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Custer Gallatin National Forest Revision #50185

Dear Messrs.:

I appreciate the opportunity to submit the following comments on the Revised Custer Gallatin Forest Plan. I request that this letter be included in the official comment record, and that the issues raised here receive specific responses from the Forest Service.

This is to be commended on its forestwide approach to food storage. Long time coming.

But, excessive human-caused grizzly bear mortalities and habitat loss from climate change and human development outside the Forest, as well as unrelenting recreation pressure inside the Forest still threaten the Yellowstone grizzly bear population. The CGNF has ample opportunity to help recover the threatened grizzly, but only if it protects all roadless lands on the forest, and improves its enforcement of limitations on roads and off road vehicle and bike use. None of the Alternatives do this, although Alt D comes the closest.

Furthermore, the Yellowstone grizzly bear population is too small and too isolated for its future to be secure. Regulatory and funding mechanisms are inadequate to ensure protection of the bear from excessive habitat development and human-caused mortality, as well as documented decline in key foods, including whitebark pine, trout and elk, and the anticipated decline of army cutworm moths.

The grizzly is an especially powerful symbol of the American West, and the essence of what makes Yellowstone unique. Furthermore, because it is so sensitive to development, the grizzly serves as a key indicator of ecosystem health, Yellowstone's version of the canary in the coal mine. Protections for grizzly habitat need to be redoubled not weakened as the FS proposes.

The plan understates the risks associated with proposed strategies, fails to disclose key uncertainties associated with its analysis, and lacks a system to promptly correct problems when they arise. The plan fails to acknowledge that an alternative approach to grizzly recovery is possible. Habitat is still available to support a much larger vision of recovery, one that will be more durable in the long-term. Lasting success for grizzly bear recovery can be accomplished by expanding and protecting existing grizzly bear populations, reconnecting populations from Yellowstone to Canada, and providing meaningful habitat protections in all occupied and suitable habitat in Greater Yellowstone Ecosystem (GYE).

The CGNF lies in a vital crossroads between current and potential ecosystems to the north, west and east. Besides protecting all roadless country in the Beartooths, Absarokas, Gallatin, and Lionhead, the FS must also

protect roadless lands in the Crazies, Pryors, and Bridgers.

The Endangered Species Act requires land agencies adopt a precautionary approach, rather than the risk embracing one it has chosen. In the revised plan the FS must clearly articulate and evaluate risks, including from climate change and human development outside the Forest.

Concerns:

1.The current grizzly bear population is too small and too isolated to ensure long-term viability; but, long-term recovery is possible under a different management approach. Grizzly bears in the lower-48 states have been extirpated in 99% of their historic range. In Yellowstone, they exist today on an isolated habitat island that is relatively small, comprising 600-700 bears, with a currently genetically effective population size that scientists agree is much too small to insure long-term persistence.
But, more grizzly bears can be accommodated in the Northern Rocky Mountains, including around Yellowstone. According to analysis by Troy Merrill, Carlos Carroll and others, it is still possible to establish a meta* population of 3,000 or more grizzly bears by expanding where bears can live in Yellowstone, recovering grizzlies in the Selway-Bitterroot ecosystem, and connecting grizzly bear ecosystems to source populations in Canada (Merrill and Mattson, 2003). The number of bears within the GYE can be increased by 300 or so animals, if grizzlies could fully recolonize areas nearby areas.

Specifically, Merrill found that about 6 million acres of additional habitat in the GYE outside the Primary Conservation Area (PCA) are suitable for bear recovery. Over 2 million of these acres - the size of Yellowstone Park - are currently occupied, according to data from the Interagency Grizzly Bear Study Team (IGBST). By protecting habitat including in connecting landscapes, bears could continue to expand their range -- greatly improving prospects for long-term recovery. The CGNF lands play a vital role in connecting populations.

2. The Plan must consider the significance and the pace of habitat change occurring in the region. The plan's invoked strategy for managing habitat security wrongly assumes that the future will look like the past. The plan calls for maintaining habitat conditions inside the PCA as of 1998, but, conditions have already changed significantly from 1998, and will continue to do so. Anyone looking up at the grey ghosts of whitebark pine witness that truth and scale of recent change.

Specifically, the plan fails to substantively consider the effects of rapid human population growth in a region which is among the fastest growing in the country, and where Gallatin county is doubling in population every ten years. This development is occurring most rapidly near the boundaries of public lands in key habitat for bears and other wildlife (Johnson, 1998).

Off-road vehicle use is also increasing on public lands in formally secure grizzly bear habitat. Yet the FS has looked the other way as trespass even in Wilderness Study Areas have escalated.

The decline of primary foods, especially cutthroat trout, whitebark pine, and elk, has decreased habitat productivity in the core of the ecosystem, significantly changing the habitat conditions that existed in 1998. These reductions have forced the redistribution of bears to lands where they have experienced higher levels of contact and conflict with humans, and will be more vulnerable to the impacts of development and human-caused mortality. Other expected changes relate to climate change and the further loss of other foods,

particularly berries. The FS must evaluate the impacts of these changes in the revised plan.

The FS failed to evaluate the impacts of declining elk on the grizzly population. Simply looking at elk objectives by the state is inadequate and means nothing to a bear. In its evaluation of bison, the FS failed to consider the fact that the hunt and slaughter programs now mean that bison are not largely available to bears.

The Forest Plan concedes that habitat conditions have changed since 1998 as a result of fires but then fails to consider the full effects of these changes, or evaluate other changes in habitat or the human environment which could affect the validity of the 1998 benchmark.

Furthermore, the FS's evaluation of future trends is based on a very small period of historical time: 1975-1998. FS fails to fully account for the significant changes that occurred before that time, and longer term trends that helped contribute to the listing of the species.

Future changes will likely result in more people on the landscape, less habitat for grizzlies, more impacts from development and resource extraction, and a much warmer climate. Given historical and foreseeable trends, it is almost certain that the future will hold more surprises and that we will have less secure habitat for grizzly bears, not more.

FS should also take advantage of experts in the arena of forecasting, and develop a more realistic view of the future and effects on carrying capacity in the GYE, along with better use of the science it does have access to (e.g., Gude et al. 2007, Schwartz et al., 2012). The agency should also try to ameliorate the effects of future changes by providing more secure habitat, not less. This argues for provisions by the FS to adequately protect suitable unoccupied habitat outside the recovery zone, and ecological connections to the Selway-Bitterroot, Northern Continental Divide and Bighorn ecosystems.

3. The plan fails to include accurate baseline data on the current human footprint. Exacerbating the problem of managing presumed security habitat at 1998 levels are inaccuracies in the underlying database on roads and development used by the US Forest Service. When the 1998 benchmark was adopted in the Conservation Strategy, the Forest Service (FS) had not fully defined habitat conditions of relevance to grizzly bears on its jurisdictions. The agency has conceded that thousands of miles of "ghost roads" exist on the forests that are not part of Forest Plans or the transportation databases used to assess access. This simple fact debars any precise or meaningful mitigations or offsets by the FS to maintain conditions at any benchmark, much less that of 1998.

In areas where the 1998 data on bear habitat security was compared to data collected in the field, a Sierra Club report found that: a. the Gallatin Forest significantly underestimated the number of motorized routes that existed in bear habitat; and, b. motorized routes occurred in areas that the agency defined as secure (500 meters from a road), (Sierra Club, 2000).

The Plan also did not include high-use non-motorized trails and non-inventoried motorized trails in its access standards. This is a significant oversight given mounting ATV use in the ecosystem. And, the FS did not evaluate use levels, despite acknowledgments in meetings (I attended a number of these), and in documents associated with the development of the CEM, that the effects of roads and trail use on grizzly bears can vary tremendously

according to human use levels.

Although the Plan discusses impacts of snowmobile use on den sites, it does not take into account the effects of late-season snowmobile use on spring-active grizzly bears. In some areas such as Cooke City, snowmobiles are still active in grizzly habitat in July - three months after den emergence. On top of this, the plan states that they don't have evidence that snowmobile use is affecting the grizzly bear population or even individual bears, while admitting that sample sizes of their referenced studies are so small that nothing can be concluded.

ATVs, and mountain bikes can have effects similar to those of roads, in terms of disturbance, displacement, habitat fragmentation, and mortality. Without a complete inventory of roads and trails and information about current levels of actual use, including post-denning snowmobile activity, the Forest Service cannot assess compliance with 1998 standards, nor evaluate the impacts of future change.

4. FS has failed to consult with the Tribes on grizzly bears as part of the lead up to the plan. I have been witness to the appalling lack of respect for Tribal people who view grizzly bears as relatives and who harbor grave concerns about whether their beliefs have been and will be accounted for in FS deliberations. I have been witness to agency spokesmen saying they will consult with, or are consulting with, the Tribes, and then fail to do so altogether, or substitute a charade for any sort of meaningful process. FS representatives do not seem to be willing to undertake good-faith efforts entailing traveling to the reservations, sitting down with Tribal people, and deeply listening to what they have to say about bears and how any pending decision by the FS may affect tribal interests. More importantly, there is no indication that the FS is willing to put sufficient credence in tribal concerns to change course.

I have worked with the Crow in previous attempts to secure protection for the Crazies, an especially sacred landscape due to Plenty Coups' vision and still the place of current religious practices. After 25 years, it is clear that the FS still have not given the Crow their due regard or protections for their sacred relationship with the Crazies. When will the FS reach out and truly consult with the Tribes?

There is an enormous opportunity for FS to do things differently with regards to Tribal interests related to grizzly bears. As has been done with the Medicine Wheel in the Bighorns (that I also worked on), the FS could initiate a sincere conversation with Tribes co-management of grizzly bears.

But the first step is for FS to sincerely listen to Tribal concerns, with an attitude of respect for the sovereign rights of Tribal nations.

5. The plan and related documents fail to include a thorough evaluation of habitat conditions outside the PCA, and fail to provide a system to monitor future conditions. The FS uses a much- reduced surrogate of the Cumulative Effects Model (CEM) as the primary method of monitoring habitat conditions inside the PCA, consisting of little more than monitoring road densities, "secure" habitat as a direct function of road densities, and grazing allotments. Nor does monitoring of these few metrics extend outside the PCA. Further compromising the FS's approach (as previously discussed), the FS has not attempted to verify the status of roads and trails, or to

resolve data discrepancies among forests outside the PCA. By the FS's admission, the roads data on national forests outside the PCA include considerable errors.

In addition, the agencies have not undertaken a detailed and spatially-explicit analysis of vegetation and habitat productivity, such as was done to develop the CEM. Of particular importance is the status of moth sites, the health of whitebark pine, the condition of cutthroat trout spawning streams, and the productivity of elk and bison summer range. Whitebark pine is an especially key issue, since it appears
that some of the most robust remaining whitebark pine stands lie in places like the Beartooths.

In sum, FS lacks any assessment of current habitat conditions outside the PCA sufficient to adequately assess the nature and significance of past and future changes. This is an important oversight given the amount of occupied habitat outside the PCA, and its vulnerability to development.

The plan states that in the future, habitat outside the PCA will be monitored, and changes assessed, but FS provides few details about how this will occur. This must be developed in order to demonstrate that adequate systems are in place to protect the grizzly bear as climate change and food losses force further expansion beyond the PCA.

6. The Primary Conservation Area is based on historical accident and political compromise, not a scientific analysis of grizzly bear habitat needs. FS relies on assumptions by the Fish and Wildlife Service that that the Primary Conservation Area (PCA) alone is sufficient to support a recovered grizzly population, implying that the boundaries of the PCA are the product of scientific analysis. That is simply not the case. The PCA is the product of historical accident and political compromise, not scientific analysis. The FS cannot rely on flawed assumptions and analysis by the FWS, summarized below.

The boundaries of the PCA are identical to the boundaries of the Yellowstone Recovery Zone in the 1993 FWS Grizzly Bear Recovery Plan, which were in turn based on the Yellowstone Recovery Zone in the 1982 FWS Recovery Plan. As the 1982 FWS Recovery Plan admits, the original boundaries were based on a crude, inadequately informed, and disputed assessment of the current range of grizzly bears in 1979, with the desired goal of providing habitat for merely 229 bears. At the time, there was "almost no data on state or private lands," as the 1982 states.

The 1982 recovery zone boundaries were flawed because they were drawn with the goal of supporting an untenably small grizzly bear population. In 1982, FWS asserted that the Yellowstone grizzly bear population will be "viable and self-sustaining," and thus "eligible for delisting" when the population reached the "population size documented in Craighead et al.," which FWS specified as "consisting of 229 bears." By any measure, the 1982 goal of 229 bears was set too low.

In designating the 1982 Yellowstone recovery zone, FWS recognized that it must "determine the habitat and space required for the achievement of the grizzly bear population goal." Yet rather than setting a biologically principled population goal and then identifying the habitat needed to achieve that goal, FWS defined its task as merely "stating or determining occupied space and habitat where management considerations for grizzly bears are necessary." Neither FWS nor the FS have undertaken a scientific habitat assessment to determine recovery zone boundaries based on the biological needs of a recovered grizzly bear population.

Indeed, FWS failed even in its stated intent to assess the extent of occupied habitat where protective management is necessary. In order to assess occupied grizzly bear habitat in the Yellowstone area for purposes of developing the 1982 recovery plan, FWS convened a workshop in Missoula, Montana December 6-7, 1979. The workshop participants developed a map that purported to depict currently occupied habitat and created a table of lands included in the FWS Yellowstone Recovery Zone. However, FWS conceded that the 1979 assessment of currently occupied habitat was plagued by inadequate data,

differing definitional standards for what constituted "occupied habitat," and continuing proposals for further changes in the occupied habitat delineation, saying that:

NOTE: Persons attending the workshops were not in full agreement with acreages designated for occupied habitat, habitat stratification or areas for resolution. Numerous calls suggesting boundary changes were received during plan formulation, some with apparent justification and some for reasons unknown. Further, there appeared to be a variance in the interpretation of the Criteria for Grizzly Bear Critical Habitat Identification (USFS, 1975) used in the delineation of essential habitat, between forests and between forest districts; and, almost no data on state or private lands. Reconvening the workshops to review each suggested change seemed impractical. Therefore, the acreages presented will have to suffice for a beginning, the refinement of occupied habitat and habitat stratification is a plan element.

Thus, by its very terms, the 1982 FWS Recovery Zone was not only designed to support an unsustainably small population of 229 bears, it was also based on incomplete and inaccurate data and unresolved differences regarding appropriate standards for assessing occupied habitat. While the 1982 recovery plan contemplated further "refinements," the originally drawn recovery zone remains the basis for the 1993 Yellowstone recovery zone boundaries, the PCA, and the delisting proposal.

The proposed PCA is fundamentally the same as the 1982 Yellowstone recovery zone. Table 2 of the 1982 Recovery Plan depicts the recovery zone's acreage, which totals 5,437,736 acres. In the ensuing eleven years leading to the development of the 1993 Recovery Plan and its final fixing of the PCA boundaries, these acreages were modified only slightly. The Conservation Strategy states that the PCA now covers 5,893,760 acres, or 8% more acreage than was originally considered occupied in 1979 and included in the recovery zone in 1982. This minimal difference in acreage is explained almost exclusively by minor changes to the constituent areas of the six National Forests, as depicted in the following table:

National ForestAcres (1000s) within occupied habitat c. 1979*Acres (1000s) within PCA c. 2005**Acreage (1000s) change 1979-2005
Beaverhead069+69
Bridger-Teton734724-10
Custer157114-43
Gallatin522909+387
Shoshone1,2581,223-35
Targhee389475+86
Total30603514+454

Neither the 1993 Recovery Plan nor any FWS document explains how the addition of 454,000 acres of Forest Service land could change the 1979 map from a depiction of occupied habitat for 229 grizzly bears into a map depicting the sufficient habitat for FWS's still-inadequate goal of 500-600 bears. The incorporation of those zones into the PCA merely cements an arbitrary line based on the flawed 1979 assessment of occupied habitat.

Ironically, the population in 1979 was likely at its lowest ebb; the Service notes that contemporary population estimates ranged from 229 to 312 bears. The 1982 FWS Grizzly Bear Recovery Plan suffered from the same flaw that afflicted many FWS recovery plans: FWS set recovery goals at or below the existing population size and below viable recovery levels, thus "managing for extinction. Nowhere does

the Service explain how an area of habitat that was supporting roughly 250 bears in 1979 is expected to support more than twice that many bears "for the foreseeable future."

The FS cannot rely on inconsistent positions by FWS on the scientific legitimacy of the recovery zone/PCA. In a 1997 supplement to its 1993 Grizzly Bear Recovery Plan, FWS stated unequivocally: "There exists no system to evaluate the amount of habitat necessary to maintain a viable grizzly bear population." Similarly, in the delisting rule FWS incorrectly asserts that "there is no known way to deductively calculate minimum habitat values" for a recovered Yellowstone grizzly bear population. This is demonstrably false; a large body of science of reserve design has developed over the last thirty years (Noss et al., 1999).

Reserve design starts by identifying focal species (like the grizzly bear), determining a viable population level and then evaluating, mapping, designating, and managing habitat necessary to sustain the population over the long term. Numerous regional conservation networks have been designed throughout the world; several have even been proposed for the northern Rockies and the lands encompassing lower-48 states grizzly bear habitat. Invariably, they have proposed the need to reconnect the existing grizzly bear populations in the lower-48 states in order to ensure sufficient habitat for long- term viability of native species, including the grizzly bear. Even the most rudimentary reserve design indicates that Yellowstone grizzly bears need far more habitat than that contained in the PCA. FWS admits that "estimates of grizzly bear densities in the Yellowstone area range from one bear per 50 sq.
km (20 sq. mi) to one bear per 80 sq. km (30 sq. mi) (Blanchard and Knight, 1980; Craighead and Mitchell, 1982)." Multiplying these Yellowstone bear densities by FWS's biologically inadequate
500-bear population target results in a reserve of 25,000,000 square kilometers, much larger than the PCA. The upper end of this calculation is very near the conservative estimate of habitat occupied by Yellowstone grizzly bears circa 2004, around 37,258 square kilometers (Schwartz et al., 2006).

The FS cannot rely on flawed analysis by the FWS, especially when its lands play so vital a role for recovery of the grizzly. The FS too must rely on the best science, not some historical artifact.

7. FS recognizes the importance of linkages between ecosystems, but fails to ensure their maintenance. The FS's approach to connectivity between the Yellowstone ecosystem and the NCDE and Selway-Bitterroot and Bighorn is inconsistent and contradictory. On one hand, the agency recognizes that linkages between ecosystems are important, and it has participated in linkage zone working groups over

the years. It has also started, but not completed, an assessment of connectivity between Yellowstone and other ecosystems.

In the Forest Service's biological assessment for the 2006 Forest Plan Amendments, the agency also underscores the importance of connectivity: "Human population increase is rapidly affecting many of the remaining possible linkages between ecosystems in the Northern Rockies, and the time for maintaining these connection opportunities is growing short." Lisette Waits, whose work is the foundation for FWS's genetics analysis, underscores the value of natural connectivity between ecosystems. She discusses natural connectivity as a positive alternative to artificial augmentation of grizzly bears.

FS acknowledged the importance of linkage in its EIS on recovery of the grizzly in the Selway- Bitterroot ecosystem, which concluded that grizzly restoration there would contribute to a meta- population of grizzly bears, and maintain the demographic and genetic health of the populations. Furthermore, retired Recovery Coordinator Chris Servheen stated to the press that recovery of grizzlies in the Selway-Bitterroot was essential to ensure the long-term health of the Yellowstone ecosystem.

FS has been increasingly involved in efforts to maintain ecological connectivity. The lands identified by Claar, et al. (1999) are similar to those found by Craighead, Merrill and others to be potential linkage zones.

Yet the FS contradicts the approach it has taken elsewhere, and states that ecological linkage doesn't matter to Yellowstone bears. The agency claims that Yellowstone is a self-sustaining population. In its plan, FS is trying to have it both ways on the question of linkage zone protection. Linkage zones cannot be vital and unnecessary at the same time. The agency must pursue a thorough analysis of the prospects of connecting ecosystems, and how that could be done.

8. The plan underestimates the impacts of current human population growth in the region, and fails to provide a system to monitor this growth that directly affects FS lands. After tipping its hat to the problem of private lands development, FS went on to dismiss one of the biggest threats to the grizzly bear in the Greater Yellowstone Ecosystem. I daresay the omission was politically driven, but there are compelling scientific and legal reasons to tackle this major threat to the future of grizzly bears. Even National Geographic, in its recent 2016 issue on Yellowstone, considers private lands development to be the most serious threat to the Greater Yellowstone Ecosystem.

The delisting plan fails to fully consider the adverse effects on grizzly bears as a result of escalating development on private lands, as well as human population growth in the region. While the plan generally acknowledges the relationship between the number of humans and the level of human-caused mortality, it fails to give a complete picture of the current situation and future trends, and to evaluate implications.

The FS plan acknowledges that a disproportional number of grizzly bear deaths and conflicts occur on private lands - a problem that is likely to worsen as growth increases - but then leaves the problem up to NGO's. FS also relies on local planning and zoning regulations to protect important private lands, despite evidence that such regulations have had limited impact on growth (Hernandez, 2004).

Human-caused mortality is directly related to the long-term survival of the Yellowstone grizzly bear. Historically, between 85% and 94% of all recorded grizzly bear mortalities in the GYE since listing have been human-caused (Mattson et al., 1996; Schwartz et al. 2006). Increasing numbers of people moving into or nearer to grizzly bear habitat will mean a greater likelihood of human-caused grizzly mortality (Merrill et al., 1999; Merrill and Mattson, 2003; Johnson et al., 2004; Schwartz et al., 2010, 2012).
Sheer numbers of people can significantly affect the persistence and survival of grizzly bears.

The recently retired Grizzly Bear Recovery Coordinator, Chris Servheen, recognized the mounting problems to grizzly bears posed by private land development. "There is a considerable disparity between the limited occurrence of private land in grizzly bear range, and the high occurrence of problem bear complaints on these lands...Another possible reason for increase in conflicts is increasing numbers of people in grizzly bear habitat...Without successful resolution of the private land problem in Yellowstone, it is likely that continuing successful management efforts on public lands will be negated." (Servheen,
1989).

Problems on private lands may be exacerbated by declines in key bear foods. Under conditions of food scarcity, bears roam more widely in search of alternatives, bringing them into areas closer to human activity, with resulting substantially increased risk of human-caused mortality (Mattson, et al., 1996; Knight, et al., 1998; Pease and Mattson, 1999; Mattson, et al., 1992). In addition to increasing mortality

risk, private lands development can compromise the quality of adjacent secure habitat on public lands.

Concerns regarding the adverse impacts of growth on the region's landscape and wildlife have been mounting (Clark and Minta, 1994; Glick, et al., 1998; Hansen et al., 2002; Gude et al., 2007). Together the twenty counties encompassing the GYE are among the fastest growing in the nation. (Rasker and Hansen,
2000; Gude et al., 2006).

Since the time when grizzly bears were listed in 1975, human population in the Yellowstone region has dramatically increased, and is expected to even more sharply increase in the future, with enormous import for the future of grizzly bears.

Between 1970 and 2000, a Sonoran Institute report showed that human population in the GYE grew by 141,621 people - an increase of 61%, compared to 38% growth nationally. In her 1998 report, "Rural Residential Development Trends in the Greater Yellowstone Ecosystem, Since the Listing of the Grizzly Bear, 1975-1998," author Vanessa Johnson showed mounting development in the GYE's twenty counties. Both Johnson and Gude et al. (2007) found that development is concentrated in important wildlife habitat, particularly along streams, adjacent to public lands and away from towns.

In addition, data from seven important GYE counties (Gallatin and Madison counties, Montana; Lincoln, Park and Sublette counties, Wyoming; Bear Lake and Fremont counties, Idaho) indicate that a disproportionate amount of private county land, that is not yet developed, has already been approved for development. Johnson notes that "projections for future trends suggest little slowing of present development levels, and a continuation of the economic and demographic conditions spurring such trends."

This assessment is confirmed by 2005 United States Census Bureau data, and a summary of county population growth in the Greater Yellowstone Ecosystem from 1980-2004 (see attached map). Gallatin County, Montana grew by 76%. Other Montana counties also showed significant growth: Madison County grew by 30%; Park County, by 23%; and, Stillwater County by 50%.

In her Master's thesis, "Rural Residential Development in the Greater Yellowstone: Rates, Drivers, and Alternative Future Scenarios" (2004), Patricia Hernandez demonstrated that rural areas of the GYE will likely experience major changes in land use by 2020. She states that, "In a business as usual scenario of land use change, rural residential development is expected to increase by 82% from 2000 to 2020." Her analysis projects that rural residential development within the GYE will likely continue to be concentrated in areas most important for agriculture and wildlife, including those adjacent to nature reserves. She also found that current zoning regulations had limited impact on the distribution of forecasted homes.
Among the counties with the highest forecasted rates of increase are several vital to grizzly bears: Teton, Wyoming; Park and Gallatin, Montana; and, Teton, Idaho.

In "Paving Over Paradise, A Study of Rural Growth in the Border Lands of Yellowstone Park," published in 2002 by Montana State University and Park County Environmental Council, researchers found that between 1969 and 1999 the valley between Livingston and Gardiner, Montana, saw a doubling in the number of housing units every ten years. A similar study by the Sonoran Institute showed human population doubling every seven years in Teton County, Idaho.

Much of this development is occurring through subdividing formerly large tracts of agricultural land. For example, a 1991 survey of subdivisions of 200 acres or less in the GYE found that over one million acres had already been subdivided (Harting and Glick, 1994). Impacts of subdividing large working ranches into smaller "gentleman ranches" of 10 acres or less can have catastrophic effects on habitat quality that far exceeds the footprint of each individual house. Whole valleys can be swallowed up and transformed into nothing more than suburbs with a nice view through the development of a mere twenty houses. The spreading of housing, infrastructure and roads throughout formerly undeveloped river bottoms and valleys creates a minefield of dangers for grizzly bears in land that had relied on or prospectively could rely on for movement and food.

Not surprisingly, all six major areas of conflict identified occur in the fastest growing counties in the ecosystem: Gallatin and Park counties in Montana; and, Park, Teton, and Sublette Counties in Wyoming. What is alarming about this growth trend is not only the population increase, but also the associated increase in human infrastructure. In each of the three Wyoming counties where population growth is projected to be greatest, half of the new migrants will reside outside of established urban boundaries. That means more people moving into grizzly bear habitat, and slicing up prime habitat with more power lines, roads and houses. The associated problems of grizzly bear-human conflicts will therefore continue to increase. In the northern reaches of the Greater Yellowstone Ecosystem, the populations in Gallatin and Park counties, where Gunther et al. (2004) identified two of the six greatest conflict hot spots for grizzly bears, are expected to grow by 15% and 26%, respectively. Clearly, the problems for grizzly bears associated with human intrusion into grizzly habitat will only increase in the future.

Future trends are alarming. The total population of the 20 GYE counties in 2010 was 450,399. According to data compiled by New West, from 1990 - 2010, these counties increased their population by 137,567 people. If they maintain that rate of population increase, there will be an additional 226,620 people in the 20 counties in 2030.

Gallatin County alone would add 68,441 people from 2010 - 2030, going from 89,616 to 158,057.

The following data, compiled by Headwaters Economics, is related to the ecologically vital High Divide region which connects the GYE to Selway Bitterroot Ecosystem, and includes some GYE counties.

In the past 50 years, the number of single-family homes in the High Divide has close to tripled, from roughly 28,000 homes in 1963 to 75,000 in 2013.

*During that time, just more than half of these new homes were built outside of town centers in unincorporated portions of the High Divide counties. Since 2010, this trend has increased and 63 percent of new homes were built outside of town.

*In the last half century, the number of new homes built in the Wildland-Urban Interface (the area within ½ mile of forested public lands) has increased by more than 300 percent, from more than 2,000 homes in 1963 to 9,000 homes in 2013.
*In the next 10 years, nearly 150 square miles of currently undeveloped private land (an area equal to one half of all private land in Teton County, Idaho) is forecasted to experience low-density "exurban" development.

If development occurs as predicted, the world of the grizzly bear will continue to shrink dramatically. Yet the delisting rule fails to evaluate the available data on human population growth or its consequences on mortality, habitat quality, and security. Instead, the FS states that existing secure habitat will remain as it was in 1998, but without evaluating the impacts of private lands development that abut secure habitat. Furthermore, despite promises in the CS that private lands development will be monitored inside and outside the PCA, the plan fails to establish a comprehensive system for monitoring of development after delisting, or to resolve conflicts, as does the CGNF plan. Without such a system, FS cannot demonstrate that it is doing its part to ensure habitat protection for the grizzly.

9. The plan lacks adequate law enforcement mechanisms.
Rampant illegal use of roadless lands and violations of road closures have occurred on the Forest for too many years. Instead of allowing such use to continue, the FS must ramp up efforts to enforce the law. Otherwise the plan is a meaningless paper exercise.

10. FS should consider including grizzly bear habitat thresholds. FS relies on FWS assumptions about population numbers, without looking at opportunities to keep habitat degradation within limits the bear can tolerate. The plan contains no specific habitat impairment standards that would prompt a management response, other than the monitoring provisions in the PCA. Monitoring standards are not the same as habitat management standards.

Research by Johnson et al. (2004) and Schwartz et al. (2010, 2012) shows that survival rates can be tied to the nature and extent of landscape features, including road densities, and thus constitute a ready basis for developing provisional triggers or standards that integrate conditions for the full extent of the PCA and even DMA. This should be considered by the FS.

Scientists have demonstrated that significant lag-times exist between habitat loss and responses in death rates and growth of grizzly bear populations. Research has also shown threshold population effects, which could mean that by the time the problem is detected, it may be too late to fix it. Estimates of lag-

times between habitat degradation and detectable effects on the Yellowstone grizzly bear population were found to be 8-13 years (Doak, 1995). According to Doak: "Long lag-times can exist between critical levels of habitat degredation and any detectable change in population sizes, even when monitoring data are excellent."

A number of suggestions were made by scientists over the years about habitat metrics that could be used to establish triggers or standards, including: a. abundance of whitebark pine, cutthroat trout, bison and other key foods, b. human population sizes and numbers of recreational visitors, and, c. levels of human-related development and activities, such as off-road vehicle use. These suggestions have been ignored by FS.

11. The plan and related documents lack necessary standards for protecting grizzly bears from the impacts of increasing ATV use on top of other forms of access and human contact. All Terrain Vehicles (ATV's) are motorized vehicles capable of running on trails. Their use is of particularly concern because it is exploding on national forest and BLM lands. They effectively transform trails into roads, and make previously remote wild country accessible to an increasing number of people.

Inadequately regulated ATV use can increase rates of human-caused conflicts and mortalities. It can turn low use trails into high use trails. It can turn secure habitat into unsecure habitat.
ATV use allows more people to get further into the backcountry faster. Grizzly bears have survived in those few areas where they have been able to find security from human-grizzly bear conflict. As more people are able to motor into formerly secure grizzly bear habitat, increased grizzly mortality is known to follow.

In the case of ATV use, many users are known to flaunt the law and ride off trail. That further compromises backcountry secure habitat. They are also known to break other laws, such as gun and
litter laws. These can be the kind of people, in fact, who are more likely to poach grizzly bears. FS needs to take this into account.

FS' approach is centered on protecting secure habitat and managing roads access. The approach was developed in the early 2000's before the explosion of ATV use took place. The FS is ill equipped, due to lack of funds and resources, to deal with the problem of monitoring ATV use on national forest lands. Their funding problems are getting worse.

FS has the burden to assess and ameliorate the impacts of all reasonable foreseeable threats to the future of the grizzly bear. In the case of ATV use, it has utterly failed this challenge.

Escalating ATV use in the Northern Rockies is a top issue of concern for managers and public alike. For example, a 1999 report by the White House Council on Environmental Policy, "Off-road Vehicles
on Public Lands," found that ATVs have damaged every kind of ecosystem in the United States. According to the FS, ATV use in the US increased by more than 150% between 1991 and 1998. During this time, the number of state-registered ATVs and motorcycles in Montana more than doubled to
18,953. And the number of ATVs in use in America continues to increase. According to the motorcycle industry council, a trade organization, ATV sales increased 89% from 1998 to 2002.

In a 2001 speech in Missoula, then Forest Service Chief Mike Dombeck drew a parallel between today's recreation industry and the timber industry of 20 years ago. He said, "On public lands, off*road vehicles will be the issue of the decade. We seem to have this attitude that we can go anywhere with anything at anytime."

In grizzly habitat, the problem of ATV use is exacerbated by:
a. The growing trend in late season snowmobile use (as late as July in some areas),
b. The increased sophistication of snowmobiles and ATV's that allows them to penetrate further into wild country, and,
c. The growing number of violations by ATV users of access standards.

In the Greater Yellowstone region, the FS concedes that ATV use needs to be much better regulated. Although data on use is hard to find, what data does exist is disturbing. A 2014 report released by the state of Montana Bureau of Business, Economic Research and the University of Montana, shows an increase in registered off road vehicles in southwest Montana, from roughly 50,000 in 2006 to 77,200 in 2013. The same report shows Southwest Montana, which includes grizzly bear habitat, to be one of three major off road vehicle hubs in the state.

Meaningful regulations that limit ATV to designated areas, away from core grizzly habitat in each national forest in the Greater Yellowstone Ecosystem, are essential before the problems worsen.
Problems associated with growing ATV use must be addressed with a comprehensive management, monitoring and law enforcement program in regards to motorized access.

12. The plan fails to address the rising issue of mountain bike use in grizzly bear habitat. FS needs to take into account recent statements by former Recovery Coordinator Chris Servheen on the problem of mountain bikes in grizzly habitat, and the results of the Brad Treat investigation. We know that bike use is increasing in grizzly bear habitat in the Gallatin Range, Taylor's Fork, and Lionhead and that risks to bears and riders are increasing.

The FS seems to know little about what is happening in the backcountry, as resources decline. But that does not let the agency off the hook to address the problem.

13. The FS plan ignore the concept of cumulative effects, which lies at the heart of understanding impacts of human activities on grizzly bears. At the time of listing of the grizzly bear, scientists had a rudimentary understanding of how grizzly bear habitat could be nickel and dimed to death. In the early 1980's, grizzly bears managers and scientists agreed that a model to understand the cumulative effects of human activities on bears at the scale of bear home ranges was a critical part of the recovery effort. While this understanding has been partially incorporated in the roads standards in the CS, FS has rejected the model for political, not scientific, reasons. The root cause was that the FS wanted to preserve "management flexibility" (read: ability to build roads and otherwise intrusively manage within its jurisdictions).

Not only was this decision not justified, FS has not replaced this concept with a defensible tool to address the problem of habitat fragmentation at scales meaningful to grizzly bear habitat use. This is especially a problem outside the PCA.

There is merit to the rationale behind the model, which should in fact be expanded to include all occupied and suitable habitat.

14. FS should establish a policy to compensate for private development by doing less development on adjacent public lands. FS should look to positive historic examples in the Northern Rockies, in which the FS compensated for overdevelopment of private lands by allowing less development on adjacent public lands. For example, in the 1980's, Lolo Forest Supervisor Orville Daniels famously stopped logging a drainage over-logged by a private timber company because of harmful impacts on wildlife.

Given the amount of private lands development anticipated in the GYE and the problem of cumulative effects on grizzly bears, it stands to reason that something has to give -- and that may be public lands development.

15. The plan gives precedence to pro-development interests, and fails to provide a meaningful way to involve citizens with differing perspectives. Concerns about biases in the public involvement in forest management have been raised without meaningful response for the last 30 years. Yet the FS has chosen to work with development interests in the biking and atv industries, and conservation groups allied with them rather than with all the affected interests who care about wilderness and recovery of endangered species. The Agency has simply replaced logging industry with the biking industries rather than answer to the broader public.

It is time for FS to rethink the engagement of the public, and develop new and creative approaches.

16. The FS assumption that grizzly bear recovery is due exclusively to self-motivated management actions is not justified. In the plan, FS claims that the guidelines for managing grizzly bears, adopted in 1986, were the primary factor responsible for increasing grizzly numbers. I agree that the steps outlined to reduce conflicts and improve security were positive, but there are alternative theories to explain the increase in population size, and they are perhaps better supported by the weight of available evidence.

One hypothesis that FS did not evaluate is the increase in key bear foods since the mid-1980's. For example, Yellowstone cutthroat trout populations rebounded after fishing regulations were instituted in the mid-1970's. Buffalo and elk numbers increased after the slaughter on the northern range was terminated. These years were dominated by good whitebark pine seed crops. And, in the early 1980's, Yellowstone bears were discovered to be using army cutworm moths, another high-quality food source. The increasing abundance of these foods was very likely driving growth of the population. More to the point, though, the FS has failed to even consider these drivers in its assessment of past causes of population growth and decline.

If foods were a major cause of past changes in size of the Yellowstone grizzly bear population, then on- going and future threats to key foods is particularly problematic, as discussed elsewhere in this letter. In its analysis, FS must evaluate alternative hypotheses, including the relationship between increased bear numbers and foods.

Another hypothesis pertains to the role of NGO's. NGO's were a key agent of positive change through litigation. The FS would never have closed hundreds of miles of roads as required by scientific evidence were it not for

litigation brought by NGO's.

Examining assumptions about how the causes of past progress matters because it provides important context for FS to examine the role of declining foods and removal of provisions for litigation under federal law.

17. FS fails to specify how adaptive management will occur. FS maintains that its plan will "allow for adaptive management as environmental conditions change." But the FS demonstrates little if any understanding of the theory and practice of adaptive management nor makes any reference to the extensive literature on this topic. In fact, adaptive management requires rigor, not only in monitoring, and the articulation of desired future conditions, but also in framing and testing explicit hypotheses through management actions deliberately designed to achieve certain effects (Holling, 1978; Walters 1986). There is probably no better example of adaptive management in practice than that underway in connection with the Glen Canyon Dam Adaptive Management Program (e.g., Melis et al., 2015). The FS would be well-advised to not only look to this example for lessons but also consult the basic literature on adaptive management.

Among other things, the success of adaptive management depends on: a. a clear and comprehensive understanding of changing conditions, and, b. specific triggers that would prompt timely management action. As previously discussed, the FS plan is sorely lacking in this area. Moreover, the history of FS actions provides little or no evidence of any "adaptive management" by intentional plan other than perhaps as a consequence of coercion by courts, politicians, or public pressure-which, in fact, does not pass muster as adaptive management.

The plan must do more to ensure that management is truly adaptive. Otherwise, FS is asking the public to place blind faith in the ability and willingness of future managers to respond to changing conditions.

18. FS fails to honestly evaluate the effects of management on key grizzly bear foods and direct a more conservative pro-bear approach. FS seems to take that approach that what happens with key bear foods is out of manager's control. This is not true. In light of escalating mortalities and the need for a precautionary approach and the application of the best science, FS must examine a more reasoned cautious way to managing bear foods.

FS has an important role in reframing the discussion about elk as they relate to grizzly bears as well. FS should undertake an analysis of what is happening to elk in the CGNF area and why. The public generally seems not to appreciate that elk numbers have declined significantly and that this decline has had effects on recovery of grizzly bears. While nothing probably can be done here to reverse the effects of deteriorating summer forage conditions or predation, changes can be made in the numbers of elk available for sport harvest, and the ways that disease threats such as chronic wasting disease are handled. FS can at least elucidate the additive effects that hunting has on these other problematic factors.

FS claims that planting of blister rust resistant whitebark pine trees can result in a healthy forest again are patently false. FS must put the planting of these blister rust resistant trees in the context of larger-scale dynamics of disturbance ecology. The agency must frame current restoration activities at the appropriate scale, which is

paltry compared to what has been lost and what will never be recovered. If FS wants to be useful in the arena of whitebark pine restoration, there is much to do, including evaluating treeline krummholz whitebark pine ecology, Clark's nutcracker- whitebark pine relations, and possible chemical resistance in whitebark pine.

These comments are made in the spirit of constructive criticism, with the aim of improving prospects for the bear and the climate that surrounds the debate about the FS plan. I look forward to an opportunity for a thorough and open discussion of the issues raised in this letter.

I appreciate the opportunity to submit these comments. Sincerely,

Louisa L. Willcox