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General Comment

See attached file(s)

The attached document constitutes my review and analysis of the proposal by the U.S. Fish & Wildlife Service to remove grizzly bears in the Yellowstone ecosystem from the list of endangered and threatened wildlife under the Endangered Species Act (Federal Register 81(48): 13174-13227).

Please note, the attached document represents only a subset of a larger review and defensibility analysis undertaken at Duke's Nicholas School of the Environment. If requested, I am happy to submit the paper in its entirety.

Kindest Regards,
Barb Cozzens

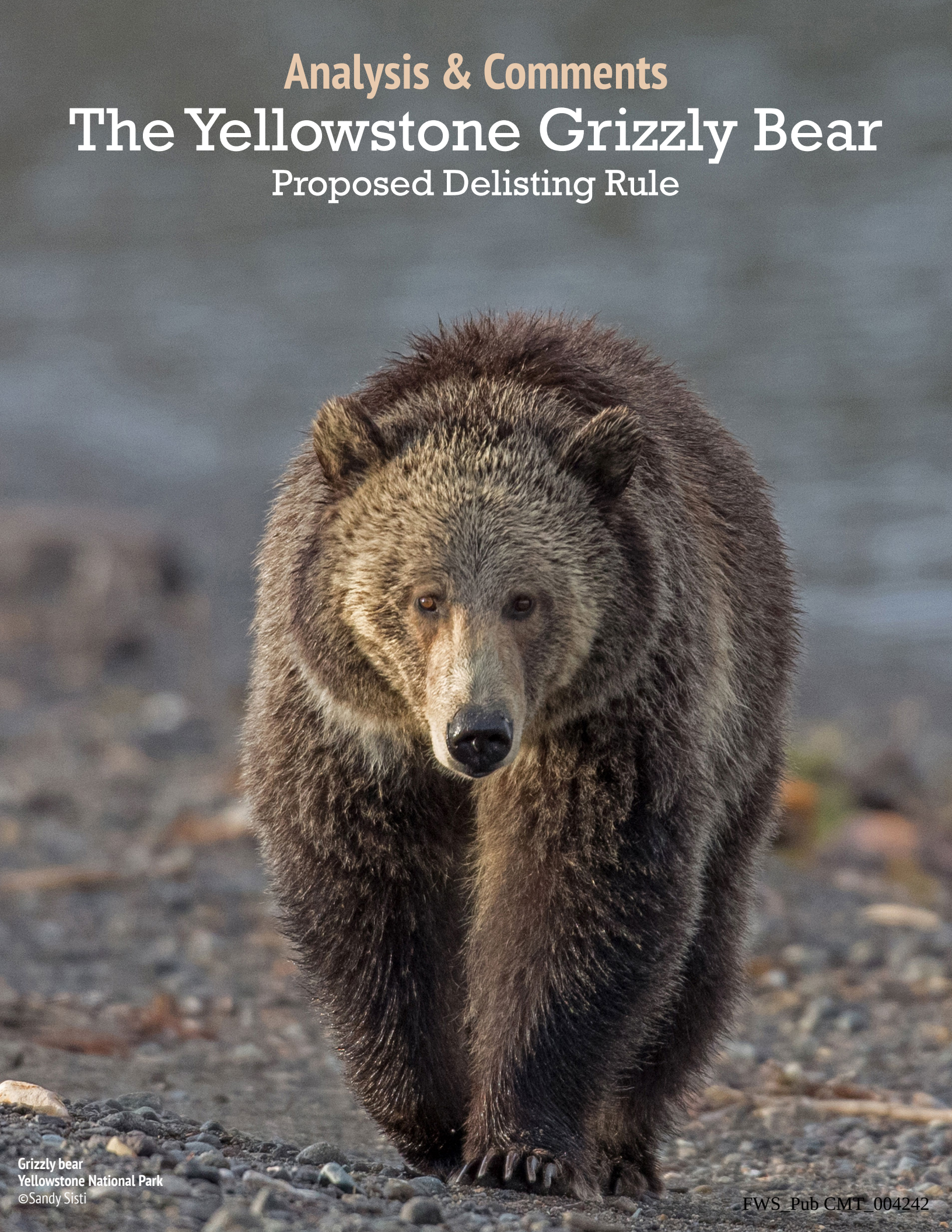
Attachments

GrizzlyDelist_BCozzens_Comments

Analysis & Comments

The Yellowstone Grizzly Bear

Proposed Delisting Rule



Grizzly bear
Yellowstone National Park
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If your actions inspire others
to dream more,
learn more, do more
and become more,
you are a leader.

- John Quincy Adams

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Contents

"Bear lifted me up so I could see all of the Earth. He said I may jump high among the cliffs, and live forever."

- Full Mouth (Crow)

Defensibility Analysis

Challenges Under Section 4

The primary challenge for the FWS will be demonstrating how it comported with section 4(b) requirements. Not only must the FWS use the "best scientific and commercial data" to make this determination, but it must sufficiently explain how this data supports its decision.[1] In addition, section 4(a) will also be pivotal in that the FWS must show that none of the 4(a) factors are present. Delisting can only be justified if none of these factors persist. Therefore, if challenged, the FWS bears the burden of showing how the scientific information supports a finding that: (1) there is no present or threatened destruction, modification, or curtailment of the grizzly bear's habitat or range; (2) there is no over-utilization for commercial, recreational, scientific, or educational purposes; (3) there is no disease or predation threatening population levels; (4) there are adequate existing regulatory mechanisms in place; and (5) no other natural or manmade factors will affect the continued existence of the grizzly bear.[2] In *Fund for Animals v. Babbitt*,[3] the court supported the plaintiff's proposition that the FWS must exhibit how each of these criteria were met.

Fund for Animals involved an ESA lawsuit concerning the listing of grizzly bears and protection for their critical habitat.[4] The plaintiff asserted that the "objective, measurable criteria"[5] in the recovery plan must address the threats that originally led to the bear's listing and must be alleviated by addressing the five-factor test established in section 4 of the Act.[6] The FWS argued it was unnecessary to design recovery criteria addressing each of the five factors. However, the court upheld the plaintiff's position and stated, "[s]ince the same five statutory factors must be considered in delisting as in listing, the Court necessarily concludes that the FWS, in designing objective, measurable criteria, must address each of the five statutory delisting factors and measure whether threats to the grizzly bear have been ameliorated."[7]

Therefore, not only is the FWS obligated to assess these five criteria, but it must also substantiate the rational relationship between the scientific data it employs and the decision it reaches. For example, in *Fund for Animals* the court looked at whether the recovery plan indeed satisfied these five criteria and whether the FWS gave sufficient explanation for its decisions. The court recognized that "judicial 'deference to the agency is greatest when reviewing technical matters within its area of expertise, particularly its choice of scientific data and statistical methodology.'"[8] Even in light of this strong

[1] 16 U.S.C. § 1533.
[2] 903 F. Supp. at 116.
[3] Id. at 111.
[4] 16 U.S.C. § 1533(f)(B)(ii).
[5] Fund for Animals, 903 F. Supp. at 111.
[6] Id.
[7] Id. at 114 (quoting State of Louisiana ex rel. Guste v. Verity, 853 F.2d 322, 329 (5th Cir. 1988)).
[8] Id.

presumption for agency opinion, the court opined that the plan was not adequate because the monitoring methodology was unreliable as acknowledged by the Agency itself. It further stated that because the Agency failed to provide a rational connection between the available data used and the choices it made, it acted in an arbitrary and capricious manner.[9]

Five-Factor Threat Analysis

The FWS examined the following factors affecting or likely to affect the GYE grizzly bear population, now and in the future:

FACTOR A: THE PRESENT OR THREATENED DESTRUCTION, MODIFICATION, OR CURTAILMENT OF ITS HABITAT OR RANGE

When the FWS listed grizzly bears in 1975, it identified habitat destruction and modification as contributing factors to their decline. Coordinated efforts were undertaken to provide highly secure areas and maintain or improve habitat conditions for the grizzly bear. Central to this approach was the designation of the Primary Conservation Area (PCA) which comprises 51 percent of the suitable habitat within the DPS boundaries. Within the PCA, federal agencies have maintained habitat conditions at or above levels documented in 1998. For 60 percent of the area outside the PCA, binding regulatory mechanisms – notably the Wilderness Act and the Roadless Areas Conservation Rule – limit development and motorized use.

"The most effective habitat management tool for reducing grizzly bear mortality risk is managing motorized access to ensure bears have secure areas away from humans"

The 2016 Grizzly Bear 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 in the foreseeable future". FWS' assessment of Factor A threats is thereby limited to these two areas.

Within Factor A, the Service specifically analyzes: (1) motorized access management, (2) developed sites, (3) livestock allotments, (4) mineral and energy development, (5) snowmobiling, and (6) climate change.

Motorized Access. Managing motorized access is widely recognized as the most effective habitat management tool for reducing grizzly bear mortality. Unmanaged motorized access increases human access to grizzly bears, thereby increasing human-caused mortality risk. In turn, increased human disturbance displaces grizzly bears, resulting in temporary or permanent habitat loss.

The FWS manages motorized access through 'secure habitat': 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.

Bear 211, killed by a hunter in November 2015, navigates a bear jam in Yellowstone National Park.
©D. Simon Jackson

Developed Sites. Developed sites include 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. Those sites on public lands are tracked and inventoried in GIS databases. Since 1998, the number of developed sites within the PCA has decreased from 593 to 578.

In "areas of suitable habitat inside the PCA", the National Park Service and the Forest Service also enforce food storage rules aimed at "decreasing grizzly bear access to human foods".

Livestock Allotments. The number of public-land livestock allotments has

[9] See generally Carlton v. Babbitt, 900 F. Supp. 526 (D.D.C. 1995).

not increased above 1998 levels. Still, approximately 14 percent of all human-caused grizzly bear mortalities in the GYE between 2002 and 2014 occurred due to management removal of bears depredating livestock. While on public lands, livestock producers must securely store and/or remove attractants, including livestock carcasses and feed. However, this requirement does not extend to livestock producers on private lands within the PCA.

Mineral & Energy Development. Oil, gas or mineral projects are not restricted in the PCA; however, since such projects reduce the amount of secure habitat, operators must replacement secure habitat of similar habitat quality.

Recreation. The FWS contends that recreational disruption to bears is limited by the 2016 Grizzly Bear Conservation Strategy's restrictions on increase in roads or developed sites. Recreation as a stressor on grizzly bear populations, according to the FWS, "would exist regardless of listed status and will be addressed in the same way whether this population is listed or delisted, through ongoing information and education campaigns."

This assertion is arguably false. Section 9's prohibition against "take", which includes harassment, provides more restrictive control than "information and education campaigns." For example, guest lodges are already offering "find an and watch grizzly bear" trips to moth sites[10]. Absent federal protections, grizzly bears could be disturbed and consequently displaced from this essential food source. Likewise, risk of human-cause mortality will presumably increase as those recreating at these sites are emboldened by the grizzly's less restrictive status.

Snowmobiling. The FWS stipulates that because there is "no data or information suggesting snowmobile use in the GYE is negatively affecting 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." But, because the potential does exist, the FWS suggests "monitoring will continue to support adaptive management decisions about snowmobile use in areas where disturbance is documented or likely to occur."[11]

In *Greater Yellowstone Coalition, Inc. v. Servheen*, the court contended the FWS "ha[s] a responsibility to ensure that an agency's decision is not arbitrary. It is not enough for FWS to simply invoke 'scientific uncertainty' to justify its action."[12] The court further faulted the FWS for its heavy reliance on "'adaptive management' to justify its decision to delist the grizzly despite the scientific uncertainty."

Vegetation Management. Vegetation management, to include timber harvest, thinning, prescribed fire, and salvage of burned, diseased, or insect-infested stands, on USFS and NPS lands inside the PCA is not expected to constitute a threat to the GYE grizzly bear DPS now, or in the future.

Climate Change. Climate Change impacts were analyzed within Factor E.

Habitat Fragmentation. By evaluating road construciton projects "in suitable habitat on Federal lands throughout the GYE DMA", the FWS intends to prevent habitat fragmentation and degredation. The FWS offers no such assurances in DPS lands outside the DMA.

Grizzly-Bear Recreation

Shoshone Lodge Outfitters offers pack trips adventures designed to "find and watch grizzly bears" on moth sites. To see "a lot of bears", the outfitter recommends a 3- or 5-day trip, at $295 per person, per day.

[10] Grizzly Bear Sightseeing. (n.d.). Retrieved from Shoshone Lodge Outfitters: http://www.shoshonelodgeoutfitters.com/grizzly-bear-sight-seeing-wy.html

[11] Id. at *10.

[12] Greater Yellowstone Coalition, Inc. v. Servheen, --- F.3d ----, 2011 WL 5840646, *7 (9th Cir. 2011).

FACTOR B: OVERUTILIZATION FOR COMMERCIAL, RECREATIONAL,SCIENTIFIC, OR EDUCATIONAL PURPOSES

Since 1975, no grizzly bears have been removed from the GYE for commercial, recreational, scientific or educational purposes. Post-delisting, grizzly bears will be classified as a game species throughout the GYE DPS boundaries outside National Parks and the Wind River Indian Reservation in the states of Wyoming, Montana, and Idaho. As the FWS anticipates the States "will desire to institute a carefully regulated hunt" of grizzly bears, the FWS must evaluate the impacts of commercial and recreational utilization once the population is no longer protected from such take by the ESA.

The state, federal and Tribal agencies tasked with implementing the draft 2016 Conservation Strategy will manage the grizzly bear population within the DMA around the long-term average population size for 2002 to 2014 of 674 individuals. Since 2002, the IGBST has relied on the model-averaged Chao2 method for estimating population. In the proposed delisting rule, the FWS refers to the Chao2 method as "the best available science", but acknowledges biases such that "as the grizzly bear population has increased, model-averaged Chao2 estimates have become increasingly conservative (i.e., prone to underestimation)." Arguably, there is a high degree of uncertainty in estimates of total population size.

Recognizing limitations of Chao2, the FWS states "if new methods become available, these will be considered for application in the GYE as long as they represent the best available science. However, until possible new methods are developed, the model-averaged Chao2 method will continue to be used." The FWS, however, fails to explain how theses new methods will be 'applied' and, more importantly, how they will reconcile deviations between new population estimates and estimates with Chao2. For example, because of corrections for low bias, corresponding mortality limits may represent a significantly greater number of bears compared with previous years.

To maintain the population around the long-term average of 674 individuals, within the DMA total mortality limits from all causes – hunting, agency removals, poaching and accidental killing – will be set annually using population estimates from the previous year. Mortalities will be managed on a sliding scale, ranging from: a) Below 600 grizzly bears – no discretionary mortalities except to protect human safety, to b) greater than 747 – total mortality limits would not exceed 10 percent for independent females, 22 percent for independent males, and 10 percent for dependent young.

In stochastic harvesting theory, this approach would be characterized as proportional harvesting strategy, where a fixed fraction of the population is removed; in this context, 'harvest' encompasses all mortality, not merely hunting. A number of studies have suggested that proportional harvesting, like threshold harvesting strategy commonly used in fisheries, can lead to overharvest and even population collapse when there is uncertainty in

Fuel to the Fire

The 10-foot by 22-foot billboard was erected on April 27, 2016 in Cody, Wyoming, just miles from Yellowstone National Park.

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population projections[13][14]. The collapse of the 50-year old Newfoundland cod fishery illustrates the risk of such harvest strategies when there is a high degree of uncertainty in population size, coupled with externalities such as poaching, exceptional natural mortality, and climate change – all factors cited in the 1983 fisheries collapse.[15]

To minimize risk of overharvest or population extinction when there is uncertainty in population size, a fourth strategy is optimal: *proportional threshold harvesting*, where only a fraction of the excess in estimated population above the threshold is removed. A particularly high level of uncertainty necessitates an even more conservative harvesting strategy, achieved by raising optimal threshold and lowering the percentage (proportion) harvested above said threshold.

Outside the DMA, mortalities are the responsibility of each state and do not count against total mortality limits. The FWS provides no mechanism to apply a harvest threshold outside of the DMA, so long as demographic criteria are met within the DMA. Studies show that use of constant harvesting strategy, where a fixed number of individuals are removed each year, regardless of the size of the population, destabilizes populations and may lead to rapid extinction unless the harvest is very small.

In an interview with Idaho State Journal in August 2015, the chairman of the IGBC's information subcommittee, Greg Losinksi, put the total population of grizzlies at 750 to 800 animals, suggesting that number may be as high as 1,150. If the GYE does in fact currently support 1,150 bears, and 674 are within the DMA, states could legally and immediately remove 476 bears, in addition to any allowable discretionary mortality within the DMA.

The FWS asserts that for delisting to occur, the states must enact regulations that will serve as "adequate regulatory mechanisms" over human-caused mortality, including mortality from sport hunting. These regulations will close the season if mortality limits for any age/sex are met. Mortality exceeding total mortality limits in any year will be subtracted from that age/sex class total mortality limit for the following year. Further, female grizzly bears with young will not available for recreational hunting.

The states will coordinate via a signed MOU to manage mortalities within the DMA in accordance with age/sex mortality limits set in the delisting rule. Because of these "detailed State and Federal regulatory commitments", the FWS concludes that commercial and recreational hunting will not constitute a substantial threat to the GYE grizzly bear DPS now, or in the future.

Because the GYE grizzly DPS has not sustained a harvest since 1975, it's impossible to accurately predict the direct and indirect effects of hunting on GYE grizzly bear population growth. Many wildlife managers assume "mortality of adult males reduces density of males and increases cub production by females, cub survival, and population growth through compensatory density dependent effects." Lebreton argues "strong compensation can rarely be expected in long-lived mammals"[16], and many studies support this. Still others support the contention that hunting can have additional indirect negative effects on population.[17]

A number of studies of Canadian and Scandanavian brown bear populations reveal that removal of older adult males by hunters may result in increased immigration of potentially infanticidal immigrant males. As a result, females avoid these immigrant males and the food-rich habitats they inhabit, and this results in small litter sizes and an estimated population decline[18,19,20]. Wielgus and Bunnell, looking at the effects of male hunting mortality on female reproduction in two small Canadian grizzly bear populations at the edge of their respective ranges, concluded "that the commonly accepted hypothesis that increased reproduction derives from trophy hunting could contribute to further declines in some grizzly bear populations." The authors conclude "wildlife managers should be cautious when dealing with small populations of vulnerable and threatened grizzly bears on the edge of the species' range."[21] In Scandanavia, authors estimate the effect of killing one adult male has a population effect equivalent of killing between 0.5 and one adult female.

As the GYE grizzly bear DPS falls on the edge of the species' range, the FWS would be well advised to

[13] Lande, R., S. Engen, and B.-E. Sæther. 1994. Optimal harvesting, economic discounting and extinction risk in fluctuating populations. Nature 372:88–90.

[14] Lande, R., B.-E. Sæther, and S. Engen. 1997. Threshold harvesting for sustainability of fluctuating resources. Ecology 78:1341–1350.

[15] Kaitala, V., et al. 2003. Harvesting Strategies in a Fish Stock Dominated by Low-frequency Variability: The Norwegian Spring-spawning Herring (Clupea harengus). Marine Resource Economics , Volume 18, pp. 263–274

[16] Lebreton JD. 2005 Dynamical and statistical models for exploited populations. Aust. N.Z. J. Stat.
47, 49–63. (doi:10.1111/j.1467-842X.2005.00371.x)

[17] Gosselin J, Zedrosser A, Swenson JE, Pelletier F. 2015 The relative importance of direct and indirect effects of hunting mortality on the population dynamics of brown bears. Proc. R. Soc. B 282 : 20141840. http://dx.doi.org/10.1098/rspb.2014.1840

[18] Id

[19] Swenson JE, Sandegren F, Soderberg A, Bjarvall A, Franzen R, Wabakken P. 1997 Infanticide caused by hunting of male bears. Nature 386 , 450–451. (doi:10.1038/386450a0)

[20] Bellemain E, Swenson JE, Taberlet P. 2006 Mating strategies in relation to sexually selected infanticide in a non-social carnivore: the brown bear. Ethology 112, 238–246. (doi:10.1111/j.1439-0310.2006. 01152.x)

[21] Wielgus RB, Bunnell FL. 2000 Possible negative effects of adult male mortality on female grizzly bear reproduction. Biol. Conserv. 93, 145–154. (doi:10.1016/S0006-3207(99)00152-4)

further analyze potential negative effects of hunting mortality on female grizzly bear reproduction.

FACTOR C: DISEASE AND PREDATION

While a number of bacteria, pathogens, parasites and other diseases have been recorded in grizzly bears, resultant fatalities are rare. And while grizzlies occasionally are killed by other wildlife, including other grizzly bears, these mortalities are insignificant to the population. As such, the FWS does not consider either disease or natural predation a significant threat to the GYE grizzly bear DPS.

Along with disease and natural predation, the FWS also considered human-caused mortality other than hunting. Beginning in the mid-1800s, widespread persecution of predators and appropriation of habitat by both early settlers and the U.S. Government caused a precipitous decline in grizzly bear populations, ultimately leading to their listing as threatened in 1975. While grizzly bear populations have since increased in both number and range, humans remain responsible for the majority of grizzly deaths.

Poaching – defined as illegal and intentional killing- is subject to criminal and civil penalties under Section 9 of the ESA, yet it constituted 7 percent of known grizzly bear mortalities between 2002 and 2014. In the proposed delisting rule, the FWS argues it "does not expect poaching to significantly increase if this proposed action is finalized because State and Tribal designation as a game animal means poaching will remain illegal and prosecutable... If anything, authorized hunting through designating the grizzly bear as a game animal may reduce the amount of illegal poaching."

Until recently, only one other large, terrestrial carnivore has been removed from the endangered species list and subsequently hunted; as such, opportunities for study have been limited. In Wisconsin, where gray wolves were hunted for 2 years before being relisted, delisting and hunting *increased* poaching of wolves, despite their designation as a game species and the state's laws and reg-

"In Wisconsin, where gray wolves were hunted for 2 years before being relisted, delisting and hunting increased poaching of wolves, despite their designation as a game species and the state's laws and regulations governing harvest thereof."

The Cost of Conflict

Grizzly bear No. 211, a boar affectionately known as "Scarface", was fatally shot by a hunter outside Yellowstone National Park in November 2015. A favorite of Park visitors and photographers alike, No. 211 was elderly by bear standards – less than 5 percent of male grizzlies reach his age. No. 211 was also "one of the most studied bears in the region", having been captured, collared and released 17 times. Though killed in late 2015, confirmation of No. 211's killing was not released until April 2016.

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ulations governing harvest thereof[22,23]. An average of 44 percent (SD 4 percent) of Wisconsin wolves over 7.5 months of age died each year after delisting procedures began and the state regained intermittent authority for lethal control. Nearly half of these mortalities resulted from poaching[24].

The FWS concludes that "(a)lthough 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 or range expansion." While poaching may not be a significant threat to the GYE grizzly bear DPS now, it may constitute a threat should poaching substantively increase post-delisting, as it did with wolves in Wisconsin.

Although Section 9 of the ESA prohibits "take" of listed species, species rules pursuant to Section 4(d) of the Act allows the FWS to establish special regulations for threatened species, subspecies, and Distinct Population Segments. These "4(d) rules" take the place of, and may increase or decrease, the normal protections of the ESA. The ESA specifies that 4(d) rules must be "necessary and advisable to provide for the conservation of such species". With respect to grizzly bears, 4(d) rules allow for mortalities related to defense of self or property, and agency removal of problem bears.

Between 2002 and 2014, 31 percent of known grizzly mortalities were attributable to humans killing bears in defense of self or property. The majority of these 97 grizzly fatalities resulted from conflicts with elk hunters. Hunters are required to carry bear spray within Grand Teton National Park and the John D. Rockefeller Parkway – a 24,000-acre parcel of land connecting Grand Teton and Yellowstone National Parks – but elsewhere on both public and private lands, they're merely encouraged to do so.

Agency removal of problem bears represents another significant source of human-caused grizzly bear mortality. Between 2002 and 2014, 135 bears were lethally removed, representing 43 percent of human-caused mortalities. FWS contends "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."

Once again, the FWS' unsubstantiated assertions overlook several scientific, peer-reviewed research studies that utilize human dimensions data to assess human attitudes towards and predict human tolerance for large carnivores. In a FWS-supported study in Wisconsin, researchers found:

Tolerance for carnivores and inclinations to

[22] A. Treves et al., Predators and the public trust. Biological Reviews, (2015).

[23] J. T. Bruskotter, J. A. Vucetich, S. Enzler, A. Treves, M. P. Nelson, Removing protections for wolves and the future of the U.S. Endangered Species Act (1973) Conservation Letters 7, 401-407 (2013)

[24] A. Treves, J. A. Langenberg, J. V. Lopez-Bao, M. F. Rabenhorst, Gray wolf mortality patterns in Wisconsin from 1979-2012. J. Mammal., (in review).

poach them are not well predicted by wealth or economic losses but rather by peer networks and social norms that foster resistance to authority and anti-establishment actions. Those inclined to poach tend to justify their actions by over-estimating how many of their neighbors and associates do so. Tolerance for bears declined when messaging was purely negative or concerns hazards posed by wildlife. Tolerance for wolves declined after delisting and legalization of lethal management, probably because people perceived the government was sending a signal that wolves have less value or illegal take will not be enforced. The implementation of lethal control did not raise tolerance for wolves after 8 years and the inauguration of public wolf-hunting did not raise tolerance for wolves after one year.[25]

Two-thirds of agency removals of GYE grizzly bears involved conflicts at developed sites, in particular those involving attractants such as garbage, human foods, animal foods (including bird feeders), livestock carcasses and wildlife carcasses. The FWS suggests outreach and education around proper attractant storage will reduce conflicts on both public and private lands. The balance of agency removals – 45 bear mortalities from 2002 to 2014 – resulted from conflicts with livestock, all but one occurring outside the PCA.

Additional human-caused mortalities occurred as a result of unintentional killings, including vehicle collisions, mortality associated with research trapping and mistaken identification. The FWS concludes that mortalities associated with self and property defense, agency removals and unintentional killing pose no significant threat to grizzly bears, now or in the future. Notably, the Agency failed to acknowledge

FACTOR D: ADEQUACY OF REGULATORY MECHANISMS

In its proposed delisting rule, the Agency argues that legally enforceable regulatory mechanisms that would be in place if the GYE grizzly bear DPS is delisted include National Park Superintendent's Compendiums, the Forest Service Amendment for Grizzly Bear Habitat Conservation for the GYE National Forests, the Wind River Reservation regulations, and State Fish and Game Commission laws.[26] Additionally, it argues that after delisting, the Service will initiate a status review with possible emergency listing if changes in Federal, State, or Tribal laws, rules, regulations, or management plans depart significantly from the proposed management details, thereby compromising implementation of the draft 2016 Conservation Strategy. [27] Accordingly, the Agency proposes that in total it is reasonable to conclude existing regulatory mechanisms, and those that would be enacted before the proposed rule is made final, are adequate to protect the GYE grizzly bear population if the protections of the Act were no longer in place.[28]

The adequacy of regulatory mechanisms will probably be the most difficult criterion for the Agency to surmount. What constitutes an adequate regulatory mechanism is not entirely clear, and what measures will be used to scrutinize a State plan is unknown. Currently, the FWS is reviewing Idaho, Montana, and Wyoming's state plans and Agency comments will soon follow. One of the important determinations is what legal criteria the FWS will use to assess the adequacy of these state plans. It is likely the Agency will apply the same measurable factors it is obligated to employ in its own recovery plan as mandated by section 4(f)(1)(B)(ii), but what other standards will be used is not dictated by the ESA. As *National Parks Conservation Association and Greater Yellowstone Coalition v. U.S. Department of Interior and National Park Service,* the first pending lawsuit filed on March 23, 2016 regarding delisting illustrates, parties are already challenging the state plans, asserting that these regulatory mechanisms offer insufficient strategies for promoting viable grizzly populations, the ultimate goal of the ESA.[29]

FACTOR FIVE: OTHER NATURAL OR MAN-MADE FACTORS

In Factor E, other natural or manmade factors, the service considers the following: (1) genetic health; (2) changes in food resources; (3) climate change; and (4) human attitudes toward grizzly bear conservation.

Genetic Health. When the grizzly bear population was listed in 1975, the isolated nature of the GYE grizzly bear population was identified as a potential threat. Current levels of genetic diversity are deemed adequate and heterozygosity values have increased slightly over the last few decades from 0.55 to 0.60. To maintain genetic diversity, the 2007 Grizzly Bear Conservation Strategy recommended that if no movement or successful genetic interchange was detected by 2020, two individuals from the Northern Conitental Divide Ecosystem would be translocated into the GYE grizzly bear population every 10 years.

[25] Hogberg, J., A. Treves, B. Shaw, L. Naughton. 2015. Changes in Attitudes toward wolves and wolf policy before and after an inaugural hunting and trapping season: early evidence from Wisconsin's wolf range. 21 May 2015. DOI: http://dx.doi.org/10.1017/S037689291500017X

[26] 50 CFR Part 17. p.12311

[27] Id.

[28] Id.

[29] National Parks Conservation Association and Greater Yellowstone Coaltition v. U.S. Department of Interior and National Park Service, filed March 26, 2016 (United States District Court, District of Columbia).

The FWS has since removed the 2020 deadline, and intends to rely on "facilitating occasional movement of males bears between the two recovery zones". "Natural connectivity will be aided by: 1) the state of Montana's "indication" it will manage discretionary mortality in "this area" and 2) attractant storage rules on public lands between the recovery zones. Translocating bears between these ecosystems will be a last resort.

Changes in Food Sources. The IGBST currently monitors productivity of four key grizzly bear foods in the GYE: winter-killed ungulates, spawning cutthroat trout, army cutworm moths, and whitebark pine seeds.

Grizzly bears consume elk and bison, primarily in the spring, as winter-killed carcasses. Use of Yellowstone cutthroat trout by grizzlies has decreased, corresponding to declines in fish populations as a result of competition from nonnative lake trout, parasite that causes whirling disases, and drought conditions in the GYE.

In the summer, GYE grizzlies feed on Army cutworm moths at high-elevation talus fields. Climate may shift distribution or flowering times of the moths' food sources, but, according to the FWS, the moths have shown foraging plasticity. The FWS discounts disturbance by backcountry visitors, stating it has never been documented in the GYE. The FWS overlooks growth in grizzly moth site trips, and related impacts of removing ESA protections with regard to harasassment and other forms of take. Rather, the FWS relies on "monitoring" and "appropriate action as necessary", rather than prescriptive protections for this important food source.

With respect to whitebark pine seeds, the crux of litigation over the 2007 delisting attempt, the FWS analyze population vital rates in relation to changing whitebark pine availability. The results, summarized in the IGBST's report, "Response of Yellowstone grizzly bears to changes in food resources: a synthesis", concludes declines in whitebark pine do not represent a threat to grizzly bears. "The preponderance of evidence supports the conclusion that bears are finding sufficient alternative food resources to maintain body condition".

Climate. Climate change effects grizzly bears directly and indirectly by reducing snowpack levels, shifting denning times, shifting the abundance and distribution of grizzly bear food sources, and changing fire regimes. According to the FWS, "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 // These changes may even make habitat more suitable and food sources more abundant." It's important to note, the FWS cites only study, co-authored by Chris Servheen, the FWS' Grizzly Bear Recovery Coordinator.

In the GYE, males entered dens later between 1975 and 1999, a period that saw increasing November temperatures. Less snowpack would likely shorten denning seasons even further, likely leading to increased conflicts with humans: specificaly, with hunters in the fall and newborn calves and lambs in the spring.

Likewise, changing climate has already caused temporal and spatial shifts in grizzly bear food sources, as evidenced by longitudinal shifts in whitebark pine. In its analysis of food sources, the FWS suggests winter severity and length as a result of climate change could reduce spring carrion availability. The FWS maintains, however, 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."

It's important to note, in explaining 2015's record high mortalities, IGBST representatives cite food abundance.

The FWS concludes "the effects of climate change do not constitute a threat to the GYE grizzly bear DPS now, nor are they anticipated to in the future." Said analysis and conclusion will likely to face judicial review. In *Defenders of Wildlife v. Jewell*, the court found the FWS's erred in determining that "climate change and projected spring snow cover would not impact wolverine at the reproductive denning scale in the forseeable future." As such, the court found the FWS' decision not to list the wolverine as threatened under the ESA is arbitrary and capricious.

Tolerance. The FWS asserts "delisting could increase acceptance of grizzly bears by giving local government and private citizens more discretion in decisions that affect them. Increased flexibility regarding 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."

Once again, the FWS offers predictions, absent scientific evidence. Throughout the analysis, the FWS relies almost exclusively on 20-year old studies by Stephen Kellert, ignoring more recent social dimensions research, particularly as it relates to delisted species.

Challenges to the DPS Listing

Courts have been clear that they will begin their analyses with an overwhelming presumption in favor of agency decisions, particularly when cases involve issues of expertise. "The court must defer to the agency's expertise, particularly with respect to decision-making

which involves 'a high level of technical expertise." The presumption of agency expertise may be rebutted only in light of whether the FWS acted within its scope, adequately explained its decision, or considered the relevant factors in making its determination. Therefore, once challenged, the FWS will bear the burden of showing a nexus between the scientific data it relied upon to simultaneously designate and delist a GYE DPS, and specifically how said approach would not jeopardize the larger listed entity. Although such a presumption exists in favor of the agency, plaintiffs have recently been able to overcome such presumption as evidenced in each of *Greater Yellowstone Coalition, Inc. v. Servheen* and *Humane Society of the United States v. Jewell*. Today's plaintiffs are highly sophisticated and heavily armed in terms of scientific knowledge and technical expertise..

Challenges Under Section 7

A final issue likely to be raised in a delisting suit (although less critical) will be a challenge to section 7; whether it is contrary to the Agency's mandate of ensuring that its actions are not likely to jeopardize the continued existence of any endangered species. This argument is difficult because it is circular in nature. If the court upholds the FWS's determination to delist the grizzly bear, then the grizzly bear is no longer an "endangered species" and thus the action cannot violate section 7. However, if the court does not agree with the Agency that it is appropriate to delist the grizzly bear then such a proposal would clearly be jeopardizing the species, and thus would be a violation of section 7. Therefore this argument will likely play a minor role in litigation as compared to the challenges under section 4 of the ESA.

Summary

Five-Factor Threat Analysis

FACTOR A – THE PRESENT OR THREATENED DESTRUCTION, MODIFICATION, OR CURTAILMENT OF ITS HABITAT OR RANGE

The FWS analyzed threats only within the PCA and adjacent areas of the DMA, and, in this assessment, relies almost exclusively on management or protection efforts on NPS and USFS lands. Failing to extend conservation efforts outside the PCA will suppress growth and natural range expansion of grizzly bears. That said, the FWS dismisses potential impacts of recreational access to moth sites, both by individuals and commercial guides, and fails to put forth pre-emptive regulatory mechanisms to safeguard these sites post delisting. Likewise, the FWS arbitrarily and capriciously dismisses threats of snowmobiling due to scientific uncertainty, once again relying on nebulous promises of "monitoring" and "adaptive management".

FACTOR B – OVERUTILIZATION FOR COMMERCIAL, RECREATIONAL,SCIENTIFIC, OR EDUCATIONAL PURPOSES

Owing to difficulties in counting grizzly bears, there is a high degree of uncertainty in the FWS' population estimates. Population estimates, in turn, inform demographic criteria and mortality limits. The likelihood of flawed inputs renders these outputs suspect. Within the DMA, mortality rates reflect a harvesting strategy with a high risk of overharvest. Outside the DMA, continuous harvesting will inevitably lead to population extinction. The FWS fails to fully evaluate threats of commercial and recreational harvest. The Service overlooks or ignores a significant body of research documenting indirect negative effects of hunting on brown bear populations of similar size in Scandinavia and Canada. In conclusion, the FWS arbitrarily and erroneously concluded that commercial and recreational hunting will not constitute a substantial threat to the GYE grizzly bear DPS now, or in the future.

FACTOR C – DISEASE & PREDATION

The FWS appropriately determined that disease and natural, non-human predation do not represent significant threats to GYE grizzly populations. With respect to human-caused mortality, other than hunting, the FWS offers little more than opinion that delisting, hunting and/or lethal removal reduce poaching and improve tolerance; the FWS ignored or overlooked scientific studies stating otherwise. Furthermore, the FWS failed to address a rise in grizzly bear mortalities in 2015. In the press, IGBST members have cited increased vulnerability resulting from lower food availability. As such, the FWS arbitrarily and erroneously concluded that hman-caused, non-hunting mortalities pose no significant threat to grizzly bears, now or in the future.

FACTOR D – ADEQUACY OF REGULATORY MECHANISMS

The question of the existence of adequate regulatory mechanisms will be difficult to prove. The definition of an adequate regulatory mechanism is not clear. Moreover, states are cooperating pursuant to a legally non-binding memorandum of understanding and the state plans are merely in draft form. Consequently, it will be difficult for the Agency to defend an adequate regulatory mechanisms attack.

FACTOR E – OTHER NATURAL OR MANMADE FACTORS

Throughout the rule, FWS cites a number of direct and indirect impacts to grizzly bears from climate change, many occurring already: decrease in Yellowstone cutthroat trout due to drought, reduced ungulate carcasses due to milder winters, loss of whitepark pine due to mountain pine beetle and blister rust, and increased conflicts due to shortened denning season. Yet, remarkably, the Service concludes that none of these impacts actually pose a threat. Therefore, the FWS arbitrarily and capriciously concluded that the combined effects of climate change and changes in key food sources pose no significant threat to grizzly bears.

DPS

Additionally, in light of *Humane Society of the United States v. Jewel*, the FWS will be hard pressed to explain its rationale for creating a GYE DPS and simultaneously delisting that same DPS.

Recommendations

1. Engage Independent, Cross-Disciplinary Researchers to Develop Robust and Defensible Population Models

The FWS and IGBST should engage the National Institute for Mathematical and Biological Synthesis (NIMBioS) to collaborate in developing biologically and mathematically defensible approaches to estimating grizzly bear population size and demographic paramaters.

NIMBioS supports interdisciplinary investigative workshops and working groups to focus on major scientific questions at the interface between biology and mathematics that require insights from diverse researchers. They're particularly interested in questions that integrate diverse fields, require synthesis at multiple scales, and/or make use of or require development of new mathematical, statistical, and computational approaches.

2. Utilize a Conservative Harvesting Strategy to Minimize Risk of Population Collapse

Given the difficulties in obtaining precise estimates of grizzly bear populations and uncertainty in demographic variables, the FWS should utilize *proportional threshold harvesting* to set mortality limits within the DMA. As reflected in the literature, proportional threshold harvesting strategy reduces the risk of overharvest and population collapse when there is uncertainty in population size. Such strategy also allows for flexibility in varying threshold and proportion values based on stochastic fluctuations. The approach proposed in the draft rule, a pseudo-proportional harvesting strategy, is inflexible and will lead to overharvest if grizzly bear numbers are overestimated.

"Accurate population estimation is prerequisite for removing individuals from such a small population."

- Russell Lande, *Conservation of Exploited Species*, in reference to Scandinavian brown bears

Outside the DMA, a constant harvesting strategy is inappropriate as asymptotic extinction in these areas will likely occur. Such approach effectively creates an invisible fence around the DMA, suppressing natural expansion and connectivity, isolating the DPS, and limiting recovery of the species to a sliver, rather than a significant portion of its former range.

3. Institute a 5-Year Moratorium on Recreational and Commercial Harvest

The FWS should enact a 5-year moratorium on all grizzly bear trophy hunting to allow federal, state and Tribal agencies time to solidify and integrate their governance, and an opportunity for the IGBST to assess the impact of delisting on Yellowstone grizzly bear populations. Likewise, IGBST can use this period to refine population and demographic estimates, which may inform more restrictive mortality limits and hunting regulations.

The decision to superimpose trophy hunting on a delisting rule more than 30 years in the making defies logic. The presumed concurrence of the two has only served to antagonize the environmental community, and mobilize the public.

As reflected in a recent poll conducted by Remington Research Group on

National Institute for Mathematical and Biological Synthesis

NIMBioS is a National Science Foundation (NSF) Synthesis Center that supports cutting-edge, cross-disciplinary research at the interface of mathematics and biology. A major goal of mathematical models and analysis in biology is to provide insight into the complexities arising from the non-linearity and hierarchical nature of biological systems. Primary goals of NIMBioS are to foster the maturation of cross-disciplinary approaches in mathematical biology and to foster the development of a cadre of researchers who are capable of conceiving and engaging in creative and collaborative connections across disciplines to address fundamental and applied biological questions.

behalf of the Humane Society of the United States and Wyoming Wildlife Advocates — both groups that oppose delisting — two-thirds of Americans oppose grizzly hunting. And, in a separate question, two-thirds support a five-year moratorium should delisting proceed[30]. Concurrently, over 100,000 citizens have signed petitions opposing grizzly delisting[31].

Even regional media that cheered delisting in 2007, have published opinion pieces opposing hunting[32].

4. Incorporate Resilience Thinking and Adaptive Capacity

The GYE's complex socio-ecological system is not stable. It's comprised of a suite of changing variables and has the capacity for regime change. To address the challenges ahead, in particular those precipitated by climate change, grizzly bear management strategies must accommodate resilience theory and build adaptive capacity.

Thus far, grizzly recovery efforts have focused on historic ranges, overlayed with ecological and socio-economic assessments of suitable habitat. Resilience theory suggests that a more complex, flexible, and iterative set of management tools[33] are necessary to maintain viable populations of this wide-ranging species.

Static recovery boundaries limit resiliency as they fail to address dynamic threats and opportunities that develop over time. Spatially dynamic reserves have been explicitly recognized for their ability to facilitate predicted range shifts of species. In defining suitable grizzly bear habitat and, by extension, the DMA, the FWS should utilize spatially dynamic boundaries, adjusted for spatially- and temporally-variable parameters, including shifting habitat distributions and migrations of grizzly food sources, presence or removal of sheep, and mast events.

Finally, the agencies tasked with managing grizzly bears must improve future decision-making through explicit learning and adaptive capacity.

5. Minimize conflicts

Require *all* hunters to carry bear spray within the DMA. Currently, hunters are required to carry bear spray only within Grand Teton National Park and the John D. Rockefeller Parkway; elsewhere, on both public and private lands, they're merely encouraged to do so.

Across the DMA, on both public and private lands, coordinate and fund programs to reduce attractants: deadstock removal, electric fencing, and bear-resistant garbage and feed bins. The FWS explore novel approaches to conflict reduction, including Karelian bear dogs and "intercept feeding", where roadkill carcasses are airlifted to high elevation denning sites to keep bears away from newborn cattle and sheep.

Finally, close commercial access to moth sites.

"We believe the population is ready to be delisted, but our argument is harder to sell when the states are preparing to hunt the bears that were nearly lost a generation ago and now are a top draw for the region's tourism industry."

- Billings Gazette Opinion

[30] http://www.humanesociety.org/news/press_releases/2016/04/opposition-yellowstone-grizzly-delisting-041216.html

[31] https://www.change.org/p/keep-yellowstone-area-grizzlies-protected-under-the-endangered-species-act/u/15760436

[32] http://billingsgazette.com/news/opinion/editorial/gazette-opinion/gazette-opinion-yellowstone-grizzlies-worth-more-alive-than-dead/article_cdd88575-2f04-5b3c-a26f-1563320492f7.html

[33] Benson, M. H. 2012. Intelligent tinkering: the Endangered Species Act and resilience. Ecology and Society 17(4): 28. http://dx.doi.org/10.5751/ES-05116-170428

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