

Comments submitted to the US Fish and Wildlife Service regarding delisting of the Yellowstone Grizzly Bear DPS, Federal Register. Vol. 70, No. 221. (November 17, 2005): 69853–69884.

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Dear Chris,

As wildlife ecologists we firmly support the provisions of the Endangered Species Act, the Recovery Process for threatened and endangered species, and the overall provisions in the Grizzly Bear Recovery Plan. However, for the reasons cited below, we feel that the Yellowstone grizzly bear population should not be taken off the list of threatened species under the provisions of the U.S. Fish and Wildlife Service proposal to remove the Yellowstone grizzly bear population from the list of threatened and endangered species under the Endangered Species Act (70 Fed. Reg. 69854-69884. November 17, 2005). In particular we do not think that grizzly habitat has been adequately protected; and this in turn leads to conditions that do not meet recovery criteria including population viability, genetic variability, adequate management after delisting, and the effects of environmental change.

This proposal in effect determines the boundaries and the management guidelines for a core population of grizzly bears and the reserve containing their core habitat. The general consensus among conservation scientists for nature reserve designs (or biosphere reserves) includes a core area of protected habitat with little to no human development; surrounded by a buffer zone with protections for important habitat and restrictions on human development; surrounded by areas where human developments and activities are paramount (UNESCO 1974, Gregg and McGean 1985, Batisse 1986, Shafer 1990, Noss 2003). Under the delisting proposal the only habitat that is fully protected is a portion of the reserve that is managed by the National Park Service (Yellowstone and Grand Teton National Parks). This comprises about 40% of currently occupied habitat and supports approximately 200 grizzlies (Schwarz et al. 2005b). A buffer zone surrounding the Parks is enclosed by the Primary Conservation Area (PCA) boundary. Within this buffer zone there are habitat guidelines which are discretionary but not legally binding. Although most of the PCA is National Forest Wilderness, actual protection of habitat is subject to interpretation of the Wilderness Act which states:

“Nothing in this Act shall be deemed to be in interference with the purpose for which national forests are established as set forth in the Act of June 4, 1897 (30 Stat. 11), and the Multiple-Use Sustained-Yield Act of June 12, 1960 (74 Stat. 215).”

And,

“Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be

responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use.”

(Section 4(a). Wilderness Act 1964)

The primary management goal for wilderness is the preservation of the wilderness character. However, other permitted uses of the federal land from which the wilderness area was withdrawn may continue if they do not interfere with the preservation of wilderness character. Road building and timber cutting have generally not been permitted in national forest wilderness, but hunting, fishing, and other types of nonmotorized and non-mechanized recreation have been. Grazing of livestock under federal leases has also been permitted.

Within the PCA buffer zone management of the grizzly bear would return to the three states of Idaho, Montana, and Wyoming, which have announced their intention to resume grizzly bear hunting. Federal land management agencies such as the U.S. Forest Service would retain a major role in management of grizzly bear habitat. Guidelines for restricting road building and development would continue on federal lands within the PCA. The PCA contains about 66% of currently occupied range and about 86% of the current population of grizzly bears within the DPS (Schwartz et al. 2002, 2005b).

By limiting road and development restrictions to the PCA, the proposed rule in effect asserts that this portion of the DPS constitutes a reserve of adequate size to maintain a self-sustaining population of grizzly bears in perpetuity with no significant risk of extinction, and that this criterion meets standards for recovery under the ESA. By leaving such restrictions non-binding, the proposed rule relies on the good will of upper level US Forest Service officers and their appointed political supervisors. In effect, the proposed rule relies on good luck (in respect to stochastic events) and good will (in respect to deterministic events).

Beyond the PCA buffer zone the proposed rule effectively creates a secondary zone where grizzlies will be managed at lower densities by the States or prohibited completely even though these are primarily Federal lands containing a large amount of suitable grizzly habitat. This is not a reserve design sufficient to accommodate the stochastic and deterministic changes in habitat and carrying capacity anticipated in the future. We repeat: the effective core of this reserve will guarantee habitat for only about 200 grizzlies under current conditions. These conditions are likely to deteriorate as discussed further in this document.

Other accepted recommendations for nature reserves (Hunter M.L. et al.1988) are:

“2. Nature reserves should contain a range of environments to allow organisms to adjust to long-term environmental change. Peters and Darling (1985) expressed a similar idea in pointing out that reserve designs should anticipate predicted changes in regional temperatures and moisture conditions resulting from carbon-dioxide-induced climate changes and consequent shifts in latitudinal and altitudinal distributions of organisms.

3. Nature reserves should be connected as much as possible by large-scale (continental) corridors that would allow species to change their geographic

distribution in response to climatic changes. The need for habitat corridors to allow organisms to move among nature reserves, thus maintaining gene flow and minimizing local extinction events, has been extensively discussed (Noss & Harris 1986; Simberloff & Cox 1987; Noss 1987). However, the need for bands of suitable habitat along which organisms can shift their geographic distribution is obvious only from a long term perspective. Ideally, there would be wide, almost unbroken, stretches of undisturbed ecosystems running north-south to allow for latitudinal range shifts in response to temperature changes, and east-west to allow for longitudinal shifts in moisture patterns. “

Although these guidelines address considerations of many species rather than just one, and are not required by a strict reading of the grizzly recover criteria: they hold true for long term persistence and should be a part of the overall recovery strategy. Connectivity is essential. "The future of grizzly bear persistent in southwest Canada and northwest USA is likely dependent on management actions that promote and ensure meta-population function" (Proctor et al. 2005).

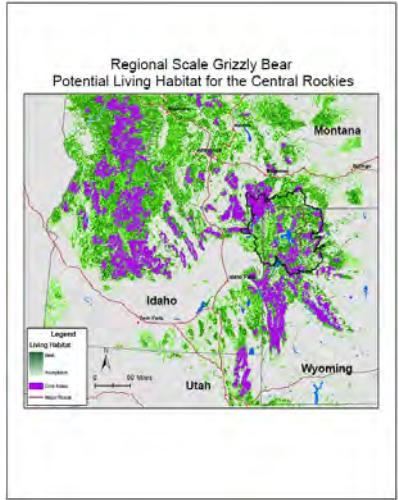
We offer recommendations that we feel would provide an adequate basis for de-listing based upon our research and experience. In brief we feel that the PCA should be designated as the *protected* core of a Greater Yellowstone Reserve and that the rest of the Ecosystem be managed as a buffer zone. If these conditions were met, the Greater Yellowstone Ecosystem would encompass a nature reserve that would be sufficient to allow a core population of grizzly bears to persist for several hundred years under careful management. The map data presented below, and metadata, are available on the Y2Ydata library at <http://y2ydata.msu.montana.edu/>.

For the sake of brevity we have condensed our arguments countering the delisting proposal in the concluding section of this document: many of them have also been argued in additional detail in the submissions presented by the North American Chapter of the Society For Conservation Biology, The Yellowstone to Yukon Conservation Initiative, The Natural Resources Defense Council, Defenders of Wildlife, and EarthJustice.

AN ADEQUATE BASIS FOR DE-LISTING

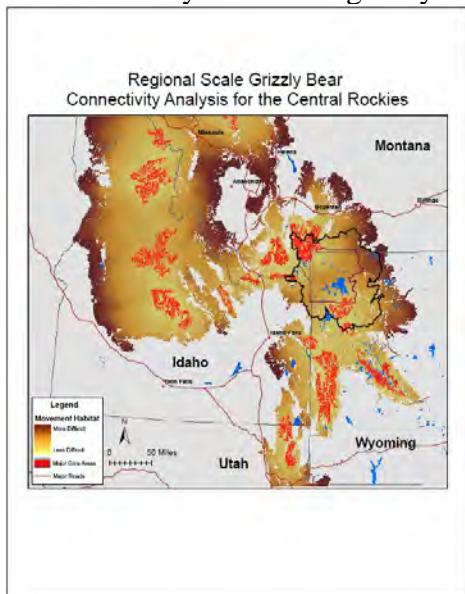
The Craighead Environmental Research Institute has refined a habitat suitability model, based upon expert opinion, which is as accurate as other models including the cumulative effects model or CEM (Olenicki and Craighead 2005a, 2005b, Craighead et al. *in prep* 2006). The CEM has not been applied outside of the Primary Conservation Area (PCA) and the IGBC is therefore unable to assess the relative importance of other habitat by relying on this model. To ensure their long-term survival we need to maintain habitat where bears can live in large enough areas to meet their needs. The map in Figure 1 defines habitat considered acceptable for grizzly bears. Areas in purple on this map are considered “core areas”, contiguous areas at least 50 km² in size of the highest quality habitat. This is the size of an average female home range in the GYE. As these model results indicate there are large areas of suitable habitat and in fact, there is more suitable habitat outside the PCA than inside. In addition many other areas consist of small patches that could not actually support a bear or patches that are distant from existing populations. To fully occupy the best habitat, grizzlies need “connectivity habitat” or “linkage habitat” that will allow them to move between the secure ‘cores’

Figure 1. Suitable habitat for grizzly bears.



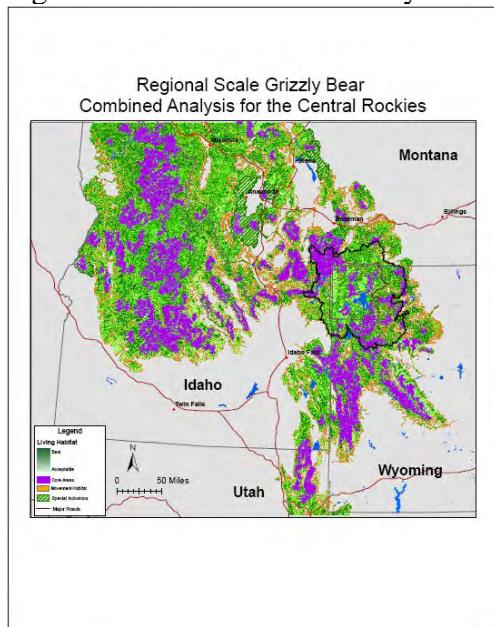
To identify connectivity habitat we used the habitat suitability cost surface (above) and determined the optimal path (least-cost-path) between adjacent core areas: the shortest distance through the best habitat. Areas in red on this map in Figure 2 represent larger core areas >250 km². These are the largest contiguous areas in purple from Figure 1. Using these core areas as a basis, we defined “functional connectivity” between them (brown shading). These are areas animals could potentially move through, according to our expert opinion, based on distance from major cores and habitat variables (including human developments and activities). Light areas represent easy movement, darker areas more difficult, with the boundary representing the greatest distance a bear would likely disperse based on our criteria.

Figure 2. Connectivity habitat for grizzly bears.



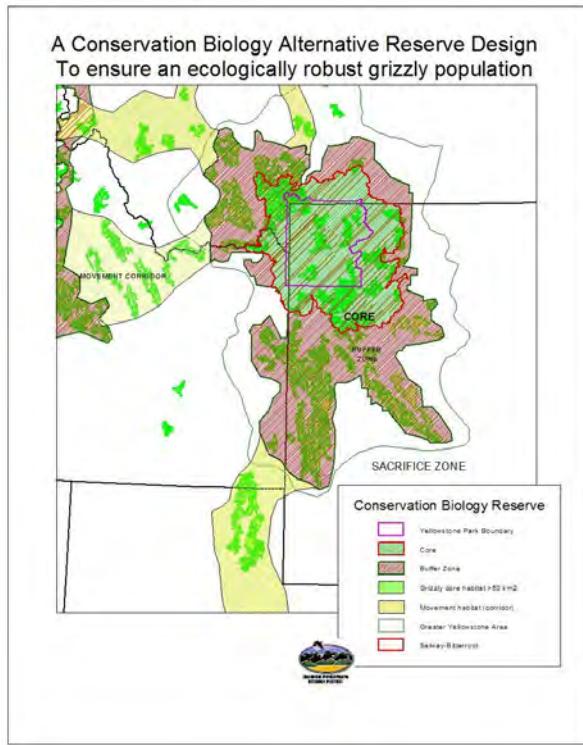
An overall picture of the current condition of grizzly bear core and movement habitat is shown in Figure 3. This map combines the models used to produce Figures 1 and 2. Because of the distances between the large core areas, some connectivity habitat does not show up even though there are smaller core areas and acceptable habitat between them. We are currently mapping many areas at this finer scale using smaller cores; in this map we have indicated two areas as ‘special inclusions’ where there is connectivity at a finer scale. Overall, this map shows areas where it is biologically possible for bears to survive and travel in regions adjacent to the Yellowstone population.

Figure 3. Core and connectivity habitat for grizzly bears.



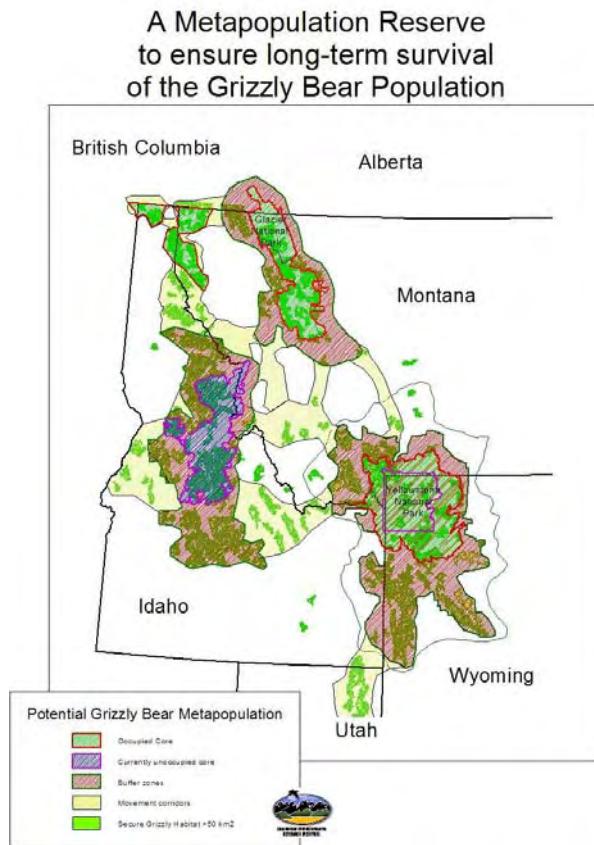
These modeling analyses provide the basis for a Reserve Design that we feel would be adequate to ensure the recovery of the Yellowstone grizzly bear population and allow delisting to occur. A simplified version of this design is shown in Figure 4. Under this alternative proposal we feel that the current PCA should be protected as “Core” habitat with a “Buffer Zone” immediately around the Core that encompasses suitable habitat in Wyoming, Montana, and Idaho. The core area should be given full habitat protection equivalent to a National Park. Grizzlies within the core should be given protection from hunting equivalent to their status in a National Park. These necessary steps will safeguard a population core of roughly 500 bears under current conditions: a minimum number necessary for short-term viability. Such protections are well within the range of possibility: for instance the Interagency Grizzly Bear Committee could petition the US Congress for legal protection for the PCA as a necessary precondition for delisting. The Grizzly Bear Recovery Plan in fact states: “Federal and State regulations should be periodically revised to ensure regulatory adequacy. The Coordinator should initiate revision of Federal regulations through the Federal Register and Code of Federal regulations “ (USFWS 1993).

Figure 4. A simplified map of a proposed reserve design.



- The protected Core should provide refuge for at least a minimum viable population. There should be no human-caused loss of habit or unnecessary mortality to ensure that the core population can persist; and these conditions should be guaranteed by law. The grizzly bear population is the primary resource.
- The semi-protected Buffer Zone should provide enough habitat and security to buffer the core population against environmental, demographic, and genetic stochasticity. Other resource uses must be balanced carefully against these needs.
- Beyond the Buffer Zone other resource uses have primacy and grizzly occupancy will be mostly discouraged except for ‘movement corridors’ or connectivity habitat where transient animals will be tolerated and encouraged. Attractants and mortality sinks will be managed against.
- The Greater Yellowstone Ecosystem grizzly population should be managed as a part of a greater US Rocky Mountain Grizzly Bear Metapopulation: core protected habitat should be maintained for 3 major population centers as depicted in Figure 5.
- These boundaries are approximate, and should be determined by the appropriate agencies, but should include most of the identified core habitat larger than 50 km².

Figure 5. A simplified map of the grizzly bear metapopulation reserve design.



In conclusion, we recommend that the following conditions be met in order to remove the Yellowstone grizzly population from the list of threatened species under the ESA:

- 1) The US Forest Service must guarantee habitat protection for all grizzly habitat on Forest lands within the PCA (recovery Zone): either the Forest Service or the IGBC should ask Congress to give all public lands in the PCA permanent legal habitat protection, or ask that they be added to Yellowstone and Teton National Parks.
- 2) The USFS will manage all actual and potential grizzly habitat outside of the PCA as it is currently proposed to be managed inside the PCA; with limited habitat alteration and no increase in road access. The States of Wyoming, Idaho, Montana, Utah, and Washington will similarly manage State lands containing suitable grizzly habitat.
- 3) The States of MT, WY, and ID will prohibit sport hunting within the PCA; and will carefully manage hunting outside the PCA so that it will not limit dispersal into any and all suitable habitat on public lands.
- 4) All land management agencies with jurisdiction in this region will manage for biodiversity and encourage grizzly bear dispersal into all areas identified as movement

habitat and encourage recolonization and/or augmentation into identified core habitat in Central Idaho and Utah.

- 5) The US Fish and Wildlife Service will re-instate the Selway-Bitterroot grizzly bear reintroduction that was cancelled for political reasons.

INADEQUACIES OF THE CURRENT DE-LISTING PROPOSAL

1) INADEQUATE CONSIDERATION OF LONG-TERM THREATS

a. Threats to habitat and food resources

The rule does not adequately consider long-term threats to the Yellowstone population, and insights from conservation science on how to craft recovery goals to address such threats. Although some simplistic population viability analyses (PVA) predict low extinction risk for the Yellowstone population, these PVAs ignore likely future declines in habitat quality due to 1) land-use trends such as exurban development and road-building that permanently remove suitable habitat, and 2) long-term declines in food resources within otherwise protected habitat.

The GYE has one of the highest human population growth rates in the U.S., due in part to immigration of people attracted by the region's scenic and recreational values. This has stimulated widespread development of biologically-important habitat, such as riparian areas, and impacted recovery of the grizzly bear. Resource extraction activities such as oil and gas development and logging also continue to degrade potential habitat, primarily through building of new roads.

Although grizzly bears have widely varied diets, in Yellowstone they feed heavily on four key foods: whitebark pine, Yellowstone cutthroat trout, Army cutworm moths, and ungulates. Whitebark pine is declining in many portions of the Yellowstone area due to mountain pine beetles, white pine blister rust, and global warming. Yellowstone cutthroat trout have been reduced due to the introduction of lake trout in Yellowstone Lake. Army cutworm moths may suffer declines due to climate change or control of the larvae by pesticides in alfalfa and wheat fields.

b. Loss of genetic variability

An isolated population of 600 bears requires gene flow from other populations to maintain and increase genetic variability. Current estimates of the genetic effective population size (N_e) of the Yellowstone population range from only 13-65 (Paetkau et al. 1998) to slightly over 100 (Miller and Waits 2003), well below the level of 500-5000 recommended for preventing genetic impoverishment. The retained genetic heterozygosity is estimated at 75% which is less than zoos manage for and the inbreeding coefficient of grizzly bears in the Yellowstone population is estimated at 0.125 (Gilpin, pers. comm.. 2006): this is what one would get from a marriage of first cousins. The proposed rule relies on genetic augmentation through importation of bears from other populations to avoid viability risks (e.g., inbreeding depression) associated with small populations.

While this method has been examined theoretically (Miller and Waits 2003), the modeling exercise was based on the genetic variability within the NCDE remaining at

current levels – which is not at all certain given current and future pressures on that region. Further, the success rate of translocations is uncertain into habitat that is already fully occupied by grizzlies. Of 4 females translocated into the Cabinet-Yaak ecosystem from 1990-1994, there is evidence of only one successfully breeding (Kasworm et al. 2004). Although her offspring may yet survive and breed, this evidence suggests that it may be necessary to translocate 8 or more female bears per generation in order to have 1-2 successful transplants. Current recommendations for the Cabinets are to introduce 12 females into the Cabinet mountains and 20 bears each into the Canadian Purcell-Yaak and South Selkirk populations in a generation (Proctor et al. 2004) and the authors warn that it may take more than that to achieve the net gains predicted by their models. It should be even more difficult for a translocated bear to become established and breed in the Yellowstone population which current demographic and population expansion data (Schwartz et al. 2005) indicate is currently at or near carrying capacity where competition will be greater than in the Cabinets.

We believe the solution to maintaining genetic diversity in the Yellowstone population lies not in agency-engineered translocation but rather includes: 1) the establishment of a grizzly bear population in central Idaho, and 2) restoration and enhanced occupancy of the connective habitat between Yellowstone and central Idaho, and between Yellowstone and the NCDE. We disagree with the USFWS opinion that cancellation of the proposed reintroduction efforts in the Selway-Bitterroot recovery area makes connectivity issues irrelevant (70 FR 69864).

2) INADEQUATE REGULATORY MECHANISMS BY STATE FISH AND WILDLIFE AGENCIES AND FEDERAL AGENCIES

The rule relies on guidelines for habitat protection and management by federal (US Forest Service) and state (fish and wildlife) agencies. However, these regulations are largely discretionary and thus do not currently offer the guarantees of long-term protection of habitat and management of hunting that are required to delist a population under the ESA. Both Wyoming and Idaho have made *a priori* decisions to prevent the re-occupation of historic range should grizzlies disperse to those regions (Moody et al. 2005, Orme et al. 2002).

3) MISAPPLICATION OF DPS POLICY

The rule misapplies policy regarding Distinct Population Segments (DPS), in that it does not consider the effect of delisting the Yellowstone population on rangewide recovery of the species. Modern conservation science endorses the conclusion that recovery goals should consider not only short-term persistence of a population but also its long-term viability, genetic and evolutionary potential, and ecosystem role.

The proposed rule's minimal definition of suitable habitat within the GYE and generally non-precautionary strategy toward threats to viability essentially guarantee that, even if the GYE population itself remains viable, no grizzly bears will disperse to adjacent areas outside the DPS. Delisting within the GYE may therefore preclude recovery in adjacent regions. As the DPS policy states, "loss of an interstitial population could well have consequences for gene flow and demographic stability of a species as a whole." Rather than consider Yellowstone delisting as part of a broader strategy for recovery, the current proposal seeks to prematurely downgrade protection for the

population with the largest potential role in rangewide recovery. The argument that delisting will enhance rangewide recovery by redirecting resources to other recovery areas is specious, since the same political figures promoting Yellowstone delisting have blocked reintroduction of grizzly bears to central Idaho and thus would be unlikely to support effective recovery efforts outside the GYE. The proposed genetic augmentation program, will import alleles from outside the Yellowstone population thus artificially attempting to modify the genetic character of the population and demonstrating unequivocally that a Yellowstone grizzly bear DPS is not viable as a standalone entity.

**4) INADEQUATE PROTECTION OF CRITICAL (Management Situation 1)
HABITAT.**

The US Forest Service would limit habitat protections for grizzly bears to the Primary Conservation Area (PCA), which encompasses about 66% of current grizzly bear range. These habitat protections are discretionary and non-binding and are thus subject to FS policy changes. Post-delisting management would effectively confine the grizzly bear population to the PCA. This area is probably inadequate to support a long-term viable population without intensive management.

Whether or not they meet standards for short-term viability, current recovery plan goals demonstrably fail to meet standards for recovery of evolutionarily-robust populations over longer time horizons. For example, Lande (1995) recommends genetically effective population sizes of greater than 5,000 (i.e., which translates to a census population of approximately 20,000 for grizzly bears; Allendorf et al. 1991) to avoid accumulation of deleterious mutations with resultant adverse effects on viability. These latter standards would require that a larger area of suitable but unoccupied habitat be reoccupied by bears, and thus are at odds with the delisting proposal's minimal definition of suitable habitat. Although the ESA pre-dates modern population viability analysis, the ESA mandate for geographically-widespread recovery also buttresses recovered populations from long-term demographic and genetic threats to viability. A population recovered to all but insignificant portions of its range would by implication be large in numbers, even for species such as grizzly bear that often occur at low densities. A metapopulation consisting of thousands to tens of thousands of grizzly bears would be much more likely to persist over centuries than would an isolated population of less than one thousand such as currently inhabits the Greater Yellowstone Ecoregion.

5) FAILURE TO CONSIDER SIGNIFICANT PORTION OF RANGE

Although the current population meets most of the goals set forth in the 1982 recovery plan, it does not meet current biological and legal standards for recovery. Because the ESA applies its protections to species threatened in all or a significant portion of their range, recovery plans must evaluate both viability issues (will the population persist?) and geographic representation issues (is the species still threatened in significant portions of its range?).

The governors of Montana, Idaho, and Wyoming in 2001 appointed a 15-member citizen roundtable to review the Draft Conservation Strategy for the Grizzly Bear in the Yellowstone Area" developed by the Interagency Grizzly Bear Committee. One of the

recommendations of the panel, echoing the language of the Conservation Strategy, was to “support the expansion of grizzly bears beyond the PCA, into areas that are *biologically suitable and socially acceptable* (italics added). This language: ‘biologically suitable and socially acceptable’, was subsequently incorporated into the State grizzly bear conservation strategies of each of the States. In our reading, there is no equivalent language in the ESA: recovery criteria are entirely based upon biological criteria, and rightly so. This language, particularly the phrase “socially acceptable” has no basis in law as a recovery criterion, and we feel that it interjects a significant element of political bias into the recovery process.

The Wyoming Grizzly Bear Occupancy Management Guidelines (Moody et al 2005) state that: “Human uses, including livestock grazing, timber harvest, oil and gas development, areas of high road densities and recreational activities/developed sites create potential increases for human/grizzly bear conflicts increasing potential for bear mortalities. Areas supporting these human uses are considered socially unacceptable for grizzly bear occupancy.” In effect, this phrase states that criteria other than biological recovery of the species in question can have precedence in the recovery process. In particular it means that sheep, cattle, and horses have precedence over threatened species on public lands; including designated Wilderness areas such as the Popo Agie and the Bridger Wilderness Areas. As such it violates the spirit, if not the letter, of the Wilderness Act. After Delisting, grizzly bears will not be “acceptable” south of the Snake River Canyon and Hoback River, or in the southern half of the Wind River Range south of Boulder Creek (Moody et al 2005).

6) FAILURE TO MEET MANDATES IN THE GRIZZLY BEAR RECOVERY PLAN: LINKAGE ASSESSMENT AND IMPLEMENTATION

Connectivity is mandated by the Grizzly Bear Recovery Plan Linkage Zone Assessment (USFWS 1993) which has never been completed for all 6 recovery zones and existing areas in Canada; much less implemented. We feel that a clear program to maintain and restore connectivity is a necessary prerequisite to delisting the Yellowstone grizzly. Without such a program it is almost certain that the population will become even more isolated.

For mammals, such as the grizzly bear, habitat connectivity is important for individual bears to meet their requirements for feeding, mating, denning and movement within and between habitat areas. At a metapopulation level, dispersal between population centers is important for population persistence (Levins 1970, Hanski and Gilpin 1997). Providing for dispersal between local populations helps ensure genetic exchange, as well as allowing for immigration and emigration in response to epidemic disease, insect outbreaks, climate change or large scale fire that might extirpate one or several local populations (Breitenmoser et al. 2001Hedrick 1996, Hedrick and Gilpin 1996). Historic evidence supports the existence of a true metapopulation structure for grizzly bears in the contiguous United States (Craighead and Vyse 1996). The GYE “...could be managed as one population center of a regional metapopulation: gene flow within the metapopulation would probably increase genetic diversity within each of the component populations (Craighead et al. 1999). Specific to the U.S. grizzly bear metapopulation, modeling work by Boyce et al. (2001) suggests that facilitating dispersal

between the six US subpopulations will increase the probability of bears occupying all subpopulations.

Evidence for historic grizzly bear connectivity suggests that the GYA population was connected to the west and north through the Centennials to the Selway-Bitterroots, to the Cabinet-Yaak and ultimately to Canadian populations (Mattson and Merrill 2002, Merrill 2005). Other evidence indicates historic connectivity to the NCDE through the Big Belt Mountains and alternatively through the Tobacco Root, Highland, Champion-Thunderbolt and/or Elkhorn mountains (Picton 1986, Merriam 1922). Our research supports the existence of effective connectivity habitat through these and other “stepping stones” on public lands.

Sincerely,
Lance Craighead
Barrie Gilbert
Tom Olenicki

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