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Title:

Comments: My comments in general are 1) the revised forest plan should protect more wilderness and continue to limit recreation in roadless areas, and 2) ensusre more protections for lands that provide connectivity for wildlife movement. The proposed Hyalite Recreation Emphasis area should not encroach on the Hyalite-Porcupine Buffalo Horn Wilderness Study Area, and the Recommended Wilderness Area should include the northern portion of the HPBH WSA, at least the portion east of the proposed Palace Butte RNA; to provide connectivity further north for wildlife. The Buffalo Horn drainage should be managed as wilderness. The Forest lands to the north of the HPBH WSA should be given more protection, and motorized and mechanized recreation should be restricted, all the way to I-90. This is the most important connectivity habitat along the Gallatin Crest. The 2012 Planning Rule requires consideration, planning and management for ecological connectivity. It includes explicit requirements for maintaining or restoring ecological connectivity on national forest lands and for facilitating connectivity planning across land ownerships (my emphasis). These may be the first such requirements in the history of U. S. public land management (Haber and Nelson 2015.

The 2012 Planning Rule defines connectivity as: "Ecological conditions that exist at several spatial and temporal scales that provide landscape linkages that permit the exchange of flow, sediments, and nutrients; the daily and seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long distance range shifts of species, such as in response to climate change. " (219.19). This definition reflects both structural and functional aspects of connectivity. The rule's reference to spatial scales and "landscape linkages" suggests a spatial structure of connected patches and ecosystems. References to water flows, sediment exchange, nutrient cycling, animal movement/dispersal, species climate adaptation and genetic interchange are functional characteristics - ecological processes - that are sustained by connectivity (Haber and Nelson 2015b).

The HPBH WSA is a critical landscape for wildlife connectivity both locally and regionally between Yellowstone National Park and protected areas to the north and northwest. Connectivity for wildlife is an increasingly important concept to be addressed in management decisions for maintaining long term persistence of wildlife populations by helping ensure the resilience (ability to adapt to change) of those populations. A connectivity strategy is a key element in Forest Plan Revisions mandated by the 2012 Planning Rule.

The Forest Service Strategic Framework for Responding to Climate Change (The Roadmap), introduced in 2008 in response to the USDA 2010-2015 Strategic Plan, is another program that includes "development of wildlife corridors to facilitate migration" as a strategy to address climate change effects. This framework is described in the 'National Roadmap for Responding to Climate Change' (USDA Forest Service 2011:

www.fs.fed.us/climatechange/pdf/Roadmapfinal.pdf). One of the 'immediate initiatives' in the roadmap is connecting habitats to improve adaptive capacity by:

*Collaborating with partners to develop strategies that identify priority locations for maintaining and restoring habitat connectivity.

*Seeking partnerships with private landowners to provide migration corridors across private lands.

*Removing or modifying physical impediments to species movement most likely to be affected by climate change. *Managing forest and grassland ecosystems to reduce habitat fragmentation.

*Continuing to develop and restore important habitat corridors for fish and wildlife.

Connectivity for wildlife through the Gallatin Crest has been summarized in the report: Wilderness, Wildlife, and Ecological Values of the Hyalite-Porcupine-Buffalo Horn Wilderness Study Area - A Report for the Lee and Donna Metcalf Foundation by The Craighead Institute (Craighead, 2015),

(http://www.craigheadresearch.org/wilderness-study-areas-and-wildlife.html), which was provided to the C-G National Forest Planning Team during the first comment period. Numerous analyses have identified the Gallatin Crest as a key corridor for wildlife movement, especially grizzly bears, going north and south into or out of the

GYE.

The first connectivity analaysis for grizzly bears was published by Walker and Craighead in the Proceedings of the ESRI Users Conference: "Analyzing Wildlife Movement Corridors in Montana Using GIS" (Walker and Craighead 1997). The primary movement route, using a least-cost-path, between the GYE and the NCDE includes the HPBH WSA.

(https://www.researchgate.net/publication/297734026_Analyzing_Wildlife_Movement_Corridors_in_Montana_Usi ng_GIS) Each of successive analyses have refined the approach and incorporated additional data as discussed in. More recently the IGBST published "Potential paths for male-mediated gene flow to and from an isolated grizzly bear population" (Peck et. al 2017) (http://onlinelibrary.wiley.com/doi/10.1002/ecs2.1969/full).

A Powerpoint Presentation showing several relevant corridor modeling analyses is included with these comments. There is concern in the scientific and conservation communities that the Forest Service Planning Team dismisses these types of analyses as "just models" as though they were not developed using the best available science, as they have been. The IGBST model is based upon accurate, known, GPS locations of grizzly bears (along with 21 locations of confirmed grizzly bear presence), and some of the other models are based upon expert opinion derived from decades of observations of grizzly bear habitat use. They represent the 'best available science' of grizzly bear (and other wildlife species in cases where grizzlies serve as umbrella species) movement.

The movement routes these models identify represent the best habitat with the least risk of conflict for wildlife connectivity, and as such should be managed to provide habitat protection and lack of disturbance due to recreation so that species can respond to climate change and also effect gene flow between populations. The US Forest Service is mandated to "improve habitat to improve adaptive capacity" by the steps discussed above.

Undisturbed roadless areas, particularly Wilderness areas, are critical for the health and maintenance of wildlife populations that are treasured by everyone in the United States; not just Montana. The fact that the C-GNF has more protected area than some other Forests is irrelevant; it is one of the few places left where we can maintain healthy ecosystems as the climate changes and human populations expand. There are about 230,000 acres of potential wilderness in the C-GNF but only about 85,000 acres are recommended for wilderness designation. The C-GNF should be managed with the big picture in mind and all 230,000 undisturbed acres that are left should be managed for the benefit of wildlife and habitat. The HPBH WSA is virtually all critical grizzly bear habitat as kernel density modeling by the IGBST has demonstrated. It is available on the IGBST website as well: https://www.usgs.gov/media/images/animated-image-showing-grizzly-bear-range-expansion-gye-1990-2016 Described in: https://pubs.er.usgs.gov/publication/70131504

Whether or not grizzly bears are finally delisted in Montana, the currently occupied grizzly bear range should be managed as critical habitat.

Thank you, Frank Lance Craighead