boundaries of suitable habitat and did not attempt to define suitable habitat itself, it is also the reason some areas in the southern Wind River Range were not included in the DMA even though they are found within Wilderness Areas. These were areas that did not meet the definition of suitable habitat because they possessed high mortality risk due to large, contiguous blocks of sheep allotments. The Service adopted the IGBST's recommended DMA boundaries in the Revised Demographic Criteria (USFWS 2017, entire). The Big Sandy and Popo Agie areas are included in the DMA because we consider most of the Wind River Range to be suitable habitat for grizzly bears in the GYE due to the large percentage of Wilderness. Lastly, recovery plans are not regulatory documents and are instead intended to provide guidance to Federal agencies, States, and other partners on criteria that may be used to determine when recovery is achieved.

Issue 40—Both public commenters and peer-reviewers thought our definition of suitable habitat was qualitative, too weak, and lacked rationale. Public commenters provided additional comments regarding our definition of suitable habitat, including that

it: (1) did not, but should, include lands with sheep allotments and other livestock operations that can increase human-bear conflicts; (2) does not identify what proportion of suitable habitat is "core habitat" versus "edge habitat;" (3) does not specify which areas (core or edge habitat, suitable or unsuitable habitat) are needed to sustain the GYE population's viability; (4) does not explain the meaning of "support survival;" (5) excluded important potential habitat on public lands adjacent to the DMA; (6) excluded "some habitat outside the DMA that is already occupied;" and (7) incorrectly excluded currently unoccupied areas based on the potential "social intolerance" for bears in these areas. Moreover, commenters noted that social acceptance is ephemeral and wondered how plans, regulations, and the 2016 Conservation Strategy would allow for the changing definition of "socially acceptable." One commenter suggested using "spatially dynamic boundaries" in our definition to allow for geographical shifts in habitat types and changing food locations. Finally, one peer-reviewer requested that we treat all of the three characteristics of suitable habitat equally, and provide more detail on characteristics 1 and 2, in our discussion of suitable habitat.

In addition, other commenters were uncertain as to how we defined unsuitable habitat and wondered if unsuitable habitat was "non-habitat," "edge habitat," habitat with a certain number of human-bear conflicts, areas where "reasonable levels of bear/human conflict precautions do not suffice to prevent the death of a substantial fraction of bears entering this area," or areas that are population sinks. One commenter suggested that the Service makes unsupported claims that bears in unsuitable habitat are more "transient" and did not define "transient." Commenters requested demographic data on each area of unsuitable habitat, presuming these areas are sinks, as well as information on the methods

managers used to determine the number of bears in unsuitable habitat and how much time each bear spent in unsuitable habitat. Other commenters worried that declaring habitat unsuitable because of the high risk of mortality would become a "self-fulfilling prophecy" and that bears entering unsuitable habitat may no longer be a member of a viable population.

One commenter requested two additional visuals: (1) a map that overlays locations of bear deaths with habitat suitability, the "range" of viable populations, and the home ranges of the dead bears; and (2) a map that shows which unsuitable habitat does not meet grizzly bear needs because of concerns about mortality risk and which unsuitable habitat does not meet grizzly bear needs for other reasons. Another commenter asked for further details on what levels and kinds of management to reduce conflicts would be considered "reasonable and manageable," specifically: I&E; efforts to reduce the availability of attractants; live-trapping and removal of conflict bears; and aversive conditioning of conflict bears.

Response—Our definition of suitable habitat is based on biological criteria and the results of previously published research about grizzly bear mortality risk and biological needs. We used the Middle Rockies Ecoregion as a surrogate for habitat quality/capacity, an approach that is supported by many previous studies which have found that mountainous regions generally possess the habitat components necessary for grizzly bear viability, including hiding cover, topographic variation necessary to ensure a wide variety of seasonal foods, steep slopes used for denning, and remoteness from humans (Craighead 1980, pp. 8–13; Knight 1980, pp. 1–3; Judd *et al*. 1986, pp. 114–115; Peek *et al*. 1987, pp. 160–161; Aune and Kasworm 1989, pp. 29–58; Merrill *et al*. 1999,

pp. 233–235; Pease and Mattson 1999, p. 969; Linnell *et al*. 2000, pp. 403–405; Mattson and Merrill 2002, p. 1128).

Our determination that large, contiguous blocks of sheep allotments were not suitable for grizzly bears was biologically based on mortality rates. Scattered, small, and isolated sheep allotments were included in suitable habitat and considered in our threats analysis under *Factor A,* above. The GYE grizzly bear population's long-term viability is ensured without their occupancy of areas that currently contain large, contiguous blocks of sheep allotments because of the habitat protections inside the PCA and the large percentage of suitable habitat outside the PCA (60 percent) that is classified as Wilderness (6,799 km^2 (2,625 mi^2)), WSA (708 km^2 (273 mi^2)), or IRA (6,179 km^2 (2,386 mi^2)). Even with the exclusion of these large, contiguous blocks of sheep allotments, most of the Wind River Range met the definition of suitable habitat. The Palisades may be outside of suitable habitat but the Idaho grizzly bear management plan specifically identifies this area as "likely to be inhabited by grizzly bears" (Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, pp. 8–9). States have no plans or intentions of excluding non-conflict grizzly bears from Wilderness, WSAs, or IRAs on public lands and have made it clear that their management efforts outside of suitable habitat and the DMA will focus on conflict response in areas with higher human densities (e.g., subdivisions) (Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, pp. 8–9; MFWP 2013, p. 44; WGFD 2016, pp. 12, 20).

The presence of grizzly bears in places with high levels of human activity and human occupancy results in biological effects to grizzly bears in terms of increased mortality risk and displacement. The level of this effect is directly related to the location

and numbers of humans, their activities, and their attitudes and beliefs about grizzly bears. The consideration of human activities is fundamental to the management of grizzly bears and their habitat. While it is true that the current distribution of grizzly bears extends outside of the DMA into unsuitable habitat, the records of grizzly bears in these areas are generally due to recorded grizzly bear–human conflicts or to transient animals, not reproductive females with offspring. For instance, between 1985 and 2014, only 2.1 percent of all sightings of unduplicated females with cubs-of-the-year were outside of the DMA (Haroldson 2016, *in litt.*). These areas are defined as unsuitable due to the high risk of mortality resulting from these grizzly bear–human conflicts. These unsuitable habitat areas do not permit grizzly bear reproduction or survival because bears that repeatedly come into conflict with humans or livestock are usually either relocated or removed from these areas.

Our definition of suitable habitat is biologically based on the best available science and not on "social intolerance." The 2016 Conservation Strategy specifies strategies to manage grizzly bear–human conflicts, and for ongoing I&E programs, both of which foster social tolerance (YES 2016a, pp. 86–95). The adaptive management approach described in the 2016 Conservation Strategy will allow management agencies to make changes, if necessary, to I&E efforts and conflict management in response to potential impacts of changes in social tolerance.

Our analysis of suitable habitat was a quantitative, broad-scale habitat assessment. As such, its purpose was to provide an understanding of the broad trends in habitat distribution, not to address the nuances of changing food sources or dynamic mortality risk as "spatially dynamic boundaries" would. While we appreciate this commenter's

suggestion, we conclude that the spatially explicit survival modeling done by the IGBST is adequate to address these concerns (see Schwartz *et al*. 2010). We have not assigned numerical quality scores to habitats based on grizzly bear body condition or productivity because of the uncertainties surrounding such calculations, instead concluding that it was appropriate to use a more generalized, coarse-scale interpretation of what habitat would meet grizzly bear needs. Other models that predict where suitable grizzly bear habitat occurs within the GYE produced results similar to ours (Noss *et al*. 2002, p. 903; Merrill and Mattson 2003, pp. 182, 184).

The Act does not require us to quantify the proportion of suitable habitat that is "core" versus "edge" habitat; however, we did consider edge effects in our analysis and chose not to include isolated patches and strips of land as suitable habitat because of the potential for higher mortality. The IGBST tracks mortality and associated causes (see Issue 34). Historically, increased human-caused mortality risk was associated with motorized access routes, which led to implementation of motorized access route standards (YES 2016a, pp. 54–71; *Factor A* analysis). Currently the leading causes of human-related mortalities are hunting-related (including mistaken identity kills by black bear hunters and self-defense), and management removals due to either livestock depredations or site-specific human-bear conflicts, which are not geographically associated with an "edge" effect. Suitable habitat, as identified in the proposed and final rule, is sufficient to maintain a recovered grizzly bear population. Please see the *Recovery Planning and Implementation Suitable Habitat* section of this final rule for the definition and a discussion of suitable habitat, including all three of the characteristics of suitable habitat and how it was mapped. Because population sinks may occur in narrow,

linear valley floors that are not suitable habitat but are largely surrounded by suitable habitat (i.e., "edge effect"), these were included in the demographic monitoring area, the area in which the population is monitored, and mortality limits will be applied. See *Factor A*, above, for further discussion.

The IGBST's annual reports include maps of mortality locations that show the distribution of grizzly bear mortalities in the GYE and the boundaries for the PCA and the DMA. As only 22.3 percent of known and probably independent-aged grizzly bears that died from 2002 to 2014 were collared at the time of their death (Haroldson 2017a, *in litt*.), it is not possible to show the home ranges of all dead bears. Please see the 2016 Conservation Strategy for discussion on conflict management (YES 2016a, pp. 86–91) and I&E efforts (YES 2016a, pp. 92–95) to reduce conflicts.

Issue 41—Commenters expressed concerns about our analysis of the relationship between habitat availability and grizzly bear population viability. A peer-reviewer expressed concerns that our discussion of habitat management in the proposed rule focused primarily on preventing human-caused mortality, rather than on systematically identifying the biological features characteristic of important grizzly bear habitat. This peer-reviewer requested that we provide information on the biological features of habitats that different ages and sexes of grizzly bears use during each season using the quantitative methods from Proctor *et al*. (2015). The peer-reviewer also suggested that these resource selection models could be used to bolster the definition of suitable habitat. One commenter believed that the Service did not properly evaluate the amount of habitat necessary to maintain a viable grizzly bear population despite available science on this subject (e.g., Noss *et al*. 1999). The commenter also believed that the Service failed to

perform spatially explicit analysis of vegetation and habitat productivity, as in the Cumulative Effects Model (CEM), which the commenter claimed we inappropriately stopped using without scientific explanation or adequate replacement. One commenter did not believe we adequately assessed relationships between habitat features and vital rates and that we did not explain the time lags in this analysis.

Response—Our habitat management standards rely heavily on reducing anthropogenic influences and minimizing grizzly bear–human conflicts because excessive human-caused mortality and subsequent population decline was the primary factor that led to the species' original threatened listing in 1975. For a detailed explanation of this rationale please refer to the *Habitat-Based Recovery Criteria* section of this final rule and Chapter 3 of the 2016 Conservation Strategy (YES 2016a). Schwartz *et al*. (2010, p. 658) used 21 years of data and nearly 12,000 known grizzly bear locations to create a habitat-based risk model that accounted for the habitat features associated with grizzly bear survival throughout the GYE. This risk model examined how motorized use of roads, productivity and seasonality of high-calorie foods, site developments, livestock allotments, number of homes on private lands, elk hunting units, and season influenced grizzly bear survival on the landscape (Schwartz *et al*. 2010, pp. 656–658). The resulting models identified source and sink habitats throughout the GYE and further supported our management approach of limiting motorized use and developed sites to improve grizzly bear survival (Schwartz *et al*. 2010, p. 659).

Schwartz *et al*. (2010, entire) did not use resource selection functions to develop their model because resource selection functions are not always proportional to the true probability of use and, therefore, are not always the best way to describe habitat

relationships (Keating and Cherry 2004, p. 788). However, in principle, the spatially explicit risk model of Schwartz *et al*. (2010, pp. 656–658) can be thought of as a special case of a resource selection function, but with the variable of interest being survival rather than habitat selection. In fact, we conclude that the risk model is more relevant for decision-making because it actually measures a demographic parameter (i.e., survival) as opposed to habitat selection, which may or may not influence demographics. We have reviewed Proctor *et al*. (2015, entire), and, while we acknowledge it is a useful tool for predicting areas of grizzly bear use, we find the results of Schwartz *et al*. (2010, pp. 658–661) more appropriate for making management decisions because Schwartz *et al*. (2010, pp. 658–661) linked habitat features to actual grizzly bear survival on the landscape.

Although Boyce *et al*.'s (2001, entire) population viability analysis did not consider possible changes in habitat, based on female with cubs-of-the-year trends from 1983 to 1997, they found that the GYE grizzly bear population had a 1 percent chance of going extinct in the next 100 years. The GYE grizzly bear population has continued to expand in both population size and distribution since this analysis. Secure habitat, as discussed by Noss *et al*. (1999, pp. 101–102), is the key to reducing human-caused mortality. Secure habitat will be provided through application of the 1998 baseline inside the PCA and through Wilderness, WSAs, and IRAs that cover 60 percent of suitable habitat outside the PCA. Mortality limits necessary to maintain a recovered population, as set forth in this rule, the 2016 Conservation Strategy, the revised demographic recovery criteria, and the Tri-State MOA, will be applied within the DMA. Please see Issue 40 and *Factor A* for further discussion of the habitat necessary to maintain a viable grizzly bear population.

Appendix E of the 2016 Conservation Strategy explains why the CEM is no longer the best available science and that the Motorized Access Model, established concurrently with the CEM, will be the tool used to project impact analysis (YES 2016b). The Motorized Access Model calculates and monitors secure habitat and motorized route density. The 2016 Conservation Strategy incorporates the IGBST's long-term monitoring data of population vital rates, habitat standards, and major foods and will be used to inform management decisions on maintaining a recovered GYE population. Although lag effects can occur in large vertebrate populations affected by habitat declines, there is little evidence of a lag effect at the grizzly bear population or individual level in response to changes in food resources. The IGBST's current monitoring system effectively identified a change in the species' population trajectory, which subsequently triggered the IGBST to conduct a comprehensive biology and monitoring review. See Issue 36 for further discussion on lag effects, vital rates, and habitat features.

Issue 42—Peer-reviewers and commenters expressed concern with our definition of secure habitat. Peer reviewers provided requests for additional rationale for our use of 10 acres as the minimum size in the definition of secure habitat; and suggestions to change our requirements for lake size in defining secure habitat since grizzly bears do not use most open water (and thus any lake, regardless of size, should be classified as insecure). A commenter worried that we used a definition of secure habitat from the USFS's 2006 EIS, which does not contain a justification for the definition.

Commenters and peer-reviewers provided the following alternative means of defining secure habitat: (1) defining "microscale" security areas as approximately 28.3 km^2 (10.9 mi^2) in size that have a 2- to 4-km (0.8- to 1.5-mi) buffer from roads or human

facilities, as recommended in Mattson (1993); (2) increasing minimum core security areas to approximately 10 km^2 (6.2 mi^2) to allow for dietary flexibility and to fully encompass the average daily movements of an adult female grizzly bear (Gibeau *et al*. 2001); (3) ensuring secure habitat is at least 500 meters (m) (1,640 feet (ft)) from areas of high human use, defined as areas with more than 100 human visits per month; and (4) including a buffer along lake shorelines that "represents the actual area used by grizzly bears."

Peer-reviewers and commenters provided suggestions on the management of secure habitat, including that: (1) any future changes to secure habitat, and subsequent mitigation efforts, need to ensure that secure habitat is distributed across the landscape in a way that does not cause habitat fragmentation and that facilitates movements of bears both within and between bear management units (from a peer-reviewer); (2) the 2016 Conservation Strategy's guidelines for road construction on secure habitat, signage, and crossing structures are vague, especially about who monitors road density, makes decisions about additional roads, and pursues mitigation; (3) the proposed rule and the 2016 Conservation Strategy were not consistent in how they discussed USFS maintenance of secure habitat; and (4) the 2016 Conservation Strategy's provisions that allow only temporary reductions in the amount of secure habitat seem to apply only to Federal projects and leave open what could happen to secure habitat affected by State or county road projects (especially if they are emergency projects or broad-scale projects that could affect more than one BMU).

Response—Our definition of secure habitat includes areas as small as 10 acres in size because the IGBST and YES concluded that all secure habitats are important for

grizzly bears in the GYE, regardless of size, particularly in peripheral areas. We remain confident in our definition of secure habitat because Schwartz *et al*. (2010, p. 661) were able to demonstrate a direct link between this definition and grizzly bear survival in the GYE. If we heeded the recommendations of commenters and enlarged the minimum size of secure habitat to 10 or 28.3 km^2 (3.9 or 10.9 mi^2), the end result would be that thousands of acres of secure habitat would no longer be considered secure and would, therefore, not be subject to the "no net loss" standard. By using a smaller minimum acreage requirement, we are not excluding any of the larger blocks of secure habitat.

Lakes are not automatically considered secure habitat. Instead, secure habitat is based on the presence or absence of motorized access. Lakes larger than 2.6 km^2 (1 mi^2) are removed from the analysis and are not considered either secure or non-secure habitat. Security of lakes smaller than 2.6 km^2 (1 mi^2) is evaluated by the presence/absence of motorized roads and trails within the general vicinity. The negative effect of humans on grizzly bear survival and habitat use are well documented (Harding and Nagy 1980, p. 278; McLellan and Shackleton 1988, pp. 458–459; Aune and Kasworm 1989, pp. 83–103; McLellan 1989, pp. 1862–1864; McLellan and Shackleton 1989, pp. 377–378; Mattson 1990, pp. 41–44; Mattson and Knight 1991, pp. 9–11; Mattson *et al*. 1992, pp. 436–438; Mace *et al.* 1996, p. 1403; McLellan *et al*. 1999, pp. 914–916; White *et al*. 1999, p. 150; Woodroffe 2000, pp. 166–168; Boyce *et al*. 2001, p. 34; Johnson *et al*. 2004, p. 976; Schwartz *et al*. 2010, p. 661). In light of this, the importance of secure habitat, simply defined as a function of distance from roads, is indisputable. Therefore, if a small lake is farther than 500 m (1,640 ft) from a motorized access route, it is deemed

secure habitat; otherwise, portions of lakes within 500 m (1,640 ft) of motorized access routes are considered non-secure habitat.

We do not think it is necessary to modify our definition of secure habitat to exclude areas within 500 m (1,640 ft) of high human use. Federal agencies lack sufficient resources and data needed to measure the intensity of human-use for every road and trail throughout the ecosystem. Instead, for grizzly bear purposes, motorized access is a surrogate measure of human presence on the landscape and one that can be reliably tracked via GIS. Research indicates that non-motorized trails do not significantly affect grizzly bear survival, and that survival was better explained by the presence of motorized routes (Schwartz *et al*. 2010, p. 659). Those areas farther than 500 m (1,640 ft) from the nearest motorized access are considered secure habitat.

We agree with the comment that any changes to secure habitat should ensure it is distributed across the landscape in a way that does not cause habitat fragmentation. The 2016 Conservation Strategy directs that, on the rare occasions when there are projects inside the PCA that require the construction of new roads (i.e., permanent changes to secure habitat), any replacement of secure habitat must be of equivalent quality and quantity (YES 2016a, pp. 61–63). Grizzly bear habitat connectivity is one of the many factors that would be assessed in determining if that replacement habitat was of equivalent quality. Additionally, any project on public lands within suitable habitat outside the PCA that requires highway construction would evaluate the impacts of this motorized use on grizzly bear habitat connectivity (YES 2016a, pp. 82–83).

The NPS and the USFS manage the majority of lands within the GYE and are responsible for managing road construction on their lands, including monitoring road

density, making decisions about additional roads and pursuing mitigation. Land and resource management plans for National Forests and National Parks in the GYE have incorporated additional habitat standards and other relevant provisions of the 2016 Conservation Strategy (USDA FS 2006b, entire; YNP 2014, p. 18; GTNP and JDR 2016, p. 3) and will guide decisions about road management. The allowance for temporary reductions in secure habitat applies only to areas inside the PCA, of which 97.9 percent of the land is Federally owned. With only 2.1 percent of the land in private and other ownerships, we conclude that any future State or county road projects would not substantially affect secure habitat. Additional specificity and timelines will be provided in State grizzly bear management plans, forest plans, and other appropriate planning documents for areas outside the PCA.

Issue 43—Many public and State commenters and peer-reviewers commented on the adequacy of the current amount of grizzly bear habitat and habitat protection. While the States emphasized that current habitat protections are adequate, some commenters thought otherwise, claiming, in regard to both the amount of habitat and level of protection, that (1) the amount of grizzly bear habitat is "shrinking" and insufficient to support long-term population growth; (2) more secure habitat should be protected now to compensate for potential future losses; (3) managers must maintain habitat conditions to keep grizzly bear populations stable; (4) one-third of occupied habitat lacks any habitat protections; (5) grizzly bears would lose 2.1 million acres (or 23 percent) of occupied habitat under State regulations; and (6) the States should be required to manage for increasing habitat. A peer-reviewer recommended that managers develop plans to control important habitat components (e.g., distribution and abundance of ungulates). Lastly, one

commenter requested additional information on the current amount of various types of habitat and how this will change in the future (such as the amount of unsuitable edge habitat, non-habitat, and denning habitat).

Response—We disagree that the amount of grizzly bear habitat is shrinking and insufficient to support long-term population growth. We acknowledge that it is difficult to specify the precise size of the area necessary to support a population of grizzly bears because these animals are long-lived, opportunistic omnivores whose needs for foods and space vary depending on a multitude of environmental and behavioral factors, and on variation in the experience and knowledge of each individual bear. Therefore, to guide us in establishing habitat criteria that will maintain a healthy population into the future, we evaluated the past habitat factors that had produced an increasing GYE population in both numbers and range. Habitat protection standards and monitoring protocols in the Conservation Strategy call for no net loss of secure habitat with respect to 1998 conditions, which are believed to have supported and contributed to robust GYE population growth observed during 1983 to 2001. Habitat standards, as they apply to the 1998 baseline, impose measurable side boards on allowed levels of human activity inside the PCA and establish a clear benchmark against which future improvements and impacts to habitat can be measured. Although approximately 23 percent of the current range occurs outside of the DMA, our assessment of suitable habitat is that it contains adequate habitat quality and quantity to support a recovered grizzly bear population (see the *Suitable Habitat* section of this final rule and Issue 41 for further discussion on suitable habitat). We conclude that increases in habitat are not necessary to support a recovered population and that our habitat protection criteria are adequate and biologically sound.

Regarding the comment suggesting managers should develop plans to control important habitat components, the GYE National Forests and National Parks have incorporated the habitat components outlined in the Conservation Strategy into their compendia, and the National Forests' 2006 Forest Plan Amendment will go into effect upon delisting, as stated in the amendment (see Issue 95 for more details on the Forest Plan Amendment). Their 15-year implementation history gives us confidence that they will do so. Additionally, the Conservation Strategy was signed by State agencies and Federal land management agencies in December 2016 and is currently in place. See Issue 48 for more information about which habitat components, including the abundance of ungulates, will be monitored. The IGBST will continue demographic monitoring of the GYE grizzly bear population and the habitat criteria set forth in the 2016 Conservation Strategy; therefore, the IGBST would be able to detect if changes in vital rates occurred and evaluate whether they were a result of changes in habitat quality or quantity. Upon completion of a demographic review, the IGBST will provide the information to the YGCC, who will decide if modifications to the 2016 Conservation Strategy are necessary.

Issue 44—Some commenters requested clarity on the "habitat standards" in the 2016 Conservation Strategy, including: (1) when, how, and by whom the standards would be revised, and (2) additional information on the "administrative and maintenance needs" that allow exceptions to the standards. Commenters also worried that the plans for habitat management (as a means to reduce human-caused mortality) in the 2016 Conservation Strategy lacked specificity and timelines.

Response—The habitat standards in the 2016 Conservation Strategy will be in effect for the foreseeable future. Results of habitat monitoring, as set forth in the 2016 Conservation Strategy (YES 2016a, pp. 54–85), will be reported in the IGBST annual reports. Revisions to the Conservation Strategy would be based on the best available science, approved by the YGCC, and subject to public comment. If the IGBST detects changes to the population as a result of habitat loss or modification through their demographic monitoring of the population, the YGCC may determine that revisions to the Conservation Strategy are necessary to maintain a recovered grizzly bear population in the GYE. The Service will initiate a formal status review if there are any changes in Federal, State, or Tribal laws, rules, regulations, or management plans that depart significantly from the specifics of population or habitat management detailed in this rule and the Conservation Strategy and significantly increase the threat to the population. The 2016 Conservation Strategy details the application rules that outline conditions under which Federal projects are authorized to cause permanent changes to secure habitat and developed sites, including administrative and maintenance activities (YES 2016a, pp. 61–67). The habitat management standards detailed in the 2016 Conservation Strategy (YES 2016a, pp. 54–85) to reduce human-caused mortality have already been implemented through National Park Compendia (YNP 2014b, p. 18; GTNP and JDR 2016, p. 3) and the 2006 Forest Plan Amendment (USDA FS 2006b, entire).

Issue 45—We received several comments from both the public and peer-reviewers regarding use and development in secure habitat within the PCA including: (1) that increased development on lands surrounding the National Parks should be considered; and (2) the exceptions that allow changes to the 1998 baseline for secure

habitat and developed sites for administrative and maintenance needs should either be limited or further clarified. In addition, public commenters suggested that: (1) projects that temporarily change the amount of secure habitat should not be allowed; and (2) recurring low-level helicopter flights and temporary road construction should not be allowed during denning season.

Response—We agree that developed sites on lands surrounding National Parks should be considered, and have done so. Within the PCA, the number and capacity of developed sites on public lands both inside and outside of the National Parks will be maintained at 1998 levels, a level that was compatible with an increasing grizzly bear population (Harris *et al.* 2006, p. 48). In suitable habitat outside the PCA, food storage orders, large percentages of Wilderness Areas, WSAs, or IRAs, and outreach programs will prevent and address the mortality risk associated with developed sites on public lands. On private lands, we have no authority to limit developed sites and do not think this is necessary. Approximately 1.5 percent of lands inside the PCA and 9 percent of suitable habitat outside the PCA are privately owned. These small proportions, coupled with the extensive outreach and conflict prevention and response protocols in the State management plans, ensure private land development is not a threat to the GYE grizzly bear population now, or in the future. For more information, please see *Factor A*, above.

However, we disagree that temporary projects should not be allowed on public lands inside the PCA. In general, it is reasonable and biologically sound to provide management flexibility and discretion to land management agencies so they can fulfill their mandates of balancing and accommodating multiple uses (USFS) and providing for public recreation while conserving resources (NPS). These allowances for temporary

changes to secure habitat were based on known levels of project activities occurring during the 1990s, a time during which the GYE grizzly bear population was known to be increasing (Harris *et al*. 2006, p. 48). There are no biological data to demonstrate that the temporary 1 percent level of secure habitat disturbance in any subunit has had any detrimental effect on the grizzly bear population. Temporary changes in secure habitat may not exceed 3 years, can affect no more than 1 percent of the largest subunit size within that BMU, may occur in only one subunit at a time, and project roads will not be open to public use (YES 2016a, pp. 63–64). These temporal and spatial restrictions, as well as the requirement that all secure habitat be restored upon completion of a temporary project, mean there will be no permanent loss of secure habitat in any subunit.

There is no exception to the 1998 baseline regarding administrative use of roads that are closed to the public. All roads, even if only open for administrative purposes, are considered open roads and are included in the 1998 baseline (YES 2016a, p. 61). There is a very specific statement in the 2016 Conservation Strategy (YES 2016a, p. 64) that allows administrative use on existing routes for the purposes of power line/utility maintenance. These roads are not open to the public, have no obvious footprint, and are used very rarely. As such, we continue to conclude that allowing access for power line and utility maintenance is not a threat to the GYE grizzly bear.

For developed sites on public lands, expansion of existing administrative sites is allowed if these are "deemed necessary for enhancement of public land management and other viable alternatives are not available" (YES 2016a, p. 66). This does not allow new developed sites for administrative purposes, only expansion in capacity or acreage of existing administrative sites. In general, administrative sites are occupied by trained

personnel of the National Forests or National Parks, contain strictly enforced requirements for securing attractants from grizzly bears, and prohibit most personnel from carrying firearms. As such, administrative sites do not pose the same level of risk to grizzly bear survival as sites occupied by the general public, so it is reasonable to allow some expansion of capacity at these existing sites.

The allowance for temporary projects that include low-level helicopter flights and temporary road construction during the grizzly bear denning season (December 1–February 28) is also biologically sound and reasonable. While no studies have been conducted documenting impacts of low-level helicopter flights on grizzly bears during the denning season, as discussed in the *Factor A—Snowmobiling* section above, even direct disturbance at den sites due to snowmobiles does not necessarily result in den abandonment or any detectable consequences to grizzly bears. Furthermore, of the 652 grizzly bear mortalities that occurred between 1975 and 2014, only 1 occurred between Dec. 1 and Feb. 28. This single mortality was a radio-collared, 20-year-old male that died in January from natural causes in YNP, most likely from maladies associated with old age. We have no information suggesting that low-level helicopter flights during the denning season may be a threat to the GYE grizzly bear population now or in the future.

Issue 46—Numerous public commenters expressed concern about the negative effects of existing, and potential future development of, roads and trails, and the species' ability to respond to these threats, including: habitat loss and fragmentation, increased access by humans into species' habitat, reductions in forage, reductions in connectivity, and collision mortality. Commenters suggested that strict guidelines on development of roads and trails are necessary to protect the species and, without these guidelines, the

species will not persist without the protections of the Act. Specifically, public commenters suggested: (1) road densities should continue to be limited after delisting to avoid potential increases in bear mortality and in logging activity; and (2) the distinction between permanent and temporary roads should be clarified since only the density of permanent roads is limited in the proposed rule, even though temporary logging roads may have higher traffic.

Response—There are no mandatory standards pertaining to motorized route densities; instead, levels of motorized access are limited indirectly by the standard for secure habitat. Consequently, open motorized access road density (OMARD) and total motorized access route density (TMARD) levels have been maintained at or below 1998 levels for all 40 subunits within the GBRZ (GYA Grizzly Bear Habitat Modeling Team 2015, pp. 118–119). Looking forward, inside the PCA, there will be no net increase, from the 1998 baseline, in OMARD, TMARD, or the number and capacity of developed sites from the 1998 baseline. Although OMARD measures only the density of motorized routes (roads and trails) that are open to the public for 1 or more days during the non-denning season (March 1–November 30), TMARD measures the density of motorized routes open to the public and/or administrative personnel for 1 or more days during the non-denning season (YES 2016b, Appendix E).

A notable number of improvements in route density since 1998 have taken place on subunits that are partially or completely contained within the Gallatin National Forest. The documented decreases in motorized route density can be directly attributed to implementation of the 2006 Gallatin National Forest (NF) Travel Plan and reflects an overall goal to manage motorized access in a manner that allows for recovery of

threatened species such as the grizzly bear. In areas of suitable habitat outside the PCA, we do not anticipate any significant increases in road densities because of other existing plans and designations (e.g., the Gallatin NF Travel Plan, the Caribou-Targhee NF Travel Plan, Wilderness, WSA, and IRA designations, State Management Plans recommending road densities of less than 1 mi/mi^2, etc.). In fact, because of these other existing plans or designations, there have been 0.1 to 6.1 percent increases in secure, suitable habitat outside the PCA since 2008 (GYA Grizzly Bear Habitat Modeling Team 2015, pp. 102–103). In addition, 60 percent of suitable habitat outside of the PCA is protected from increases in motorized use and development through its designation as Wilderness, WSAs, or IRAs.

Temporary roads are extremely limited by the application rules described in the 2016 Conservation Strategy and associated National Park and National Forest management plans. See Issues 44 and 45 for additional information.

Issue 47—We received several public comments regarding discussion and treatment of stressors inside and outside of the PCA, including: (1) questioning our scientific basis for allowing different management techniques within and outside the PCA and whether there is evidence of two distinct grizzly bear populations (one inside the PCA and one outside the PCA) warranting distinct management approaches; (2) claiming that it was "disingenuous" for us to state that "suitable habitat outside the PCA provides additional ecological resiliency and habitat redundancy to allow the population to respond to environmental changes" when the same habitat protections and monitoring do not exist outside of the PCA; (3) noting that habitat outside of the PCA has "become a sink for human-caused mortalities;" (4) questioning the presence of 500 development

sites on the 5 National Forests in suitable habitat outside the PCA; (5) suggesting that we cannot rely on State plans to protect habitat outside of the PCA; (6) specifying that the Service must address in the threats analysis that 40 percent of habitat outside of the PCA is not protected; (7) claiming that the Service is "writing off" 25 percent of independent females, since these females live outside the PCA in areas that will have inadequate habitat protections, which could result in mortality levels that exceed prescribed limits; and (8) suggesting that potential increased road development outside of the PCA will be associated with increased grizzly bear displacement, higher mortality, and lower fecundity. Additionally, commenters noted that if improved management has reduced mortality inside the PCA, management and protections should be similarly improved for habitats outside of the PCA and the same mortality limits and habitat protections apply in the entire DMA.

Response—The Service has applied a reserve design approach by designating, and providing differential levels of management and protection in, the PCA. The PCA, which is a subset of suitable habitat, contains approximately 75 percent of the females with cubs (the population's most important age and sex group) (Haroldson 2014a, *in litt*) and will continue to serve as a source area for the rest of the GYE. Differential levels of management and protection are based on their relative level of importance. Within the PCA, comprehensive protections are in place via the objective and measurable habitat criteria concerning secure habitat, human site developments, and livestock allotments, which will be habitat requirements on public lands once this final rule becomes effective (YES 2016a, pp. 54–72). Outside of the PCA in suitable habitat, there are not specific protections in place for grizzly bears (other than food storage orders); however, the

amount of permanently secure habitat provides them with the most important habitat protection possible for grizzly bear survival: limited motorized access. Mortality limits apply throughout the entire DMA.

While there are not two distinct grizzly bear populations inside and outside of the PCA, the single GYE grizzly bear population experiences different growth rates in these areas. When the population was growing at 4 to 7 percent per year in the 1990s (Harris *et al*. 2006, p. 48), most of this growth occurred inside the PCA (Schwartz *et al*. 2006b, p. 64). Similarly, when the growth rate for the entire GYE slowed between 2002 and 2011, the PCA still experienced higher growth rates than adjacent areas outside the PCA (IGBST 2012, p. 34). These differences in population growth rate inside and outside of the PCA are a testament to the effectiveness of the differential management approach (varying levels of protection based on relative importance to grizzly bears) under the IGBC Guidelines that led to grizzly bear recovery in the GYE (USDA FS 2004, p. 19). Under the Guidelines, there were five different "Management Situations" identified throughout the PCA, each with its own management direction (USDA FS 1986, pp. 3–5). These Guidelines contained no direction for management outside the PCA so lands within the PCA were always managed differently than areas outside the PCA. Such flexible management promotes communication and tolerance for grizzly bear recovery, and the best available science demonstrates that the PCA contains the habitat necessary to serve as a source area for a healthy and long-term viable grizzly bear population, and will continue to do so post-delisting.

We maintain that suitable habitat outside the PCA provides additional ecological resiliency to the population. Unlike inside the PCA, there are areas of suitable habitat

outside the PCA that are not currently occupied and that contain large stands of healthy whitebark pine (e.g., the southern Wind River Range) and vast tracts of secure habitat due to Wilderness, WSA, or IRA designations. For example, 2,948 km^2 (1,138 mi^2) of the Wind River Range, including almost all of the high-elevation whitebark pine stands, are in designated Wilderness Areas.

Issue 48—We received several comments from the public concerned with the habitat monitoring. These comments included that: (1) we do not explain what indices will be used to monitor changes in habitat and why these indices are adequate indicators of habitat degradation; (2) we do not provide adequate assurances that we will employ sufficient monitoring, beyond tracking population size, to detect possible "lag effects;" (3) we do not specify who would measure and report on the four habitat criteria in Chapter 3 of the 2016 Conservation Strategy, when the information would be collected and reported, and to whom it would be reported; and (4) one commenter suggested that we review land management activities on public lands every 3 years.

Response—The 2016 Conservation Strategy commits the implementing agencies to intensive monitoring of all grizzly bear vital rates and the relationship of these vital rates to changes in major foods and levels and types of human activities in their habitat. Annual habitat monitoring will produce results on any changes in habitat values and key food production. Details on who is responsible for food and habitat monitoring are outlined in the 2016 Conservation Strategy (YES 2016b, Appendices D, E, and F) and are reported in the IGBST Annual Reports. Thus, the system in place will not rely on indirect measures of habitat values but will annually produce direct measures of habitat values.

The multiple indices used to monitor both bear foods and bear vital rates provide a dynamic and intensive data source that allows the agencies to respond in a timely manner to results that might indicate problems. The GYE monitoring system under the 2016 Conservation Strategy (YES 2016a, pp. 33–85) is one of the most detailed and comprehensive monitoring systems developed for any wildlife species. Specific habitat variables that will be monitored include: amount and location of secure habitat, open motorized route densities, total motorized route densities, developed sites, relative abundance of ungulates, cutthroat trout abundance and use, grizzly bear use of army cutworm moth sites, whitebark pine abundance, and grizzly bear distribution and mortality. Since we will be monitoring a suite of demographic vital rates including survival of radio-collared bears, home range size, mortality of all bears from all causes in all areas, causes and locations of grizzly bear–human conflicts, body condition, and reproductive statistics like litter size, litter interval, generation time, and age of first reproduction, we are confident that we will be able to detect the consequences of significantly reduced habitat productivity soon enough to respond with changes to management approaches.

For the habitat components that are part of the 1998 baseline (i.e., secure habitat, developed sites on public lands, and livestock allotments), we have *de facto* triggers and management responses. If there are any changes in these values that depart from the 1998 baseline, there are enforceable requirements to address these deviations. Further, if grizzly bear mortalities exceed the mortality limits in a given year due to changes in habitat or resources (e.g., vehicle collision due to new road or management removal due to new livestock allotment), discretionary mortality would not be allowed, except for

human safety. Therefore, the monitoring and adaptive management system described in the 2016 Conservation Strategy (YES 2016a, entire) ensures the maintenance of a recovered GYE grizzly bear population.

Finally, we are not able to commit to reviewing land management activities on public lands every 3 years. However, we do commit to monitoring secure habitat and motorized access route density, developed sites, livestock grazing, and grizzly bear foods according to the protocol outlined in the Conservation Strategy (YES 2016a, pp. 68–73).

Issue 49—Several commenters raised concerns with our use of the 1998 baseline for habitat management. Some commenters suggested that the 1998 baseline would be insufficient to protect grizzly bears (especially in the absence of the Act's protections and its associated section 9 "take" prohibitions, section 7 consultation, and citizen suit provisions, and the 1986 Interagency Grizzly Bear Guidelines under which conflict bears are managed). Other commenters questioned the validity, and subsequent sufficiency, of the 1998 baseline because: (1) 1998 does not actually represent a period of population growth since the population growth rate from 1988 to 1998 was overestimated (Pease and Mattson 1999); (2) it was calculated using a nonparametric Chao2 estimator instead of the current model-averaged Chao2 estimator; (3) it does not appropriately distinguish between the frequency of contact with humans and the lethality of these encounters with humans (i.e., high use does not necessarily imply high risk to grizzly bears, and low use does not necessarily imply low risk to grizzly bears); and (4) if any lands burned during the 1988 fires, the habitat on those lands was thus not stable during the 1988 to 1998 period, as the Service claimed.

There were several comments regarding whether or not the 1998 habitat baseline has been maintained in the past or could be maintained into the future. Peer-reviewers and several commenters asked: (1) for additional detail on changes in habitat, roads, and developments from the past 40 years (especially since 1998), even if the amount of secure habitat has not changed, as these specifics could shed light on the feasibility and appropriateness of the 1998 baseline; and (2) whether agencies have been, and can remain, in compliance with the 1998 baseline; and, in particular, the three BMU subunits in the Targhee and Gallatin NF, which needed improvements in secure habitat in 2007. Some commenters expressed concern with the 2006 Gallatin Travel Management Plan implementation and questioned if it was approved; commenters expressed confusion as to "why the Service is not enforcing the Gallatin NF to decommission motorized routes and develop sites to comply with the 1998 baselines as all other forests have done."

A number of commenters presented alternatives to the 1998 baseline including: (1) using current conditions for the baseline, since bears are recovered under current conditions; and (2) using the "moving window analysis" from Mace and Waller (1996), which recommends open motorized route densities, total motorized route densities, and core amounts of habitat for each BMU. A peer-reviewer suggested using a defining period of 1988 to 2005, unless there were unique habitat features that were stable between 1988 and 1998. And lastly, many commenters worried that negotiations around the 2016 Conservation Strategy have already changed the 1998 baseline, and we have not adjusted our explanation of secure habitat or threats analysis accordingly.

Response—The year 1998 was chosen because secure habitat and site developments had been roughly the same during the previous 10 years (USDA FS 2004,

p. 27) and the population was increasing during these years (Eberhardt and Knight 1996, p. 419; Harris *et al*. 2006, p. 48). The selection of any other year between 1988 and 1998 would have resulted in approximately the same baseline values for roads and developed sites. We did not select baseline habitat values from years before 1988 because habitat improvements that occurred after the implementation of the IGBC (USDA FS 1986, pp. 6–21) would not have been reflected. Although we recognize that the frequency of human-grizzly bear encounters does not equate to the lethality of human-grizzly bear encounters, motorized access management is the most effective management tool for reducing grizzly bear mortality risk (Nielsen *et al*. 2006, p. 225; Schwartz *et al*. 2010, p. 661); see Issues 30, 40, 41, and 42. Additional measures to reduce the lethality of human-grizzly bear encounters include removing or securing attractants and providing education to modify human behavior/practices that contribute to conflict (YES 2016a, pp. 86–95). The 1998 baseline provides the same level of habitat protection whether the GYE grizzly bear is listed or not under the Act. The 1998 baseline refers to stability in the amount of secure habitat and number and capacity of developed sites to reduce human-bear conflicts and human-caused mortalities.

We recognize that the 1988 fires and other natural events may alter habitat, including the distribution and abundance of foods across the landscape, in the GYE. However, there is no evidence that fires detrimentally affect grizzly bears (see Issue 61). We agree that mortality risk is not static within secure habitat. Schwartz *et al.* (2010, p. 658) mapped grizzly bear mortality risk down to the 30-m (98-ft) pixel scale to identify areas where grizzly bear survival was greatest. While Schwartz *et al*. (2010, p. 661) found spatial variation in mortality risk, this fine-scale variation does not matter at the

population level because it is accounted for in the sustainable mortality rates set by the IGBST. Regarding the comment that social and dietary changes since 1998 have resulted in increased exposure to human hazards despite no net increase in livestock allotments and human infrastructure, we note that increased exposure to human hazards in and of itself is not necessarily a problem. It becomes a problem when there are an unsustainable number of bears dying as a result of this increased risk and we feel confident the ecosystem-wide mortality limits and subsequent management responses to grizzly bear–human conflicts will adequately address any increased exposure to human hazards such that a recovered grizzly bear population is maintained within the GYE.

For a discussion on overestimation of population growth estimation and Pease and Mattson (1999), please refer to *Factor E*, above.

Habitat conditions relating to the habitat standards described in the 2016 Conservation Strategy (YES 2016a, pp. 54–85) have either remained stable or improved from the 1998 baseline levels of secure habitat, site developments, and livestock allotments. The Grizzly Bear Annual Habitat Monitoring Report includes changes and corrections to the 1998 baseline and is included in the IGBST Annual Reports. The 1998 baseline: (1) was not developed to address specific projects such as oil and gas development or timber harvest; (2) does not contain threshold values for any of the major foods due to the natural annual variability in their abundance and distribution; and (3) attempted to establish realistic habitat standards that ensure adequate habitat security and minimum livestock conflicts within the PCA. Therefore, we consider the establishment of habitat thresholds for human population growth, food sources, and specific projects to

be unrealistic and that the 1998 baseline will adequately address these issues through access management and limitations on site development.

As the commenters point out, the moving window analysis approach represents the best available science and is the method used for measuring route densities on public lands in the GYE. Motorized route densities and percentages of secure ("core") habitat within the GYE are calculated using a suite of GIS geospatial tools that are packaged as the *Motorized Access Model*. Calculations for motorized route densities are based on a "moving window analysis" similar to that of Mace and Waller (1996, p. 1398), and include algorithms that have been improved since 1997 to more accurately calculate the total length of motorized routes per unit area. Mace and Waller (1996, p. 1395) determined that bears underutilized areas within 500 m (1,640 ft) from open roads with use levels greater than 10 vehicles per day. Based on this finding, secure ("core") habitat is defined in the GYE as any contiguous area greater than 10 acres in size and more than 500 m (1,640 ft) from an open motorized access route during the non-denning period. Secure levels are expressed as the percentage of the subunit that meets this definition. Any road that is open to motorized traffic for at least 1 day or more during the non-denning season (regardless of vehicle use levels) detracts from secure habitat calculations. Furthermore, routes that are gated and closed to the public year round, but which may occasionally be accessed by management personnel for administrative purposes, also detract from secure habitat. In other words, open and gated motorized routes are buffered by 500 m (1,640 ft), and these buffered areas do not count toward secure habitat.

Although no specific standards are directly imposed on motorized route densities, road construction is significantly curtailed by imposing a no-net-decrease in secure habitat per bear management subunit inside the PCA. The commenter refers to the NCDE provision for core area amounts (68 percent/2,500 acres). It is true that *most* BMUs in the NCDE are managed to maintain a minimum of 68 percent secure habitat. This is also the case in the GYE. Secure habitat is maintained at or above 1998 baseline levels. All 40 subunits inside the GYE PCA, except for 3 subunits (Henrys Lake #1, Henrys Lake #2, and Madison #2), have secure levels exceeding 68 percent. More than half of the subunits (n = 21) have secure levels at or exceeding 90 percent, and 4 subunits are completely roadless with secure habitat levels at 100 percent. Throughout the PCA, approximately 87 percent (excluding major lakes) is deemed secure habitat. With the provision for no net loss in secure habitat, the 10-acre size restriction for secure habitat ensures that small isolated pockets of roadless areas are preserved. The deficient levels of secure habitat for the 3 subunits below 68 percent are mostly due to motorized routes on private lands, as well as the legal requirements that National Forest lands provide access to State and private lands, mining claims, and summer homes, as well as county, State, and Federal rights of way. Because of the disproportionate number of restrictions on these three subunits, little opportunity exists to further improve secure levels via Federal management practices beyond the improvements that have been implemented under the 2006 Gallatin NF Travel Management Plan.

The Gallatin NF Management Plan was approved in 2006 and has implemented the 1998 baseline. The three subunits identified by the 2007 Conservation Strategy that were in need of improvement were on the Targhee and Gallatin NFs, although the

portions of these subunits that were identified as in need of improvement were within the Gallatin NF. The high road density values and subsequently low levels of secure habitat in these subunits is primarily due to motorized access on private land (USFWS 2007*a*, pp. 145–153). Managers have made improvements in these areas and attained full implementation of the 2006 Gallatin NF Travel Management Plan. These three subunits have shown on average a 7.5 percent increase in secure habitat, and these improved levels will serve as the new baseline for these three subunits (YES 2016b, Appendix E). These levels of secure habitat will continue to support a stable to increasing population of grizzly bears. Revisions to the draft 2016 Conservation Strategy did not change the 1998 baseline.

Issue 50—Some commenters expressed that there is sufficient connectivity between grizzly bear populations and that grizzly bears are making ample use of connectivity corridors, as evidenced by recent sightings of grizzly bears in new territory surrounding the GYE, in the Big Hole Valley, on "the prairie lands of eastern Montana," and between the GYE and the Northern Rockies population. Conversely, many comments from the public and peer-reviewers suggested that our discussion of connectivity of grizzly bear habitat and populations in the proposed rule and the 2016 Conservation Strategy was inadequate and required additional detail; commenters and peer-reviewers thought connectivity was essential for long-term viability of the population and species and that current levels of connectivity are inadequate. Calling the GYE grizzly bear population an "island population," commenters and peer-reviewers warned of the deleterious genetic effects, demographic concerns, environmental threats, and catastrophic events that could greatly diminish or eliminate the GYE population

without sufficient natural or facilitated improvements in its demographic connectivity to other populations. Commenters suggested that we contradicted ourselves by saying that connectivity is both "vital and unnecessary."

Commenters suggested several remaining threats to connectivity warrant further discussion in the rule, including: (1) the 150 miles of farmland and roads that separate GYE grizzly bears from their northern neighbors; (2) proposed hunting (especially along NP boundaries), combined with high mortality rates (as much as 47 percent) outside the DMA could preclude future connectivity; and (3) large-scale and long-term effects of road construction, like fragmentation, can jeopardize connectivity. Peer-reviewers asked us to explain the relevance of food storage orders to the issue of connectivity and to more fully address remaining barriers to movement, such as topography or manmade structures, including a suggestion to provide scientific evidence of grizzly bear use of crossing structures to strengthen our promotion of these structures as a management tool.

Response—We continue to be encouraged by the expansion of grizzly bears into the area between the NCDE and the GYE; however, we have not yet documented connectivity between the ecosystems and do not know the origination of the bear in the Big Hole Valley. Connectivity is relevant to this rulemaking only to the extent that it impacts the GYE DPS. To that extent, connectivity or lack thereof has the potential to impact this population's genetic fitness. As such, this issue is discussed and addressed in our five-factor analysis (see *Factor E*, above) and in the 2016 Conservation Strategy (YES 2016a, pp. 82–85). The Service has considered population viability in considerable depth (Boyce *et al.* 2001, p. 2). Boyce *et al*. (2001, p. 1) concluded that the available data "provide optimistic projections of the likelihood of persistence for grizzly bears in

the GYE; a 99.2 percent probability that the GYE grizzly bear population will persist for 100 years." Please see Issue 27 for further discussion about population viability analysis for the GYE population by Boyce *et al*. (2001).

Due to the habitat protections, population standards, mortality control, outreach efforts, and the adaptive management approach described in the 2016 Conservation Strategy, we conclude that isolation is not a threat to the GYE grizzly bear population and, therefore, does not preclude delisting. Based on estimated grizzly bear distribution in the NCDE (Costello *et al.* 2016, p. 18) and in the GYE (using the techniques described by Bjornlie *et al.* 2014a, p. 183–184, available at https://www.sciencebase.gov/catalog/folder/52fe7f75e4b0354fef6de4f0) as of 2014, the two populations are now only 71 miles apart. In addition, there have been multiple confirmed sightings outside of these distributions between the two ecosystems, such as in the Upper Big Hole last year. MFWP has indicated through their hunting season regulation framework and their Grizzly Bear Management Plan for Southwestern Montana that connectivity will be considered when relocating grizzly bears and in their setting of hunting quotas in potential connectivity corridors (MFWP 2013, p. 9; MFWP 2016, pp. 4–5). Please see Issue 96 for discussion of our assessment of potential genetic effects as a result of the GYE being an isolated population.

We have added a discussion of catastrophic events to this rule under *Factor E*. Although we acknowledge that connectivity is desirable for the long-term genetic health of the GYE grizzly bear population, at this time genetic health is not a concern for this population (see *Genetic Health* section of this rule). Connectivity will be facilitated through highway planning and food storage orders on public lands (YES 2016a, pp. 82–

85; see Issue 51 for further discussion). Grizzly bears have been documented to use crossing structures in Alberta, with a preference for structures that were "high, wide and short in length" (Clevenger and Waltho 2005, p. 453; Sawaya *et al.* 2014, p. 7). Distance to cover was also positively correlated with grizzly bear use, whereas human activity (i.e., traffic noise) was negatively correlated with use (Clevenger and Waltho 2005, p. 459).

Issue 51—Commenters stated that the 2016 Conservation Strategy did not cite any methods for modeling connectivity and that plans for monitoring connectivity are vague or weak. Several peer-reviewers suggested that: (1) monitoring and collecting genetic samples (e.g., through mandatory registration of bears hunted in the GYE or environmental DNA techniques), especially outside the DMA, could help detect movements between grizzly bear populations; and (2) the "step-selection function" method in Thurfjell *et al.* (2014) should be used to "model habitat attributes that facilitate movement and connectivity."

Response—Federal and State agencies will continue to monitor grizzly bear activity in potential connectivity areas between the GYE and the NCDE and between the GYE and the Bitterroot to document natural connectivity. Monitoring will occur using both radio telemetry and with the collection of genetic samples from all captured or dead bears to document possible gene flow between the two ecosystems. Please see the *Genetic Health* section of this final rule for further discussion on genetic monitoring to detect connectivity. Environmental DNA (eDNA) is used to detect the presence of difficult to detect species by collecting genetic samples present in their environment and has typically been used for aquatic or semi-aquatic species (Schultz and Lance 2015, p.

2). Methods to use eDNA for terrestrial species are still being developed and are not currently applicable to grizzly bears. Although detection may be possible at drinking water sources, current techniques are limited to small, slow-moving bodies of water (Rodgers and Mock 2015, p. 695). Current methods detect only species' presence and would not provide necessary information to determine the most likely population from which it originated. The IGBST is currently working on modeling to identify potential connectivity corridors between the NCDE and the GYE. Please visit our webpage for maps of the recovery zones and current known distributions, as available (*https://www.fws.gov/mountain-prairie/es/grizzlyBear.php*).

Issue 52—Several commenters also suggested methods to facilitate connectivity to other ecosystems or potential habitat areas prior to, or concurrent with, delisting, including: (1) creating demographic connectivity areas, similar to the draft NCDE Conservation Strategy; (2) implementing the same habitat standards in connectivity areas as those that apply inside the PCA, designating connectivity corridors as wilderness areas, and building "wildlife bridges" to allow bears to cross highways; (3) reducing the DPS boundaries to match those of the DMA; (4) protecting forests with large roadless tracts; and (5) working with the conservation group Yellowstone to Yukon.

Response—All Federal and State agencies are committed to facilitating connectivity (YES 2016a, pp. 82–83). Although the structure of the GYE boundaries are different than those proposed in the draft NCDE Conservation Strategy, the DMA boundary extends all the way to the DPS boundary in sections to the west and north to facilitate connectivity between the GYE and both the NCDE and the Bitterroot ecosystem. Connectivity will be managed for in highway planning (YES 2016a, p. 83).

Food storage orders are already in place on the majority of USFS lands to facilitate connectivity by minimizing human-grizzly bear conflicts (YES 2016a, pp. 84–85). Lastly, the Service currently partners with nongovernmental organizations who work to conserve important habitat linkage areas, including Vital Grounds and Yellowstone to Yukon.

Issue 53—Some peer-reviewers and commenters stated that we either did not have or did not share effective, detailed Service or State plans for facilitating connectivity between the 6 grizzly bear recovery zones in the lower 48 States. Specifically, they expressed concerns that State management plans and regulations will discourage movement of grizzly bears and prevent necessary connectivity, including that: (1) recolonization of the Bitterroot Ecosystem will be prohibited by a combination of inadequate plans for limiting mortality in linkage zones between the GYE and the Bitterroot Ecosystem (i.e., the Upper Snake River Region) and Idaho's management plan's prohibition on movement of grizzly bears into new areas; (2) the proposed rule, the Tri-State MOA, and the 2016 Conservation Strategy do not include strong enough commitments and clear partnerships that will ensure grizzly bear habitat connectivity (especially as considerations in any new road construction or highway improvement projects); (3) Idaho's and Wyoming's State plans do not discuss connectivity at all or will actively prevent the successful recolonization of unoccupied historical range because of potential for conflict (e.g., Wyoming and southern Wind River range); and (4) all of the State plans will "actively discourage," "limit," "persecute," or remove bears outside the DMA because the States have publicly shared that the Service cannot and should not

"impose additional requirements as to connectivity for delisting the GYE DPS, where connectivity and genetic exchange do not threaten the populations."

For Montana, public commenters were concerned that the State's: (1) plan and regulations are noncommittal or unclear on the subject of connectivity, and regulations fail to protect bears moving between the GYE and the NCDE because they (a) only promise to manage discretionary mortality and establish "attractant storage rules;" (b) requested removal of any language committing to effective management of mortality to facilitate connectivity, and the plan does not declare certain areas unsuitable for hunting due to importance for connectivity; (2) actions have not met the Service's apparent requirement in the proposed rule to effectively manage discretionary mortality in linkage zones; and (3) the plan does not contain language akin to that in the NCDE Conservation Strategy that discusses conflict management in the linkage zone between the GYE and the NCDE.

Other commenters suggested that State plans must manage for connectivity rather than managing toward a minimum population level and should have comprehensive management plans, not just for the GYE, that integrate all of the grizzly bear populations in their State and discuss how to facilitate connectivity between them. Overall, commenters expressed that States must provide more explicit and robust commitments to ensuring connectivity for delisting to be justified and that the final rule must "commit to connectivity and coordinated management." Without these commitments, commenters asserted that the delisting would violate Service regulations, the National Forest Management Act, NEPA, the APA, and § 219.9 of the 2012 Forest Planning Rule.

Conversely, the States commented that: (1) their discussions of connectivity in plans and regulations were sufficient to ensure the continued recovery of the GYE grizzly bear population to which one public commenter agreed with Montana; (2) the proposed rule may be too prescriptive on the subject of connectivity and movement between ecosystems; and (3) the Service should remove references to bear occupancy outside the DMA in the recovery supplement because the best available science indicates genetic connectivity is not a threat to the GYE population and the recovery criteria "are conservative in recognition of the GYE DPS' relative isolation."

Response—While connectivity among populations may be desirable, the Act does not require it for recovery or delisting. The 1993 Recovery Plan did not require connectivity for recovery of individual grizzly bear populations, and the Recovery Plan indicated the Service's intention to delist distinct populations as they met recovery goals (USFWS 1993, pp. ii, 33–34). In this final rule, we are designating and delisting the GYE population as a DPS. As stated in the proposed rule, based on the best available scientific data about grizzly bear locations and movements, the GYE grizzly bear population and other remaining grizzly bear populations are markedly, physically separated from each other. The GYE grizzly bear population meets the criterion of discreteness and significance criteria under our DPS Policy (see Issues 112, 113, 114, and 115, and the *Distinct Vertebrate Population Segment Policy Overview, Past Practice and History of Using DPSs,* and *Distinct Vertebrate Population Segment Analysis* sections of this final rule). Recovery of a DPS does not need to rely on genetic augmentation, whether natural or human assisted.

As stated in the proposed rule, connectivity/linkage, while desirable, is not required to maintain the GYE DPS. Published information indicates the genetic variability and viability of the GYE DPS is strong, and lack of connectivity is not a threat to the existence of the GYE DPS (in their entirety: Kamath *et al*. 2015; Luikart *et al*. 2010). Based on our analysis of the best available science (81 FR 13174, 13184, 13201, March 11, 2016; YES 2016a, pp. 51–52), we conclude that genetic concerns are not a threat to the GYE DPS and that bear occupancy, or lack thereof, in peripheral areas is not biologically necessary to the GYE DPS. In addition, as discussed in the *Demographic Recovery Criteria* section of this final rule and the 2016 Conservation Strategy (YES 2016a, pp. 34–37), we have applied conservative recovery and demographic monitoring criteria for the GYE population in recognition of its relative isolation.

For Recovery Zones outside the GYE DPS, the Act's protections will continue. The 2016 Conservation Strategy describes actions for habitat connectivity. Although connectivity with other Recovery Zones is not required for recovery or delisting of the GYE DPS, the 2016 Conservation Strategy and Montana's State management plan include a long-term goal of allowing grizzly bear populations in southwestern and western Montana to reconnect through the maintenance of non-conflict grizzly bears in areas between the ecosystems. The State of Montana has indicated that, while discretionary mortality may occur, the State will manage discretionary mortality to retain the opportunity for natural movements of bears between ecosystems. Grizzly bears have recently been documented in the Elkhorn Mountains, near Butte, Mill Creek, near Avon, and in the Big Hole, demonstrating that bears are moving into the area between the GYE and the NCDE and that natural connectivity is likely forthcoming; however, only the

grizzly bears from near Butt and Mill Creek were confirmed as originating from the NCDE, and the ecosystem of origination for the other bears is unknown (pers. comm., M Haroldson). Montana's approved hunting regulations incorporate areas outside the DMA into hunting districts, and apply a quota to the whole hunting district based on the portion of the district within the DMA. This approach will better allow bears to occupy suitable habitat outside the DMA.

Although the Idaho Management Plan does not allow translocation of bears from the PCA to unoccupied areas within Idaho, it does allow for natural expansion into areas that are biologically suitable and socially acceptable. While the Wyoming Management Plan discourages occupation of areas outside of the DMA that are prone to conflict, it does not discourage occupancy of any sort as is implied by reviewer comment. The DMA was developed as an area within the GYE DPS to maintain consistent monitoring while providing large-scale suitable habitat sufficient in size to maintain a recovered grizzly bear population in perpetuity. However, this does not imply that bears cannot occur outside the DMA (as they currently do now) or into the future.

Issue 54—Public commenters and peer-reviewers expressed concerns with the adequacy of our discussion of livestock allotments in the proposed rule. Commenters suggested that livestock allotments remain a threat because: (1) they reduce connectivity since they contribute to habitat fragmentation, create a barrier to grizzly bear movements, and cause mortality sinks (including the U.S. Sheep Experiment Station); and (2) livestock allotments still cause a large proportion of grizzly bear mortality. A peer-reviewer suggested that changing environmental conditions could alter the conflict dynamics between grizzly bears and livestock allotments.

Commenters explained that the Service and its partners lack sufficient plans that will effectively ameliorate the threats from livestock allotments because: (1) phasing out of livestock allotments is not, and has not been, an effective measure to reduce conflicts with wildlife; (2) there are currently no requirements to securely store or remove attractants, including livestock carcasses and feed, on private lands in the PCA; (3) current methods for managing bears to limit livestock predation have failed since there were more conflicts with livestock in 2015 than at any point in the past 100 years, and there have been more than 500 confirmed livestock deaths since 1995; and (4) allowing private interests to control the phase-out of allotments may violate section 7 of the Act and other laws. Peer-reviewers also provided comments as to the inadequacy of plans to ameliorate threats from livestock allotments including that: (1) we do not have a plan to manage for the potential to have an increase in impacts from livestock allotments on grizzly bears; and (2) our proposed rule does not specify the total number of cattle we will allow on limited acreage of cattle allotments.

Commenters suggested methods to more effectively ameliorate the threats from livestock allotments and reduce conflict with livestock, including: (1) conducting NEPA examination of all grazing allotments on public land and section 7 consultations before issuing any livestock allotment permits; (2) removing the livestock instead of the bear in cases of repeated conflicts; (3) encouraging landowners who have livestock allotment permits on Federal land to accept grizzly bear depredation of livestock, rather than expect retaliatory action towards grizzly bears; (4) instead of delisting, increasing support for programs that compensate landowners for livestock losses in place of retaliatory killing of grizzly bears; (5) requiring that livestock permits contain nonlethal conflict prevention

measures before grizzly bear removal can occur; (6) including stronger, perhaps mandatory, language on livestock allotment phase-out, especially, according to one peer-reviewer, where conflicts are common, and including commitments to work with third parties to buy out allotments; (7) withdrawing most or all grazing rights on NF Land; and (8) removing leases from public lands that are "edge areas" important for connectivity or from all grizzly bear habitat. In addition, while some commenters suggested that the U.S. Sheep Experiment Station needs to be closed, others suggest that it has effectively used such nonlethal techniques to protect sheep from grizzly bears.

Conversely, some commenters worried about heightened negative impacts to ranchers if management of livestock allotments is made more stringent because compensation for relinquishing allotments is insufficient to cover the lost revenue to those ranchers. These commenters also suggested that the impact to livestock growers as a result of closing livestock allotments is disproportionate to the threat that these allotments pose, arguing that livestock allotments (especially sheep) are a comparatively small source of grizzly bear mortality (e.g., approximately 5 and 34 percent from sheep and cattle conflicts, respectively). One commenter requested that the Service disclose the economic loss from the elimination of livestock allotments and collect more data on depredation of livestock. Commenters emphasized the problem that there are currently too many bears in the GYE, creating unsustainable predation pressure on the ranching industry. They suggested that delisting will increase the management flexibility of livestock owners and will provide needed tools for producers to protect livestock.

Response—We have thoroughly analyzed the issue of *Factor A, The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range*, and

conclude that livestock allotments are not a threat to the GYE population now or in the foreseeable future. See Issue 40 for additional information.

Livestock permits are regulated through National Forest Land Management Plans, Livestock Grazing Permits, and/or Annual Operating Instructions. The USFS controls the number of permits and allotments, herd size, and season of use. In addition, permits contain carcass disposal requirements and enforce USFS food storage orders, which include livestock feed (for more details on food storage orders see YES 2016a, pp. 84–85). Existing permits within grizzly bear habitat, either under a programmatic review or for each allotment, have undergone section 7 analysis and any significant changes to these plans (i.e., changes in herd numbers) post-delisting will be subject to a NEPA analysis. Coordination will occur with State wildlife management agencies to apply the conflict bear standards, including measures to prevent conflicts (YES 2016a, pp. 86–91). The IGBST identifies areas of concentrated conflicts to enable managers to focus subsequent efforts to prevent grizzly bear–human conflicts. All three State management plans contain direction on reducing grizzly bear-livestock conflicts and cooperating with private landowners to reach this goal (Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, pp. 15–16; MFWP 2013, pp. 51–53; WGFD 2016, pp. 22–23).

Federal and State management agencies emphasize preventative measures and nonlethal techniques whenever possible (Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, pp. 15–16; MFWP 2016, pp. 51–53; WGFD 2005, pp. 21–26). Inside the PCA, numerous sheep allotments have been retired or relocated to other, less-conflict-prone areas to accommodate grizzly bears (USDA FS 2006a, p. 170). As of 2006, there is only one remaining active sheep allotment inside the PCA (USDA FS

2006a, p. 168). Management removal will be used only as a last resort inside the PCA. The respective State wildlife agency's grizzly bear management plan will guide management of grizzly bear conflicts with livestock grazing on public lands outside of the PCA. Thus, removals as a result of these conflicts will remain within the sustainable mortality limits established in the 2016 Conservation Strategy. As such, this source of mortality will not threaten the GYE grizzly bear population.

The Service must make its decisions based on the best available scientific data. Therefore, we focus on whether or not grizzly bear mortalities resulting from conflicts with livestock affect the overall population trajectory. Grizzly bear mortalities associated with livestock depredations have mostly been eliminated within the PCA as most livestock allotments have been closed or retired. However, as the grizzly bear population expands beyond the PCA and beyond the DMA where livestock allotments remain, mortalities have again increased as a result of this range expansion. Mortality rates will remain within the biologically sustainable mortality rates in the demographic recovery criteria and the 2016 Conservation Strategy (see Issues 19 and 66). The Service has established conflict bear guidelines that are strategic in nature and provide managers with a framework to assess conflicts on a case-by-case basis. Grizzly bears depredating on lawfully present livestock on public lands may or may not be removed from the population, depending on several factors such as location of the conflict, severity of the incident, age and sex of the bear, and conflict history of the bear (YES 2016a, Chapter 4). While not required by the Act, State, Tribal, and Federal managers will continue to use a combination of management options in order to reduce grizzly bear–human conflicts, including nonlethal forms (Bangs *et al*. 2006, entire). However, these methods are

effective in only some circumstances, and no single tool is a cure for every problem. Lethal control will still be required in many circumstances. Lethal control used in combination with nonlethal methods can improve the overall effectiveness of both management options (Bangs *et al*. 2006, p. 8; Breitenmoser *et al*. 2005, p. 70).

Some commenters thought we needed stronger language making the phase-out of livestock allotments necessary. The Service has established a management system in the 2016 Conservation Strategy (YES 2016a, pp. 67–68, 72–73) that balances livestock grazing on public lands with the needs of grizzly bears. The vast majority of public lands in grizzly bear habitat in the GYE are managed with no livestock grazing. There is no livestock grazing on any of the National Parks in the GYE; the last livestock allotment in GTNP was closed in 2006. While livestock grazing allotments are a legitimate use of some public lands, we recognize that such grazing, especially sheep grazing, can lead to some grizzly bear mortality. In light of this understanding, and past management experience, the Service endorses an approach that includes minimizing livestock allotments with recurring conflicts.

The USFS's multiple-use mandate guides management to maintain a healthy forest while providing opportunities for wildlife and goods and services, such as livestock forage. Therefore, the USFS focuses on whether or not grizzly bear mortalities resulting from conflicts with livestock affect recovery of the population. The USFS has stated that, "Inside the PCA, no new active commercial livestock grazing allotments would be created and there would be no increases in permitted sheep AMs from the identified 1998 baseline. Existing sheep allotments would be monitored, evaluated, and phased out as opportunities arise with willing permittees. Inside the PCA, cattle allotments or portions

of cattle allotments with recurring conflicts that cannot be resolved through modification of grazing practices may be retired as opportunities arise with willing permittees. Outside the PCA in areas identified in State management plans as biologically suitable and socially acceptable for grizzly bear occupancy, livestock allotments or portions of allotments with recurring conflicts that cannot be resolved through modification of grazing practices may be retired as opportunities arise with willing permittees" (USDA FA 2006a, pp. 36–37).

We conclude that this approach to livestock grazing is a logical and responsive way to manage grizzly bear-livestock conflicts. In some cases, the offer of financial incentives through nongovernmental organizations has been successful in retiring sheep allotments on public lands with willing participants (Gunther *et al*. 2004, p. 20). As explained in the proposed rule, as of 2014, there was only one active sheep allotment within the PCA, on the Caribou-Targhee NF. Because research has shown that grizzly bears and cattle are more likely to coexist without conflict than grizzly bears and sheep, the phasing out of cattle allotments inside the PCA will occur only when there are recurring, irresolvable conflicts on these allotments or if willing permittees volunteer to waive their permits back to the government (Knight and Judd 1983, p. 189; Anderson *et al.* 2002, pp. 254–255). Because there will continue to be no net increase in cattle or sheep allotments allowed on public lands inside the PCA, we do not expect that livestock allotments inside the PCA will constitute a threat to the GYE grizzly bear DPS now or in the future. Programs that compensate owners for livestock losses will continue in Idaho, Montana, and Wyoming regardless of the listing status of the grizzly bear.

The Final EIS for the Forest Plan Amendment for Grizzly Bear Habitat Conservation for the Greater Yellowstone Area National Forests includes an analysis of the potential economic impacts of implementing the 2007 Conservation Strategy, including the strategy surrounding livestock allotments (USDA FS 2006a, pp. 242–254). This Final EIS concludes that the negative economic impacts of implementing the 2007 Conservation Strategy would be minimal to livestock operators and do not outweigh the positive effects to grizzly bears (USDA FS 2006a, pp. 251–252).

Lastly, we disagree that the U.S. Sheep Experiment Station needs to be closed in order to conserve grizzly bears. The Station is located 6 miles north of Dubois, Idaho, and is 113 km^2 (70 mi^2) in size, and undertakes extensive efforts to prevent grizzly bear-livestock conflicts, including: modifying the grazing schedule and/or movements; implementing good husbandry practices to keep the animals healthy; using full-time sheepherders, working dogs, and guard dogs on rangelands; limiting evening bedding areas; removal of lame livestock; minimization of unnatural attractants (i.e., using bear-resistant containers); annual education of Sheep Station employees and herders on grizzly bear identification and conflict reduction; and reporting guidelines for all grizzly bear sightings and encounters. As a result, the Sheep Experiment Station has experienced no conflicts, management removals, or livestock losses from 2002 to 2014 (Mickelsen 2016, *in litt.*).

Issue 55—Several commenters stated that we inaccurately characterized the extent of present and future oil, gas, and mineral leasing in grizzly bear habitat because: (1) we incorrectly state that there are no oil and gas leases inside the PCA as of 1998 when the USFS data shows 9 parcels under lease; (2) there are 1,643 active leases in

suitable grizzly bear habitat and the USFS has never denied a development request once a lease is granted; (3) 28 mines will be able to be developed if grizzly bears are delisted; (4) we do not acknowledge the Crevice and Emigrant Mines, two operations in the process of development, in the proposed rule; (5) Lucky Minerals, a Canadian mining company, is planning a mining operation less than 20 mi (32 km) from YNP that will lead to acid mine drainage; and (6) the Montanore Mine in the Cabinet Mountains Wilderness, and other hard rock mines, are affecting important grizzly bear habitat. A peer-reviewer also mentioned that 4 percent of suitable habitat inside, and 19 percent of suitable habitat outside, the PCA (but inside the DMA) allows for surface occupancy and that impacts of such occupancy can extend beyond the footprint itself.

Commenters suggested that these oil, gas, and mineral activities, especially those adjacent to USFS lands, will affect grizzly bear habitat and lead to population declines post delisting, since: (1) mitigation is voluntary; (2) NEPA will be inadequate to "curb harmful activities;" (3) the 1872 General Mining Law could restrain abilities to limit any new mining developments; (4) areas associated with oil and gas boom towns have an increased incidence of poaching (Berger and Daneke 1988); (5) the effects of honoring existing oil, gas, and other mineral leases are unclear; (6) denning bears, particularly females, have decreased fitness when disturbed by forest cutting, mining, oil and gas exploration, and human recreation; and (7) delisting will "lift" restrictions on oil, gas, and mineral leases in the GYE. A peer-reviewer also noted that it is unclear what actions land managers will take to mitigate for potential impacts from existing leases given the current language that land managers are "striving" to meet the application rules for changes to secure habitat.

Commenters requested additional plans and assurances to adequately explain amelioration of this threat such as: (1) more explicit plans for monitoring and mitigation; (2) complete removal, or at a minimum, commitments for no new oil, gas, or mining projects within the PCA after delisting; and (3) clarity on whether new oil, gas, or mineral projects that occur within the PCA would be required to mitigate for impacts on secure habitat by replacing the loss with intact secure habitat of similar habitat quality. A peer-reviewer also requested "additional clarification on the number of leases, the location and area of leases, and possible range of effects of these leases."

Response—We have thoroughly analyzed the issue of *Factor A, The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range*, and conclude that extractive industries (e.g., oil, gas, mining) are not a threat to the GYE grizzly bear population now or in the foreseeable future. The proposed rule accurately stated that there are no active oil and gas leases inside the PCA (81 FR 13196, March 11, 2016); however, in 2016 there were eight suspended oil and gas leases in or partially in the PCA. In addition, there are 50 leases in, or partially in, suitable habitat (2 are phosphate leases on the Caribou-Targhee and the rest are oil and gas leases). That is similar to or fewer than the number analyzed as part of the 2007 Conservation Strategy.

The potential for future increases in oil and gas leasing inside the PCA on National Forest lands is guided by the 2016 Conservation Strategy and its limitations on road density and development (YES 2016a, pp. 60–72). We do not anticipate a dramatic increase in resource extraction outside of the PCA either due to the quantity of National Forest land designated as Wilderness (6,799 km^2 (2,625 mi^2)), WSA (708 km^2 (273 mi^2)), or IRA (6,179 km^2 (2,386 mi^2)). Approximately 80 percent of all suitable habitat on

National Forest lands outside the PCA falls into one of these categories. There are also moderate to low potentials for both oil and gas occurrence and development throughout most of the six GYE National Forests, with the exception of the Bridger-Teton National Forest (USDA FS 2006a, pp. 210–213). Even with the high potential for occurrence and development in the Bridger-Teton, only 13 active oil and gas wells are currently inside that National Forest and none are within the DMA. In fact, there are no active oil and gas wells in suitable habitat. There has never been any high-density oil and gas development in suitable grizzly bear habitat in the GYE. The 1998 baseline for habitat standards was chosen as a level of development that existed during a period of robust grizzly bear population growth. We acknowledge that effects of not only mineral development but administrative and recreation uses can extend beyond the footprint of the activity, but those effects have been considered as part of our analysis. Additionally, any such proposed projects on Federal land would be subject to environmental review under the NEPA process, which requires Federal agencies to consider environmental effects that include, among others, impacts to wildlife, including possible mitigation measures.

The proposed rule (81 FR 13196, March 11, 2017) accurately stated that, "Additionally, 1,354 preexisting mining claims were located in 10 of the subunits inside the PCA (YES 2016b, Appendix E), but only 28 of these mining claims had operating plans. These operating plans are included in the 1998 developed site baseline." Activity on these 28 claims in both the PCA and suitable habitat range from small intermittent operations to 2 large mines producing platinum and palladium on the Custer-Gallatin National Forests. While claimants under the 1872 General Mining Law have a right to explore for and develop valuable mineral deposits on their claims, the USFS develops

appropriate mitigations for these claims through analysis and the NEPA process (42 U.S.C. 4321–4347.1970, as amended). Please see the 2016 Conservation Strategy (YES 2016a, pp. 62–67) for additional details on required mitigation. The proposed Montanore Mine in the Cabinet Mountains is outside the scope of this rulemaking because it is not located in the GYE. Mitigation of mineral activity on BLM-managed lands requires NEPA, and the effects analysis helps determine the appropriate mitigation.

State agencies are authorized to permit and determine appropriate mitigation for operations on private and State lands. The Wyoming Department of Environmental Quality's Land Quality Division (LQD) permits and licenses to "ensure that land disturbances resulting from mining are minimal, and that affected areas are properly restored once mining is complete" (Wyoming Department of Environment Quality–Land Quality Division 2017). The Idaho Department of Lands permits surface and placer mining operations from beginning through reclamation. The Montana Department of Environmental Quality permits and licenses mining in Montana. The Idaho and Wyoming Oil and Gas Conservation Commissions and the Montana Board of Oil and Gas Conservation are the agencies authorized to permit and regulate oil and gas wells. The State agencies also have a role in permitting on the Federal lands. Operators proposing projects to develop federally owned minerals have to get both Federal approvals and the appropriate State permits, licenses, or approvals. While it varies by State, additional State agencies may be responsible for a variety of resources such as water discharge permits or air quality permits whether the proposed operations are on Federal or non-Federal lands.

The level of exploration and development on Federal lands has remained relatively constant over approximately 20 years. Mineralized areas with a history of exploration and development particularly occur on the Custer-Gallatin NF. Activity has remained within the level described in the 1998 developed site list. To the fullest extent of its regulatory authority, the USFS will minimize effects on grizzly bear habitat from those activities based in statutory rights (e.g., the 1872 General Mining Law). Mitigation requirements will follow those outlined in the 2016 Conservation Strategy, and described below (YES 2016a, pp. 62–63). The 2016 Conservation Strategy and this final rule do not preclude future mineral development, but have set in place mitigations that will allow grizzly bear populations to be maintained.

Under the 2016 Conservation Strategy, any new oil, gas, or mineral project will be approved only if it conforms to secure habitat and developed site standards (YES 2016a, pp. 54–85). For instance, any oil, gas, or mineral project that permanently reduces the amount of secure habitat will have to provide replacement secure habitat of similar habitat quality (based on our scientific understanding of grizzly bear habitat). Any change in developed sites will require mitigation equivalent to the type and extent of the impact, and such mitigation must be in place prior to project initiation or be provided concurrently with project development as an integral part of the project plan (YES 2016a, pp. 54–85). For projects that temporarily change the amount of secure habitat, only one project is allowed in any subunit at any time (YES 2016a, pp. 54–85). Mitigation of any project will occur within the same subunit and will be proportional to the type and extent of the project (YES 2016a, pp. 54–85). In conclusion, because any new mineral or energy development will continue to be approved only if it conforms to the secure habitat

and developed site standards set forth in the 2016 Conservation Strategy, we conclude that such development inside the PCA will not constitute a threat to the GYE grizzly bear DPS now or in the foreseeable future.

Issue 56—We received comments from both the public and peer-reviewers expressing concerns regarding our discussion of snowmobiling. Specifically, these commenters asserted that a lack of evidence of impacts does not equate to a conclusion of no impact from snowmobiles. Additionally, they recommended that monitoring alone is insufficient management and that active management programs should be initiated to mitigate the potential impacts of snowmobiling (e.g., minimizing overlap between snowmobiles and denning habitat and/or limiting snowmobiles after den emergence dates). Lastly, public comments suggested that we did not adequately consider impacts from activities associated with snowmobiling, such as the use of artillery to control avalanches.

Response—We have thoroughly analyzed *Factor A, The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range*, and conclude that snowmobile use is not a threat to the GYE population now or in the foreseeable future (see discussion above under *Factor A*). The Forest Plan Amendment includes guidance that, inside the PCA, localized area restrictions are to be used to mitigate any conflicts during denning or after bear emergence in the spring. Bears tend to den in remote areas with characteristics that are not conducive to snowmobiling (i.e., steep, forested habitats). Suitable denning habitat is well distributed on the forests, and much of the general grizzly bear denning habitat identified in the Forest Plan Amendment Final EIS as being open to snowmobiling is not actually used by snowmobiles (USDA FS 2006a, p. 92). For

example, 85.2 percent of the known dens in the GYE are located in areas where snowmobile use does not occur and, of the 13.9 percent of dens that do occur in areas open to snowmobiling, only 0.8 percent are classified as high potential for snowmobile use (Haroldson 2017d, *in litt.*).

Since 2002, we have consulted with all of the GYE National Forests at least once regarding the effect of snowmobiles on denning grizzly bears (Caribou-Targhee NF 2004, p. 15; Dixon 2016, *in litt.*). While the potential for disturbance exists, USFS and IGBST monitoring over the last 3 years has not documented any disturbance or conflict (Haroldson 2016, *in litt.*). Additionally, during the winter of 2009–2010, a grizzly bear was observed digging a den in the Squaw Basin, Bridger-Teton National Forest in an area heavily used by snowmobiles (Hegg *et al*. 2010, pp. 23–28). The grizzly bear remained in the den throughout the winter and emerged April 20, 2010, with one cub-of-the-year. Thus, our best available information suggests that current levels of snowmobile use are not appreciably reducing the survival or recovery of grizzly bears.

As we stated in the proposed rule (81 FR 13174, March 11, 2016), the available data about the potential for disturbance while denning and den abandonment from nearby snowmobile use are extrapolated from studies examining the impacts of other human activities and are identified as "anecdotal" in nature (Swenson *et al*. 1997, p. 37) with sample sizes so small they cannot be legitimately applied to assess population-level impacts (in their entirety: Harding and Nagy 1980; Reynolds *et al*. 1986; Hegg *et al*. 2010). Because there are no data or information suggesting that snowmobile use in the GYE is negatively affecting the grizzly bear population, or even individual bears, we determine that snowmobiling does not constitute a threat to the GYE grizzly bear DPS

now, or in the future. Yet, because the potential for disturbance and impacts to reproductive success exists, monitoring will continue to support adaptive management decisions about snowmobile use in areas where disturbance is documented or likely to occur.

Inside YNP, the use of an avalanche management system is limited to Sylvan Pass to prevent avalanches from covering the road, and the Superintendent has the ability to consider the location of wintering wildlife and close Sylvan Pass. Furthermore, there have been no documented mortalities or disturbances of denning grizzly bears as a result of avalanche control. Avalanche control for snowmobiling does not occur on any of the National Forests within the DMA. Therefore, we conclude that avalanche control activities are not a threat now, or in the foreseeable future, to GYE population.

Issue 57—Commenters expressed concerns with threats associated with off-road vehicles (ORV) and mountain bike use on National Forest lands. Commenters stated that an increased use of ORVs on highly accessible public lands will greatly increase the risk of grizzly bear mortality. Commenters suggested that in order to adequately address this threat, managers need to develop more stringent ORV regulations prior to delisting. Commenters also stated that the Service failed to address threats associated with mountain bikes and that regulation is needed despite the fact that these risks are unknown.

Response—Limiting motorized recreation, including ORV use, is a fundamental component of the 2016 Conservation Strategy, hence the requirement for no net decrease in secure habitat inside the PCA (see Issues 43 and 49). This measure directly limits the total area affected by motorized recreation, so that grizzly bears have adequate secure

habitat regardless of the number of people using motorized trails. Limitation of non-motorized recreation, including mountain bikes, is not a component of the 2016 Conservation Strategy because we've concluded that the current and projected levels of use will not substantially impact the GYE grizzly bear population. Because mountain bikers often travel quietly and at high speeds, when combined with environmental factors (e.g., dense vegetation, hilly terrain, and running water), they may be more likely to be within 50 m (164 ft) before being detected by a bear (Schmor 1999, pp. 118–119). MacHutchon (2014, p. 37) concluded that an alert mountain biker making sufficient noise and traveling at slow speeds would not be more likely to have a sudden encounter with a bear than would a hiker. The 2016 Conservation Strategy's adaptive management approach will allow managers to respond to detrimental levels of non-motorized recreation, should they occur, on a case-by-case basis and also provide managers with the data necessary to determine if ecosystem-wide limitations may be necessary in the future.

Issue 58—Several commenters raised concerns about human encroachment into wildlife habitat claiming that grizzly bears are not resilient to human persecution or habitat degradation (Ripple *et al* 2016). Specifically, they cited potential effects of increased human recreation and visitation in bear habitat including: (1) increasing numbers of encounters, as well as long-term exposure of bears to humans, results in higher mortality risks; and (2) potential exclusion of bears from habitat since grizzly bears are twice as likely to use an area when human activity is restricted or when people are inactive (i.e., nighttime) (Coleman *et al*. 2013). One commenter stated that the Service needs to better analyze current habitat security and isolation from people and predict how it will change in the foreseeable future, in all types of grizzly bear habitat.

Commenters also proposed potential management responses that could alleviate these impacts including: (1) enhancing infrastructure to support increasing park visitation, although conversely, a peer-reviewer suggested limiting visitation to YNP and GTNP; (2) assessing human visitation as "take" under section 9 of the Act because it harasses wildlife and causes displacement from food sources; (3) restricting human access to particular habitats during times of food shortages; (4) imposing food storage orders on all habitat within the DPS boundaries, especially within the DMA, to the maximum extent possible within the law; and (5) increasing I&E for tourists and hikers.

Response—We have thoroughly analyzed *Factor A, The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range*, and conclude that human recreation is not a threat to the population now or in the foreseeable future. Our habitat management standards rely heavily on reducing anthropogenic influences and minimizing grizzly bear–human conflicts because excessive human-caused mortality and subsequent population decline was the primary factor that led to the original listing as threatened in 1975. For a detailed explanation of this rationale, please refer to Issue 41, the *Habitat-Based Recovery Criteria* section of this final rule, and the 2016 Conservation Strategy (YES 2016a, pp. 54–85).

A survey of grizzly bear experts showed that research on the potential impacts of habituation as a result of human recreational activities should be a high priority (Fortin *et al*. 2016, p. 17). Although Herrero (1985, pp. entire) found that habituated bears were at an increased risk of being involved with conflicts, other research has found that habituated bears were less likely to be involved with conflicts (Jope 1985, p. 36; Nadeau 1987, pp. 20, 46–48; Aumiller and Matt 1994, pp. 53–58; Gunther and Biel 1999, p. 3).

Although some research has found that grizzly bears avoid human activity (Coleman *et al*. 2013, pp. 1317–1317) or newly logged forests (Pigeon *et a*l. 2016, pp. 1107), these avoidances were temporal with grizzly bears returning to the area at different times of the day. Fortin *et al*. (2013b, entire) found that grizzly bears are extremely flexible in their ability to switch activity profiles (i.e., nocturnal versus diurnal) without being negatively impacted by these switches.

Section 7 of the Act will no longer apply to the GYE population upon finalization of this rule. However, the Service considers the establishment of habitat thresholds for human population growth and limits on levels of human recreation to be unrealistic and concludes that the 1998 baseline will adequately address these issues through access management, limitations on site development, and I&E efforts. See Issues 45, 54, and 108 for additional information. Under the 2016 Conservation Strategy, a multi-agency effort will be conducted to determine the best long-term solutions for alleviating the pressures of increased visitation and the potential need for increased infrastructure.

Issue 59—Comments from the public and peer-reviewers expressed concern about the potential future impacts of logging on grizzly bears in the GYE, including that: (1) 11 percent of suitable habitat outside the PCA, but inside the DMA, allows timber harvesting; and (2) timber harvest would increase after delisting since there would no longer be limits on road densities in grizzly bear habitat, opening more than 3 million acres to timber harvest and road building.

Public comments provided varied perspectives on the impacts of logging on grizzly bears including: (1) grizzly bears avoid recently logged forests (McClellan and Hovey 2001; Apps *et al*. 2004), potentially because these areas are warmer; (2) logging

disturbs denning bears, particularly females; (3) timber harvest can degrade habitat quality under "short-rotation management regimes" (Mattson and Knight 1991); (4) food availability does not increase in early successional forests in the GYE; (5) logging could degrade red squirrel habitat (and red squirrels help make whitebark pine nuts available for grizzly bear consumption); and (6) there is not currently enough science to determine the impacts of logging on bears, besides the research on grizzly bear mortalities from roads. One commenter noted that, unless no logging occurred between 2002 and 2016, we need to analyze impacts of logging after 2002.

Commenters also suggested that future management may worsen these impacts, including that: (1) the USFS could ignore habitat protections for grizzly bears that limit logging as previously occurred in Targhee NF; and (2) timber harvest lands adjacent to YNP (and in wildlife migration routes) will be designated Farm Bill priority lands, resulting in a less rigorous review. Suggestions on how to minimize these impacts included: (1) mitigation for projects that impact secure habitat should not include land that has already been disturbed (e.g., previously logged land); and (2) grizzly bears should remain listed to avoid logging in their habitat. Conversely, a commenter suggested that timber harvest is part of responsibly managing natural resources and that bears are flexible and can adapt to multiple use landscapes.

Response—Inside the PCA, secure habitat must be maintained at or above the 1998 baseline, and application rules for changes to secure habitat will apply. These rules limit changes to secure habitat to one project at a time within a bear management subunit and the impact of that project cannot exceed 1 percent of the area of the largest subunit within that BMU (YES 2016a, pp. 62–63). For permanent changes, replacement habitat

must be in place for at least 10 years before it can be used for mitigation for future projects, including logging. These rules ensure that "short-rotation management regimes" will not occur within the PCA. In addition, although roughly 17 percent or 3,967 km^2 (1,532 mi^2) of suitable habitat outside the PCA is identified as having both suitable timber and a management prescription that allows timber harvest, from 2003 to 2014, an average of only 4.7 km^2 (1.8 mi^2) was actually logged annually (Jackson 2017, *in litt.*). The IGBST would be able to detect any changes to the population as a result of changes in habitat through their demographic monitoring of the GYE grizzly bear population, which they will report to the YGCC who could then decide if modifications to the 2016 Conservation Strategy are necessary to maintain a recovered grizzly bear population in the GYE.

Timber is the primary resource extracted in grizzly bear habitat. Habitat quality (as a function of road density and timber harvest) has improved as a result of declining timber harvest, decreasing road construction, and increasing road decommissioning since the mid-1990s (USDA FS 2006a, pp. 156, 200). Timber harvest volumes and road construction have declined since the mid-1990s. Under the 1998 level of secure habitat, the GYE grizzly bear population has tripled in size and has stabilized from 2002–2014 as it has reached carrying capacity (Haroldson *et al*. 2014, p. 13; van Manen 2016a, *in litt.*). From 1986 to 2002 there has been a net reduction of more than 1,600 km (1,000 mi) of road on the six GYE National Forests (inside and outside the PCA). Inside the PCA on National Forests, there was an average reduction (elimination) of 59.9 km (37.2 mi) of road per year from 1986 to 2002 (USDA FS 2006a, p. 200). Similarly, outside the PCA, there was an average reduction of 40.7 km (25.3 mi) of road per year for this time period

(USDA FS 2006a, p. 200). Timber lands immediately adjacent to the YNP are contained within the PCA and protected under the 1998 baseline standards for secure habitat and developed sites. The standards and guidelines adopted in each Forest Plan, and the Planning Rule under which they fall, must still be abided by when considering a project under the 2014 Farm Bill.

Please see the *Vegetation Management* section of this final rule for discussion of how timber harvest may impact grizzly bears, Issue 61 for further discussion of bear use of newly disturbed forests, and the *Snowmobiling* section of this final rule and Issue 45 for discussion of potential den site disturbance. Apps *et al*. (2004, p. 148) cautioned that their findings that grizzly bears avoided newly logged areas may be a result of an "accelerated rate of conifer regeneration of cutblocks," "lower shrub cover than would otherwise be expected," and they were "associated with higher human access and influence." Although Pigeon *et al*. (2016, p. 1107) found that grizzly bears avoid newly logged forests, this was a temporal avoidance of the warmest parts of the day and grizzly bears returned to the area at cooler times of the day. Fortin *et al*. (2013b, entire) found that grizzly bears are extremely flexible in their ability to switch activity profiles (i.e., nocturnal versus diurnal) without being negatively impacted by these switches.

Issue 60—Commenters expressed concerns with our discussion of the impacts to grizzly bears from human population growth and development activities on private lands in the GYE, including that: (1) increasing development of formerly rural areas has negative impacts on grizzly bear population trends (Doak and Cutler 2014); (2) the 1998 baseline does not consider the impacts of edge effects with residential and recreational developments on private lands; (3) we need more discussion of how to minimize grizzly

bear deaths and conflicts on private lands; (4) the potential privatization of Federal land could pose a threat to habitat maintenance (especially when it is easier to transfer Federal land to private control if it does not contain listed species); (5) the States (especially Montana and Idaho) have no substantive management restrictions in grizzly bear habitat on private lands; and (6) the Service does not have a system to monitor the impacts of population growth and increased development.

Concerns from commenters on management strategies for bear conservation on private lands included: (1) questions as to how "take" prohibitions will apply to degradation of bear habitat on private lands since "take" includes habitat destruction, in addition to killing and harassing endangered animals; (2) suggestions to apply a "no net loss" policy for grizzly bear habitat on private lands; (3) suggestions that the Federal Government should use public lands to mitigate for impacts to grizzly bears that occur on private lands; and (4) suggestions that we need to consider how implementation of the 2016 Conservation Strategy will impact private landowners in the DMA, potentially adversely, since the process for meeting damage claims on real and personal property could be mired in delays. A peer-reviewer emphasized that education and mitigation will be key strategies in reducing the likelihood of "attractant sinks" (i.e., increased human-caused grizzly bear mortalities as a result of unsecured attractants) developing on the 9 percent of suitable habitat outside the PCA that is private land.

Response—Private lands comprise 2.1 percent of the PCA and 9 percent of suitable habitat outside the PCA. The consideration of private land activities on grizzly bear–human conflicts is fundamental to the proper management of grizzly bears and to human safety because these conflicts often lead to grizzly bear mortality. However, the

vast majority of suitable grizzly bear habitat is secure on public land (i.e., National Parks or National Forests). Thus, despite the conflicts that arise on private lands, we conclude that activities on private lands do not constitute a threat to the GYE grizzly bear now or in the future.

In regard to potential privatization of Federal public land posing a threat to grizzly bears in the GYE, while changes to the protected status of grizzly bear habitat on these public lands is theoretically possible, such an outcome is highly improbable, especially at the scale that would be necessary to affect the viability of the GYE grizzly bear population. Although Doak and Cutler (2014a, p. 313) graph the increase in rural population trends from 1975 to 2005, they do not include rural population trends in their modeling of population trends in the GYE (see Issues 28 and 29 for discussion on a rebuttal to Doak and Cutler 2014a).

Suitable habitat excludes areas of increased mortality risk (e.g., high population densities and sheep allotments; "edge" habitat). However, these population sinks are included in the DMA, the area in which the mortality limits apply, as set forth in this final rule, the 2016 Conservation Strategy, and the revised Demographic Recovery Criteria. These mortality limits apply to all lands within the DMA, private and public. The amount of suitable habitat, including the 1998 baseline levels of secure habitat and developed sites, are sufficient to maintain a viable grizzly bear population in the GYE. However, the habitat standards set forth in this rule and the 2016 Conservation Strategy apply only to Federal lands and, therefore, will have no direct effect on private landowners. Upon delisting, current programs that compensate owners for livestock losses will continue in

Idaho, Montana, and Wyoming regardless of the listing status of the grizzly bear (see Issue 54).

Limits on developing private lands to reduce conflicts with resident wildlife are the responsibility of the counties and the States, both of which have representatives on the YGCC; the Service has no direct authority over private lands. As previously stated, section 9 take prohibitions of the Act will no longer apply after this final rule goes into effect. Because a disproportionate number of grizzly bear–human conflicts occur at site developments on private lands (see Servheen *et al*. 2004, p. 15), we recommend that private landowners become involved in efforts to reduce these conflicts. We, in conjunction with the counties and State wildlife agencies, will continue to promote outreach, education, and management of land development activities in grizzly bear habitat to reduce bear–human conflicts upon delisting. State bear management specialists will continue to respond to human-bear conflicts and efforts to reduce conflicts on both public and private lands (YES 2016a, pp. 86–95). These efforts to limit conflicts on private lands will continue under the YGCC's management, which will be informed by future IGBST demographic reviews.

Issue 61—One commenter asked about the role of fire in grizzly bear habitat and how fire, both natural and human-induced, might be managed post-delisting.

Response—Blanchard and Knight (1990, p. 592) found that the 1988 fire resulted in the probable deaths of only a few grizzly bears and no increase in bear home range sizes or daily movement rates during or after the fire. Immediately after the fires had passed, grizzly bears moved into the burned areas to feed on the increased availability of burnt ungulate carcasses, roots, ants, and newly emerged grasses and forbs. Although

some grizzly bears avoided burned sites in the year after the fire (1989), use of burned areas in subsequent years (1990 to 1992) suggested that fires increased production of forbs and roots and were, therefore, beneficial to grizzly bears (Blanchard and Knight 1996, pp. 120–121). The period of most robust grizzly bear growth (4 to 7 percent) occurred shortly after the 1988 fires, through the entire decade of the 1990s. The USFS uses multiple fire management strategies to minimize potential negative threats (i.e., to life and structures) while allowing fire to maintain its natural role in an ecosystem. Management strategies include the use of prescribed fires to "maintain or improve habitat conditions" for wildlife (Caribou-Targhee NF 2005, p. 11; USDA FS 2011, pp. 3–4; Shoshone NF 2012, p. 2; Bridger-Teton NF 2015, pp. 8, 10). Please see the *Factor E: Catastrophic Events*, above, for further discussion on the potential impacts of fires and management practices.

Issue 62—Several public commenters and a peer-reviewer raised concerns over habitat fragmentation. Specifically, commenters noted that: (1) there is already a high degree of fragmentation of suitable habitat within the PCA and, to a greater degree, within the DMA (Merrill et al. 1999; Carroll et al. 2001; Merrill and Mattson 2003; Johnson *et al*. 2004; USDA FS 2006a; Schwartz *et al*. 2010); (2) we did not acknowledge the negative effects of this fragmentation in our proposed rule, such as genetic "isolation" of grizzly bears, "reduction of species richness, inbreeding, and loss of sustainability of the habitat" (Fahrig 2003) or on the quality and conservation of available habitat; (3) private land uses, energy development, timber harvest, ORV use, and livestock allotments are potential sources of further habitat fragmentation, especially outside the PCA; and (4) there was no provision in the rule designed to limit habitat fragmentation

within the DPS boundary outside of the DMA. Lastly, one commenter suggested that the States be required to manage for decreasing fragmentation.

Response—All the best available biological information demonstrates that suitable habitat, including fragmented and unfragmented areas, contains the habitat necessary for a healthy and viable grizzly bear population in the long term. Please see Issues 40 and 96 for discussion on suitable habitat and the impacts of genetic isolation on the GYE grizzly bear population, respectively.

Issue 63—A few public comments assumed that most or all of the GYE is designated as critical habitat for the grizzly bear.

Response—In 1976, we proposed to designate critical habitat for the grizzly bear (41 FR 48757, November 5, 1976). This designation was made stale by the 1978 critical habitat amendments to the Act, including the requirement to perform an economic analysis. This proposal was never finalized. Recognizing the importance of habitat to the species, instead, the IGBC issued habitat management guidelines within all occupied grizzly bear habitat (USDA FS 1986, entire). These habitat management guidelines are considered to be one of the primary factors in successful GYE grizzly recovery efforts.

Human-caused Mortality Issues (Factors B and C Combined)

Issue 64—Public commenters expressed opinions both for and against the hunting of grizzly bears in the GYE. Substantive comments in favor of hunting indicated that it is an appropriate management tool to: (1) help maintain a balance between an adequate grizzly bear population and adequate food resources; (2) address conflict bears and minimize future conflict with humans; (3) create opportunities for bears from other

populations to immigrate into the GYE, thereby improving genetic diversity for the GYE grizzly bear; and (4) be a source of funding for grizzly bear monitoring and conservation.

Conversely, substantive comments in opposition to hunting covered a range of issues, including that: (1) there is a lack of scientific data to support hunting and discount it as a substantial threat because it will be adding to the current levels of human-caused mortality that will not decline after delisting; (2) we did not adequately consider how hunting could impact the grizzly bear population given the species' slow reproductive cycles; (3) we should institute a 5- to 10-year moratorium on hunting after delisting to allow the grizzly bear population to reach at least 850 to 1,000 bears and there is a self-sustaining population outside the DMA, to see how State management impacts populations, and to allow for additional research on the potential impacts of a hunt; (4) hunting could cause an increase in immigration of new males that result in female avoidance via the use of less suitable habitat and thus smaller litter sizes, as well as those males committing infanticide, further depressing population numbers; (5) hunting could negatively impact grizzly bear behavior including orphaning of young and the disruption of activity patterns during denning; (6) hunting is an ineffective management tool, noting that it could lead to inbreeding and eventual extinction, hunters are likely to target the largest, fittest animals, rather than conflict bears, and that there is no evidence that hunting bears will increase grizzly bears' fear of humans; (7) States will have incentive to allow regular exceedance of grizzly bear mortality limits in order to maximize numbers of moose and elk for ungulate hunters; and (8) hunting could erode support for wildlife recovery.

Response—We agree that hunting can be an appropriate management tool to address conflict bears and minimize future conflict with humans by replacing management removals, if removals are properly targeted, and raising funding for conservation through hunting tag sales. However, while hunting may indirectly reduce competition for food among intra-specifics by reducing the number of individuals in the GYE, wildlife populations regulate themselves naturally (Caughley and Sinclair 1994, pp. 100–119), and we, therefore, do not believe hunting is necessary to "balance an adequate grizzly bear population and adequate food resources." Additionally, although hunting may increase the number of mortalities in the GYE, we believe many of these mortalities would replace management removals. Further, the number of mortalities is ultimately limited by demographic recovery criterion #3 (as outlined in the 2016 Conservation Strategy). Therefore, we do not believe that hunting would create many more opportunities for immigration than currently exist. States have demonstrated their expertise in managing wildlife, particularly game species as indicated by the relative health of most game species in the U.S. We are confident that if the States institute a hunt, that it will be carefully regulated with yearly ecosystem-wide coordination to insure that total mortality remains within the sustainable limits for each age/sex class as set forth in this final rule, the 2016 Conservation Strategy, and the Revised Demographic Recovery Criteria.

We appreciate that many commenters have concerns regarding hunting of grizzly bears. Hunting is a discretionary mortality source that will occur only if mortality limits from all other causes have not been exceeded (YES 2016a, pp. 33–50). Because the sustainable mortality limits for independent males and females include mortalities from

all sources (YES 2016a, p. 36), including hunting, and are applied within the DMA, hunting should never threaten the GYE grizzly bear population. Hunting permits will not be issued by the States if mortality limits are exceeded.

Hunting is regulated by the States who will again have management authority and jurisdiction to regulate any future hunting when this final rule goes into effect as discussed in *Factors B and C Combined*, above. Through their regulations and the Tri-State MOA, the States have made assurances that grizzly bear management, including hunting, will be managed cooperatively between the three States to ensure that a recovered grizzly bear population is maintained. As discussed above, the GYE population at its current level no longer meets the definition of a threatened or endangered species; therefore, it is not necessary to further increase the population inside or outside of the DMA.

The limited hunting that may occur in the GYE if States choose to institute a hunt will be carefully controlled and would be unlikely to affect population dynamics. Some evidence of infanticide has been found in North American and European brown bear populations (McLellan 1994, pp. 15–16; Swenson *et al*. 1997, p. 450), which can reduce the population growth rate through cub mortality; however, Miller *et al*. (2003, p. 144) and McLellan (2005, pp. 153–154) could not find evidence of population-level effects of sexually selected infanticide in North American grizzly bear populations. If hunting preferentially removed adult male bears, and if infanticide was common, hunting might result in some reduction in cub survival in localized areas. However, this would likely have little impact on overall population growth rate because hunting mortality on males would be limited in numbers and extent. We do not anticipate that the male-to-female

ratio would change markedly under the adopted mortality limits or that sexually selected infanticide would become an issue affecting population trajectory of the GYE grizzly bear population. Continued monitoring of the population through radio telemetry and observations of unmarked reproductive females will alert the IGBST to any substantial changes in cub survival or production and trigger appropriate management responses.

Although disturbances caused by hunting during denning may have negative effects on individual survival and reproduction (Swenson *et al*. 1997, p. 37, Linnell *et al*. 2000, pp. 401, 408), there is no evidence of resulting population-level impacts (in their entirety: Harding and Nagy 1980; Reynolds *et al*. 1986; Hegg *et al*. 2010). In addition, there is no data or information suggesting that human recreational activity is negatively affecting the GYE grizzly bear population. The IGBST will produce an annual population estimate for the DMA that will be used by the States to establish total mortality limits for each age/sex class for the following year. Hunting seasons will be managed by the States so as not to exceed those mortality limits. Hunting seasons will be closed within 24 hours of meeting total mortality limits, and any mortality exceeding those limits will be subtracted from that age/sex class total mortality limit for the following year per State rules and regulations (see discussion above under *Factors B and C Combined*). A management review also will be conducted by the IGBST every 5 to 10 years to assess if recovery criteria are being maintained. Consequently, any potential changes to grizzly bear behavior caused by hunting that impact population numbers or distribution criteria would be accounted for in subsequent hunting seasons.

In regard to hunting being an ineffective management tool, research by Swenson (1999, pp. 159–160) showed that brown bears were more wary of humans in areas where

brown bear hunting occurred. To our knowledge, there is no data or information that hunting would decrease the overall fitness of individuals in the GYE grizzly bear population. Hunting can be used as a compensatory mortality source, targeting bears that would otherwise be removed by management action. However, as explained above, States will authorize hunting only as long as the overall mortality limits are not exceeded. The IGBST and State agencies collect data on grizzly bear–human conflicts and will continue to do so after delisting. These data are reported and displayed spatially in the IGBST's Annual Report. Any changes in the frequency, location, or nature of grizzly bear–human conflicts would be detected. State regulations (see *Factors B and C Combined*) will prevent regular exceedance of grizzly bear mortality limits. Exceedance of the total mortality limits for 3 consecutive years would trigger an IGBST Biology and Monitoring Review, and the Service can also initiate a status review independent of the IGBST or the YGCC should the total mortality limits be exceeded by a significant margin or routinely violated or if substantial management changes occur significant enough to raise concerns about population-level impacts.

Issue 65—We received many comments from both the public and peer-reviewers regarding hunting boundaries. Peer-reviewers and other commenters sought clarification regarding whether or not hunting would be allowed within the PCA, since it is defined as a "secure area." Several comments recommended that no hunting should be allowed within the PCA, the DMA, secure habitat, JDR, GTNP (including on State or private inholdings), in Montana's Taylor Fork drainage, at food aggregate sites, or in other densely populated grizzly bear areas, while others suggested that all Federal lands should be open to hunting or that hunting be focused in areas prone to human-grizzly bear

conflict. Peer-reviewers and public commenters suggested that hunting be prohibited in connectivity areas and key wildlife corridors. Many commenters suggested that Wyoming must recognize NPS' jurisdiction over the JDR or Wyoming would be violating the National Park Service's Organic Act. Noting that the boundaries of the PCA and "secure habitat" are hard to identify, comments suggested that hunting be limited to zones that are easier to define geographically. Some commenters suggested that State managers create a buffer around YNP and GTNP in which no hunting would be allowed since bears in those areas are more used to humans and thus more vulnerable to hunters. Additionally, comments requested that we assess the impacts of grizzly bear hunting on park inholdings.

Response—As we explained in Issue 64, after de-listing, any future hunting would be regulated by the States. In most cases the public has opportunities for input when the State is adjusting hunting and management regulation. All hunting of grizzly bears will remain prohibited within National Park lands, which comprise 39.4 percent of the PCA. Hunting will be allowed on private lands and other public lands within the PCA. Within the JDR, the Secretary of the Interior is required to permit hunting in accordance with applicable Federal and State law, with exceptions for public safety, administration, or public use and enjoyment (Public Law 92-404, Sec.3.(b)). However, the State of Wyoming has indicated they do not intend to allow hunting in the JDR (Mead 2016, *in litt*.).

See Issue 40 for the definition of secure habitat; the risk of human-grizzly bear conflicts is reduced in secure habitat as a result of habitat management. However, hunting may occur in secure habitat where authorized by applicable Federal and State

laws and will be limited by the applicable annual mortality thresholds (see table 1). Hunt areas and hunt area boundaries outside NPS and Tribal lands will be addressed in State hunting regulations, which are under the purview of the State Fish and Game Commissions. See *Factors B and C Combined* and Issue 77 for more details about how the States set harvest regulations.

The total annual mortality limits inside the DMA by definition include any grizzly bear legally harvested on NPS inholdings. Any grizzly bears occupying private land inholdings within NPS boundaries are inside the DMA and are a part of both the annual population estimate and annual mortality limits, and as such, were explicitly considered during the analysis conducted in the preparation of this final rule.

The management of conflict bears within the GYE grizzly bear DPS boundaries will be based upon existing laws and authorities of State wildlife agencies and Federal land management agencies, and directed by protocols established in the 2016 Conservation Strategy and State management plans. Wyoming has indicated that they intend to "emphasize harvest in high conflict areas which typically occur a significant distance from National Park boundaries" (Mead 2016, *in litt*.). Inside YNP and GTNP, grizzly bear biologists will continue to respond to grizzly bear human conflicts. In all areas outside of the NPs, State and Tribal wildlife agencies will continue responding to grizzly bear–human conflicts. All three State fish and wildlife agencies have significant expertise in using hunting as a management tool to reduce conflicts with a number of species.

Issue 66—We received comments from peer-reviewers and the public expressing concerns with proposed mortality limits (total, independent females, and independent

males). A number of commenters questioned the biological justification for: (1) allowing any discretionary mortality at populations less than 674 bears; (2) lowered mortality rates for independent females and dependent young, but unchanged and relatively high mortality rates for independent males; and (3) independent female mortality limits greater than 7.6 percent (at any population size). Additionally, commenters asked what the mortality rate would be at population levels less than 600 to ensure population growth; these commenters suggested that merely halting all discretionary mortality would not be a sufficient response. A few commenters noted that other larger, more connected populations have much more conservative total mortality limits than the ones in our proposed rule. In order to increase confidence in the biological basis of mortality limits, commenters suggested independent peer-review of the models used to derive mortality thresholds.

A number of commenters requested additional clarification in our mortality limits, such as: (1) an explanation on uncertainty around estimated mortality limits; (2) "what point within the 95 percent confidence interval the population size estimate refers" when discussing mortality rates; (3) what the mortality rate would be at population levels less than 674 bears (i.e., how much less than 7.6 percent); (4) whether mortality limits undergo annual peer-review, would be recalculated annually, and how variability would impact management; and (5) how the proposed 7.6 percent mortality rate for independent females will maintain stability when a 9.0 percent mortality rate was required for stability in the 2007 Recovery Plan supplement. Peer-reviewers also requested example calculations of the number of allowable discretionary mortalities from hunting and management removal for each sex and age class for various population sizes (e.g., show

how many bears would have been available for hunting from 2002 to 2014 and how many years would have allowed no hunting).

Commenters worried that the proposed mortality limits could be easily exceeded (especially with hunting) and could lead to population declines because: (1) undetected population declines could result from male bears being killed nearly twice as often as female bears; (2) models run by commenters show high probabilities of population decline below 500 bears with our proposed mortality limit framework, declines that could go undetected because of our insensitive population estimates based on females with cubs-of-the-year; (3) it will be difficult to close the hunting season when total mortality limits are reached because as many as half of grizzly bear mortalities occur in non-telemetered bears and are unknown (McLellan *et al*. 1999); (4) population thresholds at which mortality rates change (e.g., 600 and 674) are only estimates (resulting from an estimation method with which the commenters took issue, see Issue 28); and (5) population estimates will be based on populations within the entire ecosystem (including National Parks), but will establish discretionary mortality in areas outside of the National Parks. Several commenters requested that we provide a full analysis of how proposed mortality thresholds will impact population numbers, dispersal, and connectivity, with one individual recommending an Environmental Impact Statement (EIS) to evaluate alternative mortality limits and habitat protections. Lastly, commenters worried that revisions to the population sex-age structure, and associated mortality limits, will happen too infrequently because it is a discretionary option for States only if mortality thresholds are violated for 3 years in a row.

We received several comments from the public suggesting adjustments to our proposed mortality limits including: (1) mortality limits should be more conservative to account for bias associated with the population size and trend and potential threats from an expanding urban-wildland interface; (2) mortality limits should be set at the lower end of the confidence interval because the use of average estimates for vital rates, mortality rates, and population size means there is a 50 percent chance that mortality limits are too high and unsustainable; (3) cumulative annual mortality should be indexed monthly or seasonally to alert managers if mortality limits may be exceeded, with a trigger to stop discretionary mortality for the year; (4) discretionary mortality should cease when the population estimate is less than 674 rather than less than 600 bears; (5) if discretionary mortality is allowed at less than 674 bears, then total human-caused mortality should be at the threshold proposed in the 2007 Recovery Plan: Supplement to the Demographic Recovery Criteria; (6) hunting should halt when the lower bound of the 95 percent confidence interval of the population estimate is less than 600 bears; and (7) only a fraction of the estimated population available for discretionary mortality should be harvested to avoid overharvest due to uncertainty in population size, a strategy known as proportional threshold harvesting. Peer-reviewers also proposed how to adjust mortality limits in the future, including: (1) discretionary mortality should change in response to potential changes in sex-age classes; and (2) hunting limits should consider annual changes in environmental conditions (i.e., drought, fire, or berry crop failures). In addition, a commenter suggested that hunting targets should be spatially explicit, concentrating mortality in the southern and eastern portions of the GYE while encouraging expansion to the west and north.

Response—The biological basis for the 7.6 percent mortality threshold for independent females was based on models presented in IGBST (2012, entire) and would maintain an average population size around 674 (which is the estimate for the time period 2002 to 2014, the timeframe during which the population began to demonstrate density-dependent population regulation). This mortality threshold was reduced from 9 percent in 2007 to the 7.6 percent current threshold because of changes in vital rates (IGBST 2012). The premise behind the 9 percent and 10 percent sustainable mortality rates when the population is greater than 674 is that a higher mortality rate would likely allow the population to return back to the long-term average of 674, consistent with the recovery criteria and the States' management commitments.

Whereas the IGBST is currently investigating the power of the Chao2 technique to assess how soon we can detect a change in population trend may be reached under the 9 percent and 10 percent scenarios, and how far the population may already be below the objective of 674 when this is detected, the premise for this adaptive management approach is well established in the literature. There is uncertainty around the mortality estimates due to unknown/unreported mortalities, but YES managers expressed a desire to rely on the central tendency of the data rather than reporting credible intervals as it would substantially complicate implementation of mortality monitoring (see Issue 33). Given that the Chao2 estimator underestimates population size, particularly at higher densities (Schwartz *et al*. 2008, figure 5), the concern that mortality limits should be more conservative to account for bias associated with the population size and trend is unfounded. Currently, there is no evidence that the age of first reproduction is increasing.

On the issue of the 50 percent chance that mortality limits are unsustainable, this is correct if mortality limits are reached every year. Decisions whether to set the mortality limits at the lower end of the confidence interval on the population estimate or based on the point estimate itself are mostly policy issues; from a scientific standpoint, however, there is justification for basing management decisions on the central tendency of the data, i.e., the point estimate of population size (see Issues 28 and 33). It is important to point out that the 7.6 percent used in the GYE is a threshold for total mortality, and is thus not directly comparable to mortality rates for other populations that use thresholds for human-caused mortality. Taking this into account, the sustainable mortality thresholds used for other populations are not distinctly different from those applied in other populations. Furthermore, if any population estimate falls below 600, there will be no discretionary mortality, except as necessary for human safety.

In response to comments about the potential to overshoot the population objective, see Issue 19. There is indeed a lag time and, thus, the potential for the population to drop below the long-term average of 674. The States have indicated that they will manage the population around the long-term average, and we recognize that the population abundance will vary above and below that point estimate. IGBST is currently investigating the power to detect when a population objective has been reached and by the time it is detected, the degree to which the population objective may be exceeded in terms of time and population size. The determination of when mortality thresholds are reached is based on total mortality, which includes a statistical estimate of the number of unknown/unreported mortalities. The IGBST uses a similar method as McLellan *et al.* (1999, pp. 913–914) to estimate unknown/unreported mortalities, but our estimates of

unknown/unreported mortalities are actually higher (as discussed in the preceding paragraph); for every reported mortality, our estimates are closer to two unreported mortalities. The estimate of unknown/unreported mortalities allows a full accounting of total mortality and thus ensures that hunting mortality does not contribute to exceeding allowable mortality thresholds.

In response to the suggestion of a monthly or seasonal mortality index, the IGBST already summarize mortalities on a continuous basis (i.e., as records come in) and would allow for managers to be alerted in a timely manner if mortalities were exceeded. This information is posted on the IGBST website (under mortality tables; see Issue 26) and is available to both the public and managers. In addition, the IGBST is able to calculate unknown/unreported mortality every time a mortality is added to the mortality database so that the hunting season can be closed by the States if allowable total mortality is exceeded. Idaho and Wyoming regulations state that all hunting shall be suspended in the DMA if total mortality limits for any sex/age class identified in the management plan are met at any time (Idaho Fish and Game Commission 2016, p. 2; Wyoming Game and Fish Commission 2016, p. 67-2). Montana regulations state that if a State meets any of its allocated regulation harvest limits at any time of the year, the respective State will cease hunting in the DMA (Montana Fish and Wildlife Commission Resolution, July 13, 2016 approving the Tri-State MOA). Calculation of these allocated regulated harvest limits take into consideration total, which includes unknown/unreported. The population thresholds at which mortality rates change are indeed only estimates. Management of wildlife populations is almost always based on estimates of population size; rarely are they based on a true census of population size. With a highly conservative population

estimation technique due to documented underestimation bias of the model-averaged Chao2 method (see Issue 28), management decisions will also be conservative.

In response to concerns that the population estimate will not detect a decline because males will be killed at nearly twice the rate as female bears and that population estimates will be based on the entire ecosystem while hunting occurs only outside of National Parks, the IGBST uses multiple techniques for monitoring, including Chao2. Although the model-averaged Chao2 technique would not detect changes in the male subpopulation, the rates and ratios we use to derive a total population estimate are based on our known-fate analyses. The sample of radio-monitored bears (females and males) will allow the IGBST to update these rates and ratios if they change, which would be reflected in the total population estimate. If male survival declines, this would lead to lower estimates of a total population size through changes in the sex ratio, which would eventually change mortality thresholds as specified in this final rule and the 2016 Conservation Strategy. Whereas hunting mortality would occur only outside the parks, mortality management is based on the notion that grizzly bears in the GYE population form a single population, within which densities vary naturally due to differences in habitat quality, habitat security, etc. Thus, some areas currently already experience different levels of mortality. If hunting is added as a mortality source, it may change these spatial patterns, potentially changing source-sink dynamics, but total mortality would be managed so that it remains sustainable for the population as a whole. This system provides management flexibility, as it provides agencies with a mechanism to address, for example, conflict issues in certain areas while allowing potential connectivity in other areas.

Several of the more detailed assessments proposed by commenters, including the idea of an EIS, are difficult to achieve given current data. Assessing the impacts of different mortality thresholds on dispersal, for example, would be a substantial challenge and require new, concerted research efforts. Whereas such analyses would provide interesting ecological insights, they are not essential for informing management decisions, particularly given the extensive and long-term research and population assessments conducted by the IGBST. Estimates of sustainable mortality thresholds will be updated frequently by the IGBST, and plans are under way to set up a system where they update vital rates and associated population projections annually.

From 2002 to 2014, hunting would have been allowed for independent males in 10 out of 13 years and for independent females in 7 out of 13 years. The average annual allowable allocation for discretionary mortality would have been 19 independent males and 4 independent females. Edits were made to all three documents for consistency in the mortality limits and to clarify that they apply annually. All three documents were updated to reflect that at an estimated population size of less than or equal to 674 bears the mortality limit for independent females and dependent young is less than 7.6 percent and not less than or equal to 7.6 percent.

Annually, mortality limits will be applied as set forth in table 2 of this final rule based on the previous year's population estimate. Mortality limits will be adjusted in the future based on reviews of vital rates by the IGBST every 5 to 10 years, or at any point a Biology and Monitoring Review is required. The current State regulations to maintain the mortality limits within those in table 2 will compensate for annual fluctuations in natural or other causes of mortality. These regulations include: suspending grizzly bear

hunting within the DMA if total mortality limits for any sex/age class are met at any time during the year; in a given year, discretionary mortality will be allowed only if non-discretionary mortality does not meet or exceed allowable total mortality limits for that year; and any mortality that exceeds allowable total mortality limits in any year will be subtracted from that age/sex class allowable total mortality limits for the following year.

While we respect concerns from commenters about the spatial distribution of discretionary mortality, it is outside of the scope of our decision-making authority. Hunt areas will be developed by the States in order to direct harvest where appropriate, if hunting occurs (YES 2016a, p. 20; WGFD 2016, p. 16); see Issues 64 and 65 for further discussion. There are a number of ways in which population mortality thresholds can be set and measured. The IGBST has spent considerable effort to develop the current system, with a number of workshops over the past decade and associated scientific documents (i.e., workshop reports and journal articles). The monitoring system that was developed from these efforts represents the best available science. Regarding the "proportional harvesting" suggestion, the number of bears available for discretionary mortality, including for harvest, will be conservative because the Chao2 estimates are very conservative.

In response to suggestions to change the mortality limits and management framework, we recognize that it is unrealistic to expect to manage down to a single individual. The States agreed to manage the GYE grizzly bear population within the DMA, to *at least* within the 95% confidence intervals associated with the 2002 to 2014 long-term average grizzly bear population estimate calculated using the model-averaged Chao2 estimator (i.e., 600 to 747). The Service and the States understand that the actual

population will vary around that level, and that mortality will be managed to ensure that the population does not drop and remain below 600.

Issue 67—Several peer-reviewers and commenters raised concerns about the implications of limiting monitoring to the DMA. Commenters were concerned that bears outside the DMA will have no protections and a failure to count bears outside the DMA will put dispersal and connectivity in jeopardy, permanently isolating the GYE population. The States requested we remove the clause "grizzly bears will not be persecuted because they are present there," in reference to the DMA, from our revised recovery criteria. One peer-reviewer commented that mortality rates may be underestimated when bears whose home ranges overlap the DMA boundary are killed outside the DMA. Commenters asserted that bears that die outside the DMA likely emigrated from the DMA and consequently should count as losses for the DMA; otherwise, threats to the population will not be accurately assessed. Peer-reviewers point out that catastrophic events within the DMA (e.g., like fire in 1988), "could displace grizzly bears forcing some to shift home-ranges to outside the DMA boundaries," which would require sampling outside of the DMA. One peer-reviewer noted that less monitoring outside the DMA may produce "less data about individual bears that may behave differently than those within the DMA." Commenters thus requested we monitor grizzly bear populations outside the DMA or in the entire GYE DPS.

Response—The IGBST will continue to collect data on all mortalities in the GYE DPS, including those outside the DMA. However, mortalities outside the DMA will not be counted towards mortality thresholds because the DMA is the area within which IGBST partner agencies conduct population monitoring. Expanding the population

monitoring beyond the DMA boundaries is not biologically justified where habitat is not suitable for the bear's long-term viability. Bears that die outside the DMA may have dispersed from within or simply have home ranges on the periphery; regardless, the population monitoring protocols that are in place would detect if the level of mortality outside the DMA reaches a point where population size inside the DMA declines. Grizzly bears throughout the GYE DPS will be classified and regulated as a game animal in accordance with State game regulations (see Issue 73).

Issue 68—We received many comments from both the public and peer-reviewers regarding the management of human-bear conflict. One commenter did not understand how our calculations of mortality rates and bear–human conflict rates are lower currently than historically (e.g., during 1989 to 1998 or 1989 to 2005). This commenter suggested we should conduct such a comparative analysis at multiple population and geographic scales. Many commenters claimed that instances of human-bear conflict have increased in recent years because of overpopulation of grizzly bears, habituation, bear colonization of lower elevations and peripheral ranges due to changing food availability and distribution, increasingly close proximity to humans and developed facilities (Steyaert *et al*. 2016), and higher numbers of elk hunters. One commenter suggested that this trend could continue since Minin *et al*. (2016) found that, as land use changes, areas that will be key to carnivore conservation are also areas with high potential for conflict. One peer-reviewer commented that the current stable population trend of grizzly bears in the GYE may not confirm that the efforts to reduce human-caused mortalities are effective. One commenter suggested that managers in the GYE have not adequately carried out recommendations from the 2009 Yellowstone Mortality and Conflict Reduction Report

(IGBST 2009), and that this report recommended creating a publicly available database of all bear encounters and mortalities, which still does not exist.

A few commenters weighed in on whether they thought the act of delisting would increase or decrease conflict. Many commenters posited that delisting the GYE population of grizzly bears would reduce human-bear conflict because it will allow for more effective population management; these commenters suggested that, if bears remain on the list, and populations thus continue to grow, more bears will be removed as a result of conflicts with humans than the number of bears that would be killed in the context of a regulated hunt. On the other hand, some commenters suggested that the GYE grizzly bear population will self-regulate without delisting because disease and starvation will effectively reduce and limit the number of bears. Another commenter was worried that lethal responses to conflict would increase following delisting.

Many commenters believed we presented an inadequate discussion of methods to manage and reduce conflict; they suggested the following improvements or additions prior to delisting: (1) improved education programs that aim to change attitudes and behaviors of people living in grizzly bear country in order to increase risk tolerance and improve willingness to share habitat (see Issue 108); (2) limits on, or elimination of, ungulate hunting to reduce defense of life and property kills; (3) incentives for hunters to retreat from downed game; (4) additional law enforcement and field staff; (5) encouragement and funding of alternatives to lethal control of bears (including additional discussion of such methods in State management plans) since lethal control does not increase public tolerance or promote avoidance of future conflict; (6) preparation of a Grizzly Bear Management Relocation Plan with pre-arranged relocation sites; (7)

discussion on how managers should resolve conflicts on Tribal lands; and (8) managing for higher wild ungulate populations to decrease livestock depredation. A peer-reviewer suggested funding for programs that reduce bear attractants on public and private lands.

Commenters also provided suggestions on how to revise State management plans or the 2016 Conservation Strategy to better address conflict management, such as: (1) explaining the 33 recommendations to abate grizzly bear conflicts in a 2006 IGBST report and incorporating these into Wyoming's grizzly bear management plan; (2) including in the 2016 Conservation Strategy the admonition that managers and citizens should not "reward" or "encourage" bears around roads, campgrounds, cities, or landfills; and (3) changes to the nuisance bear standards.

Peer-reviewers also presented a number of additional analyses that could bolster our discussion of human-bear conflict, including: (1) a review of "the social aspects of managing large predators;" (2) using NDVI data (satellite imagery) to understand bear distribution and how these distributions relate to human-bear conflict; (3) tracking of relocated animals to assess the efficacy of relocating problem bears; and (4) additional analysis on how to change mortality management techniques as the number of people living in and recreating in the GYE increases. Peer-reviewers also requested an explanation of how conflict bears will be treated inside versus outside the PCA.

Response—Although the total number of conflicts has increased, the rate of conflicts (number of conflicts as a proportion of the population size) has decreased since the implementation of the IGBC Guidelines (USDA FS 1986, entire). As grizzly bear abundance and distribution have increased, conflicts have increased, especially in areas

outside the DMA (see figure 3) where habitat is not suitable for the bear's long-term viability.

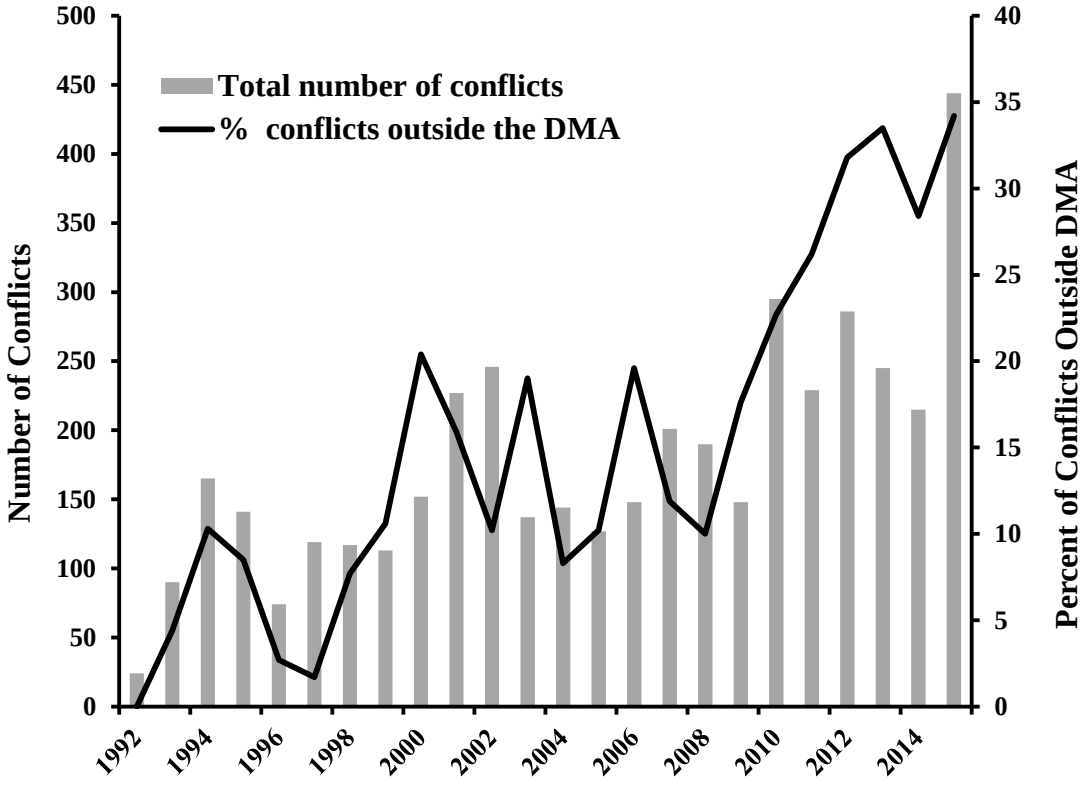

Figure 3. Number of grizzly bear conflicts compared to percent of conflicts outside of the DMA.

It is not unexpected that the number of conflicts would increase as bears increasingly encounter humans and livestock outside the PCA, where human access is generally greater than within the PCA. However, there is no evidence that bears are leaving the core of the ecosystem as a result of changes in food resources (see Issue 38 for further discussion). Areas with a high risk of grizzly bear mortality due to repeated conflict with humans or livestock were not considered suitable habitat and are not included in our quantification of habitat available to meet the needs of a recovered grizzly

bear population (see Issue 40). The IGBST 2009 report (p. 3) identifies three main causes for increased known and probable mortalities, predation, hunting (defense of life and mistaken identity), and management removal as a result of cattle depredation. The States have invested considerable resources in hunter education to reduce mortalities as a result of mistaken identity and defense of life (see Issue 108 for further details). In addition, increased I&E efforts have been made to reduce attractants (YES 2016a, pp. 86–95). The IGBST maintains a database of known and probable GYE grizzly bear mortalities, including cause (see Issue 34). In addition, potential changes in verified conflicts will continue to be documented and evaluated, as well as annual evaluations of the population and mortality, and the YGCC can make modifications to the 2016 Conservation Strategy if they deem it is necessary to maintain a recovered grizzly bear population within the GYE.

We agree that nonlethal control of grizzly bears is the preferred option for managing human-bear conflict. However, no single management tool can resolve all issues associated with human-bear conflict. Therefore, State, Tribal, and Federal managers will continue to use a combination of management options, including nonlethal forms of management. The current methods we use to reduce human-caused grizzly bear mortality by preventing and addressing conflicts in a systematic, fair, and prompt manner have accommodated an increasing GYE grizzly bear population and range since 2002.

As previously noted, the 2016 Conservation Strategy identifies, defines, and requires adequate post-delisting monitoring to maintain a healthy GYE grizzly bear population, with clear State and Federal management responses if deviations occur. Agreed-upon total mortality limits will ensure that mortality will continue to be managed

in accordance with recovery criteria. Notably, more than two-thirds of all suggested funding to implement the 2016 Conservation Strategy is designated to managing conflicts and conducting outreach to minimize conflicts, especially by decreasing attractants on private lands. Nonlethal means of addressing conflict such as relocation of conflict bears are included in the 2016 Conservation Strategy.

The 2016 Conservation Strategy prioritizes I&E programs to minimize human-bear conflicts. These programs work to change human perceptions, and beliefs about grizzly bears and Federal regulation of public lands. For example, hunter education courses and other educational materials strongly encourage hunters to carry bear spray, and information and education programs educate the public about potential grizzly bear attractants and how to properly store them. A stable to increasing GYE grizzly bear population, despite large increases in people living and recreating in the GYE over the last three decades, is evidence of the success of programs implemented that will continue under the 2016 Conservation Strategy.

In addition to public I&E, the States have implemented programs to help reduce conflicts with people including: livestock carcass removal, electric fencing subsidies for apiaries and orchards, and cost-sharing for bear-resistant garbage bins. Removal of conflict bears is still sometimes necessary. Removal is lethal to the individual bear, but it minimizes illegal killing of bears that might otherwise occur if people are encouraged to "take matters into their own hands," and it thus serves a long-term conservation purpose. Bear removal also provides an opportunity to educate the public about how to avoid conflicts and thus limits removals in the future. It encourages tolerance of grizzly bears by responding promptly and effectively when bears pose a threat to public safety.

Human-grizzly bear conflicts are reported by jurisdiction in the IGBST annual reports. The IGBST continues to conduct research on many aspects of the GYE grizzly bear and their ecosystem. Problem bears are radio-tracked when they are relocated, and the IGBST plans to assess the efficacy of relocating problem bears in the near future. The lower survival rates of relocated bears suggests that relocation should be used conservatively; however, relocated female bears have contributed to the population and should be used as a viable management alternative to removal from the population (Brannon 1987, p. 572; Blanchard and Knight 1995, p. 564). The 2016 Conservation Strategy (YES 2016a, pp. 86–91) and the State management plans detail the conflict bear standards to be applied to the GYE grizzly bear DPS once delisted. Inside the PCA, grizzly bears will be given a higher priority whereas "outside the PCA and National Park lands more consideration will be given to existing human uses." Conflict bear removals will be counted against the mortality limits set forth in this rule and the 2016 Conservation Strategy.

Issue 69—Public commenters asserted that the States' should prohibit black bear hunting within the DMA, or at the very least within the PCA, in order to reduce human-caused mortality from mistaken identification.

Response—The potential mortality that occurs to grizzly bears from mistaken identification is not considered a threat to the grizzly bear population. From 2007 to 2016, a total of 18 grizzly bear mortalities occurred in the GYE that were considered "mistaken identity," of which only 2 were females. In 2008, five grizzly bears were reported as killed due to mistaken identification, prompting an evaluation of management

and education strategies. The evaluation indicated that the increase in mistaken identity mortality was the result of bears expanding into new areas; therefore, outreach and education was increased. Following 2008, fewer than two grizzly bear mistaken identity mortalities per year were documented in the GYE. In Wyoming, black bear regulations (Wyoming Game and Fish Commission 2017, pp. 3-5–3-6) require that when a grizzly bear is detected at a black bear bait site, the hunter must shut down the bait site immediately and bear hunting at that site is disallowed for the remainder of the season. Baiting for black bears in Wyoming and Idaho is not allowed in the PCA and in the majority of the DMA and is not allowed statewide in Montana. The GYE grizzly bear population has increased while black bear baiting has been allowed in Idaho and Wyoming outside the PCA; therefore, we conclude that bear hunting is not a significant factor that will threaten the recovered status of the GYE DPS.

Issue 70—Commenters worried about the use of traps intended for game other than grizzly bears and the potential negative effects of these traps on grizzly bears, especially as grizzly bears' hibernation period shortens. Several commenters stated that trapping, as a means of harvest, should be prohibited for any animal within the PCA and/or the DMA to prevent the incidental take of grizzly bears. Several comments pointed out that the State plans do not have a reporting requirement or protocol if/when a grizzly bear is caught in a trap set for other game/nuisance species.

Response—Based on the best available information, we do not find any persuasive information to indicate that trapping for fur-bearing species will affect the viability of the GYE grizzly bear population. From 2002 to 2014, only one mortality occurred as a result of trapping for other game/nuisance species (Haroldson 2017b, *in*

litt.). When we make our status determination of the GYE grizzly bear, we consider whether it is recovered and if State management will retain that recovered status if the Act's protections are removed. Harvest, irrespective of the method, is allowed at the States' discretion, contingent upon the harvest not exceeding the aforementioned mortality limits.

Issue 71—One commenter expressed concern that we did not adequately acknowledge the grizzly bear mortalities associated with the annual elk hunt in GTNP as a continuing threat. This commenter cited a recent court decision that allowed "an increase in the number of grizzly bears that could be 'incidentally' killed in association with the annual elk hunt in Grand Teton National Park." Another commenter opined that we did not mention USDA Wildlife Services' incidental take of four grizzly bears since 1991.

Response—All known mortalities, including those associated with incidental take permits, such as the elk reduction program in GTNP, are included in the IGBST mortality database and, therefore, our mortality assessment. The mortality database identifies mortalities by cause and does note if mortality is associated with an incidental take permit. Grizzly bear mortality due to the elk hunt in GTNP is unlikely as only one grizzly bear mortality has occurred in the history of the elk reduction program in GTNP, and that was attributed to self-defense. GTNP now requires elk hunters to carry bear spray. Like any other mortality source, if there were a grizzly bear mortality associated with the annual elk hunt in GTNP, it would count against the maximum allowable mortality. The IGBST's calculation of unknown/unreported mortalities accounts for any unknown mortalities associated with incidental take permits. Mortality will continue to

be managed within the mortality limits set forth in this final rule, the 2016 Conservation Strategy, and the Tri-State MOA.

The specific statement by the commenter about bears that could be incidentally killed is in regard to an "Incidental Take Statement" that is a projected potential mortality to grizzly bears that could occur within a project area, and rather is not something that is suggested or purported to occur. Regardless, Incidental Take Statements would no longer apply after the bear is delisted.

Issue 72—We received public comments asking that we discuss the trade of grizzly bear parts, including the extent of trafficking in the United States and the state of current legislation. The commenter suggested that States pass appropriate laws making such trafficking illegal. One commenter suggested that all grizzly bears remain listed until illegal harvest data is thoroughly evaluated.

Response—The Lacey Act of 1900 (16 U.S.C. 3371–3378) is a conservation law in the United States that prohibits trade in wildlife, fish, and plants that have been illegally taken, possessed, transported, or sold. Under the Lacey Act, it is unlawful to import, export, sell, acquire, or purchase fish, wildlife, or plants that are taken, possessed, transported, or sold: (1) in violation of U.S. or Indian law; or (2) in interstate or foreign commerce involving any fish, wildlife, or plants taken, possessed, or sold in violation of State or foreign law. The law covers all fish and wildlife and their parts or products, plants protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and those protected by State law. Commercial guiding and outfitting are considered to be a sale under the provisions of the Lacey Act and must comply with U.S. Federal and State law.

The Convention is an international treaty designed to regulate international trade in certain animal and plant species that are now, or potentially may become, threatened with extinction. Under this treaty, countries work together to regulate the international trade of species and ensure that this trade is not detrimental to the survival of wild populations. Species are listed in one of three Appendices to CITES, each conferring a different level of regulation and requiring CITES permits or certificates. Any trade in protected plant and animal species should be sustainable, based on sound biological understanding and principles. An Appendix I species is one "threatened with extinction and provides the greatest level of protection, including restrictions on commercial trade." An Appendix II species is one "although currently not threatened with extinction, may become so without trade controls." An Appendix III species is one for which a range country has asked other countries to help in controlling international trade. See *https://www.fws.gov/international/cites/index.html* for more information.

All international trade in brown bears is restricted by either CITES Appendix I (in parts of central Asia) or CITES Appendix II. All U.S. and Canadian populations are included in Appendix II. Even populations not at risk (e.g., the population in Canada) is still regulated by CITES as it is a look-alike to those populations in Appendix I (including other species of ursids). Grizzly bear harvest under Appendix II for the purpose of international trade is also monitored via the issuance of CITES Export permits. Approved States and Tribes have procedures for placement of CITES export tags on skins (including furs and pelts) that were legally taken. The presence of a CITES export tag on a skin provides us with reasonable assurance that the skin was obtained legally and that hunters can legally export the item from the United States. We review

the information we receive annually from each State or Tribe to determine if there is a need to reevaluate our State- or Tribe-based finding or if the species needs closer monitoring. In addition, the States work directly with us on issues related to illegal trafficking of bear parts and the States have assisted, and will continue to assist, us with all such Lacey Act investigations. Although harvest of grizzly bears for the purpose of illegal trade in parts for medicinal purposes still occurs to some extent, the best available information indicates that this activity is not occurring at a level affecting the GYE or any lower 48-State grizzly bear population, nor do we conclude it is likely to do so within the foreseeable future.

Issue 73—There were a number of comments from the public and peer-reviewers related to poaching, mistaken identity kills, and self-defense kills. Commenters expressed concern related to poaching, illegal take, mistaken identity kills, and self-defense kills. Commenters were either concerned that there would not be enough resources to investigate and prosecute poachers or that State penalties for illegal take (such as poaching), mistaken identity kills, and self-defense kills need to be more clearly articulated and more stringent. Commenters asserted that regulatory mechanisms require little to no action against hunters for mistaken identity kills (a product of the McKittrick Policy), and mistaken identity and self-defense kills should be prosecuted as illegal take to better deter illegal take of grizzly bears.

Response—After delisting, GYE grizzly bears will continue to be protected by State, Tribal, and Federal laws and regulations (see *Factors B and C Combined*), and enforcing agencies will continue to cooperate in the investigation of poaching incidents. There is no data that suggests that the jurisdiction under which poaching is prosecuted

affects the willingness of poachers to commit the crime. We are aware of at least 22 intentional, illegal killings of grizzly bears in the GYE between 2002 and 2014, which constituted 7 percent of known grizzly bear mortalities during the same period. There is no evidence that illegal mortality levels increased following the 2007 delisting (GYE grizzlies were delisted from 2007 to 2009, before the delisting rule was vacated in *Greater Yellowstone Coalition* v. *Servheen, et al.*, 672 F.Supp.2d 1105 (D. Mont. 2009)). We do not expect poaching to significantly increase post-delisting because State and Tribal designation of the grizzly bear as a game animal means that poaching will remain illegal and subject to prosecution. The USFS, Tribal conservation officers, and Service special wildlife agents will continue to cooperate with State game wardens in the investigation of poaching incidents. Mistaken identification is prosecuted as illegal take, and any grizzly bear mortality is fully investigated to determine cause. Investigations of self-defense mortalities occur, and there have been instances of prosecution by the Service where the mortality was not deemed a self-defense situation. As previously stated, illegal take and self-defense related mortality count towards the total mortality limits within the DMA.

The McKittrick Policy requires proof of intent, that the individual knowingly killed a listed species under the Act, for Federal prosecution. However, intent is not necessary for prosecution under State law. During an investigation, the investigative officers usually meet with both local and Federal attorneys to decide if prosecution will be more successful under State or Federal jurisdiction. In most situations where the U.S. Attorney has declined prosecution conflicts, the States have taken over those prosecutions through State courts. There have been successful prosecutions under both Federal and

State laws. For example, in 2015 a man knowingly shot at a grizzly bear in the Cabinet-Yaak ecosystem, was prosecuted in Federal court, and was sentenced to 6 months in Federal prison. Under Idaho State jurisdiction, a man was successfully prosecuted in a 2014 grizzly bear killing after making a false claim of self-defense and was assessed a penalty of a $1,400 fine and civil penalties ($500 of which was suspended), 30 days suspended jail time, 1 year revocation of his hunting license, and 2 years unsupervised probation. H.R. 4751, The Local Enforcement for Local Lands Act of 2016, was not enacted. And lastly, law enforcement officers cannot comment on ongoing cases; therefore, it is not appropriate to publicly share the details of grizzly bear mortalities that are under investigation.

Adequate Regulatory Mechanisms and Post-delisting Monitoring Issues (Factor D)

Issue 74—Both peer-reviewers and public commenters expressed concern that the language in the *Factor D* section of the proposed rule was too non-committal. They requested we remove words such as "may," "anticipate," or "expect" if we hope to suggest a firm commitment to ensuring effective management post-delisting.

Response—Because modifications to State game regulations had not been approved at the time the proposed rule was published, we were able to describe them only in conditional terms. Thus, we conclude that the terms "anticipate" and "expect" were used appropriately in this section of the proposed rule. However, prior to this final rule, State regulations have been finalized and are in place and will ensure the recovery criteria are met (i.e., 2016 Conservation Strategy, Tri-State MOA, and State regulations).

Issue 75—A number of public comments questioned what we can legitimately consider an adequate regulatory mechanism and what plans, rules, regulations, and laws

we can thus consider in our *Factor D* analysis (inadequacy of existing regulatory mechanisms). A number of commenters claimed that our analysis was flawed because it relied on management regimes that are outdated or not yet final (e.g., the Idaho hunting regulations and the 2016 Conservation Strategy are still drafts; the Montana and Idaho grizzly bear management plans and the 2006 USFS Plan are outdated). One commenter asserted that it is not acceptable to simply state, "standards and provisions not yet incorporated into management plans will be integrated into future land management plan amendments or revisions." These commenters emphasized that the analysis surrounding *Factor D* must be based on *existing* regulatory mechanisms; thus, we must have finalized State plans, State regulations, the 2016 Conservation Strategy, and MOA to consider in our final rule. One commenter asserted that "adequate regulatory mechanisms" not only must be final before delisting but must also be "proven to be effective."

Another commenter noted that YNP currently includes the outdated 2007 Conservation Strategy in its Superintendent's Compendium; this commenter requested additional clarity on whether the 2016 Superintendent's Compendium would incorporate the provisions in the revised 2016 Conservation Strategy. Other commenters questioned whether land use plans, State management plans, MOAs, and conservation strategies qualify as regulatory mechanisms since they are not binding and enforceable.

Response—In *Greater Yellowstone Coalition* v. *Servheen et al.*, 665 F.3d 1015 (9th Cir. 2011), the Ninth Circuit upheld the Service's determination that existing regulatory mechanisms were adequate. The Ninth Circuit reversed the Montana district court (*Greater Yellowstone Coalition* v. *Servheen et al*., 672 F.Supp.2d 1105 (D. Mont. 2009)) on this point. The Ninth Circuit determined that the elements of the Conservation

Strategy were incorporated into binding regulatory documents, specifically National Forest Plans and National Park Service Superintendents' Compendia. The Ninth Circuit noted this was of particular importance because the two agencies collectively manage 98 percent of the lands within the Primary Conservation Area. Further, additional wilderness protections applied to suitable grizzly bear habitat outside the PCA.

On-the-ground habitat protections for GYE grizzly bears have not changed since the 2011 decision, and the GYE bear population has stabilized. The NPS and the USFS continue to manage 98 percent of the land within the Primary Conservation Area. These regulatory mechanisms have been proven to be effective. The habitat management standards detailed in the 2016 Conservation Strategy (YES 2016a, pp. 54–85) to reduce human-caused mortality have already been implemented through National Park Compendia (YNP 2014b, p. 18; GTNP and JDR 2016, p. 3) and the 2006 Forest Plan Amendment (USDA FS 2006b, entire). Changes to both the Compendia and the Forest Plan amendments per the revised 2016 Conservation Strategy are considered minor and of little biological significance and, therefore, largely the same as previous regulatory mechanisms. For example, the method to measure motorized route densities was updated, based on the best available science, so that the moving window approach calculates the total route length instead of the previous method of absence or presence of motorized routes, which often over- or under-estimated total routes (for further details see YES 2016b, Appendix E). Both agencies are signatories to the 2016 Conservation Strategy, which means that current habitat management standards will be taken into account in decision-making and that human-caused mortality will be monitored and controlled.

Section 4(b)(1)(A) of the Act requires us to make listing determinations based on the best available scientific and commercial data after taking into account the efforts of States and foreign nations, whether through predatory control, protection of habitat and food supply, or other conservation practices. The Ninth Circuit did not determine whether the 2007 Conservation Strategy was a "regulatory mechanism" under *Factor D*, but the Service is still obligated to consider other conservation efforts in its listing determinations under the Act. The 2016 Conservation Strategy is such an effort.

In terms of regulatory mechanisms to manage mortality, we are confident that the GYE grizzly bear population will be managed according to the demographic recovery criteria set forth in the 2016 Conservation Strategy and agreed to by the States in their Tri-State MOA. This framework ensures that mortality from all sources will be monitored and controlled by the States to ensure consistency with recovery criteria. Idaho, Montana, and Wyoming have capably managed other big game species (e.g., black bears, cougars), and we believe their respective State agencies have the resources, expertise, and incentives to continue their management responsibilities toward GYE grizzly bears if hunting is permitted in the future.

As to the comment that existing regulatory mechanisms must be both final and "proven to be effective," please see our response above regarding the effectiveness of NPS and USFS. The Service's Policy for the Evaluation of Conservation Efforts when Making Listing Decisions is not applicable to delisting determinations (68 FR 15100, March 28, 2003).

Issue 76—Multiple commenters weighed in on the States' ability to appropriately manage grizzly bears. Commenters expressed distrust and claimed State management

would be harmful or ineffective based on State "mismanagement" of other wildlife such as elk, bison, and large carnivores (e.g., wolves). Commenters worried that the States may ignore management requirements and decision-making would be susceptible to political influence of special interests, and suggested that States may falsify mortality information to maximize the number of bears available for hunting.

Commenters supportive of State management expressed confidence in the States' commitment and abilities to maintain a recovered population of grizzly bears, and State management will be more nimble, efficient, adaptive, and responsive to local stakeholder needs than Federal management. The State agencies themselves, in addition to public commenters, expressed confidence in their abilities to maintain a recovered population of grizzly bears, citing financial and staffing commitments to do so.

Response—The States of Wyoming, Idaho, and Montana have invested tens of millions of dollars and dedicated considerable staff time to conserve and recover grizzly bears in the GYE. During this time the GYE population has increased to a point where it has stabilized within the DMA and is approaching carrying capacity. Although commenters expressed concerns regarding the appropriateness of State management of grizzly bears, Wyoming, Idaho, and Montana have been managing and conserving wildlife since the early 1900s with significant increases in both ungulate and large carnivore populations. The States are committed to managing grizzly bears in accordance with the 2016 Conservation Strategy and its appended State grizzly bear management plans and regulations. By signing the Strategy, all management agencies have agreed to adhere to the demographic recovery criteria and habitat standards, including managing for connectivity for the foreseeable future, well beyond the delisting

and the minimum 5-year monitoring period required by the Act to address the long-term need for continued coordination among signatory agencies (YES 2016a, p. 13). The State and Federal regulatory mechanisms meant to achieve those demographic and habitat standards are currently in place, and we have nothing in the record to suggest that those regulations will change within any calculable planning horizon.

Ongoing review and evaluation of the effectiveness of the Strategy is the responsibility of the State, Tribal, and Federal managers in the GYE and will occur at least every 5 years, allowing public comment in the updating process. Any significant departure from agreed-upon Federal and/or State management plans will trigger a status review, and, if data indicate that grizzly bears in the GYE are in need of protection under the Act, we can initiate listing procedures, including, if appropriate, emergency listing.

In response to concerns about the ordinances, regulations, or resolutions passed by county governments in Wyoming regarding the presence or distribution of grizzly bears in these counties, we requested a letter from the Wyoming Attorney General's office clarifying the authority of counties in Wyoming to legislate in the area of grizzly bear management. The Wyoming Attorney General's office's response, dated August 8, 2006, states on p. 2, '' '* * * as an arm of the State, the county has only those powers expressly granted by the constitution or statutory law or reasonably implied from the powers granted.' *Laramie Co. Comm'rs* v. *Dunnegan*, 884 P.2d 35, 40 (Wyo. 1994). Neither the Wyoming Constitution nor the legislature has provided the counties in Wyoming with any expressed or implied authority over management of grizzly bears. Therefore, counties lack the authority to enact any ordinances(s), regulation(s), or resolution(s) which would affect the (Wyoming Game and Fish) Commission's Grizzly

Bear Plan on mortality or distribution of grizzly bears in Wyoming" (Martin 2016, *in litt.*). This letter indicates that Wyoming county governments have no authority to enact laws that affect grizzly bear management commitments made by the Wyoming Game and Fish Commission.

Issue 77—A number of public commenters believed that the five requirements for State hunting regulations that we laid out in the proposed rule were inadequate, allow hunting regulations that are too liberal, and/or could have severe impacts on population viability because: (1) They gave the States too much latitude in bag limits, seasons, and sex ratios and age limits for grizzly bear hunting; (2) the definition of "human safety purposes" when deciding whether to allow additional grizzly bear mortality, and its distinction from human conflict, is unclear; (3) they do not adequately take mortality from "unforeseen events, such as illness and natural disasters," into consideration; (4) they would allow for too many licenses to be issued; and (5) gaps in our regulatory requirements would not provide for adequate ecosystem-wide coordination and consistency in regulations. These commenters also suggested that the five requirements are insufficient to protect females and cubs because: (1) It would be difficult for the average hunter to distinguish between a male and female grizzly bear in the field or to tell the age of a grizzly bear; (2) they allowed for take of female grizzly bears and cubs; and (3) if a mother hides her cubs while she goes to find food, she will look like an independent female and will be vulnerable to take, leading to potential orphaning.

Commenters also suggested the Service require additional content in State regulations prior to proceeding with a delisting rule, such as that: (1) an "independent panel of ecological researchers" determine the total number of limited hunting permits;

(2) managers use a lottery system to distribute these few licenses; (3) all three States require 12-hour reporting requirements as opposed to 24-hour reporting requirements; (4) establishment of prohibitions on the killing of any bear accompanied by other bears; (5) inclusion of provisions shutting down all hunting for the season once quotas for female grizzly bears are met; (6) States coordinate season dates through the YGCC and time seasons to minimize risks to females; (7) inclusion of provisions requiring proper food storage and handling of hunter-killed carcasses; (8) provision of subsidies for bear-proof garbage containers to increase affordability and use; and (9) State quotas should not change with intra-annual fluctuations in local population levels. On the other hand, another commenter suggested that the Service would fail to honor State wildlife laws if additional provisions are required in relation to grizzly bears.

The State agencies took issue with the fact that the proposed rule prematurely assumed the three States would establish hunting seasons and suggested that the Act does not "require states to establish hunting seasons before delisting can occur." They thought that, by requiring specific provisions in State hunting regulations, the Service "created a public expectation that hunting will occur as soon as delisting is finalized."

Conversely, some commenters believed these five requirements were reasonable and adequate. These commenters referred especially to our fourth requirement as a key safeguard in ensuring the continued recovery of grizzly bears and preventing exceedance of mortality limits; this requirement ensures that the number of grizzly bears available for hunting fluctuates depending on the number of bears that have already died.

Response—We conclude, based on the best scientific and commercial data available, that the regulatory requirements we outlined in our proposed rule, and that the

States incorporated into regulation, will maintain a recovered population of grizzly bears in the GYE. State fish and wildlife agencies have significant expertise in managing hunting in a sustainable way for multiple species, and, therefore, the Service did not feel the need to micromanage how States would implement hunting regulations beyond those issues discussed. We do not consider the hunting regulations in Montana, Wyoming, and Idaho to be too liberal, but rather the States have agreed to strict mortality limits, with the additional safeguard of subtracting any excess mortality in subsequent years, which will ensure the GYE grizzly bear population remains at healthy levels.

While State regulations include no prohibition on the taking of females or the taking of cubs, regulations do impose mortality limits on the numbers of females, males, and total bears taken, and prohibit the taking of female grizzly bears with dependent young. Mortality limits take into account all forms of mortality, including management removals, illegal kills, self-defense, calculated unknown/unreported mortalities, natural mortalities, and other causes such as vehicle collisions. We believe this method adequately accounts for unforeseen mortalities.

Under State management, any open hunting season will be closed within 24 hours of the total mortality limit being met by Idaho and Wyoming (Idaho Fish and Game Commission 2016, p. 2; Wyoming Game and Fish Commission 2016, p. 67-2) and of the harvest limits being met by Montana (MFWP 2016, p. 4). If a hunter kills a female by mistake and causes an exceedance of the total allowable mortality limits for female bears, managers will subtract this mortality from the total allowable number of kills in the subsequent year, ensuring the number of female grizzly bear mortalities stays in check. Any reported cubs orphaned due to the human-caused mortality of the mother are

counted as probable mortalities in the mortality database maintained by IGBST and will count towards the dependent mortality threshold. We conclude that the provisions outlined in the 2016 Conservation Strategy and the Tri-State MOA are adequate to ensure that the three States coordinate regularly to reconcile mortality statistics, plan appropriate conservation actions, adapt management, and generally ensure the continued recovery of grizzly bears in the GYE. Please see Issues 68 and 89, as well as *Factors B and C Combined* for a full discussion of mortality limits and States' harvest regulations.

We agree with States' comments that the Act does not require States to establish hunting seasons before delisting can occur, and we regret any false expectations our proposed rule may have established. However, our intent in requesting the hunting regulations prior to delisting was to clearly demonstrate adequate regulatory mechanisms that would ameliorate such a potential threat if the States chose to establish hunting seasons, and to ensure that the GYE grizzly bear population will remain recovered if States decided to implement hunting seasons. The willingness on the part of the three States to implement regulations prior to a final decision on their part to implement hunting seasons is further testament to their commitment to manage the species in a way to ensure it remains recovered post delisting.

Issue 78—Some of the commenters critical of State plans and management practices focused on the difficulties surrounding coordination of management between all the political entities in the GYE. Commenters worried that inconsistent management and lack of communication between the three State entities, Tribes, and Federal land managers would pose the biggest threat to grizzly bears after delisting, as it could lead to errors in allocation, insufficient or inconsistent enforcement, delays in shutting down

hunting seasons, exceedance of mortality limits, violations of recovery criteria, inadequate reduction of discretionary mortality (when needed), population sinks, and lack of genetic connectivity. To mitigate this possibility, commenters requested: (1) information on how the States would be sharing and comparing data about mortality and population levels; (2) a formal process for collaboration between the States and the NPS to coordinate the management of bears that live primarily on NPS lands; (3) a "unified plan" that takes into account how many bears the other States will take; and (4) additional detail in the 2016 Conservation Strategy describing the processes States will use to coordinate with each other. Conversely, one commenter suggested that entrusting the States with grizzly bear management will help State wildlife managers effectively and consistently manage all the wildlife species in their State as a complete and connected ecosystem.

Response—All monitoring, reporting results, and management actions are centralized under the YGCC and the IGBST, as described in the 2016 Conservation Strategy (YES 2016a, entire), which all the State and Federal agencies have signed and agreed to implement. The agencies responsible for managing the GYE grizzly bear population upon delisting came together to develop the 2016 Conservation Strategy and have been effectively cooperating and communicating with each other about grizzly bear management decisions for the last 35 years.

In *Greater Yellowstone Coalition* v. *Servheen et al.,* 665 F.3d 1015 (9th Cir. 2011), the Ninth Circuit upheld the Service's determination that existing regulatory mechanisms were adequate. The Ninth Circuit reversed the Montana district court (*Greater Yellowstone Coalition* v. *Servheen, et al*., 672 F.Supp.2d 1105 (D. Mont. 2009))

on this point. The Ninth Circuit determined that the elements of the Conservation Strategy were incorporated into binding regulatory documents, specifically National Forest Plans and National Park Service Superintendents' Compendia. The Ninth Circuit noted this was of particular importance because the two agencies collectively manage 98 percent of the lands within the Primary Conservation Area. Further, additional wilderness protections applied to suitable grizzly bear habitat outside the PCA.

Since then the population has increased in abundance and distribution, and additional regulatory mechanisms have been adopted by State agencies to manage the GYE DPS at the ecosystem level, to ensure communication is facilitated annually to improve management, and to regulate any future hunting in a way that would ensure the species remains recovered. The Tri-State MOA (Wyoming Game and Fish Commission *et al*. 2016, pp. 5–6; YES 2016b, Appendix O) signed by the Commission and Directors of Wyoming, Idaho, and Montana defines the process by which the States will coordinate the management and allocation of discretionary mortality of grizzly bears in the GYE as follows:

- The Parties (referring to the three States) will support the IGBST in the annual monitoring of the GYE grizzly bear population.
- The Parties will meet annually in the month of January to review population monitoring data supplied by IGBST and collectively establish discretionary mortality limits for regulated harvest for each jurisdiction (MT, ID, WY) in the DMA, so DMA thresholds are not exceeded, based upon the following allocation protocol (YES 2016a, p. 46).

- The Parties will confer with the NPS and USFS annually. The Parties will invite representatives of both GYE National Parks, the NPS regional office, and GYE USFS Forest Supervisors to attend the annual meeting.
- The Parties will monitor mortality throughout the year, and will communicate and coordinate with each other and with Federal land management agencies as appropriate to minimize the likelihood of exceeding mortality limits.

It is true that States cannot compel Federal agencies to manage their lands in accordance with their State plans. However, as participants in the 2016 Conservation Strategy, both State and Federal agencies have agreed to carry out all its provisions, including the appended State plans. The Tri-state MOA directly incorporates the 2007 Conservation Strategy instead of the 2016 Conservation Strategy. The reason for this is that the MOA was signed before the 2016 Conservation Strategy was complete, but the MOA incorporates aspects of the 2016 Conservation Strategy. In addition, the MOA states that "The Parties intend this MOA to be consistent… with revisions to these documents made in conjunction with the delisting process."

Issue 79—Many commenters believed that the MOA, 2016 Conservation Strategy, and State regulatory mechanisms and management plans are "inadequate" to protect grizzly bears into the future and will not "ensure a stable, thriving, and connected grizzly bear population." One commenter expressed that, because of the history of wolf delisting and management, the public does not trust the Service's judgment in determining adequacy of State plans and regulations.

Commenters worried that no entity is required to act if States exceed mortality limits and that States are not compelled to monitor the grizzly bear population. To

enhance enforcement of mortality limits, commenters suggested making the 2016 Conservation Strategy mandatory and not "voluntary" and instituting penalties for States if they "exceed reasonable mortality thresholds."

Many commenters provided detailed concerns about the content of regulatory mechanisms (though these concerns were not specific to any State regulation in particular). These included that: (1) spring hunts are irresponsible since "it is impossible to know how many bears will be killed later in the year through management removals, poaching, accidents or natural causes;" (2) hunters would be able to kill hibernating grizzly bears due to provisions in the Sportsmen's Heritage and Recreational Enhancement (SHARE) Act of 2015; (3) States have not considered "what to do with the wounded bears that will escape;" (4) plans do not explain how the various entities will monitor mortality, revise limits, and prevent decreases in the levels of "scientific oversight" of the population; and (5) regulations lacked safeguards to prevent hunters, outfitters, or poachers from using radio collar frequencies to find collared bears.

One commenter suggested that the grizzly bear hunting regulations are too stringent and that normal licensing and hunting procedures should apply to any grizzly bear hunt (i.e., hunts should be open to the public and non-resident hunters); this commenter thought that the hunts should not be special limited or controlled hunts. One commenter suggested that timing the hunt to minimize female mortality was not a legally binding requirement; this commenter also noted that creating such restrictions would be logistically challenging since denning times are highly variable with weather and food conditions and because males usually emerge from dens only 2 or 3 weeks earlier than females. Others shared general beliefs that the regulatory mechanisms were adequate,

including: (1) that the proposed rule included "every possible safety net, including triggers for relisting;" and (2) that the States have committed to adjust mortality levels should populations fall below 675 bears and stop hunting if populations drop to less than 600 bears. The three States emphasized that they have agreed to collectively manage the GYE population at the ecosystem scale to maintain recovery through the Tri-State MOA. One State emphasized that the 2011 Ninth Circuit Court of Appeals ruling declared the regulatory mechanisms (which are still in place) to be adequate and thus any regulatory requirements beyond that framework are unnecessary.

Response—Comments specific to the adequacy of each State's individual regulations and plans, the MOA, mortality limits, and the 2016 Conservation Strategy appear in Issue 82. However, as noted earlier, State fish and wildlife agencies have significant expertise in how to sustainably manage game species. This expertise, combined with commitments made by States to manage the species for long-term stability, is evidence that the States will adequately manage grizzly bears to ensure the species remains recovered.

Issue 80—Many commenters stated that all State regulations (not just management plans) should require hunters to carry bear spray and should impose heavy fines or the threat of license revocation for those that fail to do so. Commenters noted that hunters are required to carry bear spray only in GTNP and JDR (though one State requested that we clarify that, since the JDR is not a NP, the bear spray requirement applies only in GTNP). In explaining the efficacy of bear spray, one commenter cited research from Smith *et al.* (2006), which found that 92 percent of bear attacks end when hunters use bear spray and 98 percent of those that carry bear spray left encounters with

bears unscathed; conversely, when hunters use firearms for protection, they are injured 56 percent of the time and 61 percent of these encounters result in lethal removal of the offending bear (Smith *et al.* 2012).

Response—Although the States do not currently require hunters to carry bear spray, States demonstrate and promote the proper use of bear spray in hunter education courses and other educational venues and materials. While the proper use of bear spray is promoted by the States, it is not 100 percent successful at stopping attacks from bears. Therefore, implications that greater use of bear spray would result in ceasing mortalities of bears or people is inaccurate. For more information on hunter education and public information efforts, see Issues 67 and 108.

Issue 81—Commenters opined that our requirements for State regulations (and the regulations themselves) do not adequately regulate the manner or method of take (e.g., baiting, use of hounds, trapping, stalking). Commenters suggested that a ban on all bear baiting be put in place in any area where grizzly bears could be present (not just inside the PCA) prior to delisting. Commenters expressed that bait stations pose threats to human safety, increase the risk of mistaken identity bear kills, and "lure [bears] outside Park boundaries." These commenters noted that Montana, Idaho, and Wyoming treat bear baiting differently. Conversely, one commenter suggested that the Service should defer to the States on the practice of baiting.

Commenters also noted the need for bans on bear trapping and bear hunting with hounds in all three States (both within and outside the PCA) prior to delisting. Commenters worried that hunting with dogs leads to conflicts between dogs and grizzly bears and can attract grizzly bears to people. Commenters also expressed that trapping

endangers humans and can cause severe damage to bears; this commenter asked if there is an Animal Care and Use Committee that has recently reviewed trapping in the GYE. One State suggested that a restriction on bear trapping should not be a foundation for grizzly bear delisting and that we remove the language in the rule that discusses bear trapping.

Response—We recognize and respect that many people find some or all forms of human-caused grizzly bear mortality as morally or ethically objectionable. However, the Act requires that we make our determination based on the status of the subject species (is it recovered and will State management retain that recovered status if the Act's protections are removed) and does not allow us to consider the manner in which individuals may be killed after delisting unless it would affect this overarching viability determination. The manner of take is subject to State control once grizzly bears are delisted. Based on the best available information, we do not find any persuasive evidence to indicate that the manner of killing will affect the viability of the GYE grizzly bear population. Protection of the GYE grizzly bear population and maintenance of the ecosystems on which bears depend has been, and will continue to be, managed consistent with the Conservation Strategy. Regarding baiting, Montana does not allow black bear baiting in any areas; black bear baiting inside the PCA is not allowed in Idaho or Wyoming (Servheen *et al.* 2004, p. 11). In areas outside the PCA in Idaho and Wyoming, State wildlife agencies will monitor grizzly bear mortality associated with black bear hunting and respond to problems if they occur. The GYE grizzly bear population has increased while black bear baiting has been allowed in Idaho and

Wyoming outside the PCA, so we conclude that baiting is not a significant factor that will threaten the recovered status of the GYE DPS.

Issue 82—Commenters questioned what State mechanisms qualified as "regulatory" for purposes of the Service's *Factor D* analysis. Commenters challenged the adequacy of various individual State regulatory mechanisms, including the Tri-State MOA, individual State management plans, laws, and regulations, rules, proclamations, or other administrative mechanisms.

Commenters questioned whether each State had regulatory mechanisms that met the elements that we identified in our proposed rule as necessary for delisting if the States decide to establish hunting seasons. State agencies commented that the Service exceeded our authority by identifying these requirements before the States decided whether to establish hunting seasons.

Commenters claimed various State regulatory mechanisms were inadequate based on public notice or involvement, or because they were the subject of litigation. Commenters took issue with the contents of State regulatory mechanisms, claiming they did not explicitly limit discretionary mortality, they allowed preemptive or unlicensed killing of bears, or they allowed killing bears causing conflict with livestock. Commenters questioned the State Commission's qualifications to set management objectives and their commitment to honoring limits, claiming prior Commission actions had harmed grizzly bears or other wildlife, such as wolves and bison.

Commenters claimed that the Tri-State MOA was inadequate, stating that it was voluntary, did not reflect all revisions in the 2016 Conservation Strategy, or otherwise did not adequately monitor bears or limit mortality.

Commenters claimed that Idaho's proclamation was not a regulatory mechanism and that various aspects of Idaho's, Montana's, or Wyoming's hunting frameworks were not final. Commenters questioned the States' abilities to enforce hunting closures and violations. Commenters questioned the timing and location of potential hunts, including their relationship to National Park boundaries, cutworm moth sites, connectivity, vulnerability of cubs and attending females, vulnerability during other big game hunts, or bear movement between hunt areas.

Commenters claimed that Montana, Idaho, or Wyoming management plans were flawed because they contained outdated factual information, did not include recent science, did not include the most current population and mortality information, had inconsistencies with other documents, did not reflect all revisions in the 2016 Conservation Strategy, or did not fully commit to the 2016 Conservation Strategy. Commenters criticized Montana's plan for not supporting the State's claim of the importance of hunting for increasing human safety. Commenters criticized Idaho's plan for not mentioning the DMA. Commenters criticized Wyoming's management plan because its hunting fees were too low, because it had not defined the term "human habituated" to ensure that only those bears posing a safety risk (and not merely bears near developed areas) will be subject to removal, and because it had not explicitly described how it would deal with orphaned cubs. One commenter suggested Wyoming adopt a "once-in-a-lifetime" limitation for grizzly bear hunting.

Response—The Act requires the Service to base its listing decisions on the five factors set forth in 16 U.S.C. 1533(a)(1) and 1533(b)(1)(A). This includes Factor D, the inadequacy of existing regulatory mechanisms. Regulatory mechanisms are not defined

in the Act, but they include those measures that, either individually or part of an overall framework, are designed to reduce threats to listed species or pertain to the overall State management and regulation of a listed species. The Act also directs the Service to consider other measures in its listing decisions, including "those efforts, if any, being made by any State ... to protect such species, whether by predator control, protection of habitat and food supply, or other conservation practices." (16 U.S.C. 1533(b)(1)(A)). The Service has a statutory obligation to take into account State conservation efforts, including the full range of State measures. This is part of the Service's Factor D analysis, and is consistent with other interpretations of the Act (*Defenders of Wildlife et al.* v. *Zinke et al.* 849 F.3d 1077 (D.C. Circ. 2017). The Service cannot dismiss a State conservation measure just because it is not legally binding. Rather, the varying levels of commitments and enforceability are taken into account as part of this analysis to ensure that the overall conclusion is reasonable. Here, the State statutes, regulations, and management plans, the 2016 Conservation Strategy, MOAs, and others reviewed in this rule all guide and clarify the States' approaches to grizzly bear management after desilting. All these measures are evaluated under Factor D and 1533(b)(1)(a). This includes the Tri-State MOA, which we consider under our broader statutory obligations under the Act, including 16 U.S.C. 1533(a)(1) and 16 U.S.C. 1533(b)(1)(A). We further note that the Tri-State MOA reflects the population goals set forth in the 2016 Conservation Strategy. This same conclusion applies to other mechanisms that commenters object to, including State management plans, policies, directives, and executive orders. Our review of the collective measures at issue is authorized under the Act, including the Act's legislative history, which indicates that section 4 listing or

delisting inquiry was drawn broadly to allow the Secretary to determine whether a species is threatened or endangered (or recovered) for any legitimate reason. H.R. Rep. No. 93-412 (July 27, 1973). Our approach is also reasonable because ignoring any of these documents or aspects of State management would violate our responsibility under the Act to consider all factors relevant to determining the biological status of a species.

We reached the conclusion that State regulatory mechanisms are adequate to protect the recovered population of GYE grizzly bears and that they do contain the general elements we required in our proposed delisting rule. Our analysis is set forth in the final rule, and we refer commenters to that discussion under *Factors B and C Combined.* We also note that we provided the public with another opportunity to review the State mechanisms through our public notice and comment period described in 81 FR 13174, March 11, 2016.

To the extent that commenters objected to public notice and comment procedures utilized by the States in adopting their respective regulatory frameworks, we refer the commenters to the administrative procedural requirements that each State must follow under State law. Responding to the specific comment about Idaho's proclamations, we note that Idaho Fish and Game proclamations, orders, and director orders carry the force and effect of law under Idaho Code 36-105(3) and 36-106(6)(D).

As to the comment that hunting regulations are not final, we would not expect all State hunting regulations to be final because no decisions have been made to authorize hunting seasons in Idaho, Montana, or Wyoming. Furthermore, the process set forth in the Tri-State MOA to establish discretionary mortality has not been undertaken yet because GYE grizzly bears have been protected by the Act. The allocation of

discretionary mortality set forth in the Tri-State MOA must be followed before any State can identify a bear quota subject to hunting because it identifies how many bears, if any, exceed population objectives. Only after that process is completed can States set hunting seasons, establish hunt unit quotas for each unit, assess and define hunter eligibility requirements, set licensing requirements and fees, and other limitations specific to administering annual hunting seasons.

The States are governed by the Tri-State MOA and have agreed in writing to follow the 2016 Conservation Strategy. The Service's review of State actions is dependent on compliance with the regulatory measures required of each State (set forth in the proposed rule), and adherence to the population objectives in the Tri-State MOA and 2016 Conservation Strategy. Outside these requirements, States will have considerable latitude to design hunting seasons based on their own knowledge and expertise. The States have an incentive to manage bears based upon recovery criteria and the associated mortality limits in both the recovery criteria and the Conservation Strategy and are, therefore, expected to take into account the biological requirements necessary for successful management, including the locations of food sources, travel corridors, connectivity, NPS boundaries, etc. Recovery of the GYE DPS would not have occurred without the active participation, support, and leadership of Idaho, Montana, and Wyoming.

The Service has analyzed and reviewed State management of other species, like elk, deer, and black bears. Over decades, the States have demonstrated responsible and professional wildlife management of these species and have a proven track record of managing these and other species to population goals and unit targets. In the many

discussions with our State partners, the Service has not encountered any situation or data that evidences an intent to deviate from these established wildlife management practices. This historical evaluation of other species informs the Service's conclusion that the suite of management principles and commitments can be reasonably considered in our overall delisting determination.

State management plans are useful because they help guide the State wildlife agencies in achieving management objectives, including population goals. The Service duly considers them in its analysis of a State's regulatory framework, as it is required to do under the Act. But management plans are not the only source of State management and control of wildlife populations. State management plans are just one of the many mechanisms the Service considered here. We understand that some commenters are disappointed that some State management plans for grizzly bears lack current data, but we look to other measures that are current and that will guide population management into the future. These include the State regulatory requirements, the Tri-State MOA, and the 2016 Conservation Strategy.

Issue 83—Many commenters weighed in on the process the Service and its partners used to author the 2016 Conservation Strategy, including: (1) that the negotiations about changes to the Conservation Strategy have been difficult to follow and the public does not know which changes have actually been incorporated into the final document (even though these changes could significantly alter grizzly bear management); (2) that the States could make changes to the Conservation Strategy at the eleventh hour when there is no risk of public scrutiny; (3) that the Service should be driving the process to revise the Conservation Strategy, not the States (as seems to be the case); and (4) since

the Conservation Strategy is a change in management, it needs to be analyzed under NEPA, the National Forest Management Act, and the Act (including the drafting of an EIS). Another commenter pointed out that the draft 2016 Conservation Strategy we released with the proposed rule did not contain the Tri-State MOA, an agreement that has essential details necessary to evaluate the adequacy of the rule and 2016 Conservation Strategy.

Other commenters provided input on the content of the 2016 Conservation Strategy, in addition to the suggestions and concerns raised in other issues (i.e., Issues 16, 17, 18, 19, 20, 31, 32, 40, 42, 43, 48, 49, 50, 53, 66, 68, 75, 78, 79, 84, 85, 86, 88, 89, 90, 91, 96, and 98), including: (1) confusion as to who was responsible for preparing the Conservation Strategy and completing the tasks therein; (2) concerns that the Conservation Strategy does not adequately explain the process for revisions and adaptive changes (see Issue 91); (3) worries that it would be too expensive to keep radio collars on a minimum of 25 adult female grizzly bears in the GYE at all times in perpetuity (YES 2016a, Chapter 2); and (4) confusion as to why the Conservation Strategy requires States to collect and report data on the number of hunters if we suggest that there is no correlation between the number of hunters and grizzly bear mortality. One commenter worried about the implications of changes discussed at the October 3, 2016, YES meeting, namely: (1) deletion of figures and description that explain when discretionary take would be permitted; and (2) removal of language explaining that 500 bears are necessary for genetic viability.

Commenters also suggested potential additions to the 2016 Conservation Strategy, including: (1) reiteration of the five elements our proposed rule stated must be in State

regulation; (2) inclusion of frequently cited documents (e.g., Food Synthesis Report) in the Conservation Strategy Appendices; and (3) addition of a clear timetable for completion of the Strategy.

Response—The Administrative Procedure Act (APA) requires that final rules be a logical outgrowth of proposed rules, after taking into consideration new information and public comment. The final 2016 Conservation Strategy and this final delisting rule are logical outgrowths of the draft Conservation Strategy and proposed rule, both documents that were made available for multiple public comment periods and peer-review. Additionally, all YES meetings are open to the public, and meeting dates and locations are posted on the IGBC website (*http://igbconline.org/*).

Issue 84—Both public commenters and peer-reviewers raised concerns about the adequacy of funding moving forward to finance grizzly bear conservation, monitoring, and enforcement. A peer-reviewer stated that the draft rule is based on the assumption that sufficient Federal and State funds will be available into the foreseeable future "to monitor and detect population changes with enough resolution to trigger management fallback mechanisms." Commenters worried that the MOA does not obligate any funds. Other commenters noted that implementation of the 2016 Conservation Strategy is dependent on funding, and one commenter suggested that the 2016 Conservation Strategy should require adequate funding to be "fully procured" for it to go into effect. Commenters and peer-reviewers also expressed confusion about the 2016 Conservation Strategy's discussion of funding (in Appendix F in the Draft 2016 Conservation Strategy), claiming it did not match the proposed rule nor adequately provide a formal outline for budgetary needs (though one peer-reviewer commended its inclusion). Some

commenters warned that Federal and State funding is not guaranteed and could decline at any time, potentially jeopardizing continued recovery.

Commenters expressed particular concern about the States' financial and administrative capacity to manage and monitor grizzly bears after delisting. Concerns about adequacy of State funding included: (1) a reminder that any Federal financial support would run dry after 5 years post-delisting; (2) confusion as to where States would find funds to make up this difference; (3) claims that delisting would cost an additional $1.2 million per year on top of current expenditures on recovery and would preclude States from pursuing certain funding opportunities (like Section 6 grants); (4) claims that funds generated from the sale of grizzly bear hunting licenses will not provide adequate funding to the States to manage grizzly bears; (5) worries that the Hicks Bill would relieve Wyoming of any obligation to pay to protect bears from illegal mortality; and (6) suggestions that States currently lack sufficient funds to combat poaching and this will only worsen in a delisted environment. Some commenters expressed concern that the States do not have sufficient staff to respond to hunting violations in a timely manner, close hunting seasons immediately upon meeting mortality thresholds, enforce adequate penalties on poachers, and conduct research and monitoring on grizzly bears to ensure effective adaptive management.

Commenters provided suggestions for ways to enhance confidence in State financial capacity for grizzly bear conservation, including: (1) State plans should clearly identify how they will fund grizzly bear monitoring, conservation, conflict management, and connectivity facilitation; (2) the Federal Government should provide sufficient financial support for State field biologists, State management of grizzly bears, and

programs to minimize bear conflict; (3) decision-makers should develop a means to share tourism dollars with State wildlife managers; and (4) managers should revive the idea of an endowment fund for the 2016 Conservation Strategy and post-delisting management, which had been part of recovery and delisting discussions for more than 20 years.

Response—We conclude that combined State and Federal commitments will provide for adequate management of the GYE grizzly bear after delisting. Federal funding is dependent on year-to-year appropriations whether or not the species is listed.

The 2016 Conservation Strategy reflects the States' commitment to future management and monitoring of grizzly bears. The States have been funding and performing the majority of grizzly bear recovery, management, monitoring, and enforcement efforts within their jurisdictions for decades; for example, the WGFD has expended more than $40,000,000 for grizzly bear recovery from 1980 to 2015. There is not a reasonable basis to believe the States will not adequately fund grizzly bear management of a delisted population. Claims that it would cost an additional $1.2 million/year are not supported by empirical data.

On April 12, 2017, the Secretary of the Interior issued a Memorandum, "Managing Grants, Cooperative Agreements, and Other Significant Decisions" establishing a new review process for Wildlife and Sport Fish Restoration Program grants in the amount of $100,000 or more. This new process may affect States, however, we do not think this memorandum will affect the capacity to conduct grizzly bear post-delisting monitoring because these procedures are temporary and do not reduce the amount of funding available for assistance.

The best available information does not support commenters' claims that the States lack the ability to monitor, manage, and respond to violations as States' have long demonstrated their expertise in managing wildlife within their borders. For example, Idaho successfully prosecuted a violation for unlawful take of grizzly bears in the GYE under State law even while the grizzly bear was listed; see *State* v. *Sommer*, CR-2014-1601 (7th Dist. Idaho, 2014).

By signing the 2016 Conservation Strategy, participating agencies have committed to implementing the protective features that are within their discretion and authority, and to secure adequate funding for implementation. Lack of adequate funding to carry out the 2016 Conservation Strategy grizzly bear management commitments could trigger a status review for possible re-listing under the Act.

Issue 85—We received several comments on the adequacy of the Service's status review triggers and suggestions for revising them. The States requested that triggers be tied to evidence of a declining population, rather than those tied to a specific number of bears, exceedance of mortality limits, or particular regulations or management. Commenters also noted that the Service's triggers need to be standardized in the rule, the 2016 Conservation Strategy, and other management plans. We also received suggestions that "a firm threshold for a review would be preferable to a 'may initiate' position."

We received a few comments on the first Service Status Review trigger in the proposed rule, including: (1) it is unclear what "significantly" means in this trigger; (2) this trigger could reduce the "flexibility that any management of any ecosystem requires" by constraining the ability of States to update and adapt management plans and strategies;

and (3) it is important to keep this trigger, despite State desires to remove it, "so that future changes cannot lead to a decline in the grizzly bear population."

Many commenters suggested increasing the population size in the second Service Status Review trigger so we would initiate a Service Status Review if the Chao2 population estimate fell below 600 bears in any given year. Other commenters suggested that the Service should determine whether the lower bound of the 95 percent confidence interval for the annual population estimate violates these requirements when assessing this trigger (as opposed to using the average).

Commenters also weighed in on the *third* Service Status Review trigger, expressing concern that this trigger could allow States to exceed mortality limits for several years before any review, "allowing for irreversible damage;" for example, it would allow States to exceed mortality limits in 7 out of every 10 years (as long as the years in which mortality limits are exceeded never occur three times in a row), pushing the population below 600 bears. Many commenters worried about the potential consequences of consistently exceeding mortality limits, and both commenters and peer-reviewers expressed concern that there will be a lag in a decision-making response to population declines that drop below 600, especially in high mortality years. As such, these commenters suggested changing the third trigger so that the Service would initiate a status review if the mortality limits for independent females are exceeded for two consecutive years and the population is below 600 bears.

Additional suggested triggers for a Service Status Review included those related to: a lack of funding; habitat standards/habitat degradation and monitoring protocols, including food monitoring (Johnson *et al.* 2004; Schwartz *et al.* 2010; Schwartz *et al.*

2012); population trends; lack of connectivity between the GYE and NCDE at least once during every 6-year period; and if the States classify grizzly bears as a predator or vermin in the future (or any classification that allows for unlimited take).

Some commenters expressed concern about the meaningfulness of our triggers, whether the Service would be willing to re-list the grizzly bear, should it become necessary, and whether the Service could re-list in a timely manner before populations decline further (given the usually lengthy process required for a listing determination). Some commenters expressed concern that the triggers do not require the Service or any other parties to act if they are violated. One commenter suggested that re-listing should be automatic to avoid these delays or failures to act. One commenter asked what recourse the Service had if other agencies did not abide by the agreements. One commenter asked how the Service would determine whether a status review is "warranted" if an individual, organization, or YGCC were to petition for such a status review. Another commenter warned that the Service cannot use "the possibility of relisting as a justification for delisting," based on past court decisions.

Response—The triggers for status reviews have been standardized between the 2016 Conservation Strategy, the Service's recovery criteria, and this rule. In addition, this rule uses "would" and "will" to confirm the firm threshold for review.

In response to comments on the *first* status review trigger, we would consider any changes in Federal, State, or Tribal laws, rules, regulations, or management plans to be a significant threat to the population if they would not maintain a recovered population. As stated in this final rule and the 2016 Conservation Strategy, this scenario does not inhibit adaptive management and application of the best-available science.

In response to comments on the *second* status review trigger, we believe that conducting a status review if the population estimate is less than 500 in any given year is appropriate. If any annual population estimate is less than 600, then discretionary mortality would cease, except for cases of human safety, thus reducing mortality rates. This approach allows appropriate corrective management responses by the management agencies to allow the population to increase prior to a status review. See Issue 19 for further discussion.

In response to the comments on the *third* status review trigger, this trigger was removed from the 2016 Conservation Strategy and this rule. However, the Service may choose to conduct a status review at any point that it deems there is a threat to the recovery of the GYE grizzly bear population or in response to any petition to re-list from an individual or organization that is determined to be substantial. Therefore, if mortality limits are exceeded repeatedly, the Service may choose to conduct a status review regardless of the population estimate.

In response to the comments requesting for additional triggers based on habitat or food monitoring, we consider the establishment of habitat thresholds for food sources to be unrealistic. As discussed in Issue 99, due to the natural annual variation in abundance and distribution in the four major food sources, there is no known way to calculate minimum threshold values for grizzly bear foods. The 1998 baseline will address these issues adequately through access management and limitations on site development. Managers will use an adaptive management approach that addresses poor food years with responsive management actions such as limiting grizzly bear mortality, increasing (I&E) efforts, and long-term habitat restoration (i.e., revegetation, prescribed burning, etc.) as

appropriate. The multiple indices used to monitor both bear foods and bear vital rates provide a dynamic and intensive data source to allow the agencies to respond to potential problems. We conclude that the adaptive management system described in the 2016 Conservation Strategy (YES 2016a, pp. 33–85) is one of the most detailed monitoring systems developed for any wildlife species and ensures the maintenance of a recovered grizzly bear population in the GYE.

The multiple indices used to monitor both bear foods and bear vital rates provide a dynamic and intensive data source to allow the agencies to respond to potential problems. The monitoring and adaptive management system described in the 2016 Conservation Strategy (YES 2016a, entire) ensures the maintenance of a recovered grizzly bear population in the GYE.

We agree that the mere possibility of re-listing is not an adequate regulatory mechanism. Re-listing cannot be an automatic function if the GYE grizzly bear population declines to the point where the protections of the Act become necessary because we are obligated to conduct rulemaking procedures, which include, among other things, an evaluation of threats) as outlined in the Act and the APA. However, listing may be expedited if necessary through the Act's emergency listing procedures. Be that as it may, we remain confident that these provisions will not be necessary due to the species' current and foreseeable viability, as managed and monitored by the 2016 Conservation Strategy and Tri-State MOA.

Issue 86—Commenters expressed concerns about the triggers for an IGBST Biology and Monitoring Review, including: (1) confusion as to the justification for changing the Biology and Monitoring Review trigger from its current status (mortality

limits exceeded for any sex/age class for 2 consecutive years) to 3 consecutive years and a population floor; (2) assertions that failure to meet recovery criteria should trigger a status review and emergency re-listing rather than a review by the IGBST; (3) concerns about the lack of a defined timeframe for completion of a review report and remedying the identified issues; (4) suggestions for clearer Service responses should the YGCC fail to take appropriate action in response to a review; (5) suggestions that the Biology and Monitoring Review triggers need to be standardized in the rule, the 2016 Conservation Strategy, and other management plans; (6) claims that the triggers are too low or are unclear; (7) concerns that there is no trigger for a lack of funding; (8) worries that a review would be politically influenced; and (9) recommendations that the delisting rule provide "clear thresholds and corrective mechanisms" with a process that "a. ensures timely action and limits time lags that arise from administrative review; b. includes an opportunity for public involvement in proposed actions, and; c. establishes a policy of rejecting proposed actions, if not supported by the best available science."

Response—Edits were made to all three documents to clarify the triggers for an IGBST Biology and Monitoring Review and to make them consistent between the documents. The triggers for an IGBST Biology and Monitoring Review are based on the demographic recovery criteria and are believed by managers to be effective for decision-making given available data. Proposed triggers for an IGBST Biology and Monitoring Review are designed to be sufficient to detect meaningful demographic changes in a timely manner. More importantly, triggers for an IGBST Biology and Monitoring Review can be adjusted if the IGBST deems they are not sufficiently sensitive or, in contrast, too sensitive (i.e., causing many "false triggers"). The IGBST Biology and

Monitoring Review triggers are more easily activated than Service review triggers to supply the YGCC with ample time to respond with management actions if necessary. It would be more appropriate to tie any lack of funding for the IGBST's monitoring responsibilities to a decision by YES/YGCC to address the issue. Details were added to this rule and the 2016 Conservation Strategy that a Biology and Monitoring review would be completed within 6 months of the request by the YGCC and the resulting written report would be presented to the YGCC and made available to the public. Any proposed changes to the 2016 Conservation Strategy by the YGCC, in response to a Biology and Monitoring Review, to address deviations from the population or habitat standards will be available for public comment and be based on the best available science.

Issue 87—Commenters and a peer-reviewer suggested that the IGBST should give a binding commitment to conduct a demographic monitoring review every 5 years or less (instead of every 5 to 10 years) because: (1) it would be more consistent with precautionary management; (2) the generation length for grizzly bears is close to 10 years; and (3) the IGBST could miss dramatic shorter term changes in grizzly bear populations in an interval of 5 to 10 years between reviews.

Response—The best available data indicate that 5 to 10 years is an appropriate interval to conduct a monitoring review. For example, generation times are now actually closer to 14 years (Kamath *et al.* 2015, p. 5516), further supporting the frequency of 5 to 10 years. Grizzly bears are a long-lived species, and estimated survival rates for both independent males and females in the GYE are over 95 percent annually until age 25, when survival begins to decline. Any demographic review done with shorter intervals will likely have many of the same individual bears in the sample. The longer the interval

between assessments the more likely it is we will have different individuals in the sample. This greater independence among bears in the sample is desirable if we are trying to assess impacts of landscape change on the demographic vigor of the population.

While official reviews will be conducted only every 5 to 10 years, the IGBST will closely monitor the population annually, including estimating population size using the model-averaged Chao2 method, monitoring and reporting the distribution of reproducing females, and monitoring and reporting mortalities. Habitat variables will also be monitored annually, including livestock grazing, food availability, and ungulate populations, Yellowstone cutthroat trout, moth aggregation sites, and whitebark pine cone production and health. The IGBST could at any time recommend a Biology and Monitoring Review to the YGCC if they deem necessary based on annual monitoring results. Additionally, the Strategy outlines specific triggers for an IGBST Biology and Monitoring Review as well as a Service-initiated status review.

Issue 88—One commenter raised concerns that managers would not be able to effectively implement adaptive management because there is no commitment to funding and implementing the necessary monitoring. Grizzly bear managers have failed to implement adaptive management in the past; for example, they did not redefine the Recovery Zone even though 40 percent of occupied habitat is now outside of it.

Many commenters and a peer-reviewer requested additional information on the adaptive process for revising the 2016 Conservation Strategy during its duration should the best available science indicate changes are warranted. One commenter hoped authors could include specific provisions in the 2016 Conservation Strategy requiring review and

updating every 5 years or including language in the preamble explaining that the 2016 Conservation Strategy will evolve as new science becomes available.

Response—We have no reason to conclude that State, Tribal, and Federal land managers are not committed to fund and implement monitoring (see Issue 84). Given that the grizzly bear generation time is more than 5 years and long-term data is needed to determine meaningful trends, it is appropriate that the IGBST has adopted an adaptive management process; the purpose of adaptive management is to change based on improving science. Recovery plans are not regulatory documents, rather they are intended to provide guidance to the Service and our partners on methods to minimize threats to listed species and on criteria that may be used to determine when recovery is achieved. In response to the comment that we have failed to implement adaptive management by not updating the Recovery Zone in the Recovery Plan, delisting determinations are based solely on an evaluation of the five factors under section 4 of the Act, and, while recovery criteria can inform that analysis, we do not need to update a species' recovery plan prior to the species' delisting. In accordance with the 1993 Recovery Plan, Recovery Zones are areas large enough and of sufficient habitat quality to support a recovered grizzly bear population and are not designed to contain all grizzly bears in the ecosystem.

Issue 89—Public commenters presented differing perspectives on whether the content of the proposed rule represented an overreach of Service authority or too little Federal Government involvement. The State agencies called some of the content of the proposed rule (particularly demands about the content of State hunting regulations and the discussion of connectivity and movement of bears between ecosystems) "unduly

prescriptive" and suggested that some of the requirements in the proposed rule "transcend the Act's authority." Some commenters and the States questioned whether we had the authority to require particular hunting regulations prior to delisting, while others suggested that we require States to classify grizzly bears as a non-game species, thus, prohibiting hunting altogether. One commenter suggested that States should be the ones setting mortality limits and monitoring mortalities.

Commenters also varied in their perspective on the proper Service role after delisting. Some commenters suggested the Service should have little to no role after delisting; one stated that after delisting "the Service must monitor, but not dictate, the state's or Tribes' management methodologies." One commenter requested that we clarify that the 2016 Conservation Strategy is a cooperative agreement and that the Service's role is not to oversee management but to evaluate the five factors under the Act should it be necessary. Others suggested the proposed rule did not allow enough Federal involvement after delisting and urged more Service engagement in independent monitoring. Some commenters went so far as to suggest "management should continue to be the responsibility of the USFWS" and that the Service should use the preemption clause of the Constitution to invalidate any State or local laws that jeopardize grizzly bears. Another commenter simply requested that we explain and clarify the Service's role in grizzly bear management within the GYE after delisting.

Response—A basic tenet of wildlife management in the United States is that States have primary jurisdiction over most wildlife in most cases. The Federal Government has a "trust resource" responsibility for a few specific categories identified under Federal law, including species deemed threatened or endangered under the Act.

When a species no longer qualifies as threatened or endangered, the management reverts back to the States.

Under the Act, we are required to show that threats to listed species have been sufficiently abated (and will remain so for the foreseeable future) such that we can reasonably reach the conclusion that the species is no longer threatened or endangered. Section 4(b)(1)(A) further clarifies that we are to take into account those efforts being made by any State to protect such species. Under Section 4(a)(1)(d) of the Act, we must determine whether it is endangered or threatened 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. The 2016 Conservation Strategy and the corresponding step-down State and Federal regulations implementing this agreement are necessary to illustrate how various risk factors are going to be managed and allow us to determine that threats have been sufficiently abated such that the species is no longer threatened or endangered.

For grizzly bears, our analysis under *Factors B and C Combined and D* identifies human-caused mortality and the regulations governing it as crucial determinants of whether grizzly bear populations in the GYE will meet the definition of an endangered or threatened species. This is similar to our previous assessment of habitat (*Factor A*) and its long-term management (*Factor D*), which was previously litigated and upheld on appeal. Therefore, regulatory mechanisms that adequately address management of discretionary mortality are a necessary component of the path to delisting. It remains the

Service's statutory responsibility to analyze threats to the species under the five listing factors and evaluate whether such regulations are consistent with a delisting determination under the Act. The State, Federal, and Tribal partner agencies implementing the 2016 Conservation Strategy continue to work together to implement a regulatory framework that allows grizzly bears in the GYE to be recovered and delisted under the Act, with continuing habitat and population management under the authorities of the individual agencies. Thus, this final rule describes standards for evaluating whether State game regulations are consistent with grizzly bear mortality targets, under the management framework of the interagency 2016 Conservation Strategy. The authority for promulgating hunting regulations for game animals remains with State wildlife commissions.

We conclude that the Service's involvement in grizzly bear management, as described in this final rule, is appropriate in scope and is consistent with statutory requirements. After the delisting of grizzly bears in the GYE, the regulatory protections of the Act will be withdrawn but the Service will continue to evaluate the species' status through post-delisting monitoring as described in the interagency 2016 Conservation Strategy. Post-delisting monitoring will continue to include data collected by various State, Tribal, and Federal agencies under the 2016 Conservation Strategy; we are confident that such monitoring can continue to provide valid data on grizzly bear status, and conclude that monitoring programs do not need be funded and implemented separately by the Service. Because grizzly bears are vulnerable to excessive human-caused mortality, the 2016 Conservation Strategy recognizes the need for active management under the jurisdiction and authority of the various Federal, State, and Tribal

agencies to implement conservation measures intended to address the source of such mortality.

With continuing interagency cooperation in implementing the 2016 Conservation Strategy, we fully expect partners will maintain healthy grizzly bear populations in the GYE without the protections of the Act. As is the case for any non-listed species, the Service can conduct a status review at any time and is required to consider petitions for re-listing if ever received. Such a review will be triggered if population and mortality targets in the 2016 Conservation Strategy are consistently not met. Furthermore, although we conclude this will likely not be necessary, Section 4(g)(2) of the Act directs the Service to make prompt use of its emergency listing authority if necessary to prevent a significant risk to the well-being of the recovered population.

We anticipate that the Federal Government will continue to be involved in grizzly bear management after delisting. As discussed in the proposed rule, the NPS, USFS, and BLM are responsible for land management over much of the GYE, and will continue to be actively involved in interagency groups implementing the 2016 Conservation Strategy. Similarly, Federal scientists, such as those employed by the USGS, will continue to monitor the GYE grizzly bear population. The Service plans to remain informed about grizzly bear status and population trends, and to remain engaged with partners as the 2016 Conservation Strategy is implemented.

As discussed in the proposed rule, we conclude that limited and well-regulated harvest of grizzly bears can be compatible with meeting mortality targets under the 2016 Conservation Strategy, and thus maintaining a healthy population that does not require the Act's protections. The suggestion to designate grizzly bears as non-game and

prohibit regulated harvest altogether is not necessary, nor is it within Federal control for most unlisted species. For example, brown bear hunting is a common and sustainable practice globally. When managed correctly, as discussed in the final rule, carefully regulated harvest can be a part of the greater conservation strategy.

Issue 90—A number of public commenters expressed concern about our use of the term "conservation reliant" species in reference to grizzly bears.

Response—We no longer use the term "conservation-reliant species" in this rule.

Issue 91—Public commenters presented differing points of view on the implementation period of the 2016 Conservation Strategy. Some parties (including the States) took issue with our characterization of the 2016 Conservation Strategy in the proposed rule as being indefinite or being in place in perpetuity. These commenters suggested that an overly long post-delisting monitoring period impinged upon States' rights. They expressed the concept that the Act is an emergency room statute and that once a species is recovered its management should be returned to the States without Federal oversight. Some commenters (including the States) suggested that the Service has conflated "conservation-reliance" with post-delisting management that exceeds the Act's requirements and that the Conservation Strategy should not be an indefinite agreement to allow for more flexibility in adjusting management strategies in response to future change. One commenter argued that the Act does not require a 2016 Conservation Strategy for delisting. A number of commenters suggested the 2016 Conservation Strategy should stay in place only for the minimum 5-year monitoring period the Act requires. The States asked the Service to remove any mentions of the 2016 Conservation Strategy being in place "in perpetuity," "perpetually," or "indefinitely" and instead state

that "[t]he 2016 Conservation Strategy will remain in effect beyond the 5-year monitoring period of the Act."

Others suggested the 2016 Conservation Strategy should stay in place for much longer than 5 years. One commenter recommended a post-delisting monitoring period of 18 years based on grizzly bears' slow reproduction and vulnerability to habitat change, noting previous precedents for monitoring periods up to 20 years. One commenter stated that "it is critically important that the IGBST continue to be involved" with GYE grizzly bear recovery GYE for 10 or more years after delisting. Several commenters expressed that the Conservation Strategy should be in place "in perpetuity."

Other commenters referenced revisions to the 2016 Conservation Strategy that clarify how it would remain in effect for the "foreseeable future." In light of the above, commenters requested that we clarify how long the 2016 Conservation Strategy would remain in effect, how long monitoring would continue, and what would happen after that point. One commenter requested a definition of "foreseeable future." Another commenter stated that common usage for "foreseeable future" was 100 years, similar to the timeframe of a forest rotation, and recommended monitoring over two rotations to allow their effects to manifest. Another commenter agreed that management was required over the foreseeable future because the grizzly bear is a conservation-reliant species.

*Response—*The 2016 Conservation Strategy serves as our post-delisting monitoring plan and represents the agreement from all management partners on post-delisting management. Post-delisting monitoring refers to activities undertaken to verify that a species delisted due to recovery remains secure from risk of extinction after the

protections of the Act no longer apply (USFWS and NMFS 2008, p. 1-1). The primary goal of post-delisting monitoring is to monitor the species to ensure the status does not deteriorate, and if a substantial decline in the species (numbers of individuals or populations) or an increase in threats is detected, to take measures to halt the decline so that re-proposing it as a threatened or endangered species is not needed (USFWS and NMFS 2008, p. 1-1).

Section 4(g), added to the Act in the 1988 reauthorization, requires the Service to implement a system in cooperation with the States to monitor for not less than 5 years the status of all species that have recovered and been removed from the list of threatened and endangered plants and animals (USFWS and NMFS 2008, p. 1-1). The legislative history of section 4(g) indicates that Congress intended to give the Services and States latitude to determine the extent and intensity of post-delisting monitoring that is needed and appropriate (USFWS and NMFS 2008, p. 1-1). According to our 2008 Post-Delisting Monitoring (PDM) Plan Guidance, decisions regarding frequency and duration of effective monitoring should appropriately reflect the species' biology and residual threats (USFWS and NMFS 2008, p. 4-4).

Delisting criteria and the formal rulemaking process for removal from the list are designed to provide reasonable confidence that the species will remain secure for the foreseeable future, and post-delisting monitoring provides an additional "check" on projections that the species will remain secure after removal of the Act's protections (USFWS and NMFS 2008, p. 4-3). There are no absolute guarantees against future declines, but if the species appears to remain secure, conclusion of post-delisting monitoring is appropriate (USFWS and NMFS 2008, p. 4-3).

We agree that it is unrealistic and is beyond what is required by the Act to expect any single version of the Conservation Strategy and intensive Federal oversight to remain in effect in perpetuity. Therefore, the 2016 Conservation Strategy was revised to remain in effect for the foreseeable future as this is the time horizon that we must consider as we evaluate the species' status relative to the Act's definition of a threatened species.

In making our determination, we considered what the "foreseeable future" means in the context of GYE grizzly bear biology and the factors potentially affecting bear viability. To determine whether a species is likely to become endangered in the foreseeable future, the Service must consider the period over which it can make reliable predictions. It cannot speculate. Solicitor's Opinion M-37021, *The Meaning of "Foreseeable Future" in Section 3(20) of the Endangered Species Act* (2009). Consideration of the foreseeable future often involves determining when current or future trends cannot be further extrapolated without veering into speculation. It can also involve making reliable predictions about future events. Using the best scientific and commercial information available, the Service must analyze events, trends and threats over different periods of time, and must synthesize that information to reach a final conclusion about GYE grizzly bears.

The partners managing the GYE grizzly population have, as discussed above, successfully reduced or eliminated the negative trends that led to the listing of the bear in the first place. In addition, we anticipate no particular future events that will lead to the DPS becoming in danger of extinction in the future. Future implementation of the 2016 Conservation Strategy and its management objectives have also been expressly tied to the statutory concept of the foreseeable future. Under these circumstances, with a stable and

protected population extending into the indefinite future, there is no need to more precisely define a particular period as being the "foreseeable future" for the bear. In other words, we cannot reliably predict on any human timescale that the status of the bear will deteriorate at all, much less that it will become in danger of extinction in the future.

However, there is not an expectation that the 2016 Conservation Strategy will remain static during its lifespan. In fact, the YGCC (the body that will coordinate management and promote the exchange of information about the GYE grizzly bear population after delisting) can revise or amend the 2016 Conservation Strategy based on the best biological data and best available science (YES 2016a, chapter 6). Any such amendments will be subject to public review and comment and approved by YGCC (YES 2016a, p. 96). More meaningful changes will need to be evaluated by the Service to determine whether they would depart significantly from previous commitments or represent a significant threat to the population and thus trigger a status review.

Periodic status reviews are consistent with Service practice for other species. For example, the Service has a history of conducting such reviews during the Northern Rocky Mountain gray wolf post-delisting monitoring period. Specifically, during this 5-year post-delisting monitoring period, we conducted six annual evaluations of status (in their entirety: Bangs 2010, *in litt*.; Jimenez 2012, *in litt*.; Jimenez 2013a, *in litt.*; Jimenez 2014, *in litt.*; Jimenez 2015, *in litt*.; Jimenez 2016, *in litt*.) and seven “on-the-spot” evaluations considering whether some of the more meaningful changes to State management laws or regulations met that standard (Cooley 2011, *in litt*.; Cooley 2012, *in litt*.; Jimenez and Cooley 2012, *in litt*.; Sartorius 2012, *in litt*.; Jimenez 2013b, *in litt*.; Cooley 2013, *in litt*.; Cooley 2014, *in litt*.). In those cases, wolf biology, high population

levels and a demonstrated track record of withstanding high levels of human-caused mortality provided us with sufficient confidence that the changes did not represent a significant threat and did not trigger a Service status review.

Issue 92—One commenter expressed concern that we do not discuss the BLM's sensitive species program in the proposed rule. This commenter wanted us to describe "how grizzly bears will be classified for planning and management purposes on BLM lands post-delisting." Several commenters stated that the BLM must have regulatory mechanisms in place to protect grizzly bear habitat after delisting, provide connectivity between habitats, and ensure adequate habitat protections are in place; commenters were concerned that these mechanisms were missing or remained in drafts unavailable to the public.

Response—Upon delisting, the GYE grizzly bear will be classified as a sensitive species by the BLM for at least 5 years. A sensitive species is one "requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA" (BLM 2008). All land use and implementation plans must address the conservation of sensitive species through appropriate habitat management. Twenty-two percent of suitable habitat outside of the PCA is managed by the BLM. This information and the habitat protections provided by this designation have been added to both this final rule (see *Factors A and D*) and the 2016 Conservation Strategy (YES 2016a, pp. 115–116).

Issue 93—We received some comments from peer-reviewers and the public in reference to the USFS designation of the grizzly bear as a "sensitive species" or "species of conservation concern" upon delisting. Commenters and one peer-reviewer considered

this USFS designation an important component of ongoing management of grizzly bears. Some commenters asked for specific statutory and regulatory definitions for "sensitive species" and "species of conservation concern" and the amount of protection afforded under each designation. Commenters expressed concern about the different authority these USFS designations provide and worried that the new designation of "species of conservation concern" under the 2012 Planning Rule would not provide the same project-level prohibitions as the "sensitive species" designation.

Response—The inherent protections afforded by the Sensitive Species designation and the Species of Conservation Concern and the Individual Species Direction are comparable. All three are designed to meet the intent of the USDA Departmental Regulations 9500–4, which directs the USFS to "Avoid actions which may cause a species to become threatened or endangered" and Sensitive Species Objectives (USDA FS 2005, Manual 2670.22), which include: "Develop and implement management practices to ensure that species do not become threatened or endangered because of USFS actions and "Develop and implement management objectives for populations and/or habitat of sensitive species." Following are the regulatory definitions:

> *Sensitive Species*: Those plant and animal species identified by a regional forester for which population viability is a concern, as evidenced by: (1) Significant current or predicted downward trends in population numbers or density; and (2) Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. (USDA FS 2005, Manual 2670.05).
>
> *Species of Conservation Concern*: For purposes of this subpart, a species of conservation concern is a species, other than Federally recognized threatened,

endangered, proposed, or candidate species, that is known to occur in the plan area and for which the regional forester has determined that the best available scientific information indicates substantial concern about the species' capability to persist over the long-term in the plan area. (36 CFR 219.9(c)).

Issue 94—Some commenters were concerned with the Service's portrayal of the USFS designations of Wilderness, WSA, and IRA and the protections each of these areas provide. Some felt that these designations are not restrictive enough to assume that there will be no impact on grizzly bears living in those areas. In roadless areas, energy development or road construction can occur in conjunction with oil and gas leases that pre-date the effective date of the roadless rule. In addition, roadless areas allow for off-road vehicle use, motorized ATV trails, and human recreation, which may impact habitat. Moreover, it cannot be assumed that there will be no changes to the roadless rule as it is currently under judicial review. In designated Wilderness and WSAs, mining claims that pre-date the Wilderness Act may be pursued. Livestock grazing is also permitted on these lands.

Response—In response to concerns about our portrayal of the USFS designations of Wilderness areas, WSAs, and IRAs in the proposed rule, revisions were made to the final rule (see *Factors A and D*) that provide clarification to our description of the USFS designations of Wilderness, WSAs, and IRAs, and the protections each of these designations provide. Although it is true that development can occur in conjunction with oil and gas leases that pre-date the roadless rule, these claims must be valid to be pursued and the plans of operation are subject to reasonable regulations to protect roadless characteristics, with mitigation to offset potential impacts from development. Although

motorized roads and trails may occur in roadless areas, they are subject to forest travel management plans. The roadless rule is no longer under judicial review and was upheld by the Tenth Circuit Court of Appeals in *Wyoming* v. *United States Department of Agriculture,* 661 F.3d. 1209 (10th Cir. 2011). If valid mining claims are pursued, the plans of operation are subject to reasonable regulations to protect wilderness values with mitigation to offset potential effects from development. Although preexisting livestock permits are allowed under these designations, new livestock allotments are not permitted in these areas.

Issue 95—Some public commenters expressed concern about the USFS plans and how they will be implemented. One commenter expressed that the USFS's 2005 guidelines for habitat outside the PCA are not legally enforceable. One commenter suggested that, once delisting is finalized, the 2006 Amendment cannot simply be reinstated and implemented; the USFS needs to do a new planning and public review process to amend their plans because the new 2016 Conservation Strategy changes the habitat protections that must be provided by existing forest plans and removes the current tools and incentives. Commenters requested additional detail on when these amendments would be made and how the public would be involved in the review. A commenter noted that, after delisting, NF lands must have mechanisms for protecting grizzly bears, providing connectivity between habitats, and ensuring adequate habitat protections; commenters were concerned that these mechanisms were missing or remained in drafts unavailable to the public. Lastly, while some comments expressed that the USFS plans are not regulatory because of the 2012 Planning Rule, others expressed that the 2012 Planning Rule requires the USFS to consider connectivity, including roads (permanent or

temporary, open or closed) and site development in light of how they may increase human-bear conflicts and grizzly bear mortality.

Response—In its 2011 decision, the Ninth Circuit Court supported the Service's conclusion that incorporation of the 2007 Conservation Strategy's habitat standards into legally enforceable national forest land management plans and the NPS' Superintendent's compendia were adequate regulatory mechanisms. The 2006 Forest Plan Amendment was consistent with the habitat guidance in the 2007 Conservation Strategy (USDA FS 2006b, entire). Since 2007, the Beaverhead-Deerlodge, Shoshone, and Gallatin NFs have incorporated the habitat direction in their forest plans amendments or revisions (Beaverhead-Deerlodge NF 2009, p. 47 and Appendix G; Gallatin NF 2015, p. II-4 and Appendix G; Shoshone NF 2015, p. 39). The 2006 Forest Plan Amendment still stands for the Custer, Bridger-Teton, and Caribou-Targhee NFs and will be implemented when delisting is final. The six GYE NFs compared the 2007 and 2016 Conservation Strategies to assess if changes were necessary to the management direction in current forest plans. They "concluded that current forest plan direction meets the intent of, or is more protective than, the updated 2016 Strategy."

Whereas minor differences in the application rules and monitoring requirements indicate that the plans will need administrative change, amendment, or revision, these differences do not impact the adequate regulatory mechanisms in current forest plans (Schmid 2017, *in litt*.). Although some of the current forest plans fall under the 1982 Planning Rule, any revisions and amendments would be in compliance with the 2012 Planning Rule. Under the 2012 Planning Rule, forest plan revisions and amendments must use the best available science and are subject to the same public process and

litigation as they were previously. In contrast to the 1982 Planning Rule, compliance with both standards and guidelines are required under the 2012 Planning Rule. Projects occurring on Federal lands, such as road development, timber projects, and oil, gas, and mining projects, must undergo NEPA analysis to evaluate impacts on grizzly bears and their habitat whether the grizzly bear is listed or delisted.

Genetic Health Issues (Factor E)

Issue 96—Public commenters raised concerns about the scientific rigor of our analysis of genetic viability. Many commenters suggested that the isolated GYE grizzly bear population has a shrinking gene pool and lacks genetic diversity since: (1) the population resulted from a genetic bottleneck, (2) the population has lacked connection to any other grizzly bears for over a century, and (3) the bears have lost 15 to 20 percent of their genetic variability in the last 100 years (Craighead *et al*. undated). Other commenters warned of the perils to small, isolated, low-genetic-variability populations from inbreeding, genetic abnormalities, birth defects, low reproductive rates, low survival rates, susceptibility to extinction from disease and parasites, and eventual population declines that can result in extinction or speciation. Commenters pointed out that genomic changes are slow and take decades to detect and that declines in the GYE grizzly bear population will further deplete extant levels of genetic diversity.

A few commenters suggested potential additional analysis and modeling to consider in our analysis of genetic viability such as: (1) models of the rate of allele loss due to genetic drift at various population sizes (though the long-term fitness implications of changes in allelic diversity are not well understood); and (2) projections of the evolutionary health of the GYE grizzly bear population.

Several comments raised concerns over the scientific basis for our lower limit of 500 bears for genetic viability, saying this threshold ensures only short-term genetic fitness and is based on outdated science (Franklin 1980) when more recent critical assessments of this standard are available (Frankham *et al*. 2014; Ewens 1990); States suggested that we incorrectly suggested that 500 bears is required for short-term genetic fitness when Miller and Waits (2003) require only 400. Commenters thought anywhere from 500 bears to 19,800 bears were necessary for long-term genetic viability (Frankham *et al*., 2013); they suggested that the current actual or effective population size in the GYE is not sufficiently large to ensure long-term genetic viability.

Other commenters took issue with our calculation and analysis of effective population size. A few commenters thought the actual effective population size was lower than the 469 bears we reported and thus not yet at the long-term viable population criterion of more than 500 bears because: (1) "effective population size is approximately 25–27 percent of total population size," suggesting a true effective population size of only 179 bears given recent population estimates (Allendorf *et al*. 1991, p. 650; Miller and Waits 2003; Groom *et al.* 2006, p. 405); and (2) we selectively reported the upper end of the effective population estimate of 469 bears when we should have chosen the more conservative estimates discussed by Kamath *et al*. (2015). One commenter opined that we did not explain how effective population size (N_e) and number of effective breeders (N_b) differ, nor did we offer the benefits and downsides of these different metrics from Kamath *et al*. (2015). This commenter also claimed that we did not use the best available science in calculating N_e and N_b (the SF/SA or Sibling Frequency/Assignment method) and instead used a method scientists have yet to fully

review (EPA or Estimator of Parentage Assignments) (Wang 2016; Waples 2016), which overestimates trends in these parameters.

Conversely, one commenter stated that the scope of the discussion of genetics in the proposed rule was too broad and that the Service should instead clearly state that "current genetic diversity sufficiently supports the delisting decision and that future management of genetic diversity after delisting is a separate matter to be managed as described in the Conservation Strategy."

Several public commenters raised concerns over connectivity and how genetic connections between grizzly bear populations could become more challenging to facilitate in a post-delisting environment (see Issue 50 for a more detailed discussion of public and peer-reviewer concerns about connectivity). Commenters claimed that lack of connectivity to other grizzly bear populations, habitat fragmentation, and habitat loss present a "long-term genetic risk for Yellowstone grizzlies" (Haroldson *et al*. 2010). One commenter felt that reintroductions into other ecosystems were the best option to expand the gene pool, restore gene flow, and increase fitness. Another commenter even suggested periodic transplants from Canada to enhance genetic diversity. One comment stated that we dismissed the need for immigration in our proposed rule and that the 2016 Conservation Strategy and the Tri-State MOA do not commit to providing transplants to ensure genetic quality; commenters suggested that, without binding commitments to connecting the GYE to northern populations, ensuring limited mortality in connective corridors, and transplanting bears, the genetic health and evolutionary capacity of the GYE population would be at risk.

Many commenters weighed in on potential transplant programs. One commenter asked us to provide more justification behind our assertion that one to two immigrants or transplants per generation is an adequate level of gene flow into the GYE (Miller and Waits 2003). Some commenters suggested that managers would need to transplant anywhere from 7 to 15 bears per decade into the GYE considering the likelihood of survival and reproduction. One commenter worried that a translocation program would be labor intensive and could jeopardize the health of the source population, especially if managers aim to move mostly females into the GYE. A few commenters stated that management should place more effort on facilitating natural dispersal instead of relying on translocations. The States requested removal of any language suggesting migrants will be necessary for genetic health of the GYE population and that the final rule more explicitly state that "genetic connectivity is not required for delisting, and that the genetic health of the GYE DPS is very strong."

Response—Our analysis of genetic viability is based on peer-reviewed literature that specifically addresses genetics of the GYE grizzly bears, as well as other relevant genetic literature. Kamath *et al*. (2015, entire), combined with Miller and Waits (2003, entire), suggests that although the GYE grizzly bear population is isolated there is no evidence of a "shrinking gene pool." Although the current effective population size for the GYE grizzly bear is lower than what is recommended by published literature on evolutionary theory (e.g., Franklin 1980, p. 136) for evolutionary success in the absence of management, it is important to note that the recommendation is based on non-managed populations. We remain confident that genetic management for the GYE grizzly bear

population will effectively address future genetic concerns (Hedrick 1995, p. 1004; Miller and Waits, p. 4338).

Because it is generally accepted that isolated populations are at greater risk of extinction over the long term, the 2016 Conservation Strategy (YES 2016*a*, pp. 82–84) identifies and commits to a protocol to encourage natural habitat connectivity between the GYE and other grizzly bear ecosystems. Although natural connectivity is the best possible scenario, isolation does not constitute a threat to the GYE grizzly bear in the foreseeable future because of intensive monitoring and adaptive management strategies that will remain in effect post-delisting. Based on the best available science (Miller and Waits 2003, p. 4338), the Service concludes that the genetic diversity of the GYE grizzly bear population will be adequately maintained by the immigration or relocation of one to two effective migrants from the NCDE every 10 years. Effective migrant is defined as a bear from another ecosystem that breeds with GYE bears and successfully reproduces. Thus, immigration of more than 1 or 2 bears may be needed, depending on survival and reproductive success of the migrants. See YES (2016a, pp. 51–53) and discussion under *Factor E* in this final rule for more information. This movement of grizzly bears between ecosystems may occur naturally or through management intervention. If management intervention is used, such translocations are not expected to have any discernible impact on the source population because of the relatively small number of bears needed and the timeframe of 10 years—and particularly because the most likely source population (NCDE) is healthy and large in size. Regardless of the method, the Service is confident that genetic impoverishment will not threaten the GYE grizzly bear population.

Connectivity between the GYE and the NCDE is a long-term goal for the State of Montana, as set out in their Grizzly Bear Management Plan for Southwestern Montana (MFWP 2013, pp. 41–44). This connectivity would provide the desired gene flow for long-term genetic fitness of the GYE population. Frankham *et al*. (2014, entire) reviewed the 50/500 rule of Franklin (1980, entire) and proposed an upward revision to at least 100/1000, to which Franklin *et al*. (2014, entire) published a rebuttal stating that, although a larger effective population size is preferable, Frankham *et al*. (2014, entire) ignored the fact that natural selection operates on phenotypes and the 50/500 is still appropriate guidance. Ewens' (1990, entire) concerns with Franklin's (1980, entire) 50/500 rule arise from their misinterpretation that 500 is a minimum population size derived from an N_e of 50 when the 50/500 rule is the N_e for short-term and long-term genetic fitness, respectively.

Our analysis of N_e using 469 bears reflects one method (EPA or Estimator of Parentage Assignment) reported by Kamath *et al*. (2015, p. 5512), which shows a 4-fold increase when compared to the same method applied to historical data of 102 in 1982. Other methods used both by Kamath *et al*. (2015, pp. 5512–5514) and historically by Miller and Waits (2003, p. 4337) did result in lower estimates of N_e, but with a consistent trend of all methods showing a significant increase in the N_e from historical data to 2007. Wildlife genetics is a rapidly evolving and technical field, where the use of newly developed techniques and approaches is commonplace. Wang (2016, entire), for example, compared the accuracies of different single-sample estimators of N_e, but those analyses did not directly compare estimates with those in Kamath *et al*. (2015), nor did the author suggest that EPA-based estimates are not reliable or somehow inferior to other

techniques. Kamath *et al*. (2015, entire) based their inference on multiple techniques for estimating effective population size, and explicitly discussed their benefits and caveats. Regardless, although the EPA technique to estimate N_e is relatively new, it has been reliably applied to numerous species, including other brown bear populations.

Although the current N_e of 469 (Kamath *et al*. 2015, p. 5512) is approaching, but has not reached, the long-term viable population criterion of an N_e 500 bears (Franklin 1980), we are confident that the, as yet, lack of N_e does not currently pose a risk to the GYE grizzly bear population's viability. The N_e has increased nearly 4-fold since 1982, combined with a lack of evidence of loss of genetic diversity (only 0.2 percent rate of inbreeding) during 1985 to 2010, and more than a 3-fold increase in N_e (variance effective or N_{ev}) since the early 1900s, based on both Kamath *et al*. (2015, entire) and genetic factors.

The high ratio of effective population size to census population size (N_e/N_c) of 0.66 reported by Kamath *et al*. (2015, p. 5513) most likely reflects the underestimation bias of the Chao2 estimator (see Issues 16 and 28). These ratios were lower when using the Mark-Resight estimate ($N_e/N_c = 0.42$), suggesting that the Mark-Resight estimate is much closer to the true population size than the Chao2 estimate (Kamath *et al*. 2015, p. 5517). However, Mark-Resight is not the best available science because investigations into Mark-Resight discovered that it was unable to accurately detect population trend. In addition, reported ratios of N_e/N_c have varied widely across grizzly bear populations (0.04–0.6; Paetkau *et al*. 1998, p. 424; Miller and Waits 2003, p. 4337; Schregel *et al*. 2012, p. 3482), with the ratios of 0.42–0.66 falling towards the upper middle of that range. Recovery criterion #1 identifies 500 individuals as a minimum population to

ensure short-term genetic fitness and is not a population goal. Five hundred bears provides a buffer above the total population of 400 (N_e of 100) recommended by Miller and Waits (2003, p. 4338) for short-term genetic health.

Indicators of fitness in the GYE population demonstrate that the current levels of genetic heterozygosity are adequate, as evidenced by measures such as litter size, little evidence of disease, high survivorship, an equal sex ratio, normal body size and physical characteristics, and a stable to increasing population. None of these indicators provide any evidence that inbreeding has affected fitness, and research on other species (e.g., Florida panther) indicates such effects typically manifest themselves only at extremely small population sizes. These indicators of fitness will be monitored annually, in perpetuity. The very low rate of loss of heterozygosity over the 20th century, in combination with the introduction of 1 or 2 effective migrants per generation (naturally or through augmentation), will ensure long-term genetic viability, and the recovered status, of the GYE grizzly bear DPS (Miller and Waits 2003, p. 4338). Although Miller and Waits (2003, p. 4338) measured a decline in allelic richness from the 1910s to the 1990s it had not declined as precipitously as previously anticipated, and Kamath *et al*. (2015, p. 5512) showed no statistical support for a decline in mean allelic richness from 1985 to 2010. Based on all of the information available that examines heterozygosity and allelic diversity in the GYE grizzly bear population, researchers concluded that genetic factors are unlikely to compromise the viability of the population in the near future (Miller and Waits 2003, p. 4338; Kamath *et al*. 2015, p. 5517). The IGBST will continue to monitor genetic diversity in the GYE grizzly bear population as set forth in the 2016

Conservation Strategy (YES 2016a, pp. 51–53). Although genetic connectivity is not necessary for the current genetic health of the GYE grizzly bear population, it is desired.

Food Resources Issues (Factor E)

Issue 97—Public commenters challenged the validity of our analysis of the effects of food availability on grizzly bear health, citing potential flaws in our conclusion that female grizzly bears have sufficient body fat including: (1) a study by Schwartz *et al* (2013), which shows a recent decline in body fat among female grizzly bears; (2) suggestions that the study we referenced "included bears that were not captured specifically for monitoring change in body fat levels" and only "included female grizzly bear fat level data from spring and summer;" and (3) notes that even if females have adequate levels of body fat in the spring and summer, they could still be fat deficient in the fall.

Other commenters worried about the defensibility of the IGBST's models analyzing the effects of food availability on grizzly bear populations; these commenters noted that much of the IGBST's data for these models comes from observational studies, which makes it difficult to isolate the effects of individual variables or rule out other confounding drivers of birth and death rates, such as spatial and temporal correlations. Finally, one commenter claimed that the three IGBST papers (Bjornlie *et al*. 2014b, Costello *et al*. 2014, and van Manen *et al*. 2015) did not account for long-term weather trends or changes in the abundance of key foods (i.e., army cutworm moths, cutthroat trout, and ungulates) other than whitebark pine in their analysis of vital rates.

Response—In their papers and reports, the IGBST recognized a potential decline in the trend of percent body fat among females after 2006, as presented in Schwartz *et al*.

(2014a, p. 73). However, the IGBST also clarified that those findings provided weak inference because they were based on very small annual sample sizes and that additional investigations were needed. For example, extending the female body fat figure from Schwartz *et al.* (2014a, p. 73) by several more years (see figure 4; IGBST, unpublished data), provides a stable instead of decreasing trend, which is why interpretation of sparse data should be done cautiously. This is also why the IGBST in the Food Synthesis report (IGBST 2013, pp. 18–20) presented an alternative analysis of body fat data, with appropriate caveats, that did not support the hypothesis that the rate of body fat gain over the active season was different for the period before versus after the period of peak whitebark pine decline.

We contend that a key point regarding female body condition, changes in food resources, and reproduction has been overlooked: female grizzly bears without adequate nutrition to support reproduction, especially in YNP where bear densities are high and from where the fall sample of female percent body fat is taken, would not support the trend in counts of females with cubs-of-the-year within YNP, or the entire ecosystem (see YES 2016a, figures 3 and 4). For example, the highest counts of females with cubs-of-the-year were in 2013 and 2014, approximately 6 to 7 years after the peak of whitebark decline and more than a decade after the start of decline. Additionally, compared with the body fat data, the inference based on vital rates (i.e., survival of different sex and age classes, fecundity) is much stronger and does not support the hypothesis that food resources have affected reproductive rates. Only a moderate decline in fecundity has been observed, and the IGBST documented those declines were greater in areas with

higher grizzly bear densities and were not associated with decline of whitebark pine tree cover (van Manen *et al*. 2016, p. 308).

The vital rates that showed the greatest change, and caused the slowing of population growth since the early 2000s, are lower cub and yearling survival (i.e., lower recruitment into the population). The IGBST investigated if the decline in cub and yearling survival could be a function of decline in food resources (whitebark pine) or whether associated with grizzly bear density. Survival of cubs-of-the-year was lower in areas with higher grizzly bear densities but showed no association with estimates of decline in whitebark pine tree cover, suggesting that grizzly bear density contributed to the slowing of population growth (van Manen *et al*. 2016, p. 308). Other studies support the interpretation of density effects playing an increasingly important role in the ecology of GYE's grizzly bears (Schwartz *et al*. 2006b, p. 1; Bjornlie *et al*. 2014b, p. 5).

There were no compelling reasons to investigate the *direct* relationship of long-term weather patterns on habitat selection, home-range sizes, or demographics of grizzly bears; no literature exists that suggests such relationships exist. Of course, changes in climate may affect the distribution and availability of key foods, such as army cutworm moths, cutthroat trout, and ungulates, but those relationships have not been sufficiently studied to incorporate those into the analyses. Furthermore, with the exception of cutthroat trout, which can be measured but is a local food resource, no reliable metrics exist to measure the distribution and availability of army cutworm moths or ungulates, let alone the ability to measure their temporal and spatial variation. The focus of the analyses in these 3 papers (in their entirety: Bjornlie *et al.* 2014b, Costello *et al.* 2014, and van Manen *et al.* 2016) was on whitebark pine because of (1) the documented

relationships between some grizzly bear vital rates and whitebark pine cone production; (2) the existence of long-term, annual monitoring data of whitebark pine cone production, and the ability to estimate decline in canopy cover of mapped whitebark pine; and (3) the emphasis on whitebark pine in the litigation associated with the 2007 delisting rule (72 FR 14866, March 29, 2007).

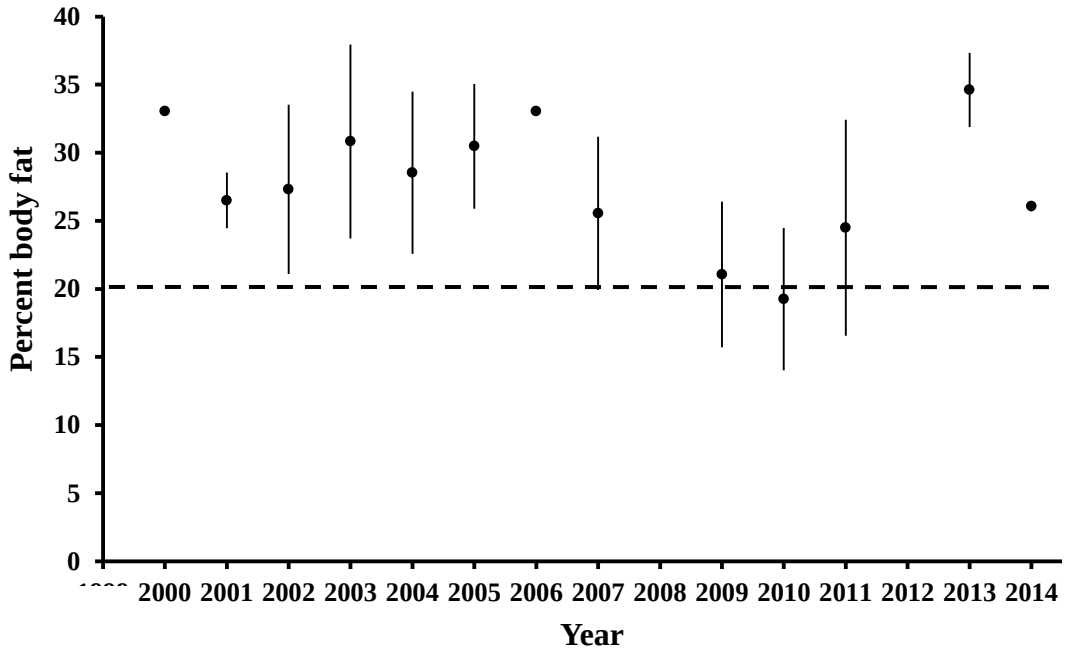

Figure 4. Trend in fall (September–October) percent body fat (mean ± 1 SD) for independent-aged female grizzly bears captured at research capture sites in the Greater Yellowstone Ecosystem, 2000–2015. No fall body fat data for independent females were collected in 2008, 2012, and 2015. Dashed horizontal line represents threshold for reproduction based on Robbins *et al*. (2012, p. 543).

Issue 98—Both public commenters and peer-reviewers suggested additional monitoring and analysis of the availability of food sources and the potential impacts to grizzly bear health. Commenters suggested: (1) an analysis of the movements and home-ranges of females with cubs because, if the home ranges are decreasing, it could bolster claims that the population is approaching biological carrying capacity; (2)

discussion of the different hazard levels associated with acquiring different types of high-quality food and whether these hazards are primarily relevant to dependent young, independent bears, or both; and (3) measurement of habitat in terms of food value, with annual and seasonal variations noted. A few commenters worried that the 2016 Conservation Strategy stated that the IGBST would monitor the four main food sources only "as budgets allow;" this commenter wondered why the IGBST, and not any other entity, had this "escape clause" and how the Service could justify allowing this caveat on food source monitoring since lack of sufficient monitoring of food sources should trigger a status review. Peer-reviewers suggested a regular review of the whole grizzly bear diet in the GYE. And both peer-reviewers and public commenters suggested continued monitoring of the relationship between the availability of the four main food sources, grizzly bear use of the four main food sources, vital rates for the GYE population, and body condition of grizzly bears.

Response—The amount and availability of the four high-caloric foods for grizzly bears will likely fluctuate due to possible changes in average temperature, precipitation, forest fires, introduced species, and resident insects. Changes in environmental conditions and resulting changes in foods for grizzly bears have been recognized by management agencies throughout the recovery process (see *Factor E: Catastrophic Events* in the rule for further discussion). That such changes will occur is neither exceptional nor unexpected. The key issue is determining if and how bears are adapting to such changes and how management agencies can facilitate adaptation. The compounded uncertainties associated with projections of possible future habitat changes, predicted responses of grizzly bears to multiple possible future conditions, and assumed

changes to vital rates in response to any such possible future habitat changes create a wide realm of possible responses.

Rather than use such a compounded uncertainty approach, the management system outlined in the 2016 Conservation Strategy (YES 2016a, pp. 33–85) depends on monitoring of multiple indices including production and availability of the four high-caloric foods; and monitoring of grizzly bear vital rates including survival, age at first reproduction, reproductive rate, cub survival, mortality cause and location, dispersal, and human-bear conflicts. The IGBST will annually report to the YGCC on the monitoring results of food production, bear mortality, and females with cubs-of-the-year. In addition, the IGBST will conduct a demographic monitoring review of the population vital rates every 5 to 10 years. The relationships between these factors will detect any impacts of changes in foods on bear viability in the ecosystem and will be the basis for an adaptive management response by the YGCC to address poor food years with responsive actions such as limiting grizzly bear mortality, increasing I&E efforts, and long-term habitat restoration (e.g., revegetation, prescribed burning), as appropriate. The continued monitoring of these multiple indices will allow rapid feedback on the success of management actions to address the objective of maintaining a recovered population.

Future studies will be directed to address further questions regarding grizzly bear responses to changing food resources and changing environmental conditions. Female home ranges decreased in size from the period of 1989 to 1999 and 2007 to 2012 with the decrease being greater in areas with higher grizzly bear densities, supporting evidence that the population is reaching carrying capacity (Bjornlie *et al.* 2014b, pp. 4–6).

It is impossible to calculate with any degree of certainty the extent to which natural foods will change across the landscape and any resulting effects on bears. With the exception of whitebark pine, there are no documented relationships among grizzly bear demographic rates and the consumption of other grizzly bear foods, such as cutthroat trout, army cutworm moths, or ungulates. It is important to note that the annual abundance and distribution of whitebark pine seeds, as well as other food sources, vary naturally, annually and spatially, and are not predictable. Thus, it is not biologically possible to define "baseline" levels for various foods, and the monitoring system discussed above is a more robust approach. During years with little or no whitebark pine seed production, grizzly bears switch to alternative foods. Indeed, the effect of whitebark pine crops on survival of independent-aged grizzly bears is relatively minor: for example, based on Haroldson *et al.* (2006, p. 39), annual survival among female bears that were not involved with conflicts varied very little and was 94.7 percent, 95.7 percent, and 96.5 percent after years with median whitebark pine counts of 0 (i.e., no crop), 7.5 (average crop), and 15 (high crop), respectively.

The caveat of food source monitoring "as budgets allow" has been removed from the 2016 Conservation Strategy. Please see Issue 85 for further discussion on funding being a trigger for a status review.

Issue 99—Several public commenters asserted that we inaccurately downplayed the importance of the four main food sources. Commenters suggested that the four main food sources are still uniquely important because: (1) the IGBST continues to monitor only these four food sources; (2) fat is especially important and is uniquely abundant in army cutworm moths, whitebark pine seeds, and late-season ungulates (Mattson *et al.*

2004; Erlenbach *et al.* 2014); (3) historically, grizzly bears have relied on the four main food sources and only fed on other foods opportunistically; (4) the list of more than 200 grizzly bear foods cited in Gunther *et al.* (2014) is inflated because to a bear "a grass is a grass;" (5) the use of false truffles during poor whitebark pine years was only documented in the core of the ecosystem and there was also no indication of the nutritional value of this food source; and (6) bear densities vary widely depending on habitat productivity (Mowat *et al.* 2013), which commenters suggested ran counter to our claims that grizzly bears are extremely flexible in their diet and thus resilient to changes in food abundance.

Commenters noted that the nutritional value (i.e., fat, protein, and gross energy), seasonal abundance, and risk and energetic cost of obtaining any alternative food source must be comparable to the four main food sources. One commenter expressed concern that the Food Synthesis Report does the minimum to satisfy the requirement of the Ninth Circuit ruling; the commenter argued that researchers should have done a robust assessment of the four key food sources, at the very least, to detect diet changes.

Response—Aside from the well-documented association between whitebark pine cone crop size and subsequent management actions on grizzly bears (Mattson *et al.* 1992, p. 432), we have not been able to detect any cause-effect relationships between abundances of the three other major foods and grizzly bear vital rates. Those foods have either fluctuated (e.g., ungulates, army cutworm moths) or declined (e.g., cutthroat trout) during the period in which the GYE grizzly bear population was stable to increasing.

While we agree that the extent to which grizzly bears might be able to compensate for the loss of one of the four major foods is unknown, the final rule discusses and relies

upon the best scientific and commercial data available. Future food source availability and the possible grizzly bear reaction to those possible future changes are discussed under *Factor E*, above, and in Issue 98. We also agree that human-caused mortality is probably the major factor limiting grizzly bear populations, although mortality can be mediated by food availability (Mattson *et al.* 1992, p. 432). The IGBST will continue to monitor major food abundance and grizzly bear conflicts and mortalities. The combination of results and IGBST analyses from these multiple monitoring indices on foods, bear vital rates, and bear–human conflicts will allow managers to respond to changes as necessary (see Issue 98).

The use of the four high-caloric foods should not be interpreted that these foods are essential for a sustainable grizzly bear population in the GYE. In the 2013 Food Synthesis Report, the IGBST suggested a paradigm shift may be needed in reference to the importance of whitebark pine to grizzly bears (see IGBST 2013). When comparing one food item to another, it is unrealistic to expect that any alternative food is fully comparable in the factors mentioned above (e.g., risk, nutritional value). Even when the full suite of alternative foods is considered, this would be an unrealistic expectation. Ultimately, what matters is that use of alternative food resources does not substantially affect bears at either the individual level (e.g., body condition, home-range size) or the population level (e.g., does not affect vital rates or mortality patterns). These issues were thoroughly addressed in the Food Synthesis Report and associated peer-reviewed publications (in their entirety: IGBST 2013; Bjornlie *et al.* 2014b; Costello *et al.* 2014; Gunther *et al.* 2014; Schwartz *et al.* 2014a, 2014b; van Manen *et al.* 2016; Ebinger *et al.* 2016; Haroldson *et al.*, in prep.). The IGBST conducted extensive analyses as part of the

Food Synthesis Report and addressed multiple research hypotheses to increase confidence in their ability to draw inferences from the data; this analysis resulted in seven peer-reviewed journal articles, several associated reports, and a number of popular science articles. Therefore the suggestion that this comprehensive research effort "does the minimum to satisfy the requirement of the Ninth Circuit ruling" is not factual.

Although we agree that, in general, to a bear "a grass is a grass," grizzly bears feed on multiple species in each phylogenetic kingdom including: 162 plant species (4 aquatics, 4 ferns and fern allies, 85 forbs, 31 graminoids, 31 shrubs, and 7 trees); 7 fungi species; 70 animal species (1 amphibian, 3 birds, 4 fish, 26 mammals, 33 insects, 1 mollusk, 1 segmented worm, and 1 spider); and 1 protista (algae). Within the plant kingdom, energy content may be as high as 2.52 kilocalories/gram (kcal/g) for grasses and sedges to 4.83 kcal/g for clover (whitebark pine seeds are 3.24 kcal/g); protein content may be as high as 21.1 percent for bear grass to 39 percent for the pre-flowering foliage of spring beauty; fat content may be as high as 15.6 percent for bear grass to 30.5 percent for whitebark pine seeds; and carbohydrate content averaged 55 percent for berry species and was as high as 88.8 percent for onion grass bulbs (Gunther *et al.* 2014, pp. 63–64). Macronutrients vary widely between plant species and within plant species as they mature, with new growth having the highest protein content, and between plant parts (Robbins 1993, entire). Grizzly bears are a generalist omnivore, which allows them to optimize their fitness by adjusting their energy and macronutrient intake (i.e., protein, fat, and carbohydrates) (Erlenbach *et al.* 2014, pp. 163–164). Research by Fortin *et al.* (2013a, p. 277) that found females using false truffles in the absence of whitebark pine were focused around the Yellowstone Lake area; however, Gunther *et al.*'s (2014, entire)

study shows the magnitude of diet fluctuation of grizzly bears throughout the GYE, and the Food Synthesis Report (IGBST 2013, entire) does not show any substantial effects to grizzly bears at the individual or population level as a result of switching from declining whitebark pine resources to using alternative food sources. Additionally, false truffles averaged 4.8 kcal/g and 11.3 percent crude protein (Fortin data, unpublished), which is close to the highest energy found for plants as discussed in Gunther *et al.* (2014, p. 63).

We do not dispute that bear densities vary widely between ecosystems depending on habitat productivity, as it is one factor that may change carrying capacity in an ecosystem; however, the ability of grizzly bears to survive in such a variety of habitat types with large differences in available food sources (i.e., coastal salmon-eating bears to interior bears that are largely herbivorous) is a testament to their dietary flexibility. In addition, there is no evidence that carrying capacity has declined in the GYE (van Manen *et al.* 2016, p. 309). Ongoing demographic monitoring by the IGBST would be able to detect such a decline and be reported to the YGCC for appropriate adaptive management, should it be deemed necessary, to maintain a recovered grizzly bear population in the GYE.

Issue 100—We received several comments from the public regarding current and future effects of reported declines in food resources, including: (1) increased home range size and dispersal distance as an effort to find food, which could lead to increased bear mortalities; (2) changes in birth and death rates; (3) past declines in the population growth rate from the 4 to 7 percent annual increases to 0.3 to 2.2 percent annual increases; and (4) leaner female bears that will not produce as many cubs. A peer-

reviewer suggested that declines in food sources could have corresponding declines in a habitat's carrying capacity for grizzly bears.

Peer-reviewers and commenters also provided input on potential management of declining food sources. A peer-reviewer disagreed with our statement that "land managers have little influence on how calories are spread across the landscape" and suggested a few examples of management actions that affect food distribution, including: "increasing ungulate densities through improving habitat and controlling hunting harvest; improving fish stocks and habitat; controlling invasive species to protect native food resources desired by grizzly bears;" and increasing bison populations by limiting lethal control of bison as a means of managing brucellosis. One commenter suggested that the grizzly bear should not be delisted because its food sources are declining and it has restricted access to additional food sources outside a protected range.

Response—The comments we received about the potential effects of declines in food sources are addressed by summarizing several key findings of the Food Synthesis Report (IGBST 2013, entire) and associated peer-reviewed publications (see Issue 37 and *Factor E* for more details). The overall findings of the Synthesis Report provided evidence that grizzly bear responses to changing food resources were primarily behavioral, with bears demonstrating substantial capacity to adjust their diets to include alternative foods. If overall food resources were declining, we would expect daily movements, fall movements, and home-range sizes to increase if bears were roaming more widely in search of foods, as suggested by commenters. However, movement rates did not change during 2002 to 2011, suggesting that grizzly bears were finding alternative foods within their home ranges (Costello *et al.* 2014, p. 2013). For females, home ranges

actually decreased in size from the period before (1989 to 1999) to after (2007 to 2012) whitebark pine decline, whereas male home ranges did not change in size (Bjornlie *et al.* 2014b). This decrease in female home range size was greater in areas with higher grizzly bear densities but showed no relationship with amount of live whitebark pine in the home range (Bjornlie *et al.* 2014b, pp. 4–6). Finally, at the population level, bear density, but not whitebark pine decline, was associated with lower cub survival and slightly lower fecundity, factors directly contributing to the slowing of population growth since the early 2000s. The combined findings of these studies suggest that carrying capacity for grizzly bears in the GYE is not so much a function of available food resources but more a function of high bear density in portions of the ecosystem. Body fat data for females in the GYE collected beyond those presented by Schwartz *et al.* (2014a, pp. 72–73) (i.e., since 2011) were well above the 20 percent threshold for reproduction published by Robbins *et al.* (2012, p. 543).

Several of the suggestions for management of declining food sources are already being implemented (e.g., cutthroat trout restoration in Yellowstone Lake, invasive species control) by land managers. Additionally, some food resources that grizzly bears consume are not native (at least 13 species; Gunther *et al.* 2014, p. 63) and may even be considered invasive. Finally, several of these suggestions may not be feasible for managers to implement as they would require managers to disregard other priorities. For example, bison populations actually have to be culled occasionally to prevent ecological damage due to overpopulation; therefore, increasing the bison population size is not a viable option. The IGBST will continue demographic monitoring of the GYE grizzly bear

population and will present their findings to the YGCC, who could then decide if modifications to the 2016 Conservation Strategy were necessary

Issue 101—Commenters asserted that grizzly bears have grown to depend on army cutworm moths and benefit from their consumption; specifically, (1) grizzly bears had almost no consumption of the moths in the 1980s but had high sustained use in the 1990s; and (2) moths are a high-fat-content food source (leading to greater fecundity) and that the remoteness of most moth sites has led to a reduction in human-caused mortality. As such, one commenter suggested that use of army cutworm moths must be encouraged. However, another commenter noted that there is a high correlation between moth habitat and grazing allotment location, thus potentially increasing the risk of human-caused mortality.

Commenters maintained that we did not account for the effect of increasing moth use on birth and death rates and, without this analysis, we cannot determine "future effects of losses of this food on the population." Commenters suggested reasons to worry about recent declines in and the future abundance of moths, and the associated health of grizzly bears, including: (1) concerns about the unknown responses of moths if up to 90 percent of the subalpine and alpine habitat upon which they depend is lost by 2099, as is predicted in some climate change models; (2) concerns about the potential impacts of pesticide use and new farming technologies; and (3) suggestions that the USFS needs to address the issue of human activity at moth aggregation sites and the potential disturbance to grizzly bears feeding at those sites. One commenter stated that all of the 31 known army cutworm moth sites are located on USFS lands (Gunther 2014); 6 of those sites are located outside of the PCA. Though commenters worried about potential

future declines in moths, a peer-reviewer noted that "bear use of army cutworm moth sites may not be a good measure of cutworm moth relative abundance because grizzly bears may return to areas where they've found abundant food sources in the past even though those resources are not present."

Response—The final rule contains a discussion of the potential effects of both global climate change and pesticides on army cutworm moths. There is no evidence to suggest that spraying of army cutworm moths has any population-level effects on grizzly bears (Robison *et al.* 2006b, pp. 1706–1710). The Shoshone NF is cooperating with other agencies to gain knowledge about the ecology of army cutworm moths, grizzly bear use of moth sites, and grizzly bear–human interactions at moth sites (Shoshone NF 2015, p. 45). New permitted activities at moth sites are restricted until a comprehensive site-management plan is developed (Shoshone NF 2015, p. 41). It is highly unlikely that any of the high-elevation sites used by the moths, all of which are on public lands, will be exposed to development.

There is no accurate method available to monitor moth numbers across thousands of square kilometers of alpine habitat. The current, best available method quantifies bear use of moth sites as an index of moth presence and distribution. Although it is known that moth abundance fluctuates in the spring on agricultural lands on the plains (Burton *et al.* 1980, pp. 4–5) and that moth flights vary in magnitude along their migration routes (Hendricks 1998, p. 165), we are not able to predict where army cutworm moths will occur on the landscape each year except by observing where bears use this food source. The IGBST is currently sponsoring the development of spatial models to predict locations of potential army cutworm moth habitat (Robison *et al.* 2006a, p. 88). The IGBST has

not documented an association between grizzly bear use of moth aggregation sites and variation in vital rates, including survival, and, therefore, the direct monitoring of army cutworm moth abundance and status is not necessary at this time.

Issue 102—Commenters had concerns about the status of cutthroat trout. Citing Haroldson *et al.* (2005), one commenter challenged our assertion that only a small portion of GYE bears use cutthroat trout and claimed that 15 percent or more of GYE grizzly bears eat this food source: Another commenter suggested increasing usage should be encouraged. One commenter questioned the disparity between males and females in their use of cutthroat trout that Mattson and Reinhardt (1995) discuss in contrast to Haroldson *et al.* (2005) and Felicetti *et al.* (2004).

Several comments stated that there has been a substantial decrease (almost 90 percent) in the cutthroat population due to predation by nonnative lake trout, declines in winter snowfall, total lack of spawning in all tributaries of Yellowstone Lake, increased drought, and subsequent reductions of in-stream flows; commenters suggested that these negative population trends are likely to continue, especially as warmer temperatures could increase incidence of whirling disease. One commenter recommended that more information be provided regarding future populations of trout including impacts to cutthroat trout from lake trout, future management of lake trout, future vulnerability of cutthroat trout to pathogens, and future impacts from climate change.

Commenters suggested that cutthroat trout declines have affected, and will continue to affect, GYE grizzly bears because: (1) the loss of cutthroat trout has left a seasonal gap in the diet of grizzly bears, which bears have filled by consuming elk calves and lower quality vegetation (Fortin *et al.* 2013a, Middleton *et al.* 2013, Ebinger *et al.*

2016), which has likely led to decreases in cub and yearling survival; and (2) a decline in cutthroat trout has decreased carrying capacity in the core of YNP.

Response—Prior to the 1990s, spawning cutthroat trout provided a seasonal food resource for a segment of GYE grizzly bears residing adjacent to the Yellowstone Lake basin. Since highs in the 1970s and 1980s, the cutthroat trout population has decreased to less than 10 percent of historical numbers due to predation by non-native lake trout (*Salvelinus namaycush*), whirling disease (*Myxoblus cerebralis*), and drought (Koel *et al.* 2005p. 16). By as early as 1997, estimates of annual consumption of fish by bears had decreased by 89 percent, with female consumption estimated at exceedingly low levels (8 fish per bear; Felicetti *et al.* 2004, p. 499). However, the GYE grizzly bear population continued to grow through the 1990s and did not slow until the early 2000s, with a shift to stable population rate attributed to the increasing density of grizzly bears within the GYE core (IGBST 2013, p. 31). The fact that cutthroat trout consumption has not directly influenced population-wide growth rates may be due to (1) limited, regional use of cutthroat trout by only a segment of the population, and (2) the demonstrated ability of female bears to perhaps augment losses from cutthroat trout with other available high-quality food items (Fortin *et al.* 2013a, p. 277; IGBST 2013, pp. 21–22; Ebinger *et al.* 2016, p. 704).

As stated previously, trout consumption by female grizzly bears was quite low in the late nineties and continued at similarly low levels into the late 2000s (Felicetti *et al.* 2004, p. 496; Fortin *et al.* 2013a, p. 276). Earlier studies contend that female use of cutthroat trout was higher than that of males in the late 1980s (Reinhart and Mattson 1990, p. 347; Mattson and Reinhart 1995, p. 2075). Discrepancies in results regarding

male versus female grizzly bear use of trout may be due to either true shifts in bear behavior, or methods used within studies. Earlier studies relied on telemetry, track sizes, and proximity to streams to estimate consumption of fish by males and females and also assumed equality of trout intake based upon time spent near streams (Reinhart and Mattson 1990, pp. 344–345; Mattson and Reinhart 1995, pp. 2073–2074). Later studies used DNA and mercury analysis techniques to more precisely establish sex of individual bears and estimate fish consumption (Haroldson *et al.* 2005, pp. 170–172; Felicetti *et al.* 2004, pp. 494–496; Fortin *et al.* 2013a, pp. 274–275; Teisberg *et al.* 2014a, pp. 370–372). Because of these differences, no directly comparable estimates exist of female use of trout before 1997.

The Service encourages ongoing efforts to control the lake trout population in Yellowstone Lake. Recent streamside counts indicate that numbers of spawning cutthroat trout are increasing on some tributary streams (Gunther *et al*. 2016, p. 44). Yet, numbers are still at levels far lower than those expected to provide any meaningful resource to grizzly bears in the vicinity of Yellowstone Lake. See Issue 99 for details regarding correlation of grizzly bear populations and food resources.

Issue 103—Many public commenters weighed in on whether whitebark pines, a grizzly bear food source, are declining. Some commenters believed whitebark pines are not currently declining or are not at risk of future decline because whitebark pines will eventually regenerate, ameliorating the losses that have occurred, and because cone production on remaining whitebark pine trees has doubled, although perhaps only temporarily in recent years, potentially as a result of warmer temperatures. Other commenters provided evidence that whitebark pines are in decline (from blister rust and

pine beetle infestations) and that this negative population trend will continue into the future, including: (1) notes that no whitebark pine cones were produced in the past year on the northern, northwestern, and western perimeters of YNP; (2) suggestions that if we found whitebark pine warranted but precluded for listing under the Act, we should not conclude that whitebark pine decline is not a concern for grizzly bears; (3) research that all whitebark pine in the GYE will be vulnerable to mountain pine beetle by 2070 (Buotte *et al.*, in press); (4) references to climate change models that predict the terminal loss of whitebark pine from the Yellowstone ecoregion; (5) concerns over potential future decline in whitebark pine due to disease, insects, fire, reproductive failure, climate change, and competition from lower elevation species; (6) suggestions that whitebark pine cannot adapt rapidly enough to changing environmental conditions given its long generation length; (7) claims that any newly planted resistant whitebark pine will take 80 years to produce seeds for grizzly bears to eat (which will be too late to help grizzly bears); and (8) suggestions that 75 percent of whitebark pine forests have already disappeared.

Commenters also disagreed on whether potential whitebark pine declines would negatively affect grizzly bear populations. Most peer-reviewers and some commenters did not believe these declines represented a threat to the GYE population because: (1) the IGBST provided a report in 2013 (which YES accepted) showing that declines in the availability of whitebark pine seeds would not lead to declines in grizzly bear populations; (2) the population has increased since 2001, concurrent with whitebark pine population decline; and (3) whitebark pine is not present within the home ranges of approximately one-third of all GYE grizzly bears and thus should be considered an

opportunistic food source rather than a fall staple. However, another commenter questioned whether this absence of whitebark pine was natural, or a result of beetles and blister rust). Conversely, other commenters suggested that the decline in whitebark pine is a more serious stressor on the GYE grizzly bear population than we acknowledged in our proposed rule because: (1) whitebark pine is the most important food source for GYE grizzly bear; (2) we overlooked how whitebark pine die-offs and grizzly bear vital rates declined simultaneously; (3) despite current positive grizzly bear population growth rates, the threat of declining whitebark pine could still be substantial and the grizzly bear population may be unhealthy; (4) contrary to our analysis in the proposed rule, the GYE population of grizzly bears may not adapt to losses of whitebark pine simply because the NCDE population of grizzly bears has continued to grow in the absence of whitebark pine; (5) low whitebark pine production results in grizzly bears seeking food sources associated with humans, leading to increased conflict between bears and humans; (6) "Nearly 20% of females handled during 2008–2013 had season-specific body fat levels low enough to put them at risk for reproductive failure, whereas prior to 2004, no females assessed were so clearly deficient in body fat;" and (7) the most severe losses in whitebark pine have occurred too recently to detect long-term population impacts, especially considering grizzly bear's slow reproductive rate.

A few commenters expressed concerns over the methods of our analysis, including: (1) concern that our analysis of whitebark pine availability did not account for the loss of whitebark pine that occurred in a 1988 fire and the subsequent lack of regeneration; (2) a request that we provide additional detail on the protocol we use to monitor the location and availability of whitebark pine, suggesting that our protocol may

be inadequate or outdated; (3) concern that the three IGBST papers analyzing whitebark pine (Bjornlie *et al.* 2014b; Costello *et al.* 2014; and van Manen *et al.* 2015) failed to account for long-term trends in weather and for major changes in abundance of other key food sources (army cutworm moths, cutthroat trout, elk, and bison); (4) concern that the method that the IGBST uses to measure whitebark pine abundance (remote sensing) underestimates the extent of whitebark pine loss and the historical use of whitebark pine by grizzly bears; and (5) warnings against Type II error (i.e., even though there was not a statistical correlation between the decline in whitebark pine and body fat does not mean the relationship does not exist) and how the use of pooled data and small sample size can contribute to type II errors.

A number of commenters suggested we consider additional analyses, such as: (1) the creation of a cone availability index to more accurately assess availability; (2) analysis of the fungi that grow symbiotically with whitebark pine, since the health and survival of the pine and the fungi are closely related; (3) monitoring of additional transects in wilderness areas southeast, east, north, and west of YNP; (4) statistical analysis to determine whether GYE grizzly bear mortality correlates more closely with annual variation in whitebark pine abundance or with management practices; and (5) evaluation of the abundance and behavior of red squirrels regarding pine nut storage and the subsequent consumption of those nuts by grizzly bears. A peer-reviewer suggested analyses comparing the vital rates of grizzly bears that feed on whitebark pine to the vital rates of those that do not.

Response—We agree with the comments that whitebark pine will eventually regenerate and ameliorate the losses that have occurred; if the whitebark pine decline was

negatively affecting grizzly bears, then the population would not have continued to increase over the same time period as their decline; and increased cone production on the surviving whitebark trees may be temporary. As for the sources of decline in whitebark pine, we note that blister rust, to which the newly planted trees are resistant, is a low source of mortality that primarily affects younger age classes while mountain pine beetle is the greatest source of mortality, primarily among older age classes. See IGBST 2013 for an overview of factors associated with whitebark pine decline. We provide this background to indicate that blister rust resistant trees are not the panacea for ensuring the availability of this food item in the long term. However, more relevantly, substantial evidence to date indicates that whitebark pine is not a critical food resource for bears; rather, whitebark pine is a high-calorie food source that is used by grizzly bears when and where available, as part of a dynamic diet that varies substantially from individual to individual, from season to season, and depending on location within the ecosystem (IGBST 2013, pp. 16–17); see Issue 99.

Approximately 75 percent of mature, cone-producing whitebark pine trees have experienced mortality since 2002, according to an opportunistic sample based on cone production transects conducted by the IGBST since 1980 (see IGBST Annual Reports). However, mortality is much lower in younger age classes and recruitment is healthy, according to monitoring conducted through the NPS Inventory and Monitoring Program (Greater Yellowstone Whitebark Pine Monitoring Working Group 2016, pp. 6–7). Despite widespread mortality, whitebark pine cone production was good in 2016, and in several other years since the decline peaked around 2009. Moreover, grizzly bears still widely used this resource in good production years. It is impossible to predict at this time

whether whitebark pine will still exist as a functional resource for grizzly bears in the future. Regardless, even if whitebark pine were to disappear from the ecosystem altogether, or becomes functionally non-existent for bears, the best available data residing in the Food Synthesis Report's (IGBST 2013, entire) research projects indicate that grizzly bears have shown substantial resilience to changing food sources and, so far, are able to find alternative food resources.

The IGBST conducted a comprehensive study, using available data, to address eight relevant research questions regarding the potential effects of whitebark pine decline on grizzly bears. Several of those questions also addressed issues related to other foods, as well as the ultimate measure of how individuals are responding to changes in food resources, body mass and body condition. See Issue 99. While there will always be new research questions to address and the IGBST is currently pursuing several new hypotheses associated with this theme, many of the commenters' suggestions cannot be addressed with current data, are not relevant, or do not seem to use the scientific principle of "preponderance of evidence." For example, the suggestion regarding the 1988 fires ignores the observation that the period of most robust grizzly bear population growth (4 to 7 percent) occurred shortly after the fires, through the entire decade of the 1990s (see Issue 61).

The changes in vital rates actually started prior to or at the start of whitebark pine decline, as documented in van Manen *et al*. (2016, pp. 307–308). Decline of whitebark pine (as measured in change of tree canopy cover) was directly considered in the analyses of van Manen *et al.* (2016, p. 308) but, unlike bear density, did not show a relationship with vital rates. The population size in the DMA has been relatively constant for the past

15 years, with no evidence of a decline over that time period. The year 2016 represents almost a decade beyond the peak of whitebark pine decline and about 7 years since the mountain pine beetle epidemic starting waning (see IGBST annual whitebark pine monitoring reports: *https://www.usgs.gov/centers/norock/science/igbst-whitebark-pine-cone-production-annual-summaries?qt-science_center_objects=1#qt-science_center_objects*). See Issue 97 for more information. The IGBST has consistently cautioned that the findings from their Food Synthesis Report support the interpretation that grizzly bears were able to respond to changing food resources *so far*. Future conditions may change these relationships, and the adaptive management approach presented in the 2016 Conservation Strategy is designed to allow managers to respond to such changes in a timely manner. However, the previous predictions from the IGBST's 2013 Food Synthesis Report, and underlying research, have been validated over time.

The interpretation that Costello *et al.* (2014) only detected a decline in use of whitebark pine at the end of her study is incorrect; Costello *et al.* (2014, p. 2010) detected a steady decline in selection of whitebark pine habitat over the entire period of 2000 to 2010, and by the end of that period the selection index indicated that bears used whitebark pine stands in proportion to their availability. Based on these findings, the authors concluded that there *was* a population-level effect of a decrease in habitat selection of whitebark pine stands over the 2000 to 2010 time period; careful reading of that paper further shows that these findings supported the hypothesis that whitebark pine seeds are not a highly selected food, but consumed opportunistically as a part of a diverse diet. We agree that, just because NCDE grizzly bears have adapted to whitebark pine

loss, this does not mean that GYE grizzly bears will automatically adapt. However, given the preponderance of data from the IGBST, this observation from another ecosystem is supportive of the conclusions and interpretations presented by the IGBST. There is currently no data on the long-term future of whitebark pine in the GYE. Environmental conditions may, or may not, change dramatically in the long term, and scientists are limited in their ability to reliably examine the potential effects of such changes. This is why the 2016 Conservation Strategy presents an adaptive management approach that is informed through scientific monitoring and research, with appropriate measures to timely adapt management as needed.

The comment about potential future impacts of higher human-caused mortality to grizzly bears in years of low whitebark pine production has received much attention but is misleading. Costello *et al.* (2014, p. 2014) specifically addressed this issue:

> "…. bears were not necessarily compelled to use less secure habitats as a direct response to WBP decline. On average, 48% of fall ranges were comprised of secure habitat outside of WBP forests, indicating most bears had ample opportunities to use secure habitats, even in the absence of WBP foraging. Consequently, most bears selected for secure habitat, irrespective of the intensity of WBP use. Among our sample of bears with WBP habitat within their fall range, 13% used ranges entirely within national parks, 27% used ranges that encompassed ≥95% secure habitat, and 47% selected for secure habitat when nonsecure habitat was present in their range. In other words, only the remaining 13% selected for nonsecure habitat. These results strengthen the supposition put forth by Schwartz et al. (2010) in their analysis of hazards to Yellowstone grizzly bear survival. Although these authors found that bears shifted to lower elevations during years of poor WBP production, they concluded that this elevation shift did not itself predispose bears to increased mortality. Instead, they found that bears shifting to lower elevations that had been altered by humans were exposed to more risk, whereas those bears shifting to lower elevations in secure habitat were not subject to increased risk."

Several of the suggestions for additional analyses are useful. However, the symbiotic connections between fungi and whitebark pine, although of interest, would best

be studied by forest ecologists, rather than IGBST. The IGBST previously examined (Schwartz *et al.* 2006b, pp. 1–2) relationships of several vital rates with annual variation in whitebark pine cone production. Whereas those analyses indicated some statistical associations of vital rates (litter size, survival of independent-aged bears) with annual variation in whitebark pine cone production, they did not include metrics of availability of whitebark pine in home ranges of individual bears included in the analyses. Although statistical relationships were observed, biological effect sizes were small and somewhat confounded by other factors, such as whether bears were in the core versus the periphery of the ecosystem. Analyses by van Manen *et al.* (2016, entire) partially addressed what is suggested in this comment; they examined vital rates using an individual covariate based on spatiotemporal index of decline in canopy cover of whitebark pine habitat since 2000 (thus, providing an index of mortality). The index was weighted by the proportion of mapped whitebark pine within the activity ranges of bears. They examined survival of independent bears, cubs, and yearlings, as well as reproductive transition using this covariate; results showed no associations of whitebark pine decline with these vital rates; rather, lower survival of cubs and, to a lesser degree lower reproductive transition from having no cubs to having cubs, were associated with an index of bear density. Thus, although analysis of vital rates for bears without whitebark pine in their home ranges has not been conducted exactly as proposed, extensive analyses previously conducted by the IGBST have addressed various aspects of the basic relationship in this comment.

Issue 104—Commenters opined that ungulates have become a more prominent part of grizzly bear diets in recent years, as other food sources have declined (especially whitebark pine and cutthroat trout), noting that male and female bears now eat more

comparable amounts of meat. Commenters also asserted that we incorrectly assumed grizzly bears do not depend on bison from the Northern Range herd (which is experiencing a population increase) because of Fortin *et al.*'s (2013a) findings that grizzly bears do not frequently feed on bison in the Central herd (which is experiencing a population decline).

We received many comments from both the public and peer-reviewers regarding recent declines in the availability of ungulates as a food source, and potential effects on grizzly bear populations, which we inadequately considered in our proposed rule. These comments included that: (1) all elk herds in the GYE (except the Upper Madison herd) have declined due to increased calf depredation, drought, chronic wasting disease, and human hunters; (2) effects on elk from hunters are synergistic because hunters preferentially target top breeding individuals (Vucetich *et al.* 2005, Wright *et al.* 2006, Mallonee 2011); (3) we neglected to include a discussion of bison population trends and, thus, did not account for the impacts to grizzly bears of planned herd reductions in various bison management plans; and (4) winter severity and length have gone down with climate change, which has decreased the availability of winter-killed carrion in the spring.

Commenters also expressed concerns regarding the potential side-effects of grizzly bear reliance on ungulates as a food source, such as: (1) declines in cub and yearling survival rates due to more deadly confrontations with other predators, including adult male grizzly bears; (2) increased conflicts with ranchers and hunters; and (3) consumption of food sources that are unsuitable for meeting female grizzly bear reproductive needs.

Commenters also suggested we include additional monitoring and analysis, such as: (1) data on the numbers of elk and bison in various ecosystem herds; and (2) information on the historical, current, and future effects of predation by grizzly bears and wolves, winter severity, disease, and habitat availability on ungulate abundance. Peer-reviewers suggested that we should (1) conduct an analysis of cub survival from 2002 to 2014 to assess predator-prey relationships, which may have a time-lag in detectability; and (2) estimate the amount of biomass left by ungulate hunters and available to grizzly bears instead of counting the number of hunters.

Response—The availability of ungulate prey such as elk and bison is not a threat to the persistence of GYE grizzly bears, and future changes in prey abundance are not expected to change this conclusion. There have been documented declines in some ungulate populations, while others have increased, and we expect fluctuations in ungulate populations to continue in the future. As generalist food consumers, GYE grizzly bears have demonstrated flexibility in meeting their dietary needs and are accustomed to successfully finding alternative natural foods. The population decline in the northern elk herd has been attributed to a variety of factors including severe winters, drought, hunter harvest, and increased predation on elk calves by grizzly bears, black bears, and wolves. However, it is noteworthy that during this same time period the grizzly bear population has continued to increase. This situation suggests that there is no detectable cause and effect relationship between elk population declines and grizzly bear population trends. See Issues 97, 98, and 99 for more information about food sources and grizzly bear demographics.

The GYE grizzly bear consumes bison primarily as winter-killed carrion, but also opportunistically kills calves and weakened adults. The Yellowstone bison population size has remained within the IBMP's recommended range of 2,500 to 4,500 bison since the year 2000, with the exception of 2005 and 2007 years when numbers exceeded 4,500. Therefore, we do not anticipate that bison as a potential food source will be a limiting factor for GYE grizzly bears in the future. Please see Issue 100 and the *Unusual or Unique Ecological Setting* section in the DPS section of the final rule for further discussion on the use of bison by grizzly bears.

Areas with a high risk of grizzly bear mortality due to repeated conflict with humans or livestock are not considered suitable habitat and are not included in our quantification of habitat available to meet the needs of a recovered grizzly bear population. See Issue 40.

As previously stated, the 2016 Conservation Strategy will continue monitoring multiple indices, including production and availability of all major foods and grizzly bear vital rates—survival, age at first reproduction, reproductive rate, mortality cause and location, dispersal, and human-bear conflicts. These data will allow managers to use an adaptive management approach that addresses poor food years with responsive management actions such as limiting grizzly bear mortality, increasing I&E efforts, and long-term habitat restoration as appropriate. The continued monitoring of these multiple indices will maintain the recovered population.

Issue 105—One commenter suggested that huckleberries (*Vaccinium ssp*.) are currently less abundant as a result of warming temperatures and a persistent drought pattern in the GYE. Another commenter referenced McLellan (2015) to warn that the

effects of huckleberry decline on grizzly bear populations could be delayed; the grizzly bear population in Canada and northern Montana did not start to decline until 11 years after the huckleberry abundance started to drop.

Response—Vaccinium berries historically have not been a significant dietary component of the GYE grizzly bear diet, occurring in only 4.9 percent of the 11,478 scats analyzed from 1943 to 2009 (Gunther *et al.* 2014, p. 64). Craighead *et al.* (1995, p. 235) found that berry availability was inconsistent across the GYE and between years. In addition, some climate models for the GYE predicted an increase in spruce-fir dominated forests at mid- to high-elevations (Schrag *et al.* 2007, pp. 9–10), which are associated with *vaccinium* berry species (in their entirety: Pfister *et al.* 1977; Steele *et al.* 1983). Low-elevation Douglas-fir and lodgepole pine forests, which are commonly associated with dwarf huckleberry, may also expand under some climate models (Rice *et al.* 2012, p. 31). Please see Issue 36 for discussion of lag effects.

The extent to which natural foods will change across the landscape and the resulting effects on bears is impossible to calculate with any degree of certainty. See Issue 98. Future food source availability and the possible grizzly bear reaction to those possible future changes are discussed under *Factor E*, above, and in the Issues 99 to 104 above.

Climate Change Issues (Factor E)

Issue 106—We received many public and peer-review comments regarding effects to grizzly bears as a result of climate change. Overall, public commenters asserted that our discussion of climate change was flawed or inadequate because: (1) we reviewed the current literature regarding climate change but did not link effects to grizzly

bears or their habitat; (2) we should consider and better describe the future impacts from climate change, despite the fact that the exact extent of impacts is unknown; (3) the "downscaled" projection we used to analyze climate change may have underestimated impacts; (4) we should have assessed impacts from the changing hydrological regime; and (5) we need to consider climate change impacts on Alaskan grizzly bears, since they are our "fall-back grizzly bear supply." Commenters suggested that the impacts of climate change in YNP are already clear since conditions have become warmer and drier with "30 fewer days per year with snow on the ground" and "80 more days each year above freezing."

Commenters mentioned the many potential ways climate change could continue to affect grizzly bears and increase human-bear conflicts (Servheen and Cross 2010), including: (1) reduction of snowpack and shortening of the winter season, which could affect the timing and success of denning, potentially reducing reproductive success and increasing conflict; (2) less snowpack could result in fewer avalanche chutes, preferred spring and summer habitat for grizzly bears; (3) the effect of drought on death rates; (4) increased frequency and extent of fire could alter plant and animal composition (Westerling *et al.* 2011) and affect the frequency of human-grizzly bear interactions and conflicts; (5) the potential of hyperthermia to limit foraging capabilities for grizzly bears in areas of decreased forest cover (Pigeon *et al.* 2016); and (6) further reductions in food sources. One commenter asked for clarification on why surveyed biologists believe that climate change is not a threat to grizzly bears, while another commented that climate change "may even make habitat more suitable and food sources more abundant." Citing the 2016 court ruling requiring the Service to more adequately consider and address the

threats of climate change on wolverines, commenters suggested that declaring that climate change is not affecting grizzly bears was similarly nonsensical and "arbitrary and capricious." Commenters suggested that managers could mitigate impacts from climate change by creating corridors for migration to new habitats or by keeping the bears protected under the Act. One commenter suggested that any decisions about delisting need to be postponed until an "independent scientific review" can look at the impacts of climate change on grizzly bears.

Commenters and peer-reviewers suggested that several issues related to climate change require monitoring, such as: (1) monitoring and modeling potential impacts of climate change on habitat suitability and the abundance and distribution of grizzly bear food in relation to temperature and moisture dependence; (2) monitoring possible effects of climate change on grizzly bear vital rates; and (3) monitoring for emerging diseases since the frequency of diseases and parasites will likely change in the context of climate change.

Response—Based on workshops involving grizzly bear experts, Servheen and Cross (2010, p. 4) concluded that "grizzly bears are opportunistic, omnivorous, and highly adaptable and that climate change will not threaten their populations due to ecological threats or constraints." More recent research by IGBST, including the Report and peer-reviewed publications associated with the Food Synthesis project, support this conclusion. Because of the substantial degree of uncertainty regarding the specific consequences of climate change on ecological communities (some of which may perhaps be positive), the questions and suggestions from the commenters are mostly speculative and are difficult to address based on current data, let alone with regard to long-term

impacts. The Service must make its listing/delisting decisions based solely on the best available scientific data. Our current understanding of that data indicates that the GYE grizzly bears are not and will not be threatened by the effects of climate change now or in the foreseeable future. However, continued monitoring and research, in combination with an adaptive management approach, will ensure that direct or indirect effects of climate change on grizzly bear ecology are detected and addressed in a timely manner.

Other Potential Threats (Factor E)

Issue 107—Some commenters raised questions about wolves and their effects on grizzly bears in the GYE. One commenter asserted that wolves have been reintroduced too recently to determine the relationship between wolves and bears in the ecosystem. One commenter stated that wolves have decreased the availability of spring carrion, which disproportionately affects female grizzly bears, and have decreased elk populations. One commenter noted that wolves have been known to kill grizzly bear cubs, though this phenomena is very difficult to detect and quantify. One comment maintained that female grizzly bears rarely usurp wolf kills (Gunther and Smith 2004).

Response—Prior to the extirpation of wolves from Yellowstone in the mid-1920s, grizzly bears and wolves coexisted for several thousand years. Post wolf reintroduction, there have been documented declines in some ungulate herds; however, overall, prey numbers remain healthy and some ungulate herds have increased (Barber-Meyer *et al.* 2008, p. 23). However, these interactions usually do not result in any injury to either bears or wolves and do not threaten the grizzly bear population. Models and field investigations suggest that, since they were reintroduced to the GYA in 1995, wolves have had little effect on ungulate availability to GYE grizzly bears (Wilmers *et al.* 2003,

pp. 914–915; Barber *et al.* 2005, p. 43; Vucetich *et al.* 2005, p. 259). This issue is discussed in more detail under *Factors B and C Combined and E* in this final rule.

Issue 108—We received comments from both the public and peer-reviewers requesting increased effort, time, and money towards public I&E campaigns regarding coexistence with grizzly bears, potentially using phone applications. One commenter was concerned that the Service would reduce I&E efforts post delisting; conversely, other commenters believed that we over rely on our efforts to inform and educate the public about potential grizzly bear encounters, and that I&E, specifically bear identification training, has failed to reduce human-caused mortality from hunters. Several commenters believed that control and reduction of the grizzly bear population, in addition to outreach, would be essential to long-term conservation of grizzly bears in the GYE. Commenters suggested that the three States' grizzly bear management regulations require all hunters to take and pass a bear identification training, which would instruct on distinctions between black bears and grizzly bears, identification of grizzly bear age, distinguishing between male and female bears, finding cubs, proper food storage, and the use of bear spray. One commenter suggested that no hunting should be allowed in the DMA until hunters in all three States can show 99 percent proficiency with bear identification.

Response—All the Federal and State agencies charged with management of grizzly bears or their habitat in the GYE recognize the importance of outreach and I&E efforts to the long-term conservation of the GYE grizzly bear population. The details related to implementing effective outreach efforts and preventing and responding to grizzly bear–human conflicts are in the final 2016 Conservation Strategy (YES 2016a, pp. 86–95) and the State management plans (Idaho's Yellowstone Grizzly Bear Delisting

Advisory Team 2002, pp. 13–18; MFWP 2013, pp. 53–59, 65–69; WGFD 2016, pp. 20–27). Over two-thirds ($3,293,817 of $4,991,123) of the anticipated costs of managing the GYE grizzly bear population are for managing grizzly bear–human conflicts and I&E efforts. This level of commitment by responsible agencies demonstrates their understanding that I&E efforts and conflict management and prevention are crucial elements of maintaining a healthy GYE grizzly bear population and help ensure that mortality limits are not exceeded. Although the effectiveness of I&E, specifically bear education training, in reducing human-caused mortality from hunters has not been formally evaluated, they are credited with increasing tolerance for grizzly bears and reducing conflicts, especially as bears have expanded into new areas where people are not as educated about living in bear country; these efforts are ongoing, and total mortality within the DMA will be maintained within the mortality limits set forth in the final rule and the 2016 Conservation Strategy. The I&E team currently uses modern media, such as YouTube and Facebook, to help educate the public. In addition, the I&E team continuously evaluates and adapts their programs to effectively educate people that live and recreate in grizzly bear habitat. The States also all have bear management specialists who dedicate a majority of their time on outreach and education to educate people about living, working, and recreating in bear country.

The 2016 Conservation Strategy prioritizes outreach and education, and the State plans also contain direction on ways, to minimize grizzly bear–human conflicts (Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, p. 15; MFWP 2013, pp. 65–69; YES 2016a, pp. 86–95; WGFD 2016, pp. 26–27). Although the States do not currently require hunters to carry pepper spray, it is strongly encouraged in hunter

education courses and other educational materials. Elk hunters in GTNP are required to carry bear spray, and this may prove to be a research opportunity to quantify how much, if any, this requirement reduces grizzly bear conflicts with elk hunters.

Between 2002 and 2014, 37 percent (115 of 311) of human-caused grizzly bear mortalities were related to hunting (defense of self or others and mistaken identity kills) (Haroldson 2014a, 2017c, *in litt.*; Haroldson and Frey 2015, p. 26), so an increase in backcountry user awareness would be beneficial. The affected States of Wyoming, Montana, and Idaho have cooperated with the Service to address conflicts between grizzly bears and hunters through extensive I&E programs. Please see Issue 109 for further details on the States' I&E programs. Idaho and Wyoming provide a voluntary bear identification test online, and all three States include grizzly bear encounter management as a core subject in their basic hunter education courses.

Issue 109—Several commenters recommended that the Service do more research on attitudes, social tolerance, perspectives, and human behavioral intentions before delisting. A commenter opined that social support is important to resolving grizzly bear conflicts, rather than compensation programs for losses. Another commenter felt that if the Service concludes that hunting increases social tolerance, the hunting quotas and locations should be arranged so bears are allowed to disperse through specified corridor zones without being hunted. While several commenters suggested delisting could significantly improve tolerance of the grizzly bear in the GYE, others stated that social acceptance of grizzly bears will not improve if we allow more discretion in bear management; instead, the commenter suggested that increased acceptance will come from rigid enforcement of laws and expanded tourism.

Response—Public support and human attitudes are discussed at length under *Factor E* of the final rule. Human attitudes toward grizzly bears, specifically, the resulting human-caused mortality, was identified as a primary cause of population decline in the species' 1975 listing under the Act (40 FR 31734, July 28, 1975). Public support is paramount to any successful large carnivore conservation program (Servheen 1998, entire; Alberta Grizzly Bear Recovery Team 2008, p. 2), and human attitudes still play a pivotal role in grizzly bear conservation. Although attitudes about grizzly bears vary geographically and demographically, we have seen an improvement in public perceptions and attitudes toward grizzly bears in the last several decades, even among traditionally conflict-related communities, like the ranching industry (Kellert *et al.* 1996, pp. 983–986). Grizzly bear–human conflicts often lead to grizzly bear mortalities, either legally in self-defense or a management removal, or illegally through vandal killing. Effective I&E programs increase public understanding of grizzly bear biology, behavior, and recovery efforts, which in turn reduces grizzly bear–human conflicts and grizzly bear mortalities while increasing human safety. Many people who live and work in occupied grizzly habitat have significantly contributed to increasing social tolerance through voluntary use of tools and techniques aimed at reducing conflict. This social tolerance has been built in large part by proactive outreach and immediate professional response to conflict incidents arising from the presence of bears.

Public outreach presents a unique opportunity to effectively integrate human dimensions of wildlife management into comprehensive programs that can modify societal beliefs about, perceptions of, and behaviors toward grizzly bears. Attitudes toward wildlife are shaped by numerous factors including basic wildlife values,

biological and ecological understanding of species, perceptions of individual species, and specific interactions or experiences with species (in their entirety: Kellert 1994; Kellert *et al.* 1996).

The I&E programs teach visitors and residents about grizzly bear biology, ecology, and behavior, which enhances appreciation for this large predator by dispelling myths about its temperament and feeding habits. Effective I&E programs have been an essential factor contributing to grizzly bear conservation since its listing in 1975. Being aware of specific values common to certain user groups allows I&E materials and workshops to be tailored to their specific concerns and perceptions. By providing general information to visitors and targeting specific user groups living and working in grizzly bear country, coexistence between grizzly bears and humans can be accomplished. Traditionally, people involved in resource extraction industries (i.e., timber harvest, mining, ranching, and hunting) are the largest opponents to land-use restrictions that place the needs of the grizzly bear above human needs (Kellert 1994, p. 48; Kellert *et al.* 1996, p. 985). Surveys of these user groups have shown that they tolerate large predators when they are not seen as direct threats to their economic stability or personal freedoms (Kellert *et al.* 1996, p. 985).

State wildlife agencies recognize that the key to preventing grizzly bear–human conflicts is providing I&E to the public and connecting the public with the right resources to prevent conflicts (Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, pp. 13–14; MFWP 2013, pp. 49–51, 65–68; WGFD 2016, pp. 26–27; YES 2016a, pp. 92–95). This outreach is the most effective long-term solution to grizzly bear–human conflicts and is paramount to ongoing grizzly bear survival and successful coexistence

with humans so that the measures of the Act are no longer necessary. All three affected States wildlife agencies (IDFG, MFWP, and WGFD) and associated partners (e.g., Grizzly Bear Outreach Project) have been actively involved in I&E outreach for over a decade. In addition, the grizzly bear management plans developed by MFWP, WGFD, and IDFG contain chapters detailing efforts to continue current programs and expand them when possible.

States are committed to continuing these public outreach and conflict response efforts to help maintain and expand that tolerance. Compensation programs are another tool that helps with this effort, since livestock producers who suffer losses from bears are likely to be more tolerant of them if they are compensated for losses caused by grizzly bears. Based on recent experiences with wolves in Idaho and Montana, social tolerance for wolves improved as both States implemented an adaptive management approach to managing conflict during the post-delisting monitoring period. By building and maintaining social tolerance, the recovered bear population will continue to be maintained.

Ultimately, the future of the grizzly bear will be based on the people who live, work, and recreate in grizzly bear habitat and the willingness and ability of these people to learn to coexist with the grizzly bear and to accept this animal as a cohabitant of the land. Other management strategies are unlikely to succeed without effective and innovative public I&E programs. The primary goals of public outreach programs are to proactively address grizzly bear–human conflicts by educating the public about the root causes of these conflicts and providing options to prevent them. By continuing to increase awareness about grizzly bear behavior and biology, we are confident that the

current and planned I&E efforts will reduce the negative outcomes of human-grizzly bear encounters such that the GYE grizzly bear population is no longer threatened by these activities, nor likely to become so in the foreseeable future.

Issue 110—A commenter requested that the Service address the high prevalence of developmental malformations in newborn grizzly bears but did not provide any information about the source of these potential malformations.

Response—To our knowledge, there have been no documented instances of high rates of developmental malformation in newborn grizzly bear cubs in the GYE or elsewhere.

Cumulative Impacts of Threats Issues

Issue 111—Both commenters and peer-reviewers expressed concern that the synergistic effects of climate change, changing food availability, invasive species, increased human-caused mortality, energy development, problematic livestock husbandry practices, increased regional human populations, and disease are unknown and may not be detected for decades. The commenters and peer-reviewers recommended a more complete analysis of this suite of impacts and consideration of their potential interactions.

Response—Our assessment of threats considered potential risk factors individually and cumulatively (see the *Cumulative Effects* section of the proposed and final rule). Our threats assessment is organized sequentially, consistent with how section 4(a) of the Act is organized. We then discuss the overall finding, which considers the cumulative impacts of all potential threat factors. We considered and weighed the cumulative effects of all known and reasonably foreseeable threat factors facing the population when reaching the conclusion that the grizzly bear population in the GYE no

longer meets, and is unlikely to meet in the foreseeable future, the definition of a threatened species. When considering the population's recovered status, it is important to remember that the recovery criteria require a minimum population size of 500 to maintain short-term genetic health, occupancy of females with young to ensure adequate distribution, and sustainable mortality limits to maintain the population around the period of stability from 2002 to 2014. After delisting, Idaho, Montana, and Wyoming have committed, through a Tri-State MOA, State management plans, and regulations, to manage mortality limits to maintain a recovered GYE grizzly bear population. The GYE grizzly bear population has been biologically recovered for at least a decade, and there is evidence that grizzly bears within the GYE DMA have reached carrying capacity.

Overall, the GYE grizzly bear population's current and expected abundance and geographic distribution (occurring both inside and outside the DMA and occurring across multiple management jurisdictions) provides the GYE grizzly bear population with substantial representation, resiliency, and redundancy (see *Significant Portion of its Range* discussion for further details). These factors provide us with confidence the population can continue to be viable in the face of the types of individual, as well as cumulative, effects mentioned in the above comments. For example, there is no evidence of negative population-level effects on grizzly bears, including accounting for a lag effect, as a result of declines in whitebark pine, cutthroat trout, or both. While it is potentially feasible that the GYE grizzly bear population may be at risk of such catastrophic events such as a cataclysmic eruption underneath YNP devastating the GYE ecosystem, such an event is extremely unlikely within the foreseeable future (see the *Catastrophic Events* section of the final rule).

Distinct Population Segment and Significant Portion of the Range Issues

Issue 112—Several commenters found our approach to the DPS designation logical and consistent with our authority under the Act and stated that failing to utilize this authority would devote resources to a recovered population and unnecessarily punish the States and communities that participate in recovery. Conversely, a number of other commenters asserted that designating the GYE population as a DPS violated the law because we are purportedly not allowed to designate a DPS for the purposes of delisting it. Commenters alleged that no provision in the Act allows this process, and our approach (designating a DPS for the purposes of delisting) has repeatedly been rejected by Federal Courts. Another commenter thought delisting should not occur until DPSs were designated across the entire range of the subspecies. Commenters took issue with our position that the designation of the DPS in the proposed delisting rule is consistent with the Service's past practices.

Response—Section 4(a)(1) of the Act authorizes the Service at any time to determine whether a species, which by definition includes a DPS, is endangered or threatened. Section 3(16) of the Act defines a "species" as including any subspecies of vertebrate fish or wildlife which interbreeds when mature. In addition, section 4(c)(1) of the Act authorizes the Service to revise the List to reflect recent determinations made under section 4(a) by directing the Service to "from time to time revise each list…to reflect recent determinations, designations, and revisions." Nothing in the Act suggests that the Service is precluded from making such determinations and revisions with respect to a subspecies or DPS that is part of a larger listed species. Therefore, the Service is acting within its authority in determining that the GYE grizzly bear DPS is neither

endangered nor threatened and revising the List by removing the GYE grizzly bear DPS. Furthermore, while in some situations it may be appropriate to designate multiple DPSs simultaneously, the lack of such requirement provides useful flexibility, allowing the Service to subsequently list or delist DPSs when additional information becomes available or as the conservation status of the taxon changes. We disagree with commenters' contentions that the action taken in this final rule is inconsistent with the Service's past practice. Although a few of our examples predate the DPS policy, the authority to list and delist DPSs had been clearly established since the 1978 amendments to the Act. In addition, two of the examples have been finalized since publication of our proposed rule. Please see the *Distinct Vertebrate Population Segment Policy Overview, Past Practice and History of Using DPSs,* and *Distinct Vertebrate Population Segment Analysis* sections of this rule for further explanation of our DPS policy, history, and analysis.

Issue 113—The States supported our analyses and concurred that the GYE population qualifies as a DPS under our DPS policy. However, others claimed that even if we were allowed to designate the GYE as a DPS at the time of delisting, our analysis did not adequately justify such a designation. First, in the opinion of some commenters, the Service's DPS policy requires that we consider three factors when determining whether a DPS designation is valid—discreteness, significance, and status. The commenters argued that our DPS policy allows designation of a DPS only if the DPS alone qualifies for listing as either endangered or threatened; this is the "status" portion of the DPS designation analysis. These commenters contended that we considered only discreteness and significance and left out the status portion of the analysis. We instead,

they argued, "rolled" the status analysis into the proposed rule's five-factor analysis. These commenters suggested that if we had followed the "requirement" that the status analysis be done in the context of the DPS designation, we could not have designated the DPS because we would have concluded that the population does not qualify as threatened or endangered.

Second, a few commenters seemed to have misunderstood our analysis. One stated that our conclusion that the GYE DPS does not qualify as an endangered or threatened species meant that the GYE DPS does not qualify as a "species" under the Act. Another suggested that because the grizzly bear is currently listed as a DPS (lower 48 States) we cannot designate the GYE population as a DPS because this would be creating a DPS of a DPS.

Third, commenters weighed in on the geographic scope of our DPS designation. Some commenters thought we drew the DPS boundary appropriately. Others thought we should have defined it more broadly to include: (1) additional unsuitable habitat where bears from the GYE population might roam; and (2) additional suitable habitat deemed necessary for connectivity to other populations of grizzly bears. Still others thought we should have conducted additional analyses to evaluate the importance of unsuitable habitat to GYE grizzly bears including information on: (1) how much time grizzly bears spend in unsuitable habitat; (2) why grizzly bears spend time in unsuitable habitat; (3) how much time researchers spend looking for bears in unsuitable habitat; and (4) the extent to which bears need this habitat as corridors between areas of suitable habitat. Another commenter suggested that the DPS should include all grizzly bears in Montana

since all grizzly bears in the State of Montana should be removed from the lists of threatened and endangered species.

Fourth, several commenters wanted greater certainty about our intentions for grizzly bear recovery in the remainder of the listed entity (lower 48 States outside of the GYE DPS). Some stated that, prior to taking action on any individual population, the Service must designate multiple DPSs encompassing the entire range of the subspecies, set recovery goals for each DPS, and evaluate the status of each DPS for listing. Others recommended that we explain our intentions for the remainder of the grizzly bear listed entities in a notice of proposed rulemaking, which should set forth a timeline for initiating and completing such reevaluation and allow solicitation of public comment on possible ways the remainder of the listed entity could be reclassified.

Response—Our process for determining that the GYE grizzly bear population is a valid DPS is entirely consistent with the Services' joint 1996 DPS Policy (61 FR 4722, February 7, 1996). The 1996 DPS Policy identifies two elements that must be considered when identifying a DPS: (1) The discreteness of the population segment in relation to the remainder of the species (or subspecies) to which it belongs; and (2) the significance of the population segment to the remainder of the species (or subspecies) to which it belongs. Our policy clearly states that if a population segment is both discrete and significant then it is a DPS (61 FR 4725, February 7, 1996). The GYE grizzly bear population meets both of these elements (see *DPS Analysis*) and, therefore, is a DPS.

Because the GYE grizzly bear population is a DPS based on the "discreteness" and "significance" qualifications, we must then evaluate the DPS's conservation status in relation to the Act's standards for determining whether the DPS is endangered or

threatened. The authority and standards for conducting this status determination comes directly from section 4(a)(1) of the Act and the Service's implementing regulations, not the DPS policy. In other words, the outcome of the discreteness and significance analyses determines if a population is a DPS. Then the outcome of the section 4 analysis on that DPS determines if the DPS warrants protections under the Act. This final rule adheres to all of the required analyses for identifying the GYE grizzly bear population as a DPS. And, therefore, per section 4 of the Act, we have the authority to consider if the GYE grizzly bear DPS is endangered or threatened; and if it is neither, as we have determined here, to revise the lower-48 grizzly bear listing to remove the DPS from Federal protection.

Our recognition of the GYE grizzly bear DPS does not create a DPS of a DPS. A population's discreteness and significance determinations are based on its discreteness and significance to the taxon (species or subspecies) to which it belongs; in this case the taxon is the subspecies *Ursus arctos horribilis* (see *DPS Analysis*). Therefore, consistent with our 1996 DPS Policy, the GYE grizzly bear is a DPS of *Ursus arctos horribilis* and not of the lower-48 States listing.

As stated in the proposed and final rules, when delineating the boundary of the GYE grizzly bear DPS, we focused on including sufficient habitat that was capable of supporting grizzly bear reproduction and survival now and in the foreseeable future. We have defined "suitable habitat" for grizzly bears as areas having three characteristics: (1) being of adequate habitat quality and quantity to support grizzly bear reproduction and survival; (2) being contiguous with the current distribution of GYE grizzly bears such that natural recolonization is possible; and (3) having low mortality risk as indicated

through reasonable and manageable levels of grizzly bear mortality. The GYE grizzly bear population is the most studied grizzly bear population in the world, and we are confident that the suitable habitat encompassed within the area delineated as the GYE DPS is more than sufficient to maintain the recovered population now and in the foreseeable future. For more information on these analyses, please refer to the *Suitable Habitat* and *Distinct Vertebrate Population Segment Analysis* sections of this rule. With respect to the assertion that the entire State of Montana be included in the GYE DPS, there is no biological basis for considering all grizzly bears in the State of Montana as part of the GYE DPS. When this rule becomes effective, all areas in the lower 48 States outside of the GYE DPS boundary will remain protected as threatened under the Act.

For more than 30 years, the Service has strived to maintain transparency in our grizzly bear recovery program. The Service's grizzly bear Recovery Plan, first approved in 1982 and revised in 1993, and its supplemental documents (USFWS 1982, 1993, 2007*a*, 2007*b*, 2016, 2017) identify distinct Recovery Zones and unique demographic parameters for six different grizzly bear populations with the expressed intent that these individual populations would be delisted as they each achieve recovery (USFWS 1993, pp. ii, 33–34). Given this history, it is not an efficient use of our limited resources to initiate a rulemaking process to revise the lower-48 States listing. Such a rulemaking would provide no more information about our intentions for grizzly bear recovery than the parameters and documents already guiding our existing grizzly bear recovery program.

Issue 114—While some commenters found our analysis of the best available science to support a determination that the population is discrete, others questioned the

strength of our discreteness analysis. Some took issue with our determination that the GYE population is "markedly separated" from other populations of grizzly bear. Commenters contended that it is well accepted in the scientific community that the GYE grizzly population will need to be well connected with other populations across the western landscape in order to foster the species' true recovery. Commenters found it illogical to use the GYE population's current lack of connectivity to other grizzly bear populations to justify delisting. They found our position with respect to genetics inconsistent because they contend we make the opposite argument when asserting, in our DPS analysis of significance, that we cannot state with certainty that the GYE grizzly population's genetics differ 'markedly' from other grizzly bear populations.

Response—We have determined that the GYE population is markedly, physically separate from other grizzly bear populations; however, this determination is not our justification for delisting the population. The GYE grizzly bear population is being delisted because we have determined after a thorough analysis of the five threat factors that it is not in danger of extinction now or in the foreseeable future throughout all or a significant portion of its range. Grizzly bears will remain listed in the remainder of the lower 48 States outside of the GYE DPS, and we are committed to pursuing grizzly bear recovery in the five remaining Recovery Zones identified in the 1993 Grizzly Bear Recovery Plan.

We refer to genetic studies estimating heterozygosity in our consideration of discreteness to further support the conclusion that grizzly bears from the GYE are markedly, *physically* separated from other grizzly bears. As we state in the rule, heterozygosity is a useful measure of genetic diversity, with higher values indicative of

greater genetic variation and evolutionary potential. High levels of genetic variation are indicative of high levels of connectivity among populations or high numbers of breeding animals. By comparing heterozygosity of extant bears to samples from Yellowstone grizzly bears of the early 1900s, Miller and Waits (2003, p. 4338) concluded that gene flow and, therefore, population connectivity between the GYE grizzly bear population and populations to the north was low even 100 years ago. However, we do not know whether differences in heterozygosity levels between grizzly bears from the GYE and other populations are *biologically* meaningful, and we have no data indicating they are. Therefore, this same information is not sufficient to support a claim that that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

Issue 115—With respect to our DPS analysis of significance, some commenters found our analysis adequately supported our determination of significance. Others found our conclusion that the population's "loss would represent a significant gap in the range of the taxon" to be hypocritical because it results in the delisting of the population and, in their opinion, makes loss of the bears more likely. Commenters argued that our DPS significance determination undermines our duty to recover the "species as a whole" because it doesn't make sense that we could argue the GYE population's essentiality to the species overall in order to support delisting the bears. Commenters contended that the Service's duty under the Act is to get listed species to a point where the law's protections are no longer required, not undermine recovery efforts for the remainder of the listed entity by using conflicting interpretations of scientific data.

Response—The DPS analysis for significance is intended to determine the biological and ecological significance of the population to the taxon to which it belongs. As specified in the DPS policy (61 FR 4722, February 7, 1996), this consideration of the population segment's significance may include, but is not limited to, the following: (1) persistence of the discrete population segment in an ecological setting unusual or unique for the taxon; (2) evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon; (3) evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; or (4) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

Based on public comments, we reevaluated our assessment of the "unique or unusual ecological setting" for the GYE grizzly bear and revised our discussion in this final rule. In this case, we determined that the GYE grizzly bear population is significant due to its persistence in an ecological setting unique for the taxon and that loss of the population would result in a significant gap in the range of the taxon (i.e., *Ursus arctos horribilis*). This determination means that the GYE grizzly bear population qualifies as a valid DPS. The GYE grizzly bear population is being delisted because we have determined after a thorough analysis of the five threat factors that this DPS is not in danger of extinction now or in the foreseeable future throughout all or a significant portion of its range. Grizzly bears will remain listed in the remainder of the lower 48 States outside of the GYE DPS, and we are committed to pursuing grizzly bear recovery in the five remaining Recovery Zones identified in the 1993 Grizzly Bear Recovery Plan.

Issue 116—Commenters expressed discontent with the Service's current interpretation of the phrase ''significant portion of its range'' (SPR) in the Act's definitions of "endangered species" and "threatened species." Some commenters did not believe the Service's interpretation is reflective of Congressional intent. Commenters believed that the Service erroneously interpreted "range" to mean only the range in which the species currently exists. Commenters thus took issue with the exclusion of historic range from any SPR analysis. Commenters also believed that the Service's threshold for significance was too stringent.

Response—The Service's current interpretation of the phrase "significant portion of its range" (SPR) is consistent with the plain language and mandates of the Act and provides clarity as to both the meaning and consequences of the SPR phrase. With respect to the criticism that the Service should have considered lost historical range in our SPR analyses, it is the Service's position that the term "range" in the phrase "significant portion of its range" is in reference to a species' current range. Thus, to consider lost historical range in our SPR analysis would be inconsistent with this interpretation. We do not separately consider whether lost historical range is an SPR because we already evaluate the effects of lost historical range on the species when we evaluate the status of the species in its current range. Specifically, in our evaluation of current status, we are considering whether, without that portion (i.e., lost historical range), the species is in danger of extinction or likely to become so in the foreseeable future (See discussion under *Factor A*, above). If lost historical range had indeed been an SPR prior to its loss, then, with the loss having occurred, the species should currently be in danger of

extinction or likely to become so in the foreseeable future in its remaining current range. Such a determination would then result in the listing of a species throughout its range.

Again, the Service's analysis to determine if a species "is in danger of extinction" throughout all or a significant portion of its range denotes a present-tense condition of being at risk of a current or future undesired event. To say a species "is in danger" in an area where it no longer exists—i.e., in its historical range where it has been extirpated—is inconsistent with common usage.

Finally, in our SPR analysis we set forth the standard by which a portion of a species' range may be considered significant. It is the Service's position that a portion of the range of a species is significant if the species is not currently endangered or threatened throughout all of its range, but the portion's contribution to the viability of the species is so important that, without the members in that portion, the species would be in danger of extinction, or likely to become so in the foreseeable future, throughout all of its range. We have applied this standard in our final rule.

Issue 117—Several commenters expressed concern about our "significant portion of its range" analysis. A commenter expressed concern that the proposed rule relegates grizzly bears to small portions of the lower 48 States and ignores the species' lost historical range in the remainder of the lower 48 States. Commenters specified that our analysis of lost historical range should consider the entire population of grizzly bears across the lower 48 States. Further, assuming that our proposed DPS delisting process is legal, commenters instructed us to also consider lost historical range of the GYE DPS, including an analysis of what constitutes the GYE DPS' historical range, how that compares with the GYE DPS' current range, and whether or not the loss of historical

range is significant. They further directed the Service to consider threats in areas where the population is either extirpated or home to only a few individuals; they claimed that it is insufficient to focus analysis entirely on an area where a population persists to support a finding that threats elsewhere are not significant. Commenters noted that many activities that have potentially adverse effects on bears are found only outside of YNP, outside of the PCA, or outside the DMA. They expressed concern that the Service acknowledges some of these threats but discounts their importance. Commenters stated that the standard we seemed to apply (localized threats must threaten extinction of the GYE DPS as a whole) was inappropriate and illegal. They further stated that the Service's SPR analysis ignores the fact that loss of bears in the peripheral areas would result in significant range contraction and that, according to our own policy, such lost range may never be reclaimed or considered in future listing decisions.

Response—This action is specific to the grizzly bear population in the GYE and, therefore, affects the legal status only of grizzly bears within the GYE. In other words, when this rulemaking takes effect, grizzly bears in the lower 48 States occurring outside of the boundary of the GYE DPS will remain listed as a threatened species under the Act. Therefore, consideration and analyses of grizzly bear populations elsewhere in the lower 48 States is outside the scope of this rulemaking.

As stated in our response to Issue 116 above, it is the Service's standard practice to consider the effects of lost historical range on the species when we evaluate the status of the species in its current range. In the case of the GYE DPS, we address historical range in our analysis of suitable habitat. In our discussion we acknowledge that bears historically occurred, although were probably not evenly distributed, throughout the area

of the GYE DPS. Many of these habitats are no longer biologically suitable for bears (see Issue 40).

Limited gene flow, as suggested here, would not compromise the required level of discreteness for DPS status, as the DPS policy does not require complete separation of one DPS from other populations, but instead requires ‘‘marked separation.’’

As stated previously, it is the Service’s standard practice to consider the effects of lost historical range on the species when we evaluate the status of the species in its current range. See discussion under *Factor A*, above. Additionally, our status analysis thoroughly evaluated all potential threats to the population in its current range. It would be inconsistent with Agency current practice to consider threats in areas where the grizzly bear does not currently exist.

Our SPR analysis is consistent with current agency practice. After careful examination of the GYE grizzly bear population in the context of our definition of “significant portion of its range,” we determined areas on the periphery of the range warranted further consideration because human-caused mortality risk threats are geographically concentrated there. After identifying these areas, we evaluated whether they were significant and determined they were not significant because, even without the grizzly bears in these areas, the GYE grizzly bear DPS would not be in danger of extinction, or likely to become so in the foreseeable future. These areas will likely never contribute meaningfully to the GYE grizzly bear population because of lack of suitable habitat and loss of traditional grizzly bear foods (i.e., bison). Therefore, we did not need to determine if grizzly bears were in danger of extinction or likely to become so in these peripheral areas (see *SPR Analysis for the GYE Grizzly Bear DPS*).

Determination

An assessment of the need for a species' protection under the Act is based on whether a species is in danger of extinction or likely to become so because of any of five 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. As required by section 4(a)(1) of the Act, we conducted a review of the status of this species and assessed the five factors to evaluate whether the GYE grizzly bear DPS is endangered or threatened throughout all of its range. We examined the best scientific and commercial information available regarding the past, present, and foreseeable future threats faced by the species.

In considering what factors might constitute threats, we must look beyond the mere exposure of the species to the factor to determine whether the exposure causes actual impacts to the species. If there is exposure to a factor and the species responds negatively, the factor may be a threat and we then attempt to determine how significant the threat is. If the threat is significant, it may drive, or contribute to, the risk of extinction of the species such that the species warrants listing as endangered or threatened as those terms are defined by the Act. Alternatively, some threats may be significant enough to contribute to the risk of extinction but are adequately ameliorated through active conservation and management efforts so that the risk is low enough that it does not mean the species is in danger of extinction or likely to become so in the foreseeable future.

As demonstrated in our five-factor analysis, threats to this population and its habitat have been sufficiently minimized and the GYE grizzly bear DPS is a biologically recovered population. Multiple, independent lines of evidence support this interpretation. Counts of females with cubs-of-the-year have increased. Since at least 2001, the demographic recovery criterion that requires 16 of the 18 BMUs to be occupied with females with young has been met. The Recovery Plan target for a minimum population size of 500 animals inside the DMA to ensure genetic health has been met since at least 2007, using the conservative model-averaged Chao2 population estimator. Calculations of population trajectory derived from radio-monitored female bears showed an increasing population trend at a rate of 4 to 7 percent per year from 1983 through 2001 (Eberhardt *et al.* 1994, p. 362; Knight and Blanchard 1995, pp. 18–19; Schwartz *et al.* 2006b, p. 48), which had slowed to 0.3 to 2.2 percent from 2002 to 2011 (IGBST 2012, p. 34). The population trajectory that includes the most recent data is based on the Chao2 estimator and indicates no statistical trend (i.e., relatively flat population trend) within the DMA for the period 2002 to 2014 (van Manen 2016a, *in litt.*).

Occupied grizzly bear range has more than doubled since 1975 (Basile 1982, pp. 3–10; Blanchard *et al.* 1992, p. 92; Schwartz *et al.* 2002, p. 203; Pyare *et al.* 2004, pp. 5–6; Schwartz *et al.* 2006a, pp. 64–66; Bjornlie *et al.* 2014a, p. 184). Independent female survival rates, the single most important cohort to population trajectory, are high and have remained unchanged for 3 decades (IGBST 2012, p. 33). In total, this population has increased from estimates ranging between 136 and 312 bears when listed in 1975 (Cowan *et al.* 1974, pp. 32, 36; Craighead *et al.* 1974, p. 16; McCullough 1981, p. 175),

to an average population size between 2002–2014 of 674 using the model-averaged Chao2 population estimator.

Grizzly bears occupied 92 percent of suitable habitat within the DPS boundaries as of 2014 (Fortin-Noreus 2015, *in litt.*) and will likely occupy the remainder of the suitable habitat in the future. The GYE grizzly bear population currently has sufficient numbers and distribution of reproductive individuals to maintain its recovered status. The main threat of human-caused mortality has been addressed through carefully monitored and controlled total mortality limits established in the Grizzly Bear Recovery Plan Supplement (USFWS 2017, entire) and carried over into the 2016 Conservation Strategy (YES 2016a, pp. 33–53) and into State regulations as per tables 2 and 3 and discussed in *Factors B and C Combined*, above. These total mortality limits are calculated to ensure long-term population stability around the average population size for 2002–2014.

During our analysis, we did not identify any factors alone or in combination that reach a magnitude that threatens the continued existence of the species now or in the foreseeable future. Significant threats identified at the time of listing that could have resulted in the extirpation of the population have been eliminated or reduced since listing. We conclude that known impacts to the GYE grizzly bear population from the loss of secure habitat and development on public lands (*Factor A*); unregulated, excessive human-caused mortality (*Factors B and C Combined*); a lack of regulatory mechanisms to manage habitat and population (*Factor D*); and genetic isolation, changes to food resources, climate change, catastrophic events, or negative public attitudes (*Factor E*), do not rise to a level of significance, such that the population is in danger of extinction now

or in the foreseeable future. Thus, based on our assessment of the best scientific and commercial information available, on our expectation that current management practices will continue into the foreseeable future—Federal regulations to maintain habitat protections as per *Factor A*, above, and State regulations that will regulate total mortality as per tables 2 and 3 and *Factors B and C Combined*, above—we, therefore, determine that the GYE grizzly bear DPS has recovered to the point at which protection under the Act is no longer required. The best scientific and commercial data available indicate that the GYE grizzly bear DPS is not endangered or threatened throughout all of its range.

Significant Portion of its Range Analysis

Background

Having determined that the GYE grizzly bear DPS is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we next consider whether there are any significant portions of its range in which the GYE grizzly bear DPS is in danger of extinction or likely to become so. The phrase "significant portion of its range" (SPR) is not defined by the Act, and we have never addressed it in our regulations: (1) The outcome of a determination that a species is either in danger of extinction or likely to become so in the foreseeable future throughout a significant portion of its range, but not throughout all of its range; or (2) what qualifies a portion of a range as "significant."

Two district court decisions have addressed whether the SPR language allows the Service to list or protect less than all members of a defined "species": *Defenders of Wildlife* v. *Salazar*, 729 F. Supp. 2d 1207 (D. Mont. 2010), concerning the Service's delisting of the Northern Rocky Mountain gray wolf (74 FR 15123, April 2, 2009); and

WildEarth Guardians v. *Salazar*, 2010 U.S. Dist. LEXIS 105253 (D. Ariz. Sept. 30, 2010), concerning the Service's 2008 finding on a petition to list the Gunnison's prairie dog (73 FR 6660, February 5, 2008). The Service had asserted in both of these determinations that it had authority, in effect, to protect only some members of a "species," as defined by the Act (*i.e.*, species, subspecies, or DPS), under the Act. Both courts ruled that the determinations were arbitrary and capricious on the grounds that this approach violated the plain and unambiguous language of the Act. The courts concluded that reading the SPR language to allow protecting only a portion of a species' range is inconsistent with the Act's definition of "species." The courts concluded that, once a determination is made that a species (*i.e.*, species, subspecies, or DPS) meets the definition of "endangered species" or "threatened species," it must be placed on the list in its entirety and the Act's protections applied consistently to all members of that species (subject to modification of protections through special rules under sections 4(d) and 10(j) of the Act).

Consistent with that interpretation, and for the purposes of this rule, we interpret the phrase "significant portion of its range" in the Act's definitions of "endangered species" and "threatened species" to provide an independent basis for listing a species in its entirety; thus there are two situations (or factual bases) under which a species would qualify for listing: A species may be in danger of extinction or likely to become so in the foreseeable future throughout all of its range; or a species may be in danger of extinction or likely to become so throughout a significant portion of its range. If a species is in danger of extinction throughout an SPR, it, the species, is an "endangered species." The same analysis applies to "threatened species." Therefore, the consequence of finding that

a species is in danger of extinction or likely to become so throughout a significant portion of its range is that the entire species will be listed as an endangered species or threatened species, respectively, and the Act's protections will be applied to all individuals of the species wherever found.

We conclude, for the purposes of this rule, that interpreting the SPR phrase as providing an independent basis for listing is the best interpretation of the Act because it is consistent with the purposes and the plain meaning of the key definitions of the Act; it does not conflict with established past agency practice (*i.e.*, prior to the 2007 Department of the Interior Solicitor's Opinion), as no consistent, long-term agency practice has been established; and it is consistent with the judicial opinions that have most closely examined this issue. Having concluded that the phrase "significant portion of its range" provides an independent basis for listing and protecting the entire species, we next turn to the meaning of "significant" to determine the threshold for when such an independent basis for listing exists.

Although there are potentially many ways to determine whether a portion of a species' range is "significant," we conclude, for the purposes of this rule, that the significance of the portion of the range should be determined based on its biological contribution to the conservation of the species. For this reason, we describe the threshold for "significant" in terms of an increase in the risk of extinction for the species. We conclude that a biologically based definition of "significant" best conforms to the purposes of the Act, is consistent with judicial interpretations, and best ensures species' conservation. Thus, for the purposes of this rule, a portion of the range of a species is "significant" if the species is not currently endangered or threatened throughout all of its

range, but the portion's contribution to the viability of the species is so important that, without the members in that portion, the species would be in danger of extinction, or likely to become so in the foreseeable future, throughout all of its range.

We evaluate biological significance based on the principles of conservation biology using the concepts of redundancy, resiliency, and representation. *Resiliency* describes the characteristics of a species that allow it to recover from periodic disturbance. *Redundancy* (having multiple populations distributed across the landscape) may be needed to provide a margin of safety for the species to withstand catastrophic events. *Representation* (the range of variation found in a species) ensures that the species' adaptive capabilities are conserved. Redundancy, resiliency, and representation are not independent of each other, and some characteristic of a species or area may contribute to all three. For example, distribution across a wide variety of habitats is an indicator of representation, but it may also indicate a broad geographic distribution contributing to redundancy (decreasing the chance that any one event affects the entire species), and the likelihood that some habitat types are less susceptible to certain stressors, contributing to resiliency (the ability of the species to recover from disturbance). None of these concepts is intended to be mutually exclusive, and a portion of a species' range may be determined to be "significant" due to its contributions under any one of these concepts.

For the purposes of this rule, we determine if a portion's biological contribution is so important that the portion qualifies as "significant" by asking whether, *without that portion*, the representation, redundancy, or resiliency of the species would be so impaired that the species would have an increased vulnerability to stressors to the point that the

overall species would be in danger of extinction or likely to become so in the foreseeable future (*i.e.*, would be "endangered" or "threatened"). Conversely, we would not consider the portion of the range at issue to be "significant" if there is sufficient resiliency, redundancy, and representation elsewhere in the species' range that the species would not be in danger of extinction or likely to become so throughout its range if the population in that portion of the range in question became extirpated (extinct locally).

We recognize that this definition of "significant" establishes a threshold that is relatively high. On the one hand, given that the outcome of finding a species to be in danger of extinction or likely to become so in an SPR would be listing all individuals of the species wherever found, it is important to use a threshold for "significant" that is robust. It would not be meaningful or appropriate to establish a very low threshold whereby a portion of the range can be considered "significant" even if only a negligible increase in extinction risk would result from its loss. Because nearly any portion of a species' range can be said to contribute some increment to a species' viability, use of such a low threshold would require us to impose restrictions and expend conservation resources disproportionately to conservation benefit: Listing would be rangewide, even if only a portion of the range of minor conservation importance to the species is imperiled. On the other hand, it would be inappropriate to establish a threshold for "significant" that is too high. This would be the case if the standard were, for example, that a portion of the range can be considered "significant" only if threats in that portion result in the entire species' being currently endangered or threatened. Such a high bar would not give the SPR phrase independent meaning, as the Ninth Circuit held in *Defenders of Wildlife* v. *Norton*, 258 F.3d 1136 (9th Cir. 2001).

The definition of "significant" used in this rule carefully balances these concerns. By setting a relatively high threshold, we minimize the degree to which restrictions would be imposed or resources expended that do not contribute substantially to species conservation. But we have not set the threshold so high that the phrase "throughout a significant portion of its range" loses independent meaning. Specifically, we have not set the threshold as high as it was under the interpretation presented by the Service in the *Defenders* litigation. Under that interpretation, the portion of the range would have to be so important that current imperilment there would mean that the species would be *currently* imperiled everywhere. Under the definition of "significant" used in this rule, the portion of the range need not rise to such an exceptionally high level of biological significance. (We recognize that if the species is imperiled in a portion that rises to that level of biological significance, then we should conclude that the species is in fact imperiled throughout all of its range, and that we would not need to rely on the SPR language for such a listing.) Rather, under this interpretation we ask whether the species would be in danger of extinction or likely to become so everywhere without that portion, *i.e.*, if that portion were completely extirpated. In other words, the portion of the range need not be so important that even being in danger of extinction in that portion would be sufficient to cause the remainder of the range to be endangered; rather, the *complete extirpation* (in a hypothetical future) of the species in that portion would cause the remainder of the range to be in danger of extinction or likely to become so in the foreseeable future.

In implementing this interpretation, the first step in our analysis of the status of a species is to determine its status throughout all of its range. If we determine that the

species is in danger of extinction, or likely to become so in the foreseeable future, throughout all of its range, we determine the species is an endangered species (or threatened species) and no SPR analysis will be required. If the species is neither in danger of extinction nor likely to become so throughout all of its range, we next determine whether the species is in danger of extinction or likely to become so throughout a significant portion of its range. If it is, we determine the species is an endangered species or threatened species, respectively; if it is not, we conclude that the species is neither an endangered species nor a threatened species.

The range of a species can theoretically be divided into portions in an infinite number of ways. However, there is no purpose to analyzing portions of the range that have no reasonable potential to be significant *and* threatened or endangered. To identify only those portions that warrant further consideration, we determine whether there is substantial information indicating that: (1) the portions may be "significant," and (2) the species may be in danger of extinction there or likely to become so within the foreseeable future. Depending on the biology of the species, its range, and the stressors it faces, it might be more efficient for us to address the significance question first or the status question first. Thus, if we determine that a portion of the range is not "significant," we do not need to determine whether the species is endangered or threatened there; if we determine that the species is not endangered or threatened in a portion of its range, we do not need to determine if that portion is "significant." In practice, a key part of identifying portions for further analysis is to examine whether there are threats that are geographically concentrated in some way. If the potential threats to the species are essentially uniform throughout its range, no portion is likely to be endangered or

threatened and thus would not warrant further consideration. Moreover, if any concentration of threats applies only to portions of the species' range that clearly would not meet the biologically based definition of "significant," such portions will not warrant further consideration.

SPR Analysis for the GYE Grizzly Bear DPS

Applying the process described above, we first evaluated the current range of the GYE grizzly bear DPS to determine if any area could be considered a significant portion of its 50,280 km^2 (19,413 mi^2) range (Bjornlie *et al*. 2014a, p. 184). The current range of the GYE grizzly bear DPS includes 44,624 km^2 (17,229 mi^2) inside the DMA and 5,656 km^2 (2,184 mi^2) outside the DMA. As mentioned above, one way to identify portions for further analyses is to identify portions that might be of biological or conservation importance, such as any natural, biological divisions within the current range that may, for example, provide population redundancy or have unique ecological, genetic, or other characteristics. Based on examination of the best available science (Schwartz *et al.* 2006b, entire; IGBST 2012, entire), we determined the GYE grizzly bear population is a single, contiguous population within the DPS boundaries and that there are no separate areas of the range that are significantly different from others or that are likely to be of greater biological or conservation importance than any other areas due to natural biological reasons alone. Therefore, there is not substantial information that logical, biological divisions exist within the GYE grizzly bear population's current range.

The Service has identified the PCA as a secure area for grizzly bears, with population and habitat condition maintained to ensure a recovered population is maintained and to allow bears into suitable habitat. This is likely to be significant (i.e., if

this area were hypothetically lost, the rest of the range would at that point be threatened or endangered) because it contains approximately 75 percent of females with cubs-of-the-year for most or part of the year (Schwartz *et al.* 2006a, pp. 64–66; Haroldson 2014a, *in litt*.). However, as noted above in our summary of factors affecting the species, threats to the species within this area have been ameliorated through restoration and active management as discussed in the factors above. Surveys indicate that the species has been maintained and is well-established, and remaining factors that may affect the species occur at low levels throughout this area. There is no substantial information indicating the species is likely to be threatened or endangered throughout this area, the PCA. Therefore, the PCA does not warrant further consideration to determine whether the species may be endangered or threatened in a significant portion of its range.

After determining there are no natural divisions delineating separate portions of the GYE grizzly bear population, or other important areas that warrant further consideration, we next examined whether any stressors are geographically concentrated in some way that would indicate the species could be in danger of extinction, or likely to become so, in that area. Through our review of potential threats, we identified greater mortality risk in the areas on the periphery of the population's current range. More grizzly bear mortality occurs toward the periphery of its range, as evidenced by lower population growth rates in these areas (Schwartz *et al*. 2006b, p. 58; IGBST 2012, p. 34) and higher likelihood of conflicts (Gunther *et al.* 2012, p. 50). These areas where greater mortality is likely to occur are outside the DMA boundaries (figure 1). We do not anticipate declines in relative population size or geographically concentrated stressors inside the DMA boundaries due to conservative population objectives, enforceable

mortality limits, vast amounts of wilderness and roadless areas, and additional habitat protections specifically in place for grizzly bears on public lands in nearly half of their current range (i.e., the PCA). With these measures evaluated by a meticulous monitoring program, we are reasonably assured that grizzly bears inside the DMA boundaries will continue to flourish. Because it is also reasonable to expect that GYE grizzly bears may not be managed as conservatively outside the DMA boundaries where they could be exposed to more intensive hunting and management pressure, we considered these peripheral areas where known grizzly bear range extends outside the DMA boundaries to warrant further consideration to determine if they are a significant portion of this population's range.

Because we identified areas on the periphery of the current range as warranting further consideration due to the geographic concentration of mortality risk there, we then evaluated whether these areas are significant to the GYE grizzly bear population such that, without the members in that portion, the entire population would be in danger of extinction, or likely to become so in the foreseeable future, throughout all of its range.

The core population inside the DMA is resilient, and its current range provides the necessary redundancy to offset loss of individual bears in peripheral areas. The areas that may experience higher mortality rates represent a very small proportion of the range, and an even smaller proportion of the total number of animals in the GYE grizzly bear population. Moreover, if bears in these peripheral areas were in fact lost, that loss would not significantly affect the long-term viability of the GYE grizzly bear population, much less cause the population in the remainder of its range to be in danger of extinction or likely to become so. Therefore, there is not substantial information indicating that the

peripheral portions of the GYE grizzly bear population's range are significant to the rest of the population.

After careful examination of the GYE grizzly bear population in the context of our definition of "significant portion of its range," we determined areas on the periphery of the range warranted further consideration because human-caused mortality risk is geographically concentrated there. After identifying these areas, we evaluated whether they were significant and determined they were not significant because, even without the grizzly bears in these areas, the GYE grizzly bear DPS would not be in danger of extinction, or likely to become so in the foreseeable future. These areas will likely never contribute meaningfully to the GYE grizzly bear population because of lack of suitable habitat and loss of traditional grizzly bear foods (i.e., bison). Therefore, we did not need to determine if grizzly bears were in danger of extinction or likely to become so in these peripheral areas. We have carefully assessed the best scientific and commercial data available and determined that the GYE grizzly bear population is no longer in danger of extinction throughout all or a significant portion of its range, nor is it likely to become so in the foreseeable future. As a result of this determination, we hereby remove this population from the List of Endangered and Threatened Wildlife.

We are aware of the March 28, 2017, Arizona District Court ruling in *Center for Biological Diversity, et al.* v. *Sally Jewel, et al.*, which vacated and remanded the Service's 2014 Final SPR Policy (79 FR 37578, July 1, 2014). The district court found that our 2014 SPR Policy did not give sufficient independent meaning to the SPR phrase and thereby avoided the need to provide rangewide protections to a species based on threats in a portion of the species' range. The Service is currently considering

appropriate next steps in light of the district court's decision. However, we have decided to finalize this action because our final determination on the recovered status of the GYE grizzly bear population does not hinge on the SPR analysis. As stated above, if grizzly bears in the periphery of the current range were in fact lost due to the geographic concentration of mortality risk, that loss would not appreciably reduce the long-term viability of the GYE grizzly bear population, much less cause the population in the remainder of its range to be in danger of extinction or likely to become so. In other words, under any definition of SPR it is clear that the GYE grizzly bear population is not in danger of extinction throughout all or a significant portion of its range, nor is it likely to become so in the future.

Effects of the Rule

This final rule revises 50 CFR 17.11(h) by establishing a DPS and removing the GYE grizzly bear DPS from the Federal List of Endangered and Threatened Wildlife. The prohibitions and conservation measures provided by the Act, particularly through sections 7 and 9, would no longer apply to this DPS. Federal agencies would no longer be required to consult with the Service under section 7 of the Act in the event that activities they authorize, fund, or carry out may affect the GYE grizzly bear population. However, actions within the DPS would still be managed by State, Tribal, and Federal laws, regulations, policies, and management plans ensuring enforcement of the 2016 Conservation Strategy. Delisting the GYE grizzly bear DPS is expected to have positive effects in terms of management flexibility to the States and local governments. The full protections of the Act, including section 4(d) (50 CFR 17.40), would still continue to apply to grizzly bear populations in other portions of the lower-48 States outside the GYE

grizzly bear DPS' boundaries. Those grizzly bears outside the GYE DPS will remain fully protected by the Act.

Post-Delisting Monitoring

Section 4(g)(1) of the Act requires us to implement a system, in cooperation with the States, to monitor for at least 5 years all delisted and recovered species. The primary purpose of this requirement is to ensure that the recovered species does not deteriorate, and if an unanticipated decline is detected, to take measures to halt the decline to avoid re-listing. If data indicate that protective status under the Act should be reinstated, we will initiate listing procedures, including, if appropriate, emergency listing.

For the GYE grizzly bear population, the 2016 Conservation Strategy serves as the post-delisting monitoring plan. The 2016 Conservation Strategy will remain in effect for the foreseeable future, beyond the 5-year monitoring period required by the Act due to their low resiliency to excessive human-caused mortality and the manageable nature of this threat. These management actions are detailed in the 2016 Conservation Strategy and will be evaluated by the management agencies every 5 years, allowing for public comment should updates to the Conservation Strategy be made in the future.

Monitoring

To ensure the long-term conservation of grizzly bear habitat and continued recovery of the GYE grizzly bear population, several monitoring programs and protocols have been developed and integrated into land management agency planning documents. The 2016 Conservation Strategy and appended State grizzly bear management plans satisfy the requirements for having a post-delisting monitoring plan for the GYE grizzly bear population. Monitoring programs and a coordinated approach to management would

continue for the foreseeable future. Monitoring programs will focus on assessing whether demographic and habitat standards described in the 2016 Conservation Strategy are being achieved and maintained.

Within the PCA, the IGBST will continue to monitor habitat standards and adherence to the 1998 baseline. The IGBST will report on levels of secure habitat, developed sites, and livestock allotments annually, and these will not be allowed to deviate from 1998 baseline values unless changes were to be beneficial to grizzly bears (USDA FS 2006b, entire; YNP 2014b, p. 18). The IGBST, with participation from YNP, the USFS, and State and Tribal wildlife agencies, also will continue to monitor the abundance and distribution of common grizzly bear foods. This system allows managers some degree of predictive power to anticipate and avoid grizzly bear–human conflicts related to a shortage of one or more foods in a given season.

Within the DMA, the IGBST will continue to document population trends, current distribution, survival and birth rates, and the presence of alleles from grizzly bear populations outside the GYE grizzly bear DPS boundaries to document gene flow into the population. Throughout the DPS boundaries, locations of grizzly bear mortalities on private lands will be provided to the IGBST for incorporation into their annual report. To examine reproductive rates, survival rates, causes of death, and overall population trends, the IGBST will radio-collar and monitor a minimum of 25 adult female grizzly bears every year and a similar representative sample of adult males. The objective will be to maintain a radio-marked sample of bears that are spatially distributed throughout the ecosystem so they provide a representative sample of the entire population inside the DMA. Mortalities throughout the GYE DPS will be monitored and reported annually and

evaluated in accordance with the DMA total mortality limits and population objectives in table 3.

Outside of the PCA, the GYE National Forests will monitor agreed-upon habitat parameters in suitable habitat and will calculate secure habitat values outside of the PCA every 2 years and submit these data for inclusion in the IGBST's annual report (USDA FS 2006b, p. 6). The GYE National Forests also will monitor and evaluate livestock allotments for recurring conflicts with grizzly bears in suitable habitat outside the PCA (USDA FS 2006b, p. 6). The Greater Yellowstone Whitebark Pine Monitoring Group will continue to monitor whitebark pine occurrence, productivity, and health both inside and outside the PCA (USDA FS 2006b, p. 7). Members of the IGBST will monitor grizzly bear vital rates and population parameters within the entire DMA. Finally, State wildlife agencies will provide known mortality information to the IGBST, which will annually summarize these data with respect to location, type, date of incident, and the sex and age of the bear for the entire DPS area.

In the 2007 final rule (72 FR 14866, March 29, 2007), we reported habitat quality and effectiveness values for 1998 using the Cumulative Effects Model and associated 1998 habitat data (USFWS 2007*c*, appendix F). Since 1998, the value of the Cumulative Effects Model has been questioned (Boyce *et al.* 2001, p. 32). Specifically, the validity of all the coefficients cannot be verified or ground-truthed, calling into question all of the model outputs. Without scientific and statistical defensibility, the Cumulative Effects Model will not produce credible results and it cannot be used (Boyce *et al.* 2001, p. 32; Borkowski 2006, pp. 85–87). While the Cumulative Effects Model provided an index of relative change in habitat quality over time, it was never able to predict grizzly bear

habitat use or preference or relate habitat to changes in population parameters. Because we no longer consider the Cumulative Effects Model to represent the best available science, we are no longer relying on or reporting measures of habitat quality or effectiveness using it. Instead, the IGBST will assess and report human-caused changes to grizzly bear habitat through maintenance of the 1998 baseline values for developed sites, grazing allotments, and secure habitat (YES 2016b, appendix E).

While the inverse relationship between whitebark pine seed production and grizzly bear conflicts in the GYE has been documented (Mattson *et al.* 1992, p. 436; Gunther *et al.* 1997, p. 38; Gunther *et al.* 2004, pp. 13–14), there are no data relating other foods such as spring ungulate carcasses, army cutworm moths, and cutthroat trout to the number of grizzly bear–human conflicts. Additionally, Schwartz *et al.* (2010, p. 662) found no relationship between the spatial distribution of whitebark pine, cutthroat trout, army cutworm moths, or ungulates and grizzly bear survival. Therefore, while it is important to continue to monitor food abundance, there is no scientific evidence that habitat quality is a limiting factor for grizzly bear survival in the GYE. The IGBST will continue coordinating with the National Forests and National Parks within the PCA to monitor food abundance but will focus management recommendations on regulating the risk of human-caused mortality through the 1998 baseline (i.e., factors the agencies have the authority and ability to regulate). Private land development and the numbers, causes, and spatial distribution of human-bear conflicts will continue to be monitored and reported annually, because this scenario is where habitat quality intersects with grizzly bear mortality risk.

To address the possible "lag effect" associated with slow habitat degradation taking a decade or more to translate into detectable changes in population size (see Doak 1995), the IGBST will monitor a suite of indices simultaneously to provide a highly sensitive system to monitor the health of the population and its habitat and to provide a sound scientific basis to respond to any changes or needs with adaptive management actions (Holling 1978, pp. 11–16). This "lag effect" is a concern only if the sole method to detect changes in habitat is monitoring changes in total population size (see Doak 1995, p. 1376). The monitoring systems in the 2016 Conservation Strategy (YES 2016a, pp. 33–85) are far more detailed and sophisticated and would detect changes in vital rates in response to habitat changes sooner than the system described by Doak (1995, pp. 1371–1372). The IGBST will be monitoring a suite of vital rates including survival of radio-collared bears, mortality of all bears, reproductive success, litter size, litter interval, number of females with cubs-of-the-year, distribution of females with young, and overall population trajectory, in addition to the physical condition of bears by monitoring body mass and body fat levels of each bear handled. Because of the scope of monitoring, we feel confident that we will be able to detect the consequences of significant changes in habitat within a reasonable timeframe that would allow for appropriate management response.

Monitoring systems in the 2016 Conservation Strategy allow for adaptive management (Holling 1978, pp. 11–16) as environmental issues change. The agencies have committed in the 2016 Conservation Strategy to be responsive to the needs of the grizzly bear through adaptive management (Holling 1978, pp. 11–16) actions based on the results of detailed annual population and habitat monitoring. These monitoring

efforts would reflect the best scientific and commercial data and any new information that has become available since the delisting determination. The entire process would be dynamic so that when new science becomes available it will be incorporated into the management planning and monitoring systems outlined in the 2016 Conservation Strategy (YES 2016a, pp. 33–91). The results of this extensive monitoring would allow wildlife and land managers to identify and address potential threats preemptively, allowing those managers to ensure that the GYE grizzly bear population remains a recovered population.

Triggers for a Biology and Monitoring Review by the IGBST

The YGCC will use the IGBST's monitoring results and annual reports to determine if the population and habitat standards are being adhered to. The States, Tribes, and National Parks will use the IGBST's annually produced model-averaged Chao2 population estimates to set and establish total mortality limits within the DMA as per tables 2 and 3. The 2016 Conservation Strategy signatories have agreed that if there are deviations from certain population or habitat standards, the IGBST will conduct a Biology and Monitoring Review as described under *Factors B and C Combined*, above. A Biology and Monitoring Review would be initiated if any of the following scenarios occur (as further described under *Factors B and C Combined*, above): (1) exceeding the total mortality limit for independent females for 3 consecutive years; (2) exceeding the total mortality limits for independent males for 3 consecutive years; (3) exceeding the total mortality limit for dependent young for 3 consecutive years; (4) failure to meet the distribution criterion requiring sightings of females with young in at least 16 of 18 BMUs

in 3 consecutive years; (5) failure to meet the model-averaged Chao2 estimate of 48 females with cubs-of-the-year for any 3 consecutive years.

In addition to the scenarios described under *Factors B and C Combined*, a Biology and Monitoring Review by the IGBST would be initiated if there were a failure to meet any of the habitat standards described in the 2016 Conservation Strategy pertaining to levels of secure habitat, developed sites, and livestock allotments. These IGBST reviews were established to detect deviations that may occur due to normal variability or chance events and do not necessarily mean the GYE grizzly bear's status is deteriorating. As such, they are more easily activated than those that trigger a Service status review under the Act. These triggers could indicate the need to adjust management approaches and are intended to provide the YGCC with ample time to respond with management actions before involving the Service. A Biology and Monitoring Review would be completed within 6 months of the request by the YGCC, and the resulting written report would be presented to the YGCC and made available to the public.

An IGBST Biology and Monitoring Review examines habitat management, population management, or monitoring efforts of participating agencies with an objective of identifying the source or cause of failing to meet a habitat or demographic goal. This review also will provide management recommendations to correct any such deviations. A Biology and Monitoring Review could occur if funding becomes inadequate to the implementation of the 2016 Conservation Strategy to such an extent that it compromised the recovered status of the GYE grizzly bear population. If the review is triggered by failure to meet a population goal, the review would involve a comprehensive review of vital rates including survival rates, litter size, litter interval, grizzly bear–human conflicts,

and mortalities. The IGBST will attempt to identify the reason behind any variation in vital rates such as habitat conditions, poaching, excessive roadkill, etc., and determine if these compromise the recovered status of the population. Similarly, if the review was triggered by failure to meet a habitat standard, the review would examine what caused the failure, whether this situation requires that the measures of the Act are necessary to ensure the recovered status of the population, and what actions may be taken to correct the problem. The IGBST would complete this review and release it to the public within 6 months of initiation and make it available to the YGCC and the public.

The YGCC responds to a Biology and Monitoring Review with actions to address deviations from habitat standards or, if the desired population and habitat standards specified in the 2016 Conservation Strategy cannot be met in the opinion of the YGCC, the YGCC could recommend that the Service consider re-listing of the GYE grizzly bear DPS (YES 2016a, pp. 96–103). Because the YGCC possesses substantial information about the population's status, the Service would respond by conducting a status review to determine if re-listing is warranted.

The Service can also initiate a status review independent of the IGBST or the YGCC should the total mortality limits be exceeded by a significant margin or routinely violated or if substantial management changes occur significant enough to raise concerns about population-level impacts. Emergency re-listing of the population is an option we can and will use, if necessary, in accordance with section 4(g)(2) of the Act, to prevent a significant risk to the well-being of the grizzly bears (16 U.S.C. 1533(g)). Such an emergency re-listing would be effective the day the rule is published in the *Federal Register* and would be effective for 240 days. During this time, we would conduct our

normal notice-and-comment rulemaking regarding the listing of the species based on the five factors of section 4(a)(1) of the Act to take effect when the 240-day limit on the emergency re-listing expires.

Triggers for a Service Status Review

Upon delisting of the GYE grizzly bear population, we will use the information in IGBST annual reports and adherence to total mortality limits as per tables 2 and 3 to determine if a formal status review is necessary. Because we anticipate that the YGCC and IGBST are fully committed to maintaining GYE grizzly bear population management and habitat management through implementation of the 2016 Conservation Strategy and State and Federal management plans, and to correct any problems through the process established in the 2016 Conservation Strategy and described in the preceding section, we created a threshold for criteria that would trigger a formal Service status review that is higher than that for a Biology and Monitoring Review. Specifically, any of the following scenarios would result in a formal status review by the Service:

(1) If there are any changes in Federal, State, or Tribal laws, rules, regulations, or management plans that depart significantly from the specifics of population or habitat management detailed in this final rule or the 2016 Conservation Strategy that would significantly increase the threat to the GYE grizzly bear population. The Service will promptly conduct such an evaluation of any change in a State or Federal agency's regulatory mechanisms to determine if such a change represents a threat to the GYE grizzly bear population. As the Service has done for the Rocky Mountain DPS of gray wolf, such an evaluation will be documented for the record and acted upon if necessary.

(2) A total population estimate is less than 500 inside the DMA in any year using the model-averaged Chao2 population estimator, or counts of females with cubs-of-the-year fall below 48 for 3 consecutive years.

(3) If fewer than 16 of 18 bear management units are occupied by females with young for 3 consecutive 6-year sums of observations.

(4) If the Service determines a petition to re-list from an individual or organization is substantial.

In addition to these four criteria for a status review, the Service may conduct a status review at any time that the best scientific information indicates a review may be necessary or if population and mortality targets in the 2016 Conservation Strategy are consistently not met. Upon completion of a formal status review, a notice of availability would be published in the *Federal Register*, and the review would be available at *http://www.fws.gov/mountain-prairie/es/grizzlyBear.php*. If a status review recommends re-listing the GYE grizzly bear DPS, a proposed listing rule would be published in the *Federal Register*, which is open to public comment and subject to peer review.

Status reviews and re-listing decisions would be based on the best available scientific and commercial data available. If a status review is triggered, the Service would evaluate the status of the GYE grizzly bear population to determine if re-listing is warranted. We would make prompt use of the Act's emergency listing provisions if necessary to prevent a significant risk to the well-being of the GYE grizzly bear population. We have the authority to emergency re-list at any time, and a completed status review is not necessary to exercise this emergency re-listing authority.

Required Determinations

National Environmental Policy Act

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the NEPA of 1969 (42 U.S.C. 4321 *et seq*.), need not be prepared in connection with regulations pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the *Federal Register* on October 25, 1983 (48 FR 49244).

Paperwork Reduction Act

This rule does not contain any new collections of information other than those already approved under the Paperwork Reduction Act (44 U.S.C. 3501 *et seq*.). The agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

Executive Order 13211

Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking certain actions. As this rule is not expected to significantly affect energy supplies, distribution, or use, this action is not a significant energy action and no Statement of Energy Effects is required.

Government-to-Government Relationships With Tribes

In accordance with the President's memorandum of April 29, 1994, Government-to-Government Relations with Native American Tribal Governments (59 FR 22951), E.O. 13175, and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities,

and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes.

Beginning in April 2014, the Service sent consultation invitation letters via registered mail to the four Tribes having treaty interests in the proposed GYE grizzly bear delisting area: the Northern Arapaho, Eastern Shoshone, Northwestern Band of the Shoshone Nation, and Shoshone-Bannock Tribes. Over the next year the Service was made aware of many more Tribes having an interest in the GYE grizzly bear and expanded our efforts in explaining the status of the bear and offering government-to-government consultation to Tribes.

On February 17, 2015, the Service sent letters offering government-to-government consultation to 26 Tribes. On June 15, 2015, the Service sent out a second round of letters to 48 tribes, offering another opportunity for consultation, followed by personal phone calls or emails from Service leadership to the 48 tribes, personally inviting them to engage in government-to-government consultation. On August 13, 2015, the Service met with the Rocky Mountain Tribal Leaders Council in Billings, Montana and invited tribal representative to engage in consultation concerning the GYE grizzly bear.

On October 29, 2015, the Service sent letters to 53 tribes, which included all Tribes, Tribal Councils, and First Nations in Canada that have contacted the Service regarding the GYE grizzly bear population. The letters invited all Federal Tribes to engage in government-to-government consultation. In addition, the letter invited Tribes

to participate in an informational webinar and conference call held on November 13, 2015.

On March 3, 2016, the Service announced its proposal to delist grizzly bears in the GYE. The announcement was disseminated to all Tribes west of the Mississippi River with Tribes being notified by both email and hard copy mail. In addition, the Service announced two consultation meeting opportunities in the *Federal Register* and in the Tribal leader letters at the same time the proposed rule published. The two meetings were hosted in Bozeman, Montana and in Rapid City, South Dakota.

On March 10, 2016, the Service hosted a tribal conference call to provide an overview of the proposed delisting and discuss any questions or concerns. It was not considered government-to-government consultation. The announcement for this call was included in the March, 3rd notifications sent to Tribes.

To date, the Service has conducted ten Tribal consultations with the following Tribes: June 10, 2015: Confederated Salish and Kootenai Tribes; June 18, 2015: Blackfeet Nation Wildlife Committee; July 21, 2015: Northern Arapahoe Tribal Council; July 21, 2015: Eastern Shoshone Tribal Council; July 30, 2015: Shoshone Bannock Tribal Council; April 28, 2016: Bozeman Montana (Tribes Present at meeting: Shoshone Bannock Tribes, Northern Cheyenne Tribe, Eastern Shoshone Tribe, Northwest Band of the Shoshone); May 5, 2016: Rapid City, South Dakota (Northern Arapaho, Rosebud Sioux); November 2, 2016: Eastern Shoshone Tribe; November 16, 2016: Shoshone Bannock Tribe; April 07, 2017: Northern Cheyenne Tribal Council. Government-to-Government consultation is not open to the public or media. This process involves consultation with Tribal members speaking on behalf of their Tribe and

as a representative of their Tribe (see **FOR FURTHER INFORMATION CONTACT** above, for more information).

References Cited

A complete list of all references cited in this final rule is available at *http://www.regulations.gov* at Docket No. FWS–R6–ES–2016–0042, or is available upon request from the Grizzly Bear Recovery Coordinator (see **ADDRESSES**).

Glossary

1998 baseline: The 1998 baseline represents the best available habitat measures representing ground conditions inside the Primary Conservation Area (PCA) as of 1998. Habitat standards identified in the 2016 Conservation Strategy pertain to secure habitat, developed sites, and livestock grazing allotments. The standards demand that all three of these habitat parameters are to be maintained at or improved upon conditions that existed in 1998. The 1998 baseline represents the best estimate of what was known to be on the ground at that time and establishes a benchmark against which future improvements and/or impacts can be assessed. It also provides a clear standard for agency managers to follow when considering project-effect analysis.

Chao2 estimator: A bias-corrected estimator of the total number of female grizzly bears with cubs-of-the-year, derived from the frequency of single sightings or double sightings of unique females with cubs-of-the-year (Keating *et al.* 2002; Cherry *et al.* 2007) as identified based on a rule set by Knight *et al*. (1995).

Cubs: Any use of the word cubs is synonymous to cubs-of-the-year.

Demographic monitoring area (DMA): The area of suitable habitat plus the potential sink areas within which the GYE grizzly bear population is annually surveyed

and estimated and within which the total mortality limits apply. The DMA is 49,928 km^2 (19,279 mi^2). See figure 1 for a map showing the DMA.

Dependent young: Young grizzly bears less than 2 years old. Dependent young are with their mothers and are dependent upon them for survival.

Discretionary mortality: Mortalities that are the result of hunting or management removals.

Distinct population segment (DPS): The Service defined a DPS in the DPS policy (61 FR 4722, February 7, 1996) that considers two factors to determine whether the population segment is a valid DPS: (1) discreteness of the population segment in relation to the remainder of the taxon to which it belongs; and (2) the significance of the population segment to the taxon to which it belongs. If a population meets both tests, it is a DPS, and the Service then evaluates the population segment's conservation status according to the standards in section 4 of the Act for listing, delisting, or reclassification.

Greater Yellowstone Ecosystem (GYE): YNP and GTNP form the core of the GYE, which includes portions of three States: Wyoming, Montana, and Idaho. At more than 90,000 km^2 (34,750 mi^2), it is one of the largest nearly intact temperate-zone ecosystems on Earth.

Illegal kills: Illegal human-caused mortality, including but not limited to, vandal killings, poaching, and mistaken identity kills.

Independent females: Grizzly bear females 2 years old or older.

Independent males: Grizzly bear males 2 years old or older.

Interagency Grizzly Bear Study Team (IGBST): The Interagency Grizzly Bear Study Team (IGBST) is an interdisciplinary group of scientists and biologists responsible

for long-term monitoring and research efforts on grizzly bears in the GYE. The main objectives of the team are to: (1) monitor the status and trend of the grizzly bear population in the GYE; and (2) determine patterns of habitat use by bears and the relationship of land management activities to the welfare of the bear population. The IGBST is led by the USGS. IGBST members are representatives from the USGS, NPS, Service, USFS, the Eastern Shoshone and Northern Arapaho Tribal Fish and Game Department, and the States of Idaho, Montana, and Wyoming.

Model-averaged Chao2 estimator: The method to estimate the total number of female grizzly bears with cubs-of-the-year based on a statistical weighting of linear and quadratic regression models fitted to data since 1983 to smooth annual variations in the time series, and using endpoint in the time series as the estimate for the current year.

Model-averaged Chao2 population estimator: The method to estimate the total population size derived from the model-averaged Chao2 estimate of females with cubs-of-the-year.

Primary Conservation Area (PCA): The name of the Recovery Zone area post-delisting. The habitat-based recovery criteria apply within the PCA.

Recovery Zone: The area defined in the 1993 Grizzly Bear Recovery Plan within which the recovery efforts would be focused in the GYE. The Recovery Zone is not designed to contain all grizzly bears.

Significant portion of its range (SPR): The Service defines a portion of the range of a species as "significant" if the species is not currently endangered or threatened throughout all of its range, but the portion's contribution to the viability of the species is

so important that, without the members in that portion, the species would be in danger of extinction, or likely to become so in the foreseeable future, throughout all of its range.

Suitable habitat: We define suitable habitat for grizzly bears as areas having three characteristics: (1) being of adequate habitat quality and quantity to support grizzly bear reproduction and survival; (2) being contiguous with the current distribution of GYE grizzly bears such that natural recolonization is possible; and (3) having low mortality risk as indicated through reasonable and manageable levels of grizzly bear mortality. Suitable habitat is made up of the Middle Rockies ecoregion, within which the GYE is contained. This area meets grizzly bear biological needs providing food, seasonal foraging opportunities, cover, and denning areas. See the *Suitable Habitat* section of this final rule for a more complete explanation.

Total mortality: Documented known and probable grizzly bear mortalities from all causes including but not limited to: management removals, illegal kills, mistaken identity kills, self-defense kills, vehicle kills, natural mortalities, undetermined-cause mortalities, grizzly bear hunting, and a statistical estimate of the number of unknown/unreported mortalities.

Transition probability: The probability of a transition for an adult female (greater than 3 years old) among reproductive states. The possible reproductive states are: no young, with cubs-of-the-year, with yearlings, or with 2-year-olds. Ten potential reproductive transitions are biologically feasible.

Yellowstone Grizzly Bear Coordinating Committee (YGCC): The committee of State, Federal, Tribal, and county agencies charged with implementing the 2016 Conservation Strategy post delisting. They will coordinate management and promote the

exchange of information about the GYE grizzly bear population. Members include: YNP and GTNP; five National Forests: Beaverhead-Deerlodge, Bridger-Teton, Caribou-Targhee, Custer Gallatin, and Shoshone; one BLM representative; the Biological Resources Division of the USGS; one representative each from Idaho, Montana, and Wyoming; and one representative from each Native American Tribe with sovereign powers over reservation lands within the ecosystem.

Authors

The primary authors of this final rule are staff members of the Service's Grizzly Bear Recovery Office (see **FOR FURTHER INFORMATION CONTACT)**.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, we hereby amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations as set forth below:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245, unless otherwise noted.

2. Amend § 17.11(h) by revising the first entry for "Bear, grizzly" under "Mammals" in the List of Endangered and Threatened Wildlife to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Common name	Scientific name	Where listed	Status	Listing citations and applicable rules
MAMMALS * * * * * * *				
Bear, grizzly	*Ursus arctos horribilis*	U.S.A., conterminous (lower 48) States, except: (1) where listed as an experimental population; and (2) that portion of Idaho that is east of Interstate Highway 15 and north of U.S. Highway 30; that portion of Montana that is east of Interstate Highway 15 and south of Interstate Highway 90; that portion of Wyoming south of Interstate Highway 90, west of Interstate Highway 25, Wyoming State Highway 220, and U.S. Highway 287 south of Three Forks (at the 220 and 287 intersection), and north of Interstate Highway 80 and U.S. Highway 30.	T	32 FR 4001, 3/11/1967; 35 FR 16047, 10/13/1970; 40 FR 31734, 7/28/1975; 72 FR 14866, 3/29/2007; 82 FR [Insert **Federal Register** page where the document begins], [Insert date of publication in the **Federal Register**]; 50 CFR 17.40(b).[4d]
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Dated: June 1, 2017.

James W. Kurth,

Acting Director, U.S. Fish and Wildlife Service.

[FR Doc. 2017-13160 Filed: 6/29/2017 8:45 am; Publication Date: 6/30/2017]