The Alliance for the Wild Rockies is opposed to delisting the grizzly bears in the Yellowstone Ecosystem. Please accept the following comments by Dr. David Mattson, PhD on the Yellowstone grizzly delisting proposal from me on behalf of the Alliance for the Wild Rockies.

Agency Spin: Government claims about Yellowstone's grizzly bears… and the rest of the story

Following is a summary of the key claims of being made by government scientists and managers, and a response. The length of the piece is due to the complexity of the issues presented here. There is a clear pattern of bias in both what is presented and how its presented by government officials. This bias is unambiguously supportive of delisting the Yellowstone grizzly bear population with disregard for important environmental trends and scientific uncertainties. When such bias is exhibited by public servants, it is nothing less than a betrayal of the public trust.

Another key point pertains to the quality of science being done by government scientists. There is a lack of conceptual sophistication in both the design and interpretation of the analyses that have been undertaken. Correspondingly, there is a seeming pattern of substituting statistical gimcrackery for conceptual depth and substance. In part, this may be a reflection of the blinders unconsciously adopted when doing science within an echo chamber shared by those who are present by invitation only and who are voicing a similar political agenda. Which is to say, the patterns of bias and scientific practice evident in this case are probably not wholly a result of deliberate malfeasance, but rather evidence of "group think", which is a common hazard when science is monopolized by a chosen handful.

This points to the pitfalls of any monopoly over science, as is currently the case with research being done by Yellowstone's grizzly bear scientists. The only cure is for the monopoly to be broken. One primary means of doing so is to make all data freely available to any researcher with an interest in it and, moreover, provide them with resources to undertake independent inquiry and analysis.

CLAIM 1: The Yellowstone grizzly bear population is large, has steadily grown in size, has correspondingly expanded its range, and meets or exceeds demographic recovery criteria. The population is therefore ready to be delisted.

The rest of the story: Population size and trend are a poor basis for making judgments about current status and future prospects of the Yellowstone population. Population size and trend are notoriously insensitive to deteriorating habitat conditions because of often long lags in demographic responses and because population trend is intrinsically a snapshot of the past—a look in the rearview mirror. However large the population might be, and however fast it might have grown, tells us nothing about the unfolding present and impending future.

This matters because none of the unfolding trends in Yellowstone's grizzly bear habitat is positive (see response to CLAIMS 2 and 3). Whitebark pine and cutthroat trout have been or will soon be lost as major food sources. Meat, one of the other four abundant high-quality foods, poses substantial hazards for any bear that consumes it (see response to CLAIM 2). Moreover, elk, which have been a major source of meat for Yellowstone grizzlies, have undergone substantial population declines in the north, east, and west. The southern elk population that winters in the Jackson Hole area is furthermore scheduled for major reductions to combat the threat of Chronic Wasting Disease. The only one of the four major foods that continues to be abundant is army cutworm moths, but even this food is projected to diminish as its alpine habitats are lost to climate warming.

CLAIM 2: Yellowstone grizzly bears have compensated for loss of whitebark pine and cutthroat trout by eating more meat. Loss of whitebark pine has had little impact on the population.

The rest of the story: Yellowstone grizzly bears appear to be eating more meat now compared to in the past, probably as a compensatory response to loss of whitebark pine and cutthroat trout. The greatest shift in diet has apparently occurred among female grizzlies, which is not surprising given the greater extent to which they relied on whitebark pine seeds in the past. On average, females ate twice as many pine seeds as did males.

However, this turn to meat is problematic. Consumption of meat is much more hazardous for Yellowstone grizzlies compared to consumption of virtually any other food aside from human garbage. Recent fairly dramatic increases in consumption of livestock on the periphery of the ecosystem has resulted in increased conflict with humans and resulting increased killing of the involved bears. This has been especially evident in the east and southeast in places such as the upper Green River drainage. Moreover, increased consumption of elk poses hazards for both cubs and adult bears. Increasing scavenging of hunter kills has resulted in increasing conflicts and resulting hunter-caused mortality. Cubs of females that use meat also tend to die at a higher rate, primarily because of more frequent contact with especially adult males—and even wolves. Adult males have historically been much more oriented toward eating meat and will sometimes kill cubs if given a chance. This continues to be the case.

Put another way, increased consumption of meat by Yellowstone grizzlies is not auspicious, either now or looking to the future. Recent declines in cub and yearling survival are consistent with the increased hazards posed to young bears when their moms seek out meat in competition with adult males and wolves. The lack of support given by federal and state agencies for dissemination of husbandry practices that foster coexistence with bears does not bode well on the livestock front, especially after delisting. Moreover, declines in elk

populations that have been largely driven by worsening habitat conditions are likely to continue as drought becomes part of the new normal. Continuing demand for sport hunting opportunities coupled with effects of both wolf and grizzly bear predation will almost certainly worsen conditions for elk.

CLAIM 3: The fact that Yellowstone grizzly bears are as fat now as in the past is further evidence that loss of whitebark pine has not been detrimental.

The rest of the story: This statement is both deliberately misleading (if not an outright falsehood) and misses the larger point insofar as dietary shifts are concerned. Regarding the falsehood, a decline in body fat among adult females has, in fact, been documented by Schwartz et al. (2013). This decline among females, in contrast to what was found for males, is exactly what we would expect with loss of pine seeds and the greater historic reliance on pine seeds among females compared to males. Interestingly, government scientists present evidence of worsening body condition among females and then go on to dismiss this result by invoking small sample sizes, which is a classic case of political spin and, moreover, spin that survived peer review (see response to CLAIM 10 below).

Insofar as the more important aspect of dietary shifts is concerned: consequences manifest both nutritionally and in the risks of death associated with using alternate foods. Meat is a high-quality food and, nutritionally, every bit as beneficial as pine seeds. This holds especially for the composition of elk and bison carcasses during the fall when fat content is as high as or higher than that of pine seeds. Triumphant (and misrepresentative) proclamations regarding body condition completely miss the question of hazards. And there is no doubt that eating meat is much more hazardous than eating pine seeds, especially for females and their cubs (see response to CLAIM 2).

Finally, a more recent decline in body fat among females is consistent with asynchrony relative to loss of whitebark pine. As noted below in the response to CLAIM 4, females were probably shifting more to meat during the 1990s in response to losses of whitebark from the 1988 fires and from blister rust. But these earlier shifts occurred during a time when bison populations in central Yellowstone Park and elk populations everywhere in the ecosystem were at an all-time high. However since especially the mid-2000s these ungulate populations have declined dramatically, which, along with further losses of whitebark pine to bark beetles, matches the decline in body fat documented by Schwartz et al. (2013).

CLAIM 4: Even with losses of whitebark pine, there is still strong evidence that whitebark pine seed crops continue to have spatial and temporal effects on vital rates of Yellowstone grizzly bears as well as levels of contact and conflict between humans and bears.

The rest of the story: This is not necessarily a claim to be questioned but, rather, a claim to be placed in context. Losses of whitebark pine have been uneven in time and space . Moreover, death of mature whitebark pine has been mitigated by a near two-fold increase in cone production by the remaining trees, by all indications driven by progressive warming of the climate since 1970. However this boost in cone production is temporary and only delays the inevitable losses of mature trees meted out by proximal factors such as disease, insects, and competition, but ultimately driven by climate warming (see response to CLAIM 10 below). The somewhat artificial increase in cone production is just one of potentially many factors introducing lag effects in the response of grizzly bear birth and death rates to deteriorating habitat conditions (see response to CLAIM 1). All of this means that an effect of whitebark pine cone crop size has persisted and will persist for a while yet, but masking an overall negative trajectory.

But the more important point pertains to contradictions in the scientific results being presented by government scientists and managers. Although, on the one hand, there seems to be a drive to dismiss the importance of whitebark pine, on the other, there seems to be no denial of the historic and on-going effects of whitebark pine seed availability on critical facets of demography and human-bear conflict. This schizophrenia can be plausibly interpreted as a tension between the partisan imperative to support delisting and some measure of adherence to scientific integrity, at least among government scientists (see concluding comments).

CLAIM 5: Grizzly bears are omnivores and will adjust to loss of foods simply by eating something else. This is evident in the shift to meat and the increased consumption of false truffles. Moreover, grizzlies in Yellowstone are known to have eaten more than 200 different foods.

The rest of the story: This claim is disingenuous at best and outright dishonest at worst. First are the factual problems. Not all foods are equal either in terms of abundance or quality. A figurative stalk of celery is not equal to a figurative steak; and there are huge differences in the nutritional and energetic quality of the foods available to Yellowstone grizzlies. With the exception of meat, none of the foods being eaten in compensation (for example, roots and mushrooms) are close to the quality of the foods being lost (whitebark pine seeds and cutthroat trout). Moreover, we know that quality and quantity of foods manifests in potentially huge differences in grizzly bear densities. So food quality and quantity matter! Any grizzly bear that we find alive will, by definition, have eaten something, but that tells us nothing about implications for the population. As a final note on this point, the increased consumption of false truffles by government scientists was only documented for bears in the core of the ecosystem and without any indication whether this food was energetically or demographically beneficial. This stands in contrast to the tacit implication that bears

everywhere are eating truffles and that this food is somehow fully compensatory for lost foods.

Second are the representational problems. A critical feature of any food is not just its nutritional quality but also, and perhaps more importantly, the hazards associated with eating it, especially whether it brings bears into conflict with people. This facet of food is amply evident in the consumption of meat (see response to CLAIM 2) but also applies to other foods, such as some roots, that often occur at lower elevations in habitats nearer where people live and recreate. Insofar as the "greater than 200 different foods" claim is concerned: a list such as the referenced one based on taxonomic distinctions made by humans has essentially no relevance to bears. Foods need to be understood in functional rather than taxonomic terms when it comes to bear foraging. For example, from a bear's perspective, a grass is a grass, with differences arising primarily from plant architecture and changes in fiber content as the growing season progresses. Yet people interested in inflating a list of "foods" could generate 40-50 "types" if they differentiated taxonomic genera and species, and even more yet if they differentiated subspecies.

As a bottom line, claims of omnivory and associated inflated lists of potential "foods" are spurious and misleading when it comes to the current and future plight of Yellowstone grizzly bears. This point is so transparently evident that one has to wonder what motivates scientists making this claim: Ignorance? Duplicity? Perhaps Group Think? (see concluding comments)

CLAIM 6: Grizzly bears are also benefiting from wolves because a number of bears have adopted the strategy of appropriating wolf kills throughout the bears' active season.

The rest of the story: There is, indeed, ample evidence of grizzly bears usurping and benefiting from wolf kills. But the key fact virtually never disclosed by government scientists is that virtually all of the bears benefiting from wolf kills are males—predominantly adult males. There are very few records of females, especially females with cubs, appropriating a wolf kill, and in the few instances where this has been recorded, the females have put their cubs at risk from both wolves and from other bears (see response to CLAIM 2). In fact, it is more likely that wolves have been detrimental to female grizzlies rather than the opposite. Females historically obtained most of their meat during the spring by scavenging on winter-killed ungulate carcasses. Given the propensity of wolves to kill vulnerable elk (i.e., the young and the old), there are, all else equal, predictably fewer of these animals available to succumb to the rigors of winter and show up as carrion during spring, to the benefit of female grizzlies. And spring carrion is a comparatively safe meat for females to eat because it is often scattered abundantly across the landscape in smaller packages, which predictably results in smaller odds of encountering other grizzlies. At a population level all of this matters because it is females, not males, that are the reproductive engines of a bear population—the segment that ultimately determines whether a population grows or declines.

CLAIM 7: Current estimates of population trend have accounted for sightability and effort bias associated with use of unduplicated females with cubs-of-the-year (COY) to index population size.Recent critiques by Doak and Cutler (2013) are wrong.

Another perspective: It seems inconceivable that current methods for estimating population size and trend based on both the Chao2 (past) and Mark-resight (current) techniques can adequately account for sightability biases introduced by major changes in observer effort and bear behaviors over the last 25 years. This is not only the result presented by Doak and Cutler in their 2013 paper, but also a result to be found in the very publications invoked by government scientists to justify their adopted methods.. Government scientists also claim that

they have increased efforts to fine females with cubs-of-the-year simply because the population has spread so widely, implying that the effort to search any given area has remained constant. This is quite simply wrong. If you contrast the increase search effort with the increase in distribution of the grizzly bear population, it turns out that search effort has doubled.

From another perspective, the issue of bias in methods in not best addressed through assertions in the scientific literature, especially when in the form of argumentative dismissals by those privileged with monopolistic access to the data. A far better approach, both scientifically and managerially, would be to take a precautionary stance in the face of uncertainty and controversy and to release the data for independent check and inquiry. The current approach adopted by the government is poor science, poor management, and amply evident of a biased partisan agenda.

CLAIM 8: The leveling of population trajectory and changes in demography of the Yellowstone grizzly bear population have occurred because the population has reached carrying capacity, not because of loss of whitebark pine.

The rest of the story: This is another claim that begs the question of motivation and sophistication on the part of government scientists and managers. The most obvious point to be made is that carrying capacity is axiomatically a function of food quality and quantity. Carrying capacity, as a concept, cannot be divorced from what is happening with whitebark pine and cutthroat trout. In other words, the distinction between an effect of carrying capacity (i.e., density dependent effects) and an effect of, say, losing whitebark pine is a false one. Yet such a false distinction—a straw man—does provide government scientists the opportunity to "demonstrate" that whitebark pine loss has been of no consequence if they can pin demographic changes to

some spurious temporal and spatial distinctions amplified by use of data that is not available for external review.

In particular, government scientists have claimed that declines in cub and yearling survival predated major losses of whitebark pine "beginning in the mid to late 2000s" and so must have occurred because of "density dependent" effects. To be clear, "density dependent" is just a fancy way of invoking either worsening female body condition (which has occurred [see above]) or decreased survival because of increased exposure to hazards; for example, of cubs to male bears at carcasses. So the turn to meat is plausibly what government scientists are calling a "density dependent effect," which could be better understood as compensation among females for losing whitebark pine. And whitebark pine was being lost in substantial amounts to white pine blister rust as early as the mid-1990s followed by the advent of major losses to bark beetles around 2003. Prior to this, even, there had been substantial losses of whitebark pine in the core of the ecosystem to the fires of 1988, with demonstrable declines in consumption of whitebark pine seeds by Yellowstone's grizzly bears. Given the greater average reliance of females on whitebark pine seeds, we would expect females to be more sensitive to these early losses, manifest in early compensatory shifts to eating meat. The bottom line is: changes in birth and death rates and resulting population trajectory are readily attributable to loss of whitebark pine, not some abstract and unspecified "density dependent" mechanism.

Another straight-forward inconsistency in government claims regarding "density effects" follows from the simple fact that, even by the government's own data, the Yellowstone grizzly bear population has not grown since the early 2000s at the same time that distribution has increased substantially. This begs the question: how can overall density increase at the same time that the same numbers of bears are spread out over a larger area? Axiomatically, density has to decrease, which means that supposed increase in density has not occurred, meaning that density, as such, cannot be a major cause of the stalling in population growth.

A final note regarding this claim: It could be that the population has leveled or even declined simply because of high grizzly bear mortality since 2006, without invoking any "density-dependent" mechanisms. Mortality limits for adult males and/or adult females have been violated during 5 out of the last 7 years, with a record 56 bears known to have been killed during 2012. Government scientists claim that limits have been so conservative that there would be no population effects even with violation, but this assumes that the methods used to estimate size and trend of the population—and from which limits are derived—are reliable. As noted in response to CLAIM 7, there is much doubt about the reliability of methods and estimates, enough so to debar any confident claims about true mortality limits and the population-level effects of violations.

CLAIM 9: Whitebark pine is genetically adaptable and so will likely fare well with climate change. Moreover, blister rust resistance has increased in selected stock from 11% to 22%. This augurs well for the future of whitebark pine and grizzly bears in the Yellowstone ecosystem.

The rest of the story: Whitebark pine currently is distributed in a well-defined climate envelope typified by cold and relatively dry conditions. There is also evidence that competition with lower elevation early successional tree species such as lodgepole pine and Douglas-fir limits the downslope distribution of whitebark pine. The claim that whitebark pine, a very long-lived species with correspondingly long generation lengths, can somehow genetically adapt to extremely rapid climate change and in a way that defies current demonstrable climatic limits as well as relations with lower-elevation competitors is, not to be impolite, ludicrous. What is even more ludicrous is claiming that somehow this rapid adaptive response, even assisted by geneticists and tree orchards, can also accommodate novel highly lethal insects and pathogens, of which the insects (bark beetles) are clearly abetted

by warming climatic conditions. Even if climate-adapted and blister rust-resistant whitebark pine were to be engineered through advanced genetic techniques, planting enough trees to make a difference ecosystem-wide would require essentially unlimited budgets and, once established, the trees at maturity would still be fodder for bark beetles. Furthermore, each new mutation of blister rust (a predictable event) would necessitate yet another generation of expensive genetic engineering and propagation.

Whatever happens to whitebark pine, we have ample evidence that responses of grizzly bears to food availability, including whitebark pine seeds, are non-linear and subject to threshold effects. Below a certain abundance level you see little use; above a certain abundance level you see dramatically increased use. The implications are that, even if whitebark pine persists and increases in abundance, it will still be so diminished that consumption of whitebark pine seeds by Yellowstone grizzly bears will never recover to anywhere near former levels.

CLAIM 10: All of our science has been peer reviewed, which means that it is a sound basis for making decisions for management of Yellowstone's grizzly bears, including potential delisting.

The rest of the story: It would be nice if peer review worked as well as the government scientists and managers claim it works. Their narrative strongly implies that peer review insures the absence of error and a partisan agenda; that is to say, normative bias. Yet the ample research on peer review and its effects shows that peer review does a remarkably poor job of detecting and correcting errors and of filtering out partisan research. Several studies have shown that error detection is about what you would expect at random. By contrast, peer review has been shown to discourage creativity and insure obedience to ruling scientific paradigms and those who are affiliated with those paradigms. Put succinctly, peer review does little to guarantee that the current crop of Yellowstone grizzly bear science is a reliable and

non-partisan basis for making important decisions—such as delisting the population.

By contrast, what has been shown to be an effective means of correcting and advancing our knowledge of grizzly bears (and all manner of other things) is independent inquiry into the same topics, using the same data if needed. The contingency of access to the same data becomes all the more relevant when there is only one population and one data set, the topic is symbolically charged, and the science is highly contested—as is the case with Yellowstone's grizzly bear population. Under these conditions a monopoly on the data is tantamount to betrayal of the public trust. Yellowstone's grizzly bear scientists and managers have publicly voiced their resistance to disclosing data to anyone other than those whom they invite in, which could be construed as betrayal of their responsibility as public trustees.

Thank you for accepting these comments made by Dr. David Mattson.

Sincerely yours,
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