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Review of the united states fish and wildlife service's 2017 endangered species act delisting rule for the greater yellowstone ecosystem grizzly bear

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The Greater Yellowstone Ecosystem grizzly bear (*Ursus arctos horribilis*) population and four other populations were listed as “threatened” in the lower 48 states by the US Fish and Wildlife Service (USFWS) on July 28, 1975, based on the 1973 Endangered Species Act (ESA). An agency Final Rule in the *Federal Register*, issued on March 29, 2007, made it a distinct population segment (DPS) and removed the GYE population from the ESA listing. After litigation, a federal District Court ordered relisting on September 2, 2009, and vacated the 2007 rule. The USFWS appealed the decision and lost. On March 16, 2016, the agency issued a Proposed Rule to again delist this grizzly bear population, and a 90-day public comment period followed. A review of the public comments and agency responses found in the *Federal Register Final Rule* of July 31, 2017, reveals that the public perceived that the agency did not always respond fairly or comprehensively to some of the pertinent bear policies. Some issues were overlooked, given inadequate treatment, and suffered from misinformation. These topics include habitat fragmentation, migration and dispersal, habitat connectivity, other population proximity, private land, and others. The 2017 rule also delisted the GYE grizzly bear. After the USFWS objected, a federal Circuit Court agreed with a lower District Court that the 2017 delisting rule be vacated and the GYE grizzly bear be relisted. A *Federal Register* notice issued on September 24, 2018, affirmed that action. On March 31, 2021, the agency changed its position and recommended continued listing of the GYE grizzly bear. Congress introduced legislation from 2023–2025 to delist the GYE and NCDE grizzly bear populations. Responding to State petitions to delist, the agency concluded on January 20, 2025, that the lower-48 grizzly bears should remain listed (USFWS 2025). Although the topic of the 2017 delisting rule is now eight years old, the extent to which the USFWS did not respond adequately to certain topics is informative and timely since the agency could be compelled to write more delisting rules and respond to more public comments in the future.

KEYWORDS

yellowstone, US fish and wildlife service, grizzly bear, federal regulations, delisting, endangered species act

1 Introduction

1.1 The physical setting

The Western US population of grizzly bears (*Ursus arctos horribilis*) was estimated to be approximately 50,000 during the European colonization in the 1800s (Servheen et al., 1999). The population in the region of lower 48 states was reduced by half between 1850 and 1970, and their range was reduced by 98% (Mattson et al., 1995). Grizzly bear populations in the contiguous U.S. declined from 37 in 1922 to 4 in 1999 (Servheen et al., 1999). As of 2021, only 1,913 bears were left in the lower 48 states (U.S. Fish and Wildlife Service, 2021, pp. 61–63), and it increased to >2,200 in 2022 (Van Manen et al., 2023).

The Greater Yellowstone Ecosystem (GYE), sometimes called the Greater Yellowstone Area, was first described by Craighead (1977) to represent continuous critical habitat for the grizzly bear. Its subsequent delineation varied based on the source: 14 million ha (Corn and Gorte, 1986), 18 million ha (Glick et al., 1991), 26 million ha (Noss et al., 2001), and 36 million ha (Gude et al., 2006). The last delineation by Gude et al. was socio-economic and comprised 20 counties. The Greater Yellowstone Coordinating Committee sets the GYE at 9.2 million ha (GYCC, 2021). The federal agencies have given the GYE de facto recognition (Keiter, 1989). Based on the 18 million ha spatial definition of Glick et al. (1991), the GYE contains two national parks (Yellowstone and Grand Teton); one national parkway (John D. Rockefeller Memorial Parkway); parts of six national forests (Bridger-Teton, Shoshone, Caribou-Targhee, Gallatin, Custer, and Beaverhead-Deerlodge); three units of the National Wildlife Refuge (NWR) System (National Elk Refuge, Red Rock Lakes NWR and Gray's Lake NWF; one Native American Reservation (Wind River); Bureau of Land Management; Bureau of Reclamation; state; municipal; and private lands in Wyoming, Montana, and Idaho. Approximately one-third of a 20-county GYE delineation has been classified as developed (Hansen and Phillips, 2016, p. 329).

Elevation in the GYE ranges from approximately 1,610m to 3,462 m. The GYE harbors the headwaters of the Gallatin, Madison, Yellowstone, Clarks Fork, Wind/Bighorn, Snake, and Green Rivers, which flow into the more voluminous Mississippi, Columbia, and Colorado Rivers. The US Forest Service is the largest landowner (47.8%), followed by the National Park Service (11.0%), Bureau of Land Management (7.0%), Fish and Wildlife Service (0.5%), and Natural Resources Conservation Service (0.1%). Private lands constitute 27% and State lands 4.2%. As of 2006, the predominant land cover was forest (37%) and grasslands (35%). The dominant land cover on private lands was scrub/shrub (35%) and grasslands (26%), with agriculture covering 18%. Public lands dominate at

higher elevations, while private lands occur lower down. Roadless areas (more than 500 m from a road) constitute 64% of the GYE (from McIntyre and Ellis, 2011). GYE resources have also been described by Corn and Gorte (1986).

These U.S. grizzly bears primarily reside in national parks, national forests, and federal wilderness areas, with some individuals found on private land, some having moved there as their ranges expanded (Gunther et al., 2014). The region between the Greater Yellowstone Ecosystem (GYE), Northern Continental Divide Ecosystem (NCDE), and the Bitterroot Ecosystem (BE) includes towns, cities, highways, roads, ranches, and exurban areas. Unsurprisingly, ecological integrity is correlated with land allocation (Hansen and Phillips, 2018). See Figure 1.

The GYE Recovery Zone, covering 20,000 km², is home to 1,030 bears. Our second grizzly bear population in the U.S. portion of the NCDE, harbors 1,163 bears. Third is the U.S. portion of the Selkirk Ecosystem (SE), which holds 51 bears. Fourth is the 6,700 km² Cabinet-Yaak (CYE) area, with 70 bears (US Fish and Wildlife Service (USFWS), 2024). The bear population in the fifth region, the US Northern Cascades Ecosystem (NCE) at 25,000 km², has been functionally extinct since the late 1990s (Costello et al., 2023; USFWS, 2021). No resident bears now exist in the 5,054 km² BE.

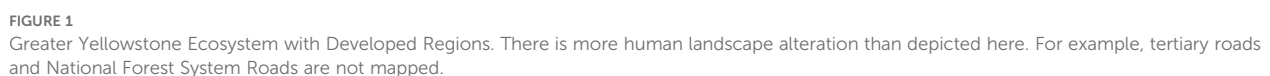
For a more comprehensive and readable introduction to the GYE grizzly bear situation from a mostly agency perspective, see White et al. (2017). For another good account of GYE biology, consult Hansen (2006). For valuable general information, see Gunther (2015).

1.2 The legal setting

The provided timeline lists GYE grizzly bear legal and biological events from 1973–2025. Based on provisions detailed in the Endangered Species Act (ESA) of 1973 (87 Stat 884), the Yellowstone grizzly bear population and four other populations were listed as “threatened” by the US Fish and Wildlife Service (USFWS) on July 28, 1975 (40 *Federal Register*, pp. 31734–31736). The reasons for listing included roads, logging, outdoor recreation, legal hunting and poaching, and habitat isolation. The agency drafted its first Yellowstone grizzly bear recovery plan in 1983 and revised it in 1993 (USFWS, 1983, 1993). The 1993 plan identified five recovery areas with grizzly bear populations in the lower 48 states: the Greater Yellowstone Ecosystem (GYE) in Montana and Wyoming, the Northern Continental Divide Ecosystem (NCDE) in Montana, the Cabinet-Yaak Ecosystem (CYE) in Montana, the Selkirk Ecosystem (SE) in Idaho and Washington, and the North Cascades Ecosystem (NCE) in Washington. The ESA has proven its effectiveness for many species (Greenwald et al., 2019).

On November 19, 2005, the USFWS announced that the Yellowstone grizzly population had recovered and proposed removing its ESA-threatened status. On that same day, 250 scientists opposed the delisting. The agency's *Proposed Rule* (USFWS, 2006) would make the Yellowstone population an official Distinct Population Segment (DPS) and shall remove

Abbreviations: USFWS, U.S. Fish and Wildlife Service; ESA, Endangered Species Act of 1973, as amended; GYE, Greater Yellowstone Ecosystem; NCDE, Northern Continental Divide Ecosystem; CYE, Cabinet-Yaak Ecosystem; SE, Selkirk Ecosystem; NCE, Northern Cascades Ecosystem; BE, Bitterroot Ecosystem; PCA, Primary Conservation Area; DMA, Demographic Monitoring Area; DPS, Distinct Population Segment.



In 2008, three lawsuits were filed by non-governmental organizations (NGOs) in Montana and Idaho federal courts challenging the 2007 delisting decision. A federal District Court judge on September 21, 2009, ordered the USFWS to restore the

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Subcommittee, 2016), they addressed the judge's concern about whitebark pine and other factors. However, the agency concluded that the potential scarcity of this tree due to climate change would not harm the bear.

On March 16, 2016, the USFWS again issued a *Proposed Rule* in the *Federal Register* to delist the GYE grizzly bear (USFWS, 2016). During the public comment period, 66 scientists sent a letter on May 6, 2016, to Sally Jewell, Secretary of the Interior, protesting the delisting. The agency announced that two informational meetings and two hearings would be held to inform the public about the *Revised Demographic Criteria*, a supplement to the 2016 *Conservation Strategy* (Yellowstone Ecosystem Subcommittee, 2016). These criteria argued that the minimum population size of 500 bears was needed, with at least 48 females with cubs of that year, with most reproductive females located in the Primary Conservation Area (PCA). Minimum viable population is defined as “the smallest isolated population that has a specified statistical chance of remaining extant for a specified time in the face of foreseeable demographic, genetic, and environmental stochasticity, plus natural catastrophes” (Groom et al., 2006, p.706, based on Shaffer, 1981). The comprehensive December 14, 2016, *Conservation Strategy* was produced to direct the management and monitoring of grizzly bears more and their habitat upon delisting.

Comments on the 53-page *Federal Register Proposed Rule* were due in 60 days, but the deadline was extended to 90 days amidst more controversy (Dickie, 2016). In total, 665,000 public comments were reportedly received from environmental organizations, scientists, professional societies, states, political representatives, private citizens, and other groups.

Humane Society of the US v. Zinke, 856 F.3d 585 (DC Circuit, 2017) was filed to protest the perceived premature delisting of the GYE grizzly bear in the anticipated Final Rule. On June 30, 2017, the agency issued the *Final Rule* for the GYE grizzly bears (USFWS, 2017), again making it a DPS and delisting the bear. The agency explained its positions on various issues in the 2017 Final Rule while responding to public comments, accepting or opposing specific arguments. The rule consequently grew to 131 pages, a monumental effort. The first part provided background on key issues and the agency's position on them, while the second part responded to public comments. The rule was divided into 117 separate topics.

Responding to *Crow Indian Tribe v. United States*, a District Court vacated the 2017 delisting rule on June 30, 2017. Even after the agency recommended continued grizzly bear protection in the lower 48 states (USFWS, 2021), agency actions continued due to legal challenges and Congressional initiatives (Gordon, 2022). During 2022, the Governor of Montana issued a petition to delist the GYE and NCDE grizzly bears. On February 6, 2023, in response to three petitions, the USFWS published another *Federal Register* notice seeking public information, called a 90-day status review, that discussed the potential issuing of another delisting rule (USFWS, 2023). The agency then filed a Declaration on July 26, 2024, indicating they were delaying their response to two petitions judged by them as valid and would finalize their “12-month findings” on January 31, 2025, for both the GYE and the NCDE

populations of grizzly bears (Case 2:23-cv-00092-ABJ Document 33-filed 7-26-2024).

On January 8, 2025, the USFWS denied petitions from the states of Wyoming and Montana to delist the GYE grizzly bear, and this action applied to all U.S. grizzly bear populations (USFWS, 2025). The agency said the GYE grizzly bear will remain on the threatened list, as will the other US grizzly bear populations, now regarded as a metapopulation (McCullough, 1996). A metapopulation is defined as “A network of semi-isolated populations with some level of regular or intermittent migration and gene flow among them, in which individual populations may go extinct but can then be recolonized from other populations” (Groom et al., 2006, p.706). The agency ruling expanded the DPS to circumscribe all lower-48 grizzly bear populations. Public meetings in Montana, Idaho, and Wyoming were planned for late January and early February 2025. For a more thorough treatment of the legal history of GYE grizzly bears, see Greenwald (2023). Also consult Mott and Burnham (2019); Keiter (2020), and CRS (2024). To better understand the politics and political discourse surrounding the GYE grizzly bear and delisting, consult Mollett et al. (2025).

In summary, the agency did not always respond accurately to issues like habitat fragmentation, migration, private land, and other subjects. Some issues reviewed here were not raised by commentators or judges. The USFWS and their advisors should have been well-acquainted with these problems, yet their responses indicated their unfamiliarity or they ignored some facts. Although these events occurred eight years ago, hindsight may facilitate predicting future events and potential further arguments by the USFWS. We now turn to specifics in the 2017 delisting rule.

2 Habitat loss and fragmentation

The agency concluded that “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” (USFWS, 2017, p. 30524).

The USFWS recognized habitat fragmentation and that this influence threatens grizzly bear populations (Parmenter et al., 2003). The impacts of fragmentation elsewhere are well known (Fahrig, 2003, Fischer and Lindenmayer, 2007). Habitat loss and fragmentation are among the top causes of species decline (Haddad et al., 2015). In the above USFWS quote, however, the agency did not consider rural housing trends. The construction of rural homes has been the primary form of land-use change in the GYE (Rasker and Hansen, 2000). Montana's Gallatin County was once the fastest-growing county in the state, and lost 95,680 acres due to sprawl from 1990 to 2016 (Headwaters Economics, 2024). Moreover, single-family homes rose from comprising 11,640 acres in 1990 to 28,938 acres in 2016, with one-third of the lots exceeding 10 acres (Rasker, 2018). Gallatin County is located inside the DPS. If we consider an additional ten Montana counties that are fully or partially inside the DPS, a mean of 31,472 acres was converted into sprawl from 1990 to 2016 (mostly single-family homes) (Headwater Economics, 2024). Based on present trends and using the 20-county GYE delineation,

Hansen and Phillips (2018) predicted that the number of homes will increase to 503,465 by 2050. When located in grizzly bear-occupied areas, such construction represents a diminishment of grizzly bear habitat. Road and highway density are also a negative influence on bear habitat, and sometimes serve as an indicator of forest fragmentation (Heilman et al., 2002). For a detailed account of past efforts to thwart GYE sprawl, see Wilkinson (2025). Housing encroaching on protected areas is a national problem (Volker et al., 2010; Hjerpe et al., 2020). The threat of sprawl is not confined to US parks. A similar situation occurs in the Canadian portion of the NCDE (Horejsi, 1989). Therefore, housing development in the GYE is a major component of ongoing habitat fragmentation.

3 Human population growth

The agency declared, “We do not consider human population growth on private land to constitute a threat to the GYE grizzly bear DPS now or in the foreseeable future” (USFWS, 2017, p. 30526).

However, human population growth is probably the leading cause of biodiversity loss (Hansson and Göttmark, 2022). Its growth is typically accompanied by habitat fragmentation and persecution (McKee et al., 2004). The above agency statement becomes questionable based on other GYE data. During 1970–1999, the GYE experienced a 58% increase in population size and a 350% increase in rural land development (Gude et al., 2006). Many investigators reported the unprecedented influx of new residents (Rasker and Hansen, 2000; Johnson et al., 2003; Gude et al., 2006). The arrival of new people seeking an improved lifestyle continues, and the city of Bozeman is a prime example. Current GYE population growth and housing density are predicted to double by 2050. This growth trend projects a human population of 846,146 by 2050 (Hansen and Phillips, 2018). Therefore, human population growth on certain private land is a threat to the grizzly bear.

4 Habitat connectivity

The agency said, “We will continue efforts to reestablish natural connectivity between the GYE and other grizzly bear populations” (USFWS, 2007, p. 14896).

However, the USFWS has failed to have a consistent connectivity policy position (Gunther et al., 2014). In 1993, the agency assigned importance to grizzly bear “linkage zones” and indicated that providing connectivity between recovery zones was a long-term objective (USFWS, 1993, p. 24). In 2004, the Interagency Grizzly Bear Committee remarked in a memo that the long-term future of the GYE grizzly bear population was bleak unless critical corridor connections were secured (Thompson, 2004, p. 708). In 2011, the USFWS made another supportive statement regarding the need for corridors (U.S. Fish and Wildlife Service (USFWS), 2011). Moreover, in the 2017 Final Regulation, the agency stated that natural connectivity is important and bears will benefit from occasional gene flow (USFWS, 2017, p. 30518). The USFWS observed that “commenters and peer-reviewers thought connectivity was essential for long-term viability” (USFWS, 2017, p. 30579).

Nevertheless, in response to public comments, the USFWS remarked that “Lack of connectivity is not a threat to the existence of the GYE DPS [bears]” and “... is not required to maintain the GYE DPS [bears]” (USFWS, 2017, p. 30581). As a result, one commenter observed that the agency thought connectivity was “both vital and unnecessary” (USFWS, 2017, p. 30579). In a follow-up to the 2017 regulations, the USFWS did not change its position, indicating that “Connectivity is not necessary for the current genetic health of the GYE grizzly bear population...” (USFWS, 2018, p.18740).

Many scientists have stressed the need for habitat connectivity between US grizzly bear populations in the technical literature (Craighead and Vyse, 1996; Servheen et al., 2002; Carroll et al., 2004; Proctor et al., 2004) and federal regulations testimony (e.g. Craighead et al., 2005). State and federal organizations have also elaborated on the benefits of corridors for grizzly bears (Montana Fish Wildlife and Parks, 2013; Yellowstone Ecosystem Subcommittee, 2016). Non-government organizations (NGOs) have undertaken activities to preserve habitat connectivity in certain locations between the GYE, NCDE, and BE (Shafer, 2015). Creating connectivity on US public lands does raise legal issues (Keiter, 2018).

There is evidence that corridors facilitate animal movement (Beier and Noss, 2008; Gilbert-Norton et al., 2010, 2013) and other benefits (Chetkiewicz et al., 2006), including allowing dispersal, migration, foraging, and range shifts. Gene flow is another key reason (Shafer, 2022). International guidelines have been developed to facilitate corridor creation (Hilty et al., 2020). Conservation case studies document their implementation around the world. For an example of a dual-country large-scale effort to facilitate habitat connectivity, see Hebblewhite et al. (2022). Connectivity conservation is now addressed by the top science journals (Brodie et al., 2025). Therefore, the USFWS's position on habitat connectivity in the GYE has changed over the decades from for, to unconcerned, to again for today.

The agency's legal position on listing and habitat connectivity also raises concerns. They remarked that the absence of linkage zones would not stop the delisting if other recovery goals were met (USFWS, 2007), and their position in 2017 remained unchanged (USFWS, 2017, pp. 30580–30581). This decision was likely made because they argued that usable corridors were not the intention of the ESA, and therefore, they did not insist on them in the 2007 and 2017 regulations (USFWS, 2017). However, two scientific societies (American Society of Mammalogists and Society for Conservation Biology) objected to this viewpoint on May 10, 2016, in their comments on the 2016 Proposed Regulations (USFWS, 2016). They argued that “the ESA obligate[s] the USFWS to manage the metapopulation of grizzlies in the lower 48 states, not just each population individually” (SCB/ASM, 2016). Corridors or habitat connectivity can facilitate gene flow, but if that ideal is not possible, there is a management alternative.

5 Translocation

The USFWS also said that translocating grizzly bears into the GYE would only occur as a “last resort” (USFWS, 2017, p. 30536).

Translocation is a “management technique often used in mitigation for endangered species protection whereby an individual, population, or species is removed from its habitat to be established in another area of similar or identical habitat” (Groom et al., 2006, p. 709). The agency later changed its mind about this management technique being a last resort, likely due to critiques of its genetics policy (e.g. Shafer, 2022) and its support by GYE grizzly bears scientists (Turnock et al., 2025). During 2024, the State of Montana released several grizzly bears from the NCDE into the GYE to facilitate gene flow. However, translocation should not occur without some careful outcome considerations (Mildigans et al., 2018; Evans et al., 2023). This option is receiving more attention due to climate change (Butt et al., 2020). This management technique was tried decades ago for the CYE (Servheen et al., 1995) and has continued at other lower 48 state locations (Turnock et al., 2025). Therefore, the agency’s position on translocation as expressed in its regulations has changed from being “a last resort” in 2017 to being actively implemented in 2024.

6 Other population proximity

The USFWS stated that “Grizzly bears in these peripheral areas are not biologically necessary for the GYE grizzly bear population” (USFWS, 2017, p. 30510).

Dismissing other nearby grizzly bear populations as irrelevant to delisting was part of the reason why a 2018 federal court judge ruled to relist the bear (Crow Indian Tribe et al. v. USA (2017) 17-cv-00089). In the court’s words, the agency “failed to consider how reduced protection in the GYE would impact the other grizzly bear populations” (2018 US Dist. LEXIS 163319, 48 ELR 20168, 2018 WL 4568418 (D. Mont. September 24, 2018)). This judge would not have agreed with the following agency statement: “The management and potential status of other grizzly bear populations is outside the scope of this review” (USFWS, 2017, p. 30552). The USFWS recorded what one commenter said, “Recovery must address the entire lower 48 states as a whole unit, instead of splitting out the GYE” (USFWS, 2017, p. 30558). Today, the USFWS is looking at other grizzly bear populations as potentially contributing to the persistence of the GYE population.

7 Private land and development

The USFWS remarked, “We do not consider human population growth on private lands to constitute a threat to the GYE grizzly bear DSP now or in the foreseeable future” (USFWS, 2017, p. 30526).

This highly questionable remark may have contributed to a false sense of security. It contrasts with the statements and findings of other scientists and practitioners. Gunther (2015) calculated that 41% of all GYE grizzly bear conflicts occurred on private land. Similarly, Schwartz et al. (2010) found that 62% of grizzly bear mortalities occurred on private land outside the GYE Primary Conservation Area (PCA). According to Hansen (2011), private land in the GYE is a mortality sink for grizzly bears, and even low-

density residential settlements are sinks (Schwartz et al., 2012). Mark Bruscano, a State of Wyoming grizzly bear biologist and member of the Interagency Grizzly Bear Study Team (IGBST), indicated that the largest long-lasting threat to grizzly bears is human development on private land (Quammen, 2016), which will only worsen over time. Glick and Freese (2004) perceived that the future of biodiversity in GYE is determined by what happens to its private property. Knight et al. (1999) thought private land development was the greatest threat to the grizzly bear. The topic was deemed sufficiently important to stimulate the writing of a law journal article (Middleton et al., 2022).

The agency also explained, “On private lands, we have no authority to limit developed sites and do not think it is necessary” (USFWS, 2017, p. 30575).

They do have the tools to take some action. For example, they can acquire easements or impose the ESA. They can acquire land or enter into cooperative agreements. Under the fastest growth (boom) scenario, Gude et al. (2007) predicted that 180,000 homes would be built in the GYE by 2020. However, based on 2016 data, the number of homes built was approximately 227,000 (Gude et al., 2017). Based on Schwartz et al.’s (2012) model predictions, heavy private land development will occur outside the GYE PCA and within the current distribution of grizzly bears. Kolankiewicz et al. (2024) said sprawl is the greatest threat to the GYE.

Private land constitutes 31% of the GYE (Hansen & Phillips 2018), but only 750,000 acres (11%) are protected by conservation easements (Keiter, 2020, p. 148). According to Sells and Costello (2023), approximately 50% of existing grizzly-bear-occupied areas are privately owned. Thus, the importance of private land in corridors between the GYE and the NCDE should not be underestimated (Gigliotta et al., 2022).

Offer (2020) identified landowners in Peck et al.’s (2017) three computer-modeled habitat corridors, stretching northwest-southeast from the GYE to the NCDE. The author found that the central corridor (using Peck’s least-cost-pathway model with an equal resistance surface) had 41.7% of its total length intersected by private land.

Over four decades ago, Varley (1988) famously stated that “No one, it seems, wants to tackle the issue of threats to the park (or ecosystem) that arise on private lands (p. 222).” Although this situation is changing based on problem awareness, coordinated efforts to address this problem are lacking (Wilkinson, 2022). Today, the USFWS is very aware of the importance of private land to grizzly bear recovery.

8 Food resources and climate change

The USFWS emphatically stated, “There is no evidence that changes in food resources will become substantial impediments to the long-term persistence of the GYE grizzly bear population” (USFWS, 2017, p. 30544).

Climate change entails a shift in temperature and weather caused by natural or anthropogenic influences. The typical effects include rising temperatures, sea-level rise, more frequent and

stronger weather events, changes in rainfall, and impacts on biological diversity. Whitebark pine seeds are an important part of the grizzly bear's diet. However, a warming climate will allow mountain pine beetles (*Dendrotonus ponderosae*) to spread and kill white pine trees. This predicament is ongoing.

However, an IBGST-organized workshop looked at this situation differently in 2010. Except for being forced into closer proximity to humans, this workshop concluded that the GYE grizzly bear would unlikely be affected by climate change (Servheen and Cross, 2010). It is therefore unsurprising that in 2017, the USFWS said, "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" (USFWS, 2017, p. 30521). However, based on the advice received from other scientists, a federal judge disagreed (Gardner, 2013). For an elaboration of why this judge may have thought climate change was a threat, see Mattson (2019). While controversial, other scientists regard the negative impact of climate change on whitebark pine as a problem for the grizzly bear (Buotte et al., 2016; Raffa et al., 2012). It is therefore unclear whether grizzly bears will survive without the whitebark pine tree, but this lack of information does not imply that there will be no potential negative future influence on the bear if the trees diminish or disappear. Today, members of the IBGST agree that climate change may negatively influence the persistence of the tree in the GYE (Costello et al., 2015). One thing seems clear. Climate change will force more human-grizzly contact, which will likely have negative outcomes for the bear.

9 Management removal

The USFWS also said, "We do not consider management removals a threat to the GYE grizzly bear population now, or in the foreseeable future" (USFWS, 2017, p. 30529).

Management removal usually means killing a bear due to some severe transgression like injuring or killing a visitor, repeatedly feeding on livestock, or being a recurrent problem at campgrounds. However, they can also be moved elsewhere or given to zoos. In the GYE population from 2002 to 2019, management removal accounted for 64% of all mortalities (USFWS, 2021). The USFWS and US Forest Service were sued in 2019 for allowing the lethal removal of 72 grizzly bears over ten years because of anticipated problems with sheep ranching [Center for Biological Diversity versus Haaland, 603. Supp. 2d 1094, 1098 (D. Wyo, 2022)]. Thus, management removals at this level will not enhance the future persistence of this GYE grizzly bear population.

10 Hunting

The agency also concluded that "this source of mortality [hunting] does not constitute a threat to the GYE grizzly bear DPS now, or in the foreseeable future" (USFWS, 2017, p. 30530).

In response to the 2016 draft grizzly bear delisting rule, one regulations commentator remarked, "We [USFWS] did not

adequately consider how hunting could impact the grizzly bear population" (USFWS, 2017, p. 30588). This is true. For example, a study of grizzly bear hunting in British Columbia from 1980-2016 revealed that excessive hunter harvest was the norm (Artelle et al., 2013). The downsides of hunting are poorly understood (Mattson, 2020).

The agency explained another result of hunting for other species. "From 2002 to 2014, 31 percent (97) of human-caused grizzly bear mortalities in the GYE were in self-defense or defense of other persons [usually elk hunter] kills..." (USFWS, 2017, p. 30528). Therefore, many grizzly bear kills are a result of elk (*Cervus canadensis*) hunters defending an elk carcass or spring black bear (*Ursus americanus*) hunters killing a grizzly bear by mistake. In addition, many non-hunter grizzly bear killings go unreported (McLellan et al., 2018).

The agency also stated that "Hunting should never threaten the GYE grizzly bear population" (USFWS, 2017, p. 30588). For an abundant carnivore like the American black bear, assuming wise management strategies are in place, the populations should not be threatened by hunting (Hristienko and McDonald, 2007). However, the situation with the far less abundant US grizzly bear warrants more caution. Looking at brown bear data spanning 30 years, researchers observed that hunting disrupted the interactions between age-specific survival and environmental factors, altered reproduction strategies, and life expectancy (Bischof et al., 2018). Therefore, kills resulting from the deliberate hunting of grizzly bears may not be inconsequential sources of mortalities. However, the unintentional lethal encounters while hunting elk or spring black bears add to this mortality count. The 1975 listing of the grizzly bear as a threatened species and the first grizzly bear management plan (USFWS, 1983) mentioned legal hunting as a probable cause of decline.

11 Population viability and minimum habitat area

The USFWS remarked, "The DMA [Demographic Monitoring Area] provides more than enough suitable habitat for a large, robust, healthy, and viable population and will continue to do so in the foreseeable future" (USFWS, 2017, p. 30551).

First, as some commenters pointed out, it is not clear what "foreseeable future" means. However, the current population is not large enough for long-term evolutionary adaptation (i.e., hundreds of years or centuries). For both short and longer periods, the GYE grizzly bear population will continue to slowly lose genetic diversity unless natural immigration from other populations or translocation occurs (Shafer, 2022).

The agency also said, "There is no published method to deductively calculate minimum habitat values required for a healthy and recovered population" (USFWS, 2017, p. 30509).

Minimum habitat area, or minimum area requirement, is defined as "the amount of space (suitable habitat) that is required for long-term persistence of a population" (Pe'er et al., 2014, p. 93).

Although this agency statement may be true, many scientists have proposed minimum habitat areas based on various criteria (Allendorf and Ryman, 2002; Bader and Sieracki, 2022). These estimates should not be dismissed because they cannot be accepted as precise. One approach to derive the minimum habitat area is population viability analysis (PVA) (Chaudhary and Oli, 2019). “Population viability analysis (PVA) ...entails evaluation of data and models for a population to anticipate the likelihood that a population will persist for some arbitrarily chosen time in the future” (Boyce, 1992, p. 481).

12 Population and mortality counts

The agency stated, “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” (USFWS, 2017, p. 30568). ”

The agency’s long-standing policy of not counting bears outside the DMA raises a significant issue. This practice prevents a good approximation of the total GYE grizzly bear population size because the population of grizzly bears in the GYE’s “occupied range” extends beyond those in the DMA.

13 Proposed allowed mortality in corridors

The USFWS said, “The State [Montana] will manage discretionary mortality to retain the opportunity for natural movements of bears between ecosystems” (USFWS, 2017, p. 30581).

In other words, the state believes it can manage grizzly bear hunting in the region between the GYE and NCDE while simultaneously facilitating inter-ecosystem dispersal. Why did this policy arise? To finalize the Memorandum of Agreement (MOA) between the states of Montana, Idaho, and Wyoming, the state of Montana insisted that any statement suggesting that grizzly bear migration was needed to retard the genetic erosion of the GYE population be deleted (USFWS, 2017, p. 30610). The USFWS agreed to accommodate the State’s suggested language in the Final Rule, which ultimately stated that “genetic connectivity is not required for delisting, and the genetic health of the GYE DPS is very strong.”

The agency recognized that grizzly bears moving outside the DMA will find themselves on land where bears are unwelcome by all three states (USFWS, 2017, p. 30580). The agency also knew that states of Idaho and Montana “will actively prevent the successful recolonization of an unoccupied historical range because of the potential for conflict” (USFWS, 2017, p. 30580). The MOA and 2017 *Federal Register* Final Rule inform us that grizzly bear population growth will be reduced based on “allowable” mortality, due to hunting, accidental deaths, and management removals. This may result in migrating bears being considered “uncountable deaths,” rather than grouped into total allowable mortality. The states of Montana and Wyoming identified these areas as “no-death count zones.”

The USFWS indicated they wish to “facilitate occasional gene flow from nearby grizzly bear populations like in the NCDE” (USFWS, 2017, p. 30536). However, at the same time, the states want to drop the grizzly bear population size on the fringes of their range, the very locations where migrating bears may be found. This conflict in dispersal and mortality goals was pointed out in the media (Koshmrl, 2024). The agency admitted that “Delisting of the GYE grizzly bear population may reduce the potential for NCDE grizzly bears to disperse to the GYE due to increased mortality inside the GYE DPS” (USFWS, 2018). Dispersing grizzly bears in Canada suffered increased levels of mortality (Proctor et al., 2002). Agencies exacerbate this problematic dispersal issue when hunting migrating bears in corridors is allowed. The agency recorded “Peer reviewers and public commenters suggested that hunting be prohibited in connectivity areas and key wildlife corridors” (USFWS, 2017, p. 30589). There are no grizzly bear mortality limits for areas outside the GYE DMA (USFWS, 2018).

Therefore, sport hunting in corridors will exacerbate the stated USFWS goal of continuing interagency efforts to provide and maintain movement opportunities for grizzly bears. The former US grizzly bear recovery coordinator (Servheen et al., 2024) and others also dispute the scenario that grizzly bears should be hunted in migration corridors. Hunting and facilitating bear migration, when allowed together, is problematic when seeking to augment a bear genome through inter-ecosystem movement. Therefore, the USFWS past position on hunting grizzly bears in GYE habitat corridors was dictated by adjacent states, which was likely precipitated by politics.

14 Extinction predictions

The USFWS remarked, “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” (USFWS, 2017, p. 30607).

As the southernmost range of the grizzly bear in North America, the GYE population is threatened by many factors, including continued habitat loss and fragmentation, hunting and poaching, management removal, climate change, accidents, and other stresses (Hansen, 2006; Schwartz, 2010; Keiter, 2018). Therefore, the above agency statement, even on a decades-long time scale, dismisses ongoing major negative influences as inconsequential. Today, the agency would likely not embrace such a rosy prediction.

15 Final thoughts

Many issues in the 2017 Final Regulations were given inadequate attention or were compromised by misinformation. Some were overlooked even by regulation commenters and judges. Some USFWS thinking has changed since 2017. Nevertheless, since such activity to delist the grizzly bear in the lower 48 states may continue, this review should provide insight into how the USFWS might

respond if asked to write another GYE grizzly bear delisting rule. If that happens, one can anticipate that some writing may be influenced by the federal administration's political ideology.

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Timeline for the greater yellowstone ecosystem grizzly bear population.

	1973	The Interagency Grizzly Bear Study Team was created as a result of the closure of Yellowstone NP's open-pit garbage dumps
	December 27, 1973	U.S. Endangered Species (ESA) Act becomes law
	July 28, 1975	Grizzly bears in the lower-48 states are listed as threatened under the ESA
	January 29, 1982	The U.S. Fish and Wildlife Service (USFWS) prepares a grizzly bear recovery plan for lower-48 states grizzly bears.
	1983	The Interagency Grizzly Bear Committee was formed
	September 1991	Grizzly bear hunting in the lower-48 states ceased
	September 10, 1993	USFWS updates its recovery plan for the US grizzly bear, identifies five recovery areas, and gives the GYE a recovery goal of 500 bears
	January, 2000	The USGS Northern Rocky Mountains Science Center was created, and the IGBST became a part of it
	November 15, 2005	USFWS makes known its intent to delist the GYE bears
	June 30, 2006	USFWS releases <i>proposed</i> delisting rule for public comment and indicates the bears are a distinct population segment (DPS)
	January 4, 2007	Non-governmental organizations (NGOs) file a lawsuit against the USFWS
	March 22, 2007	USFWS releases <i>final</i> delisting rule for the GYE grizzly bear
	September 21, 2009	A federal court judge places the GYE grizzly bear back on the ESA threatened list
	August 2010	The USFWS appeals the relisting decision
	October 26, 2010	The USFWS officially reinstated the GYE grizzly bear on the ESA list
	September 6, 2011	USFWS publishes grizzly bear "5-year review"
	December, 2013	The Interagency Grizzly Bear Committee recommends delisting of the GYE grizzly bear
	March 11, 2016	USFWS publishes proposed rule to delist and opens a public comment period
	May 6, 2016	As part of these public comments, 66 scientists sent a letter to the Secretary of the Interior protesting delisting
	August 12, 2016	Presuming impending delisting, NGOs file a lawsuit against the state of Montana for rushing to adopt grizzly bear hunting regulations
	June 30, 2017	In their final delisting rule, USFWS again removes the GYE grizzly bear from ESA listing
	August 30, 2017	NGOs and others sue the USFWS over delisting the GYE grizzly bear
	May 16, 2018	USFWS supplements the 1993 grizzly bear recovery plan
	May 2018	In response to delisting, the states of Montana and Idaho finalized rules to allow grizzly bear hunting
	August 30, 2018	A federal District Court judge halts the hunt days before it begins
	September 24, 2018	The same federal District Court places the GYE grizzly bear back on the ESA list
	May 24, 2019	USFWS asks a federal Appeals Court to remove the GYE grizzly bear from ESA listing
	July 31, 2019	USFWS complies with the District Court judge's September 24, 2018, order to relist
	March 30, 2021	USFWS publishes an updated lower-48 grizzly bear "5-year review"
	March 31, 2021	USFWS recommends continued ESA listing for the GYE grizzly bear
	December 2021-March 2022	The states of Montana, Wyoming, and Idaho filed petitions to delist the GYE and NCDE grizzly bears
	February 6, 2023	In reaction to the petitions, the USFWS's "90-day finding" indicates delisting in Wyoming and Montana may be appropriate, and will formally respond to the state petitions in 12 months
	January 15, 2024	USFWS issued a proposed rule to better define the GYE grizzly bear's DPS
	January 17, 2024	The GYE Tri-State Memorandum of Understanding is signed. The states will manage 800-950 bears in the GYE DMA
	September 30, 2024	A State of Montana grizzly bear management plan was released

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	January 9, 2025	Congress introduced legislation to delist the GYE and NCDE grizzly bears. Earlier legislation appeared in 2023 and 2024.
	January 20, 2025	USFWS responds to state petitions. It concludes that lower-48 state grizzly bears shall remain ESA-listed and be managed as a metapopulation