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Comments:

The Custer Gallatin National Forest is facing unprecedented challenges. Climate change, societal demands, fire, and the need for maintaining the integrity of the Greater Yellowstone Ecosystem (GYE) just to name a few. On March 1, 2019, the Custer Gallatin National Forest (CGNF) released their draft Environmental Impact Statement (DEIS) for the Draft Revised Forest Plan (DRFP). Our main focus as we look toward the future, the focus that we want to see addressed, is how is this plan going to make the CGNF better? Based upon that point, how is this plan going to maintain the integrity of the GYE? How will suitability and sustainability be managed for the forest of tomorrow?

Contained below for your active consideration are comments from the Gallatin Wildlife Association (GWA). GWA has long been involved in the active participation and discussion with CGNF pertaining to issues of wildlife and wildlife habitat. Our organization is deeply concerned about the long-term effects that increased recreational and exploitive demands will place upon wildlife and fisheries in southwest Montana. In the January/February 2017 edition of Sierra Club's magazine "Sierra",¹ E.O. Wilson submitted an article entitled Fifty-Fifty, which pertains to his Half-Earth Project. In that article he said:

"Only by committing half of the planet's surface to nature can we hope to save the immensity of life-forms that compose it."

This philosophy is no more relevant than in today's world. Nearly two-thirds of the way through the comment period of the CGNF Revision Plan, we learned on May 6, 2019 of a Washington Post article (Fears, Darryl, 2019)² containing this headline:

"One million species face extinction, U.N. report says. And humans will suffer as a result."

Further on in the story we learn of a United Nations Press Release from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)³. According to the Washington Post article, this report had seven lead co-authors from universities around the world.⁴ In that release, there was a link to the actual report, in which the first paragraph reads as follows:

"Nature is declining globally at rates unprecedented in human history [mdash] and the rate of species extinctions is accelerating, with grave impacts on people around the world now likely, warns a landmark new

report from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), the summary of which was approved at the 7th session of the IPBES Plenary, meeting last week (29 April - 4 May) in Paris."

This United Nations report substantiates the words of E.O. Wilson. And that has no better application than right here in the Greater Yellowstone Ecosystem where we can help fight species depletion and a declining natural world. The GYE is recognized as the best intact ecosystem in the lower 48, and it is widely recognized as one of the last remaining and best functioning temperate ecosystems in the world. Dr. Doug Smith, Senior Wildlife Biologist for Yellowstone National Park (YNP), claimed that fact recently at a lecture at the Museum of the Rockies in Bozeman.

The mission of GWA tries to be true to that goal. The Gallatin Wildlife Association is a nonprofit wildlife conservation organization representing hunters, anglers and other wildlife advocates in Southwest Montana and elsewhere. Our mission is to protect habitat and conserve fish and wildlife. GWA supports sustainable management of fish and wildlife populations through fair chase public hunting and fishing opportunities that will ensure these traditions are passed on for future generations to enjoy. We support the Montana constitution which states: "The opportunity to harvest wild game is a heritage that shall forever be preserved" and that "the legislature shall provide adequate remedies to prevent unreasonable depletion of natural resources." We appreciate this opportunity to comment.

Introduction:

This DRFP is the first attempt at a Forest Plan since the consolidation of the Custer and Gallatin National Forests in 2014. These two forests were combined for the purpose of cost and resource sharing singularly to be administered out of Bozeman, Montana. As a result, today the CGNF, United States Forest Service Region 1 - Missoula, Montana, administers over three million acres with the help of seven Ranger Districts in two states. The forest is divided into six geographical areas covering a span of over 400 miles. Within this administrative boundary, it should come as no surprise there are a vast array of differences in the geology, ecology, climate, land use, social economics, and culture. We believe it is also safe to say local demands which are placed upon the breadth of the forest by local user groups differ in scope and intensity. Our statement is borne out on page seven of the Introduction of the DRFP:

"The Custer Gallatin is among the most ecologically, socially, economically, and culturally diverse national forest in the Forest Service's Northern Region."

With this diversity comes a challenge for the public to comment intelligently on the totality and breadth of the forest. With these vast scopes and differences, it poses the question as to why the Custer National Forest would not have been better off merging with National Forests closer in distance and demographics.

But there is another first in regard to this DRFP. It is the first time CGNF is under mandate to prepare their new Forest Plan utilizing the Forest Service 2012 Planning Rules. GWA realizes that these efforts consume an enormous amount of time and manpower, especially over a forest with such an expansive diversity. Perhaps the implementation and/or interpretation of the 2012 Planning Rule helps explain the serious decline in the Forest Service's recognition of and support for rare and declining species on the CGNF. More on this issue later on in our comments.

The draft plan consists of five alternatives including Alternative A, the "No Action" Alternative. The other alternatives are B, C, D and E. GWA was confused early on in the commenting process whether or not the DRFP had a "Preferred Alternative". GWA only learned later in the process that there was none. The confusion was due to the wording in the Summary Draft on page 5 calling Alternative B the "proposed action" and yet on page 6 of the DRFP, it states there is no preferred alternative. This should have been better clarified for the public.

There is a distinct difference between alternatives in the amount of acreage designated for recommended wilderness, backcountry areas and recreational emphasis areas. GWA is concerned with the positioning of Alternatives D and E in its presentation. We fear many people may look at these two options side by side and consider them both extreme and refuse to seriously consider either one. We obviously do not believe Alternative D is extreme. There is a simple description of Alternative D on page 6 of the Summary DEIS characterizing the overall intent as follows:

"Alternative D was developed to address comments and themes of emphasizing natural processes and restoration."

We obviously do not believe that a decision which would emphasize natural processes and restoration is extreme. In fact, GWA believes that Alternative D is more in tune with the goals and understanding of the 2012 Planning Rule than any other alternative.

GWA is pleased there is an honest assessment of forest conditions. The DEIS seems to be that document. The DEIS states the pressures and stressors that befall the CGNF and as a result, paints a more accurate portrayal of reality on the ground. We believe the DEIS supports all of the alternatives in the DRFP. Yet surprisingly, there does seem to be a difference in the overall tone between the DEIS and the DRFP. The majority of DRFP alternatives seem to favor "use" rather than "protection" and yet it is "protection" that the DEIS seems to scream out for. Problems do confront the forest, but it seems the DRFP is either overlooking them or minimizing them. The DRFP needs to reflect the reality on the ground as much as the DEIS and showcase the best path forward to mitigate those stressors. The future of the Revised Forest Plan cannot just be a giveaway for every demand placed upon it by user groups.

Wilderness:

If we are serious in the goal of preserving species on this planet as stated in E.O. Wilson's writing Fifty-Fifty, a writing that pertains to Wilson's Half Earth Project, then the protection of wilderness is paramount. To be true to E. O. Wilson's quote, all of these proposed wilderness designations would be essential to maintain the integrity of our forests. It takes all of the parts to make up the whole. Leaving out portions of any credible wilderness weakens that integrity. How can we protect the variety and diversity of lifeforms anywhere if we have no place for them to exist?

The GYE is believed to be the only intact temperate zone ecosystem in the lower United States, but it is becoming increasingly isolated by growing human populations and development. This influx of human activity further isolates the habitats of plants and animals to the north and northwest. The isolation is particularly threatening to populations of large mammals, as it will result in a gradual deterioration of population genetics

and population resilience in the GYE. The Gallatin Range must remain in wilderness condition to provide a northward connection with other mountain ecosystems in the northern Rocky Mountains.

The debate over wilderness can be one of the more heated issues in our society. But it is not hard to understand why when the issue of wilderness has been misrepresented to the public, many times by those who are in charge of managing our public lands. This misrepresentation occurs when we contrast wilderness' equivalence with recreation. This should never happen as it minimizes wilderness to its most simplistic terms.

Wilderness maintains the diversity of the forests; maintains wildlife and its habitat; provides security and connectivity; conserves the landscape; and protects the watershed and the quantity and quality of water. Actually, wilderness fulfills many of the concepts that fall under the Multiple Use-Sustained Yield Act of 1960. So why is wilderness only discussed in public terms as another form of recreation? This has been an error in its presentation and has only increased the confusion, the conflict, and the controversy in the public arena.

There is scientific rationale for wilderness, but as long as the Forest Service is willing to pay more attention to keeping user groups happy, science will be discarded. E.O. Wilson's quote above, the dangers of ecosystem isolation, and the benefactors of maintaining wilderness are all based upon science. But perhaps a scientific reference from the Craighead Institute will provide more credence. In a research paper entitled Wilderness, Wildlife, and Ecological Values of the Hyalite-Porcupine-Buffalo Horn Wilderness Study Area (Craighead, Lance 2015)⁵, a paper funded by the Lee and Donna Metcalf Foundation, the last paragraph on page 8 of the Executive Summary describes the importance of natural processes which occur in wilderness.

"Intact ecosystems which are not fragmented by human developments or degraded by human activities are important for many reasons. These include the provision of ecosystems services such as clean air and clean water, climate regulation, soil formation, nutrient cycling, and harvesting of food, fuel, fibers, and pharmaceuticals. Ecosystems also provide spiritual and psychological benefits whose values are not yet well understood. These benefits, like many others derived from wild places, cannot be exactly measured in traditional economic terms."

The following paragraph from page 6 of Lance Craighead's work further states scientific rationale for wilderness. The benefits of maintaining our roadless areas and wilderness cannot be overstated enough, especially in times of a warming world.

"Although solitude and primitive types of recreation are still important wilderness values, we have learned much more about the ecological importance of wilderness areas in the decades since the Wilderness Act, and the Montana Wilderness Study Act, were passed. We now know that intact, roadless areas of secure habitat are critical for maintaining healthy ecosystems, particularly in the face of our rapidly changing climate. Intact, functioning ecosystems are our best hope for removing carbon dioxide from the atmosphere and sequestering it, and for buffering the impacts of climate change. Intact areas with wilderness characteristics are essential for maintaining the fish and wildlife populations that provide Montanans with a quality of life that has disappeared from most other states."

Inventoried Roadless Areas:

We know roadless areas have their value. They provide habitat for wildlife and maintain forest integrity, all the scientific rationale that wilderness areas provide. But the Inventoried Roadless Area (IRA) lands, specifically those within the GYE, are included in national legislation called the Northern Rockies Ecosystem Protection Act. This legislation was reintroduced in 2019 under House Bill 1321 and Senate Bill 827. Those IRA lands within this DRFP are contained within proposed legislation. The map below indicates those boundaries. These roadless areas have national value as they are the last of the last and must be managed for potential inclusion as wilderness. The map provided below is from the Alliance for the Wild Rockies.⁶

<https://allianceforthewildrockies.org/nrepa>

To reiterate from page 6 of Lance Craighead's work: "We now know that intact, roadless areas of secure habitat are critical for maintaining healthy ecosystems, particularly in the face of our rapidly changing climate." Section 3.21.6 of the DEIS claims there are nearly 848,091 acres of land classified as Inventoried Roadless Areas. That amounts to nearly 28% of all lands within the CGNF. That is a significant amount of roadless areas for the 21st century, and is perhaps one reason for the diversity of wildlife and for the nearly intact ecosystem that we have. But that has been changing as we speak.

With regard to current alternatives, Alternatives A, B, and C only recommend 4%, 13%, and 17% (respectively) of all IRA lands as wilderness. These alternatives don't do justice in meeting the goal of wilderness protection for all lands having wilderness character. On the other hand, Table 166 on page 760 of the DEIS lists Alternative D incorporating 73% of those IRA lands as wilderness. GWA believes this is what it means to emphasize natural processes.

Recommended Wilderness Areas:

Four alternatives of the DRFP have set aside acreage for wilderness designation; the only one not having done so is Alternative E. Alternatives A, B, C, D, and E have 7, 9, 9, 39, and 0 number of recommended wilderness areas (RWA), which are composed of 33,741, 113,952, 146,555, 711,425 and 0 acres of recommended wilderness respectively. Wilderness characteristics persist across the entirety of 711,425 acres of CGNF land listed in Alternative D. One of the more obvious choices for wilderness is the already existing Hyalite Porcupine Buffalo Horn Wilderness Study Area (HPBH WSA) of the Gallatin Range at 155,000 acres. Portions of the Lionhead, Cowboy's Heaven, Crazy Mountains, Bridger Range, Pryor Mountains, and Tongue River Breaks in eastern Montana contain suitable areas as wilderness and should be recommended as such. In addition, there are other key additions to existing wilderness such as Emigrant Peak, Dome Mountain, Tie Creek, Deer Creek, Rock Creek, Line Creek Plateau, etc. to the AB Wilderness, and additions to the Lee Metcalf Wilderness.

GWA supports Alternative D, although we would like to recommend these two additional standards for the component.

1. These lands must be managed to maintain wilderness character.
2. There should be a standard or guideline stating that mechanized or motorized use in wilderness areas should be prohibited.

Even though the Wilderness Act of 1964 prohibits mechanized and motorized use in wilderness areas, GWA would like to ensure these standards to be instilled in the DRFP. All other alternatives of the DRFP are unacceptable in terms of acreage recommended for wilderness. They are unacceptable for the sake of

wilderness, for the sake of forest health, and for the sake of wildlife. GWA believes that maintaining the integrity of the GYE is paramount whereas the other alternatives sacrifice and risk our heritage to no end.

Backcountry Areas: A False Equivalency

Within the DRFP, on pages 131 and 132 there is an introduction of a land-use designation entitled "Backcountry Areas" (BCA). While this designation provides some protective qualities to the resource, the decision of how to manage these lands is ultimately administratively driven. This designation does not provide the security of a Congressional act. Pressure by local, organized user groups could easily sway administrative land-use determinations. There is no consistency from one BCA to another other than they seemed to be based upon input from local recreationists as some BCA allow mechanized vehicles and some don't, and some allow motorized vehicles and some don't, and some allow both. An example of this is found on pages 186 and 187 of the DRFP. The DRFP allows for motorized and/or mechanized recreation opportunities in the Buffalo Horn, Lionhead, West Pine and Cowboy Heaven Backcountry Areas.

This designation seems to be used in an effort to perhaps encourage some preservation groups to accept fewer acres of wilderness in order to increase acreages for backcountry areas. For example, on Table 2, page 8 of the Summary of the DEIS for the Draft Revised Forest Plan, there are these statistics:

The problem with this administrative land-use designation is that it does not provide the assurances of preservation which is associated with a designation of wilderness. The classification of BCA is much more recreation driven than preservation. Even though this designation does not allow for permanent road construction, it does allow for temporary roads. It also allows timber harvest for the purposes of fuel reduction, restoration, and wildlife habitat enhancement. There is no protection here. The loss of wilderness would be permanent. The intrusion of man deeper into the forests would be complete. This land-use designation is not a protective measure but an exploitive one. GWA rejects this action in lieu of wilderness.

The Gallatin Range:

The future of wilderness designation in the Gallatin Range has been an unfulfilled and unreachable goal by many in the Gallatin Valley for years. The issue has provided one of the more heated debates among the citizenry in the process. It's been stated the GYE is the most intact ecosystem in the lower 48 states. Protection as a result of the HPBH WSA has been part of that history. But with that said, the Gallatin Range is still the only mountain range originating in YNP not yet having permanent wilderness protection. Protection of CGNF lands in the Gallatin Range needs to be done in order to secure the integrity of the entirety of the Greater Yellowstone Ecosystem.

We will once again refer back to the paper by the Craighead Institute Wilderness, Wildlife, and Ecological Values of the Hyalite-Porcupine-Buffalo Horn Wilderness Study Area (page 8):

"Based on the data and information contained in this report, the HPBH WSA can be considered an intact 'ecosystem' or critical component of a larger ecosystem, the GYE, and as such should be protected from

further human alteration and disturbance. This protection should be as restrictive of human uses as possible and should be as permanent as possible."

Of the five proposed alternatives, only one maintains the acreage originally proposed in the HPBH WSA. That alternative, Alternative D, is the only one which seems to recognize the value set forth in the Montana Wilderness Study Act of 1977. GWA believes keeping the entirety of the HPBH WSA is an imperative.

The Heart of the HPBH WSA:

One reason, if not the only reason, the HPBH WSA failed to become wilderness alongside the Lee Metcalf Wilderness in 1983 was the checkerboard nature of the Gallatin Range. That issue is resolved now as a result of many tireless hours by those trying to secure wilderness protection. We are thankful for the Forest Service recognizing the need and demand to incorporate the original Wilderness Study Area (WSA) into an alternative, one supported by the compromise reached in 1977. But we question why the other alternatives did not follow suit. And we question why other organizations are willing to throw away an already reached compromise.

GWA would like to refer the CGNF and others back to the testimony of Montana Fish, Wildlife and Parks (MFWP) of 1993. This was at a time when MFWP and many non-governmental organizations (NGO)s provided testimony before Congress on March 23, 1993. The discussion takes place as MFWP and others were trying to secure passage of H.R. 873, The Gallatin Range Consolidation and Protection Act, a bill to resolve the checkerboard nature of private and federal land on the Gallatin Range.

"If the exchange fails - then kiss the WSA Goodbye

If the exchange fails, we'll lose much, much more than the 43,000 acres in the heart of the Porcupine/Gallatin WSA because just about every other section of the 155,000-acre WSA is private land (in a swiss-cheese or checkerboard pattern).

If we lose the heart then we've basically lost the entire WSA - which was established by Congress 16 years ago.

If the exchange fails, then the resultant habitat fragmentation will be devastating.

Remember that the Porcupine /Gallatin, Taylor Fork and South Cottonwood wildlands are critical habitat for large elk herds, numerous grizzly bears, and healthy populations of bighorn sheep, moose and deer, plus pristine watersheds that the Federal Government has been trying to place into public ownership since 1925.

These wildlands include some of the most important wildlife/biological corridors in the West. These values will be destroyed if this land exchange fails."

Now that these lands have been secured into the public domain, we have to ask the question, how can we exclude these exact same lands from wilderness in the year 2019 when these very lands were described as the "heart of the WSA", the very lands that were being touted as the rationale for wilderness as recently as 1993? GWA supported wilderness designation in 1993 and we support wilderness for the HPBH WSA in 2019. We have copies of that testimony from other groups as well stating their demands that H.R. 873 should pass for the purpose of wilderness designation.

Demands placed upon the forest by an ever-increasing population are only going to intensify. Climate change affects are only going to become more evident. The Gallatin Range is such a unique landscape for wildlife; its geographic setting makes it critical that the ecological balance of the GYE is maintained. The Gallatin Range provides habitat for elk, grizzly bears, bison, wolves and wolverines, and many more species the Montana Natural Heritage Program (MNHP)⁸ considers to be Species of Concern. In fact, the MNHP lists 28 birds, 7 mammals, 3 fish, 2 amphibians, and 4 invertebrates as either "at risk" or declining in numbers, 44 species in all, all within the Gallatin Range. Link found here:

<http://mtnhnp.org/SpeciesSnapshot/>

The Gallatin Range provides connectivity corridors to the north, which is utmost in its importance to reestablish that lost contact with other ecosystems such as the Northern Continental Divide Ecosystem.

Table 149 on page 738 in the DEIS states that 142,456 acres of original 144,064 acres of IRAs in the HPBH WSA are recommended as wilderness. That computes to nearly 99% of those original lands in the Gallatins to be set aside for wilderness as wilderness, lands having already been determined to meet criteria of having wilderness character. Once again, GWA would like to refer the CGNF to the published paper by the Craighead Institute, Wilderness, Wildlife, and Ecological Values of the Hyalite-Porcupine-Buffalo Horn Wilderness Study Area (Craighead, Lance page 133)⁹:

"By all these criteria, the HPBH WSA certainly qualifies for wilderness designation. In particular, its ecological features, as discussed in this report, highlight its importance for maintaining native plant and animal populations, and the ecosystem services they provide, into the future. Wilderness areas were originally valued for the "opportunities for solitude or a primitive and unconfined type of recreation". The sponsors of the Wilderness Act realized that all of our federal lands were being developed for resource extraction and other uses, and that there would be no wild places left to enjoy the solitude and wildness if they weren't protected. At that time there was no clear understanding of the great ecological importance of these wild places."

For these reasons, GWA supports Alternative D, even though we realize this alternative has included some lands not originally supported by GWA. But Alternative B and C recommend less than half to slightly over half of the roadless lands possible as wilderness in the Gallatin Range. There are many problems with these token suggestions of wilderness. Some have been previously discussed, but other problems are the boundary limitations which are placed on the landscape. Much of the boundary limitations of proposed wilderness are relegated to lands either at or near high-altitude elevations; lands which can be described as mostly rock and ice. This allows the integrity of the ecosystem to become compromised leaving most of the important wildlife habitat of forest and riparian levels out of protection. Areas such as the Porcupine Buffalo-Horn and West Pine areas are critical in this regard for wildlife. It must be also noted that the southern-most portion of the HPBH abutting the YNP is incorporated as a segment of the "Grizzly Bear Recovery Zone" as delineated by the US Fish and Wildlife Service in 1993.

1. Only one alternative, Alternative D, supports the existing HPBH WSA in its current form. The others do not. The description and need as stated in the DEIS don't match the majority of the alternatives.
2. What is the scientific reasoning or justification for dismantling (as proposed in Alternatives B, C and E) the existing HPBH WSA, a WSA which has been managed to protect wilderness characteristics for over 40 years?
3. What is the scientific rationale for the wilderness boundaries of Alternative B and C and how do they better serve the issues of connectivity?

1. It is misleading to state, as is stated below in the DEIS on page 16 under the title of 2.5.1 Elements Common to All Alternatives, that all alternatives will treat the HPBH WSA the same.
2. How is the CGNF going to manage and monitor the Porcupine-Buffalo Horn in alternatives B and C?
3. Cutting out the Buffalo Horn area goes against the Grizzly Bear Recovery Area.

"[hellip]manage the Hyalite-Porcupine-Buffalo Horn Wilderness Study Area consistent with the Montana Wilderness Study Act of 1977 (unless released by Congress) and the 2001 Roadless Area Conservation Rule (Roadless Rule)"

This would only be the case until final determination by Congress, after which significant differences would exist between alternatives. At that point, the HPBH WSA would not be managed the same.

1. Page 737 of the DEIS states a scientific fact. The reason for the variety of wildlife species on the HPBH WSA is due to the variety of habitat. What happens to those species then if their habitat is left out of a proposed wilderness? Out of protection? Such is the case of the wilderness proposals contained in Alternative B and C?

The Pryor Mountains:

The Pryor Mountains are truly unique and different when compared to other landforms of south-central Montana. They are unique in their geology, their ecology, and their biology. Their isolation has led to some botanical wonders, species that occur nowhere else on the landscape all the way to trees of juniper estimated to be over 500 years old. Even the paragraph from the DRFP below states their value quite well. Yet once again we are seeing a disconnect between words of the DRFP from the proposed actions of the majority of the alternatives within the DRFP as it pertains to wilderness designation in the Pryor Mountains. An example is found in this statement on page 147:

"The national forest portion of the Pryor Mountains contains a unique and diverse assemblage of botanical resources and plant associations within a relatively small area. The Pryor Mountains are important for scientific study and education. Due to the exceptional diversity in a small area, many researchers and educators in earth sciences have recognized its scientific value. Because of a unique convergence of three floristic provinces (Northern Great Basin, Middle Rocky Mountains, and Northern Great Plains), the Pryor Mountains are considered a "botanical hotspot," rich in species and community diversity. More than 400 plant species can be found here. Many rare plant species in the Pryor Mountains are associated with the Madison limestone geology of the area."

Alternatives A, B, and C recommend only 6,804 acres of wilderness in the totality of the Pryor Mountain Geographic Area while Alternative D recommends 43,861 acres according to Table 4 of the Summary DEIS. If

the Pryor Mountains are valued as highly as the DRFP states they should be, why is it only 15.5% of the potential wilderness is recommended as wilderness? The other alternatives recommend the majority of those remaining lands as "Backcountry Areas", a designation not nearly the same level of protection as wilderness. It is misleading to infer otherwise. As a result, GWA strongly supports the Bear Canyon, Big Pryor Mountain, Punch Bowl RWAs, and an enlarged Lost Water Canyon RWA to be set aside for wilderness designation. They should be managed as wilderness so as not to lose their wilderness characteristics during that time. GWA believes that these landscapes and ecosystem types are underrepresented in the National Wilderness Preservation System - or not represented at all. More on this below.

GWA is confused as to why more emphasis was not given to the role of protection on the Pryors. On page 148 of the DRFP there is this statement:

"At the crossroads of three distinct ecological provinces, the Pryor Mountains offer exceptional biodiversity, unique geology, and opportunities for research and education."

Usually when multiple types of ecological systems connect in an isolated fashion such as here, there is a proliferation of flora and fauna in nature which don't normally coexist anywhere else. Again, such is the case here. GWA would like to place emphasis on diversity. In the Federal Register¹⁰, page 21265 of Vol. 77 No.68 dated April 9, 2012, section 219.9(2), there is a statement discussing diversity:

"Ecosystem diversity. The plan must include plan components, including standards or guidelines, to maintain or restore the diversity of ecosystems and habitat types throughout the plan area."

In reviewing the plan component for Terrestrial Vegetation for the Pryor Mountain Geographic Area (Section 3.4.7 of the DRFP), the standards and guidelines appear weak and few. Where is the protection? The two Standards mention noxious weeds and extractable minerals within the vicinity of biodiversity regions, and the three Guidelines mention the need to minimize impacts from livestock grazing and mineral exploration. The final standard says that Utah Juniper cannot be cut except for purposes of human safety or research. How is this a winning strategy for protection of an area known for its biodiversity?

1. Why don't the alternatives of the DRFP reflect the language that the opening remarks of Section 3.4 "Pryor Mountains Geographic Area" in the DEIS seem to support? Alternative D is the only alternative which seriously addresses the value of the Pryor Mountains.
2. Where are the protection standards for those biodiverse areas of the Pryors as it relates to recreation and grazing?

1. Where are the management guidelines protecting those biodiverse areas of the Pryors; i.e., the botanical areas of special interest?
2. What role does Alternative D play in the Pryors outside of the number and totality of acreage for wilderness and backcountry areas?
3. With all the ecological variability in the Pryors, what is the justification or science rationale for the small acreage of wilderness in Alternatives B and C?
4. How do the standards and guidelines given help maintain or restore the diversity of terrestrial vegetation at its maximum potential?

on the west side of the Bridger Range. To support this argument for wildlife importance, there is this declaration from CGNF's own 2017 Assessment: Forest Plan Revision, Final Terrestrial Wildlife Report (Dixon, Bev; et al. 2017)¹¹.

"This landscape contains a high level of wildlife diversity, including most native species. However, notably missing from this landscape are bison, bighorn sheep, and grizzly bears. A remarkable feature of this landscape is the Bridger Mountain Migratory Flyway, which hosts between 2,000 and 3,500 migrating raptors each fall, including the largest known concentration of migrating golden eagles in the continental United States (Eberly et al. 2016). This landscape also provides a potential corridor of mountainous Federal land, which may facilitate wildlife movement between the Greater Yellowstone Area and other large contiguous blocks of wildlife habitat to the north, such as the Northern Continental Divide Ecosystem in northwest Montana."

These key linkage areas proposed by CGNF will need help maintaining their integrity and serving that purpose for which they were intended. And that help could definitely come in the designation of wilderness. It has been said that wilderness is not the only way to protect or preserve wildlife, but GWA believes it is the best way. Without the protection of these key corridors, wildlife will suffer from the overuse, noise and exploitation of human fragmentation of the forest.

The Crazy Mountains may not be associated with wildlife connectivity as much as the Bridgers, but it does have a role. Wildlife corridors seen on page 30 of this document indicate that. Wolverines would be a prime example of a species that would use that connectivity. GWA would like to bring the attention of CGNF to an article in Montana Pioneer by Pat Hill¹², "Couple Seeks Knowledge of Wolverines: A Creature They Almost Never See". In that article, it states:

"Estimates regarding the remaining wolverine population in the lower 48 states range from between 500 to 750 animals, and Gehman said he thinks about 200 of those remaining wolverines are surviving in the wilds of Montana, with about 20 wolverines in the Gallatin Mountain Range, 20 in the Madison Range, and 50 in the Absaroka Range. Gehman said there may be three or four wolverines in and around the Crazy Mountains as well. He said that the rest of the state's wolverine population is probably concentrated in the Bob Marshall Wilderness and Glacier National Park."

Without spending too much time on this subject (it will be discussed later on in these comments), science modeling will help with the evidence. But there is another unique reason for wilderness for the Crazy Mountain Range, one besides wildlife, scenic beauty and forest integrity. There is a uniqueness to this isolated range. Page 167 of the DRFP states this:

"The Crow Tribe call the Crazy Mountains Awaxaippia meaning "high landscape that is jagged or rough and have a bad reputation or omen." At least four prominent chiefs of the Crow Tribe fasted on the Crazy Mountains, and the prophetic "dreams" received affected Crow National policies towards "American" government. Vision quest and fasting bed structures have been located on three prominent peaks within the Crazy Mountains and other sites have been found along the flanks of these high peaks that may be related to this traditional cultural practice. These practices continue today. The Crazy Mountains are considered a traditional cultural landscape and has been proposed by the Crow Tribe for nomination to the National Register of Historic Places."

So many times we are talking about sites and ecosystems in terms of the natural world, but the Crazy Mountains are unique in the fact that they have that asset plus a spiritual world. There is a history, a culture, a natural beauty, a spiritual and wild character to these lands. As we read this description above from the DRFP, we learned of this week's guest column in the Bozeman Daily Chronicle (Doyle, Shane; Not Afraid, A.J.; and Bird, Adrian; 2019)13:

"By any measure, the Crazy Mountains hold a special role in the history of the West and a sacred role in the survival of the Apsaalooke Nation."

"That future depends on the Medicine of the Crazy Mountains, and on future generations of leaders being able to draw upon it when it needed. That means that we must be able to fast and pray in ceremonial solitude as we have since time immemorial in the sacred places that define and embody the essence of our identity as Apsaalooke people and as human beings."

"That's why we're asking the Forest Service to not expand mechanized and motorized travel in the Crazies. We are also asking the agency to not allow mining, the building of any new roads, construction of any new energy or utility corridors, or development of any new recreation sites or facilities."

The guest column is asking that the lands of the Crazy Mountains be retained as wilderness; be retained in solitude. GWA agrees that the wildness of these lands must be protected for the importance of the wildlife connectivity which they provide and for the solitude and spiritual atmosphere which prevails.

Tribal Interests of the Crazy Mountains:

The lands now designated as the Custer-Gallatin National Forest were once lands occupied and held sacred by the tribes of Montana, especially the Crow. In the nineteenth century, the indigenous people were deprived of these lands, either by Treaties forced upon them or by other nefarious means. The tribal people were relocated to reservation lands, but they continued to hold sacred the mountains and prairie lands they once used without contention. Bison and other game roamed these lands and provided sustenance for the people who lived here in what is now southern Montana. It was government policy to slaughter the bison so as to deprive the native people of their livelihood and make them dependent on government largesse to survive. This enabled removal to reservation lands. Nonetheless, the Crazy Mountains, the Beartooth and the Pryors were still considered sacred places for the Crow. This is noted in the DRFP.

Today, those mountain areas are still considered sacred places for the Indians where they go for a quiet place for meditation and respite. In a recent article posted in the Bozeman Daily Chronicle, Shane Doyle and other tribal members wrote of the importance of these mountains to the Crow tribal people and asked the Forest Service to consider their need for retention of solitude as they draw near to the completion of the Custer-Gallatin Forest Plan.

For many years, the indigenous people of America were dealt with so badly by the U.S. Government, and even today tend to have their interests ignored. The CGNF, in preparing its Forest Plan, makes note of the tribal interests in preserving these ceremonial sacred sites and the archeological evidence that can be found in many

locations throughout the CGNF. The DRFP can redeem those failures, if only in part by taking the interests of the Indian people seriously and providing access and solitude in those places they hold sacred.

Alternative D exclusively represents those tribal interests and is clearly the only alternative that will respect the aspirations of the Indian people. Gallatin Wildlife Association stands with the Crow people in encouraging the Forest Service to give strong consideration to the interests and needs of the Crow people.

1. Outside of Alternative D, how is the DRFP going to protect the "key linkage area" along the west side of the Bridgers?
2. How is accessibility to the Crazy Mountains going to be managed any differently than what it has been?
3. What is the priority of securing or transferring private land into public land in order to gain a fuller wilderness protection in the Crazy Mountains?
4. What is the future plan (if any) of fire protection of the Bridgers and Bangtails, especially in those areas in the wildland/urban interface?

Wildlife:

The GYE is distinguished by its wildlife. The beautiful description of wildlife found on page 55 of the DRFP (shown below) should be a key rationale as to why these lands need protection at the highest level. Wildlife is a prime example of why this area of the GYE is crucial in fulfilling E.O. Wilson's call to preserve half the planet. It is the abundance of lifeforms here that warrant this ecosystem to be included in the half of the planet to protect. Even during the writing of the comments in this document, we have learned the latest news release from the United Nations about the great potential of mass extinction of 1 million species of plants and animals. The inconsistent management of wildlife across state and federal agencies does not help in this regard; it actually exacerbates the problem. We would like to refer to a paper by M. Nie, et al. entitled "Fish and Wildlife Management on Federal Lands: Debunking State Supremacy" (Nie, M., et al., 2017)¹⁴:

"Federal land management agencies have an obligation, and not just the discretion, to manage and conserve fish and wildlife on federal lands. We debunk the myth that 'the states manage wildlife and federal land agencies only manage wildlife habitat.' The myth is not only wrong from a legal standpoint but it leads to fragmented approaches to wildlife conservation, unproductive battles over agency turf, and an abdication of federal responsibility over wildlife. Another problem exposed is how the states assert wildlife ownership to challenge the constitutional powers, federal land laws, and supremacy of the United States. While the states do have a responsibility to manage wildlife as a sovereign trust for the benefit of their citizens, most states have not addressed the conservation obligations inherent in trust management; rather, states wish to use the notion of sovereign ownership as a one-way ratchet—a source of unilateral power but not of public responsibility. Furthermore, the states' trust responsibilities for wildlife are subordinate to the federal government's statutory and trust obligations over federal lands and their integral resources."

This highlights one of the problems of wildlife management whether it be on the world stage or locally. There is a divergence of purpose, a contradiction of management practices, and a lack of collaboration between government agencies. This needs to be overcome.

On page 55 in the DRFP under the opening paragraph of Wildlife, there is this description of the CGNF:

"Wildlife habitat on the Custer Gallatin is extremely diverse, ranging from the rugged topography and alpine environs associated with the highest peaks in the state of Montana, to the more temperate coniferous forest slopes at mid-elevations, to the pine-savanna and badland ecosystems at lower elevations in the eastern Districts. Such diversity and associated complexity provides conditions for a vast array of wildlife species and guilds, with over 600 species of mammals, birds, reptiles and invertebrates recorded on the Custer Gallatin, according to the Montana Natural Heritage Program in 2018. Many species are residents, with some individuals spending their entire lives within the national forest, while others are migratory, and spend only part of their life cycle here."

One piece of historical and scientific rationale for the abundant existence of wildlife in the GYE can once again be found in Lance Craighead's report Wilderness, Wildlife, and Ecological Values of the Hyalite-Porcupine-Buffalo Horn Wilderness Study Area (page 17):

"The HPBH WSA, along with the NW corner of Yellowstone National Park, to which it is connected physically and ecologically, has long been a refuge for beleaguered wildlife populations. At the turn of the last century (1900) this region was one of the few places in the northern Rocky Mountains that still supported elk, bighorn sheep, grizzly bears, and other species that had been decimated by market hunting, fur trapping, and an expanding human population[hellip].

Hunting restrictions and other regulations have allowed wildlife populations to recover until they are near carrying capacity in the HPBH WSA. Today however, these populations are again threatened by developments and activities of the increasing human population as well as the warming climate which we have created."

There has already been a huge impact placed upon the wildlife from many sources: urban sprawl, development, recreation, timber cutting, roads and highways, etc. Now we have to consider climate change as a major pressure point. As the volume of human activity increases in our forest, the greater the adverse effect. To say this another way, the more we protect the integrity of our forest, the more we protect the diversity of our wildlife. The influx of people over these coming years is only going to increase the demands placed upon the forest and the pressures placed upon wildlife. Hard decisions must be made now and the DRFP must reflect those hard choices.

1. Has the CGNF or Forest Service used any Probability of Persistence (reference 6, page 92) analysis in the determination of biodiversity on the landscape?

Species of Conservation Concern:

The Forest Service must follow the procedures and guidelines as stated in the 2012 Planning Rule when a forest is about to determine Species of Conservation Concern (SCC). Those determinations were made as stated by the Regional Forester for both plants and animals and are listed in the DRFP. The Forest Service defines SCC(s) as stated in the DRFP as follows:

"A species, other than federally recognized threatened, endangered, proposed, or candidate species, that is known to occur in the plan area and for which the regional forester has determined that the best available scientific information indicates substantial concern about the species' capability to persist over the long-term in the plan area (36 Code of Federal Regulations 219.9(c))."

While GWA finds nothing inherently wrong with this definition, there still seems to be a large deal of ambiguity, subjectivity, and perhaps a lack of perspicacity in the decision-making process. The 2012 Planning Rule establishes this decision-making process be made by the Regional Forester, but this decision should be made on facts and science. Perhaps a panel or combination of several scientists and experts in the field along with the Regional Forester would be a better solution. GWA understands the Forest Service can solicit outside input in this effort, but we believe there needs to be an honest debate among scientists inside and outside of the Forest Service (if the Forest Service can't be impartial) as that final determination is made. This discussion may get beyond the scope of this DRFP, but it is a discussion worth having at some point.

GWA would like to challenge the determinations made by the Regional Forester, Leanne Marten¹⁵. Her letter of Feb. 7, 2019 addressed to the Forest Supervisor lists three species of animals for inclusion. They are the Western Pearlshell, Greater Sage Grouse and the White-tailed Prairie Dog. It is hard to imagine that out of 600 species of mammals, birds, reptiles and invertebrates known to occur on the CGNF, only three were set aside for listing. Our concern is not with the Regional Forester herself, but with the criteria that these decisions are based upon. GWA believes if the decision-making process was more inclusive with a different set of criteria, the DRFP would have read a lot differently.

Continuing this discussion, we found it interesting that only three (3) animals were listed as SCC(s) in each of the three different forests on the U.S. Forest Service webpage below. Those forests listed have either undergone or are presently in the revised forest plan process. Forests listed on the webpage having letters from the Regional Forester on the issue of SCC are the Flathead National Forest, Helena, Lewis and Clark National Forest and the Custer Gallatin National Forest. Link found here¹⁶:

<https://www.fs.usda.gov/detail/r1/landmanagement/planning/?cid=fseprd500402>

The Flathead National Forest has listed three birds, no mammals. The Helena Lewis and Clark National Forests has two birds and the mussel western pearlshell, and the CGNF has listed one bird, the western pearlshell, and only one mammal, the white-tailed prairie dog. It is hard to fathom that out of the three national forests of western Montana, only one species of mammal has been chosen for listing as a SCC. We presume these determinations are forest specific, but it is hard to imagine the listing would be so indifferent to mammals on all three of the National Forests. With as much pressure and stress placed upon wildlife and their habitat as a result of climate change, disease, habitat fragmentation and human encroachment, GWA feels strongly that there are more than three species per forest which would qualify as Species of Conservation Concern.

GWA understands that the listing species of conservation concern is a relatively new approach, instituted by the 2012 Planning Rule. It is the process in which each forest must undergo as a Forest develops a new long-range plan. Prior to this, the U.S. Forest Service used a list of "sensitive species" for identifying imperiled wildlife. GWA will refer back to a document submitted during the last comment period, a document by the U.S. Forest Service dated October of 2012 entitled Wilderness Character Monitoring Report Hyalite Porcupine Buffalo Horn Wilderness Study Area (Clark, Erin; Schlenker, Kimberly; Filardi, Catherine, 2012)¹⁷. On page 20, they define species of concern based upon 2011 baseline:

"In 2011, one new sensitive species was recognized for the region: bighorn sheep (*Ovis canadensis*). This brings the total to 31 known indigenous species that are listed as threatened, endangered, sensitive, or species of concern known or assumed to utilize habitat within the HPBH WSA, or, in the case of plants, known or suspected to be established on the Gallatin National Forest."

Bald eagle

Bighorn sheep

Black-Back woodpecker

Canadian Lynx

Gray wolf

Grizzly bear

Peregrine falcon

Western big-eared bat

Wolverine

The western pearlshell, Yellowstone cutthroat trout and Western cutthroat trout were also listed. But none of these species (except the western pearlshell) are listed today under the new criteria and the new classification. We understand the year 2011 was used as a baseline. We understand that SCC does not list species that are already listed as threatened, endangered or under some of other classification. And we understand that there is a new criterion used today, but the thought remains, perhaps the Forest Service needs to review the criteria or the process in which it is being used. The criteria that was used in preparation of this DEIS and DRFP errs on the side of losing species rather than on the side of preservation. The abrupt change of having 31 species of concern to only two listed as species of conservation concern in and of itself is concerning and needs a severe colleague review of scientists inside and out of the U.S. Forest Service.

The defense stated in the Federal Register Vol. 77 No. 6818 dated April 9, 2012 on page 21218 suggests that the new species-of-concern approach is more accurate or scientific. But this defense does not bear fruit. An analysis of these criteria by Dr. Jim Bailey¹⁹ states the argument in more layman terms. It has been said that the classification under the 2012 Planning Rule is:

* being "more focused" than was the 2011 sensitive species list. But this seems bogus since the 2011 list noted each Forest on which each sensitive species occurred.

* a better indicator, whereas, 2011 species could be listed as "sensitive" if there was a concern for population viability, yet in the new approach, that concern must be "substantial".

* a better indicator than the 2011 listing, as species could be listed if they were "suspected" of being present on the Forest area back then, but in the new approach, species presence must be "known".

* more accurate based upon the following approach. "If there is insufficient scientific information available to conclude there is a substantial concern about a species capability to persist [hellip]that species cannot be identified as a species of conservation concern".

These are substantial differences between the two approaches; however, the decision still comes down on which side does the Forest Service want to err. An answer to these criteria comes back to what was said above. It comes down to subjectivity and perspicacity. These criteria basically state the CGNF would rather

have assurances their classification is going to have positive effects or else they don't want to be bothered with the management. This indicates the Forest Service is more willing to risk the loss of a native species than to risk attempts which would bear an unsuccessful conclusion. But even with the change in approach and classification, that doesn't explain why more mammal species aren't listed as SCC. Pikas, bighorn sheep, bison, moose, etc. still have the potential of success.

Finally concerning the last bullet point above. That language is found on page 80 of the CGNF Assessment Forest Plan Revision, Final Terrestrial Wildlife Report (Dixon, Bev20, et al. 2017):

"If there is insufficient scientific information available to conclude there is a substantial concern about a species' capability to persist in the plan area over the long term that species cannot be identified as a species of conservation concern. (FSH 1909.12.52c)."

If the CGNF won't list a species because they feel they don't have sufficient data, the answer to that problem is gain more sufficient data. Perhaps this should be a standard or guideline, but species of conservation concern is not even a component. Why not? It is too easy to throw out a species of concern because there is no data. Even though the decision is made by the Regional Forester, we are not sure why the public could not have input in the process. In this example, one potential standard or guideline would be providing opportunities for more research and monitoring to collect that data.

In that regard, GWA would like to reference other sources.

1. Montana Natural Heritage Program: On page 55 of the DRFP, there is this statement:

"Such diversity and associated complexity provides conditions for a vast array of wildlife species and guilds, with over 600 species of mammals, birds, reptiles and invertebrates recorded on the Custer Gallatin, according to the Montana Natural Heritage Program in 2018."

The CGNF acknowledges the diversity mentioned in the Montana Natural Heritage Program (MNHP),²¹ but you don't acknowledge or give credence to the number or variety of species listed as SCC(s) by the same organization. That link is included here:

http://mtnhnp.org/SpeciesOfConcern/output/NHP_Animal_SOC.pdf

GWA believes the Forest Service should acknowledge some of those listings as defined by the MNHP as SCC. Species such as bison, wolverine, fringed myotis, hoary bat, spotted bat, black-tailed prairie dog are some of those species mentioned at various levels of concern. Notice, species of birds or fish are included on MNHP website as well, but no mention of them here. Yet, they should also be considered.

GWA would like to repeat the following comments we previously submitted on March 3, 2018 as we feel they are still relevant:

1. Steve Gehman's comments of Feb. 2018 on SCC(s) (pg. 14):

Finally, we would like to include those comments by Steve Gehman,²² a wildlife biologist who has performed scientific research on the CGNF and who has had a working relationship with the CGNF. We will not include the full context of those comments due to the length of this work, but we advise the CGNF planning staff go back and read those concerns of Steve Gehman. Here are a few excerpts:

"I do not believe that the Species of Conservation Concern (SCC) designation is an adequate indicator of the plant and animal species for which the Forest Service (FS) should have "substantial concern regarding the species' capability to persist over the long term in the plan area."

"Of the more than 600 species of mammals, birds, reptiles, amphibians, and invertebrates that have been recorded on the CGNF[hellip][hellip]it is hard to believe that only three species are deserving of attention due to concern for their long-term persistence."

"I am not alone in that belief. The Montana Department of Fish, Wildlife and Parks and the Montana Natural Heritage Program both use the terminology 'Species Of Concern' (SOC) to designate "native animals breeding in the state that are considered 'at risk' due to declining population trends, threats to their habitat, and/or restricted distribution."

We concur with those comments by Steve Gehman on this topic made last year.

GWA believes that the DRFP is severely lacking in its discussion of SCC. Again, we realize and understand that the determination is made by the Regional Forester. Even though SCC does not have its own discussion paragraph as a component, perhaps it should have. If the classification is that serious, if it really means that much in the ultimate determination of how the forest manages a specific species, then a more serious discussion needs to occur as to how these determinations are made. As it is, there are no alternatives that differentiate management practices based upon the subject matter of SCC(s).

Before we close out this discussion on SCC, GWA would like to bring out one more scientific article which directly or indirectly is relatable to SCC. We would like to refer CGNF to the article "Directions in Conservation Biology" by Graeme Caughley²³. This article was published in the Journal of Animal Ecology in 1994. There are seven summary declarations in this article, but to save time and space only three of those will be stated here:

<https://pdfs.semanticscholar.org/15d0/81b4f99b7a274fdcae940b02fe3221d7d71b.pdf>

1. "Conservation biology has two threads: the small-population paradigm which deals with the effect of smallness on the persistence of a population, and the declining population paradigm which deals with the cause of smallness and its cure.

1. The small-population paradigm has not yet contributed significantly to conserving endangered species in the wild because it treats an effect (smallness) as if it were a cause. It provides an answer only to a trivial question: how long will the population persist if nothing unusual happens? Rather, its major contribution has been to captive breeding and to the design of reserve systems.
2. The declining-population paradigm, on the other hand, is that relevant to most problems of conservation. It summons an investigation to discover the cause of the decline and to prescribe its antidote. Hence, at least at our current level of understanding, it evokes only an ecological investigation which, although utilizing the rigour of tight hypotheses and careful experimentation, is essentially a one-off study of little theoretical interest."

GWA wants to especially note summary comment 4. We will mention further on in these comments that CGNF and other land management and wildlife government agencies most likely need to think outside the box and change their paradigm because what we have been doing is barely working. We are entering into a new world with new stressors with the large driver of climate change.

1. GWA would like to add to the record as well as make part of these comments, a set of letters between GWA and Leanne Martin, the Regional Forester and her office (Region 1 of the USFS) concerning specifics and decisions made to the inclusions of species of conservation concern.

1. Why is it that the SCC does not have its own component? Even though the decision as to specific species is made by the Regional Forester, there could have been discussions as to how each alternative was going to advance the degree of protection of those species.
2. GWA wants a full explanation as to how the final assessment of species for SCC was made and what criteria were used to disqualify those species not chosen.
3. GWA believes that other mammals are certainly qualified to be listed, such as bison, bighorn sheep, moose, wolverine and swift fox, perhaps a few more. See notice of letter below.
4. Have there been recent studies concerning risk analysis on specific species? Were those used in any SCC determinations?
5. There should be a complete analysis on the criteria used and how the process is conducted in order to make those SCC determinations prior to and after the 2012 Planning Rule was implemented because something is severely wrong.

1. GWA will present documentation along with these comments, including a series of letters between GWA and the Regional Forester concerning the issue of SCC.

GWA believes that bison, bighorn sheep, moose and wolverine and the swift fox should be considered as species of conservation concern. The discussion of four of those five species appears in their own separate discussion below in this document. In this regard, GWA would like to refer CGNF to specific letters between GWA and Leanne Martin, Regional Forester of Region 1 of the U.S. Forest Service, pertaining to the issue of Bighorn Sheep and other potential SCC. We would like to make these documents as part of the official record²⁴. Letters can be found in the Appendices.

Wildlife Connectivity:

One of the greatest threats to wildlife is the fragmentation of habitat. When fragmentation occurs, it interrupts the normal behavior of the species and the ability of them to move freely across the landscape. And that means

the ability to move without fear of molestation, harassment or the likelihood of mortality. Unfortunately, these outcomes assuredly occur more often than reported. Highways, trails, fences, grazing allotments, recreation, timber harvesting, etc., whatever the lot, almost any structure built by or any action taken by man on the forest results in the fragmentation of habitat inhibiting connectivity.

The DRFP must be proactive as to how wildlife will be able to move on the large landscape in the future. Both the DEIS and DRFP acknowledges the reality, in fact the DEIS spends 21 pages discussing connectivity. But as we all know, it is the implementation of a plan, the methodology, the realization that will be the difference between success and failure. It is a biological imperative that animal and plants have the ability to move across the landscape in order to survive and to remain forever wild. They need to have the ability to connect one ecosystem with another in order to preserve genetic material, fight disease, and fight the harmful impacts of climate change. Carnivores and large ungulates need to reestablish those north and west corridors moving out from the GYE to those of the Northern Continental Divide Ecosystem (NCDE) and Salmon-Selway-Bitterroot.

The Language of "key linkage areas":

The DEIS recognizes only one critical pressure point on the CGNF, and that is for species traveling north from the Madison, Henrys Lake, and Gallatin Mountains Geographic Area to that of the Bridger, Bangtail, and Crazy Mountains Geographic Area. The DEIS makes this statement clear on page 491:

"The locations identified as key linkage areas include the north end of the Gallatin Range in the Madison, Henrys Lake, and Gallatin Mountains Geographic Area and the west side of the Bridger Range in the Bridger, Bangtail, and Crazy Mountains Geographic Area."

The DRFP and the DEIS uses language of "key linkage areas" when characterizing specific areas where connectivity is applicable. The two areas designated as "key linkage areas" (within the DRFP) really comprise part of the same connectivity corridor, that of the Gallatin and Bridger Range. Maps detailing these areas are found on pages 87 and 68 respectively in Appendices 2 of the DEIS. GWA agrees this linkage area is of prime importance and most likely needs the most attention. But GWA wants to place into the record four other wildlife linkage areas for consideration. One is the Paradise Valley region between the Absaroka-Beartooth Wilderness Area and the Gallatin Range (all part of the CGNF); the second being the CGNF lands in the Madison Range to the Beaverhead Deerlodge National Forest of the Gravelly Mountains; the third being the Montana Idaho border area from YNP to the Selway Bitterroot; and the fourth being the corridor north from the Absaroka-Beartooth Wilderness to that of the Crazy Mountains. The map below highlights key wildlife corridors found on Figure 9 from the DEIS, page 142, Appendices 2. Further explanation is below:

Figure 9. Results of connectivity analysis for the "large forest specialist" generic species, assuming near-optimal movement behavior. Results are shown for the full study extent (top panel) and in greater detail for individual forest units. Warmer colors represent landscape pixels predicted to have greater value for promoting connectivity of large forest specialists across the study extent.

The DEIS discusses in great detail the importance of connectivity, and Figure 9 shown above indicates the existence of that connectivity. In fact, if one were to overlay this corridor map over "key linkage areas" maps shown on pages 68 and 87 in Appendices 2 of the DEIS, there would be 100% correlation. Not only does this map show that linkage already exists, but that the Gallatin-Bridger Range has a "high" connectivity value.

The 2012 Planning Rule and the DRFP and DEIS:

According to the quote below, the 2012 Planning Rule must include components to maintain or restore connectivity. Section 3.10.6 of the DEIS claims this fact under Connectivity on page 477.

"The 2012 Planning Rule requires that the plan must include components, such as standards or guidelines, to maintain or restore the ecological integrity of ecosystems on the Custer Gallatin, including plan components to maintain or restore connectivity. As it pertains to wildlife, connectivity is defined as the ecological conditions that exist at several spatial and temporal scales that provide landscape linkages that permit 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."

That statement is based on specific wording on page 21265 of Vol. 77, No. 6825 of the Federal Register dated April 9, 2012. But there seems to be a disconnect between the discussion of connectivity in the DEIS compared to the no corresponding "Connectivity" component in the DRFP. Without a component of "Connectivity" in the plan, there are no "Connectivity" set of guidelines, standards, goals and objectives. GWA believes that the subject of "connectivity" warrants its own component in the DRFP with its own set of required elements.

The Need to Protect Key Linkage Areas:

With "key linkage areas" being established or so designated, these lands will be in need of systematic protection. Linkage areas will be a focal point for wildlife, leaving them sensitive to any further habitat disruption and fragmentation. "Wildlife" component, Section 2.3.15 of the DRFP, already suggests that "key linkage areas" will achieve protection through three of the seven proposed Guidelines on page 57. Guidelines 2, 3, and 4, stated below, list some of those protections:

1. include "vegetation management activities" which would "design features to restore, maintain or enhance habitat connectivity for long distance range shifts of wide ranging wildlife species."
2. not construct "new permanent facilities or structures for administrative or public use within key linkage areas."
3. "be free from sustained substantial disturbance for at least four years out of every 10-year period, including at least two consecutive years of no sustained substantial disturbance."

GWA appreciates the DEIS's in-depth discussion on connectivity and the carryover of those thoughts into the Guidelines of the "Wildlife" component. These suggestions are all well and good and will help protect those linkage areas. But GWA believes there needs to be more protection than this. There should also be language protecting these areas from timber harvest and thinning, from mining, oil and gas exploration, and from any new road construction. There should or may also be spatial and temporal restrictions on recreation and/or other entries into "key linkage areas". But "key linkage areas" deserve protections and that may be what is necessary in order for the establishment of wildlife corridors to be successful. A focus on restoring and conserving native species, both plant and animals, as well as natural processes such as fires and watershed function in these important connecting corridors of habitat should be a priority.

As for Desired Conditions, only one of the eight Desired Conditions under the component of "Wildlife" pertains to connectivity; that being item 5 on page 56. It says the following:

"Landscape patterns throughout the Custer Gallatin provide habitat connectivity for wildlife, particularly wide-ranging species such as medium to large carnivores and wild ungulates. Resulting habitat connectivity facilitates daily and seasonal movement, as well as long-range dispersal of wildlife to support genetic diversity, allowing animals to adapt to changing conditions over time."

We have to remember that this is a desired condition, not an existing one. Conditions change and GWA's concern is that the CGNF will not make allowances for those inevitable changes. Our fear is that demands made by the recreational public will override the need to follow Guidelines and Standards as set in the 2012 Planning Rule for connectivity. In fact, many of the determinations made within the DRFP's proposed actions (Alternatives B and C) will actually hinder or circumvent this Desired Condition of "Wildlife". Decisions such as reducing wilderness, allowing mechanized and motorized use in BCA, allowing recreational emphasis areas (REA) on the same landscape as "key linkage areas", allowing timber harvesting and fuel mitigation measures all on the landscape will create greater fragmentation on the forest. This is the disconnect.

On this latter point, even the DEIS recognizes the conflict of "key linkage areas" being overlapped by the designation of REA. Page 492 states the following:

"Other forest plan allocations may vary by alternative within the key linkage areas. In alternative C, a portion of the southern key linkage area (in the Gallatin Range) would also be allocated as a recreation emphasis area. In areas of dual allocation, the more restrictive direction would apply. Since the key linkage area direction is more restrictive for certain uses than the recreation emphasis area, the entire southern key linkage area would be managed under guidelines for key linkage areas."

GWA finds this troublesome as this language does not occur in the DRFP. This seems to raise unnecessary confusion and conflict when there doesn't have to be any. On the matter of connectivity, the DEIS lists the requirement for connectivity on page 477:

"There are two primary requirements for habitat connectivity. The first is that suitable habitats are present for species of interest, and the second is that landscapes are permeable to wildlife movement."

More on that second requirement below, but first as stated, connectivity requires suitable habitat. Those Guidelines included in the "Wildlife" component will help in this effort. But whatever the Forest Plan of the future looks like, it needs to ensure the habitat in those areas is protected. GWA believes the best way to ensure that is through the designation of wilderness. Alternative D is the only alternative which specifies that designation. More on this later.

A major weakness in the DRFP is the lack of specificity as to how the forest is going to reach connectivity. We have these specific comments and questions below:

1. GWA believes the subject of wildlife connectivity should have been a separate component, one where alternatives could have been specific to that component, a component where alternatives could be evaluated on their own merit. Why was "Connectivity" not given its own component for discussion?
2. It was confusing in distinguishing the difference between Goals and Objectives from Desired Conditions. The Desired Conditions are not based on reality, especially as they exist now. Both will have to be a goal to work toward, not yet achieved, so what's the difference between these elements? How will those be achieved?
3. Without specific action or methodology, there was no way to determine how the Desired Condition (item 5) was going to be achieved. What actions are going to be undertaken to achieve connectivity as stated in item 5 on page 56 of the DRFP?
4. According to the Guidelines, there are no differences between Alternatives B, C, and D. According to the Objectives under "Wildlife", the only difference between Alternative B, C, and D is the number of projects to be completed. Wouldn't the designation of wilderness be a significant difference between the Alternatives since Alternative D is the only alternative providing complete protection through wilderness designation?
5. How can land designations such as Backcountry Areas and Recreational Emphasis Areas (whether they either be adjacent to or incorporated onto the same landscape) exist in the vicinity of "key linkage areas" without being counterproductive? This would be the case under Alternatives B and C. How would that not hinder wildlife connectivity? In other words, how do lands designated as Recreational Emphasis Areas benefit or enhance "key linkage areas" when they are the same landscape? This is the case with Alternative C.
6. GWA believes that the Guidelines need to be stronger as those "key linkage areas" need further protection. There should be language protecting "key linkage areas" from timber harvest and thinning, from mining, oil and gas exploration, and from any new road construction.
7. There should also be potential spatial and temporal restrictions of entry or recreational uses onto "key linkage areas."

According to pages 488 and 489 of the DEIS, there are additional plan allocations to protect habitat in key linkage areas.

"Alternatives B, C, and D would all incorporate additional forest plan allocations with associated land use restrictions for areas of known, or intuitive importance for wildlife movement as key linkage areas."

1. What are those plan allocations? Why weren't those elaborated upon in the DEIS and DRFP?
2. GWA would like to recommend a few standards or guidelines of our own pertaining to wildlife connectivity.
3. Establish and maintain communication and collaboration with adjacent landowners of CGNF border property in the vicinity of "Key Linkage Areas" urging them to maintain their property as a wildlife conservation easement.
4. If necessary and if plausible, have the CGNF look into the possibility of purchasing said properties for wildlife conservation as "Key Linkage Areas".
5. GWA has to support Alternative D under the subject heading of wildlife because that alternative (as the DRFP states) emphasizes natural processes.

Finally, GWA would like to refer the CGNF to a Press Release by Senator Tom Udall of New Mexico and Rep. Don Beyer of Virginia dated December 6, 2018. In that Press Release, Rep. Beyer26 made the following statement concerning their proposed "Wildlife Corridors Conservation Act":

"With roughly one in five animal and plant species in the U.S. at risk of extinction due to habitat loss and fragmentation, one of the simplest yet most effective things we can do is to provide them ample opportunity to move across lands and waters," said Beyer.

"The Wildlife Corridors Conservation Act would provide the most important step of any single piece of legislation at the present time in enlarging the nation's protected areas and thereby saving large swaths of America's wildlife and other fauna and flora, especially in this critical time of climate change and shifting locations of the original environments in which a large part of biodiversity has existed," renowned biologist E.O. Wilson said of the bill, which he has urged members of Congress to support."

The message is that Congress (some members of Congress) recognize that the Federal Government needs to have a more active and participatory role in this effort of establishing connectivity. In other words, local officials aren't paying attention to the warning signs. The Forest Service, including the CGNF, needs to be advocating in this effort to our Congressional delegation.

The I-90 Corridor and Other Highways:

The CGNF has already recognized the importance of the I-90 corridor between Bozeman and Livingston as critical for wildlife when they designated lands on either side of the Interstate as "key linkage areas". There have been recent discussions among conservationists looking at the possibility of creating a wildlife crossing (an overpass) near mile-marker 316 on the I-90 corridor between Bozeman and Livingston. In that effort, the CGNF needs to be an integral part of that conversation as one particular location consists of U.S. Forest Service land on both sides of the interstate. The creation of a wildlife overpass will take considerable time, money and effort, but the ground work needs to start now as we have learned there needs to be some key language in the DRFP.

This past December, Montanans for Safe Wildlife Passage hosted a summit in Helena over the concepts of reducing vehicle/wildlife collisions. One of the proposals considered here and one that has been successful in other western states including Montana is constructing a wildlife overpass. During that summit, Patty Garvey-Darda, a Wildlife Biologist for the Okanogan Wenatchee National Forest from Washington, stated there needs to be language in any U.S. Forest Service's Forest Plan stating that highways will be a permeable barrier to wildlife. In our search for that language, a small group of activists representing their respective organizations in a collaborative organization called Montanans for Safe Wildlife Passage discussed this language with Bev Dixon, wildlife biologist of the CGNF on May 7, 2019. Upon receipt of her response back in an email, portions of which will be submitted here as part of the record, she concluded that the current language in the DRFP would be sufficient for any future action to construct wildlife crossings. Email response from Bev Dixon, wildlife biologist for CGNF dated May 8, 2019.

"The 2012 Planning Rule provides considerable flexibility in forest plan language. We are unaware of any standardized language required in plans to allow Forest Service cooperation/collaboration/participation in wildlife highway crossing design or implementation on NFS lands, nor is there any such language that would preclude FS participation. We know of no Engineering-specific laws, regulations or policies that require specific forest plan language regarding highways or wildlife crossing structures on NFS lands. There is a Memorandum of Understanding (MOU) between the Forest Service (FS) and the Federal Highway Administration (FHWA) that calls for agency coordination/cooperation on federal highway projects that occur on NFS lands (see more about this below).

I also spoke with Patricia Garvey Darda, USFS I-90 Project Coordinator and Wildlife Biologist in Region 6, on the Okanogan-Wenatchee NF. Patty recently attended a summit in Helena MT, where she presented information about FS collaboration with Washington State Department of Transportation (WSDOT) in creating safe passage for wildlife across I-90, which bisects the Cascade Mountain Range on NFS lands in Washington State. Patty indicated that it was neither the presence of specific terminology, nor lack thereof, in their forest plan that influenced the I-90 project in the Cascades, but rather the fact that their plan contains clear language regarding the need to provide for habitat connectivity and specifically, wildlife permeability across I-90

(emphasis added by BDixon). It was because of this language in their forest plan that the FS had significant influence over mitigation measures required for highway projects on NFS lands. Patty provided the following information regarding their efforts:

A National MOU between the Forest Service and the Federal Highway Administration (FHWA) directs the agencies to work cooperatively where highways occur on NFS lands. The MOU developed streamlined, nationally consistent procedures by which the FHWA may appropriate National Forest System lands for the use of Interstate and some state highways under Chapters 1 and 2 of Title 23, United States Code (23 U.S.C.). This MOU allows the Forest Service to adopt the FHWA NEPA without a separate decision if the project is designed to be consistent with the Forest Land Management Plan and all laws and regulations that apply to NFS lands (emphasis added by BDixon). The Snoqualmie Adaptive Management Area Plan (AMA, or Forest Plan) guidance regarding habitat connectivity was instrumental to establishing the Forest Plan consistency elements needed for the 15-mile I-90 Snoqualmie Pass East project. The Washington Department of Transportation (WSDOT) incorporated the need to provide "ecological connectivity to prevent the genetic and demographic isolation of species" in their NEPA purpose and need statement for the project.

Given these findings, we believe the language incorporated in our draft forest plan would support Forest Service participation in design and implementation of highway projects affecting Custer Gallatin NFS lands, including mitigation measures to allow safe wildlife passage across highways that occur on NFS lands. Thank you for your interest and involvement. Feel free to provide any additional comments you may have on the draft plan or DEIS within the specified comment period."

GWA would like this language to be part of the official record and part of the actual revision plan. The response from Bev Dixon states the following: "Given these findings, we believe the language incorporated in our draft forest plan would support Forest Service participation in design and implementation of highway projects affecting Custer Gallatin NFS lands, including mitigation measures to allow safe wildlife passage across highways that occur on NFS lands." The problem currently is that there is no language providing this assurance in the DRFP. However, the DEIS does support it from our understanding and from what we are being told by the CGNF. We are disappointed the DRFP does not mention I-90 as being a barrier to wildlife. The DEIS states the following on page 491:

"Interstate 90 and nearby development presents a major impediment or barrier to north-south movement for most land-dwelling wildlife species that occur on the Custer Gallatin. Those capable of getting across the highway face high mortality risk to do so. The key linkage areas in alternatives B, C, and D encapsulate the portions of the Custer Gallatin that are in closest proximity to Interstate 90, and occur as relatively narrow bands that create a natural ecological flow pattern funneling wildlife movement to a point where crossing the Interstate may be attempted to reach a destination. The key linkage areas represent the shortest distance between Custer Gallatin administrative units that would involve a crossing of Interstate 90. Managing National Forest System lands in close proximity to the highway for habitat connectivity would provide potential staging opportunities for wildlife on the move to remain relatively secure until a safe crossing of the highway can be executed. The path between the Gallatin and Bridger Mountain Ranges presents the shortest distance for wildlife to travel between isolated parcels of public (for example low development) lands in a north-south (or vice versa) fashion between larger contiguous blocks of relatively secure habitat. While other important linkage areas are present on the Custer Gallatin, none have the same unique ecological characteristics or management concerns as those identified in the key linkage areas found in alternatives B, C and D."

The CGNF Final Revision Plan needs to state that I-90 will be a permeable barrier to wildlife. This is interesting language considering the DEIS as stated above necessitates that in order for there to be connectivity, "landscapes are permeable to wildlife movement." Again, this is found on page 477 of the DEIS. We obviously don't want this corridor to become an impermeable barrier.

The DRFP presents no alternative that resolves the I-90 conflict. I-90 and other highways and byways have shown to be killing grounds for wildlife proving that some form of mitigation must be done. Other highways that need further study are U.S. Hwy 191 north of West Yellowstone and even U.S. Highway 89 in the Paradise Valley north of Gardiner.

1. Please state in the DRFP that I-90 will be a permeable barrier to wildlife.
2. What is the strategy to mitigate highway and roadway barriers to wildlife in the future? We see no mention of mitigation. There should be some mention of alleviating this problem in the Revised Forest Plan.
3. Language articulating that there will be future discussions and willingness to consider wildlife crossings should be a goal, an objective, or perhaps even a standard or guideline.
4. There should be an analysis of grazing allotments in the vicinity of known wildlife corridors to determine existing or potential conflicts with wildlife.
5. The Custer Gallatin National Forest must adopt a forest wide standard for all grazing permits requiring "let-down" fencing and remove barriers that impede migration of native species.

Beaver:

The CGNF should adopt beaver management plans to increase water management opportunities in the face of declining snowpack. In an arid, dry climate it makes no economic sense to allow commercial exploitation of beaver by traditional trapping. It is time that we embrace 21st century science and manage beavers for their far more valued economic and ecosystem services. The agencies, USFS, and especially Montana Department of Fish, Wildlife & Parks (MFWP) should no longer view such a valued species as merely a fur bearer for recreation harvesting. The shared goal should be to manage for beaver restoration projects that will provide water related environmental services. Beaver should be lethally removed only if severely damaging valuable private or public property.

As far as how the DEIS and the DRFP are handling the issue of beavers, once again there seems to be a dichotomy of seriousness. At least the DEIS gives credence to the species by allowing them to have a couple of paragraphs in the discussion. But the DRFP seems to give a deaf ear to the importance of beavers. The CGNF realizes the importance of beavers on the landscape as page 172 of the DEIS provides the following acknowledgement:

"Beavers were instrumental in the creation and maintenance of willow, alder, birch, and aspen stands. Water table during historical times were much closer to the surface due to the creation of beaver ponds. Therefore, soil moisture was more available to support extensive stands of riparian vegetation. Wildlife, primarily bird species, which are tied to riparian communities were probably maintained at a higher population level than those currently."

So, what has happened to the beaver? The answers are provided on page 173.

"By the middle of the century, beaver populations had been greatly reduced by trapping, and cottonwoods were able to mature in many riparian areas."

"Beaver populations have declined across much of the Custer Gallatin due to reductions in woody forage species from livestock grazing impacts, mining, road construction, and access related activities. Due to human conflicts with beavers in drainages with roads, beaver are often trapped and eliminated or trapped and translocated by state agencies."

The USFS along with other management agencies should inform the public how economically valuable beavers are as a low-cost component that provides considerable drought management and water quality improvement services. Live trapping and transplanting beavers are an established practice. The United States Forest Service (USFS), Bureau Land Management (BLM), and the State of Washington have developed plans, procedures, and manuals for capturing problem or surplus beavers and establishing thriving populations in historic and degraded locations. Transplanting beavers is not expensive and averages about 50% success. The following references/resources examine beaver restoration by many public agencies. These plans, resources, and contacts provide a complete view of beaver management and restoration.

1. USFS Beaver Restoration Guidebook. <https://www.martinezbeavers.org>
2. Beaver Restoration Toolbox. <https://www.martinezbeavers.org/wordpress/wp-content/uploads/2013/10/Beaver-Restoration-Toolbox-Karl-Malcolm-2013.pdf>

1. Douglas W. Smith, Daniel B. Tyers, "The Beavers of Yellowstone," *Yellowstone Science*, Volume 16 (3) 2008

https://digitalcommons.usu.edu/aspen_bib/7022/

Steps of Beaver Restoration:

In the conclusion of his thesis, *Ecosystem Pioneers: Beaver Dispersal and Settlement Site Selection In The Context of Habitat Restoration*, Torrey Ritter sums up the future of beaver restoration (Ritter, Torrey Daniel, April 2018)28:

"Beaver mediated habitat restoration is increasing in popularity and has proven to be an effective and efficient form of stream restoration. Stream restoration leaders will benefit from incorporating knowledge of beaver ecology into the restoration process. Habitat selection by beavers in restoration scenarios does not necessarily follow the same patterns as beaver settling in optimal habitat, and stream specific conditions must be carefully interpreted to select restoration sites that have the highest probability of success. Furthermore, beaver dispersal is a major factor influencing site selection, and understanding this process of beaver life history is critical to assessing current colony distributions and potential natural beaver occupancy in project areas. Well before project implementation, restoration practitioners should become familiar with the status of local beaver populations and their distributions as well as available habitat in the project area and potential risks to that habitat in the short and long term. Working with beaver ecology and behavior has the potential to greatly improve beaver restoration project success, leading to dramatic habitat improvements and establishment of ecosystem services in critical riparian and wetland habitats."

The North American beaver (*Castor canadensis*) builds dams that pond water on streams providing crucial ecological services to aquatic and riparian ecosystems and enhancing biodiversity. Consequently, there is increasing interest in restoring beavers to locations where they historically occurred especially in arid western United States. However, despite often intensive efforts to reintroduce beavers into areas where they were severely reduced in numbers or eliminated in the 18th and 19th centuries, beavers remain sparse or missing from many stream segments.

The Benefits of Restoration:

The capacity of beaver to modify habitat is inarguable, putting them on a short list of species along with humans recognized as "ecosystem engineers". In recent decades, the capacity of beaver to change environments for the better has led many to view the species in a new light. Research indicates that habitat modifications induced by beaver create a boon for a broad spectrum of fish and wildlife beyond the beavers themselves. Furthermore, the list of beneficiaries clearly includes people and domestic livestock. Previously occupied patches of beaver habitat in these settings are optimal places to consider beaver restoration projects. These historic sites should be mapped as the first step to widespread beaver restoration. More and more restoration practitioners are using beaver to accomplish stream, wetland, and flood plain restoration. This is happening because by constructing dams that impound water and retain sediment, beaver substantially alter the physical, chemical, and biological characteristics of the surrounding stream ecosystem, providing benefits to plants and wildlife. The results of beaver activity include: higher water tables; reconnected and expanded flood plains; higher summer base flows; expanded wetlands; improved water quality; greater habitat complexity; more diverse populations of plants, birds, fish, amphibians, reptiles and mammals; and increased complexity of the entire river ecosystem.

When beaver recolonize stream systems, their impoundments increase base flows as well as recharge and elevate the water table (Pollock et al, 2003)²⁹. Furthermore, given that climate change is expected to increase drought and reduce snowpack, water storage from beaver impoundments will be an effective tool to mitigate the associated reductions in water resources (Lawler 2009)³⁰. Climate change is of particular concern in areas that currently depend on glacial and snowmelt runoff. As water storage in the form of glaciers and snow decreases, surface and ground water storage behind beaver dams high in water sheds provides a buffer to maintain base flows.

Beaver increase the amount of ground water storage and aquifer recharge (Pollock³¹ et al, 2003, Westbrook³² et al, 2006). This ultimately may be the most important beaver-related positive environmental factor. In addition, ground water is released more gradually than surface water and has no evaporative loss. In areas where ground water is being depleted faster than it is being recharged naturally, beaver ponds will help offset aquifer depletion, especially when beaver activity is on a watershed scale. Increased ground water storage will help offset rising stream temperatures associated with open water surface areas. Cold pockets of water have been found downstream of beaver dams due to the upwelling of ground water (Pollock et al, 2007)³³. In particular, this includes the growth rate of emergent vegetation found in ponds, upstream sediment loads, and the number of beaver dams upstream.

Habitat requirements to support beaver are intuitive and basic, including adequate water flows, vegetation for food and building, a modest gradient, less porous soils, and protection from various threats (trapping, overgrazing, major flooding).

Management actions can be taken to improve habitat quality, therefore promoting occupation by beaver. These measures can encourage incoming dispersing beaver and provide additional beaver for future reintroductions.

Beavers directly impact the hydrology of watersheds they occupy by:

"Wetland habitat created by beavers help maintain constant summer flows and store water during droughts. (Wyoming Game and Fish, 1993)34;

Altering water temperature regimes (Collen and Gibson, 2001)35;

Introducing complexity to streams (Naiman, Robert J; Johnston, Carol A; Kelly, James C; 1988)36;

Alter nutrient cycling in streams (Naiman et al, 1986)37;

Improving stream function by reconnecting flood plains (Rosell et al, 2005)38;

"Beaver ponds also stabilize watersheds by reducing high flows and downstream flooding" (Wyoming Game and Fish, 1993)39.

Farmers and ranchers have historically viewed beavers negatively for their role in flooding agricultural land. An improved understanding of and appreciation for the capacity of beavers to increase range health through water retention has prompted some to take an active role in fostering beaver activity in the lands they manage. Managers considering beaver restoration should be familiar with the potential benefits beaver can yield for domestic and wild grazers as well as the sensitivity of beaver to riparian habitat degradation stemming from forage and trampling by domestic livestock and wild ungulates. Highlighting increased water availability for water-limited grasses can be an effective approach for engaging ranchers who might otherwise oppose beaver restoration programs. Gaining support for excluding livestock from riparian areas might be facilitated by promoting benefits anticipated for grazing elsewhere in the watershed.

Throughout the American West, especially on public lands, restoring beavers to headwater streams will enhance the resilience of vital habitats. Beavers engineer ecosystems making stream and wetland communities much more diverse, resilient, and widespread. Beaver dams not only reduce peak runoff during floods, they also store water that can sustain stream flow during drought.

Based on a survey of how dams store water, the Lands Council of Washington State predicts that reintroducing beaver to 10,000 miles of suitable habitat in Washington could help retain more than 650 trillion gallons of spring runoff which would slowly be released by beavers' naturally leaky dams. The Council began investigating the beaver option after learning that the state was considering dam projects costing billions of dollars. The argument is that beavers can do the job at a small fraction of the expense for manmade projects. The Council estimates that restoration, maintenance, and monitoring would cost less than one million dollars. The Council group plans to test water storage predictions with small scale beaver reintroduction projects that will compare groundwater levels before and after beavers settle into their new homes.

Beaver activity and colonization should be monitored with respect to Cutthroat trout, riparian standards, aquatic ecosystem standards, hydrological connectivity, and for providing fire breaks due to wetlands.

The restoration of beavers is a natural solution. We now recognize the beaver as a keystone species - an animal that plays a vital role in how an ecosystem works. Beaver dams create wetlands and meadows that improve water, increase biodiversity, and their dam building stores water for irrigation and recreation. As the climate gets warmer, letting beavers be beavers is a simple solution to water conservation.

The DEIS:

In Desired Condition 9 on page 23 of 2.3.5 entitled Watershed and Aquatics, there is this statement about beavers:

"Beavers play an important ecological role within suitable habitat by increasing water residence time and spatial extent of water on the landscape, and aquatic and riparian habitat complexity."

Guidelines 3 on page 25 under the same component is the only other mention of beavers in this component:

"To protect the ecological functions that beavers provide management actions to reduce beaver threats to infrastructure should use techniques that sustain beavers (such as, using pipes to reduce water levels, notching dams to restore streamflow)."

Even though beavers aren't considered a species of sensitive nature, GWA does believe that the emphasis isn't as strong as it should be in the DRFP.

1. Beaver could and should have been utilized more within the discussion of the DRFP under the component of Watershed and Aquatics or even during the discussion of climate change. The CGNF should acknowledge the beneficial effects that beaver can bring to the table in mitigating negative effects of climate change.
2. The CGNF should adopt beaver management plans to increase water management opportunities in the face of declining snowpack. This could have been considered as a standard or guideline.
3. The CGNF should work along side and in conjunction with MFWP to restore beaver to the CGNF. This could have been considered as a standard or guideline.
4. There should be inter-relationship studies performed concerning moose and beaver on the CGNF. Along with this, the CGNF should conduct an inventory on prime beaver habitat.
5. The CGNF should conduct a public educational and outreach program on beaver restoration which relates to comment 2 above.

Bison:

One of the more controversial and heated debates within the GYE concerns bison and how to manage them on public land. Bison have been on the natural landscape long before man, yet there are efforts from certain entities within Montana and elsewhere attempting to identify bison as livestock. Without rehashing the argument in detail, it is safe to say that all of this political action against bison is a result of various groups seeking to protect their own special interest. If there ever was an example of discrimination being practiced against a native species, this is it. As a result, free-roaming bison are not found on the CGNF landscape in any significant numbers. The few that are present only do so as they migrate out of YNP to reach winter feeding

grounds and many of these end up getting killed. In reality, there is this fact about bison as presented by (Sanderson, E.W., et al. 2008)40:

"Although more than 500,000 bison exist in North America today, we estimated they occupy <1% of their historical range and in no place express the full range of ecological and social values of previous times."

We urge the CGNF to consider an alternative which will restore and conserve year-round populations of bison to historic habitat that will have a 90% or better probability of persisting for at least 100 years (see Traill et al 41. 2010 and Dratch and Gogan42 2010). The bison are described in these terms found within the DEIS:

On page 455:

"The Custer Gallatin is unique within the National Forest System in that it borders Yellowstone Park on the north and west sides, where bison naturally tend to migrate to lower elevation habitats on National Forest System lands when winter snows become too deep in the Park. The Yellowstone bison population is unique in that it is genetically pure due to isolation from domestic bovines (such as cattle), and it contains thousands of individuals that exhibit wild behavior, roaming relatively free over large landscapes (White et al. 2015)."

"Bison have a key ecological role in the Greater Yellowstone Ecosystem, and are managed largely under the auspices of an Interagency Bison Management Plan, developed in partnership between Yellowstone National Park, the state of Montana, USDA Forest Service and Animal and Plant Health Inspection Service (USDI NPS 2000)."

On page 456:

"Partly because of their size, but also due to behavioral characteristics, bison have a key ecological role, and are considered a "keystone species" in prairie/grassland ecosystems."

On page 457:

"Bison presence is currently limited to relatively small areas on the Custer Gallatin, primarily located within state-identified bison management zones west of Yellowstone Park in the Madison, Henrys Lake, and Gallatin Mountains Geographic Area and north of the park in the Madison, Henrys Lake, and Gallatin Mountains and Absaroka Beartooth Mountains Geographic Areas. There is suitable habitat for bison outside these management zones, and bison occasionally wander, but not far, outside the zones. Bison are native to the Custer Gallatin, and their presence in suitable habitat on National Forest System lands is a desired condition."

These statements fairly and accurately describe the natural and political landscape, although one could argue the actual treatment of bison (not described here) is more grotesque than one could imagine. Paragraphs under Affected Environment (Existing Conditions) on page 457 of the DEIS further describe the political landscape; details too lengthy to reproduce here, but details which are driving the management of bison.

The Interagency Bison Management Plan:

Another driver of the management of bison is the Interagency Bison Management Plan (IBMP). The DRFP seems to describe a different tone as it relates to the IBMP's management of bison than its description through the DEIS. Discussed on page 61 under the Introductory paragraph, the scene is described this way:

"The framework for management of Yellowstone bison is found in the Interagency Bison Management Plan, including the delineation of management zones where bison presence is tolerated and management is emphasized. At the time the plan was written, bison were located only in the Madison, Henrys Lake, and Gallatin Mountains Geographic Area and the Absaroka Beartooth Geographic Area."

The problem is not that there isn't any habitat; the problem is that bison are not tolerated outside of imaginary boundaries as established by the IBMP (Zone 2). This is verified on page 17 in the book, *Yellowstone Bison, Conserving an American Icon in Modern Society*, (White, P.J.; Wallen, Rick L.; Hallac, David E., 2015)43:

"The lack of tolerance for wild bison in most areas outside of Yellowstone National Park is the primary factor limiting their restoration in the Greater Yellowstone Area."

The Forest Service (CGNF) seems to be taking credit for bison in the park, ignoring the fact that only a few bison ever make it onto the CGNF landscape at all. In order for bison to be part of the CGNF landscape, Zone 2, an imaginary line established by the IBMP needs to be either moved deeper into the CGNF or removed altogether. The irony is that the CGNF is signatory to the IBMP.

GWA believes that the IBMP actually serves as a deterrent in arriving at a best available solution to manage bison on the large landscape outside of YNP. This interagency committee does not seem to be utilizing the best available science in its attempt to manage bison, thereby allowing the interagency team to become stuck in political gridlock. The politicians are the largest reason that bison aren't upon the landscape of the CGNF. It is this fact that allows the majority of CGNF lands not to be available to bison.

GWA supports some of the efforts listed within the DRFP; for example, the statements listed under Desired Conditions on page 61. Specifically, GWA supports Desired Condition 4, a desired condition which specifically relates to Alternative D. It states the following:

"Bison are present year-round with sufficient numbers and adequate distribution to provide a self-sustaining population on the Custer Gallatin National Forest."

But it must be noted, this is a desired condition, not a present condition. GWA agrees that the CGNF should work toward this goal to achieve this desired condition. GWA also applauds Guidelines 1-3 listed on page 62 of the DRFP. But again, Alternative D presents the better option as it tries to promote free-roaming bison on the landscape. Alternative D continues:

"To facilitate bison expansion into unoccupied, suitable habitat, management actions should not impede bison movement."

These are the right statements to make, but GWA believes the majority of the alternatives will not achieve these desired conditions. Alternative D is the more proactive alternative in trying to reach these goals, but even this falls short of what is required. These conditions will not be achieved until bison are allowed to traverse beyond the killing fields and imaginary lines set forth by the IBMP.

The Population:

The population of bison in the YNP is essentially divided up into two herds; the central and northern herd. It is the status of the central herd that is of particular concern. According to a status report by YNP, population numbers within the central herd have been driven down dramatically to 847 in 2017. Two bullet points were taken from the status report and shown below (Geremia, Chris, et al, 2017).⁴⁴ The link can be found here:

http://www.ibmp.info/Library/OpsPlans/2017_StatusYellowstoneBisonPopulation_Sep2017_Final.pdf

"The count of 847 bison in central Yellowstone (i.e., the central herd) was a 42-48% decrease from summer 2016. This reduction was due to removals during winter 2016-2017 and the dispersal of bison from central to northern Yellowstone."

"We do not recommend management removals or state and tribal harvests of bison in the western management area in Montana. Bison migrating west of the park during winter are almost entirely from the central breeding herd, which has decreased substantially in abundance during recent years."

These numbers are of an overall concern as we are not sure where the numbers are trending from here. We will repeat a reference here from above. We urge the CGNF to consider an alternative that will restore and conserve year round populations of bison to historic habitat that will have a 90% or better probability of persisting for at least 100 years (see Traill et al⁴⁵. 2010 and Dratch and Gogan⁴⁶ 2010). Remember Traill in the 2010 abstract of his paper states the following:

"This literature collectively shows that thousands (not hundreds) of individuals are required for a population to have an acceptable probability of riding-out environmental fluctuation and catastrophic events, and ensuring the continuation of evolutionary processes. The evidence is clear, yet conservation policy does not appear to reflect these findings, with pragmatic concerns on feasibility over-riding biological risk assessment."

As far as population outside the park there is this statistic found in "Bison Management Plan", American Prairie Reserve (Freese, C. H., K. Kunkel, D. Austin, and B. Holder)⁴⁷. This work notes on page 155 in an August 25, 2015 letter to the then Montana Fish, Wildlife & Parks Director Jeff Hagener:

"No viable wild population exists in the state and nationwide the only large population is in Yellowstone National Park. As proposed by Sanderson et al (2008) and others, populations need to be greater than 1,000 to provide a "large contribution" to ecological recovery. This is also true from a genetics standpoint."

As previously noted, this could easily be corrected if bison were to be tolerated by the IBMP by either the removal of or beyond the imaginary zone 2 boundary line.

The Importance of Genetic Diversity:

Not only are the declining numbers of bison a concern, but there is the issue of genetic diversity of the Yellowstone herds. GWA would like to stress the importance of maintaining this genetic purity, another reason for trying to get these species listed as either endangered or threatened or even listed as a SCC. The scientific study of Bison Conservation Initiative: Bison Conservation Genetics Workshop: report and recommendations, (Dratch, P. A., and P. J. P. Gogan. 2010)⁴⁸ can be summed up the following way in preserving genetic diversity:

1. The 12 Dept. of Interior herds are an irreplaceable resource for the long-term conservation of North American plains bison. Most of the herds show low levels of cattle introgression dating from the time when they were saved from extirpation; those herds should not be mixed without careful consideration as to their origin. Herds that show no evidence of cattle ancestry by the current molecular methods are the highest priority for protection from genetic mixing with any other bison herds.
2. Despite the fact that most of the herds now managed by the U.S. government were founded with very few bison and have been maintained for many generations at relatively low population sizes, they do not show obvious effects of inbreeding. They have retained significant amounts of genetic variation by the standard measures, heterozygosity and allelic diversity.
3. To preserve genetic variation in federal bison herds over decades and centuries, herds should be managed at a population or metapopulation level of 1,000 animals or more, with a sex ratio that enables competition between breeding bulls.
4. The current methods used to evaluate the DOI bison herds, using mitochondrial DNA and a suite of nuclear DNA microsatellites, are highly informative at the herd level. They have confirmed relatedness of herds that we know from historical records have a common origin. They have detected cattle ancestry in most of the herds where it was suspected and have shown some loss of rare alleles.

It is the genetic diversity that is in need of protection, and for that there needs to be a size large enough to prevent a loss of alleles over time. And before that can happen there needs to be a land large enough to maintain that size herd. This is where the importance of CGNF lands can be valuable, to increase the size of herds especially on lands where the bison do not normally occur in significant numbers.

This finding is verified by more research. According to (Freese, C.H., et al. 2007)⁴⁹ in an article entitled "Second Chance for the Plains Bison" in *Biological Conservation*, there is this scientific fact:

Research indicates that it takes between 2,000-4,000 bison in order to preserve 95% of the genetic diversity of Yellowstone bison over 200 years (Freese et al. 2006), and this is assuming there is not even the slightest deviation in modeling assumptions. Indeed

research has indicated that such deviations have occurred; Yellowstone bison have already lost rare alleles, and this trend is likely to continue under current management protocols.

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"Research indicates that it takes between 2,000-4,000 bison in order to preserve 95% of the genetic diversity of Yellowstone bison over 200 years (Freese et al. 2006), and this is assuming there is not even the slightest deviation in modeling assumptions. Indeed, research has indicated that such deviations have occurred; Yellowstone bison have already lost rare alleles, and this trend is likely to continue under current management protocols."

The Genetics warrant Species of Conservation Concern:

In order to maintain this genetic diversity, GWA believes a listing of bison as a Species of Conservation Concern is necessary. That and the effect that numbers of bison need to occur on the landscape of CGNF. According to a scientific journal article entitled "Conservation Genetics and North American Bison" (Hedrick, Phillip, 2009)50 genetic rationale is provided for the conservation of the species as we know it:

"However, it is clear that bison need to be managed as a conservation species because of the potential effects of the low initial numbers of founders, past bottlenecks in various herds, cattle hybridization in a number of conservation herds, artificial selection for nonadaptive traits, isolation of most conservation herds, and the observation of severe inbreeding depression in 1 conservation herd."

That discussion can be found here in the American Genetic Association's online journal, Journal of Heredity:

https://www.buffalofieldcampaign.org/archives/habitat/documents/Hedrick_Bison_Genetics.pdf

There are many reasons to list bison as a SCC. The fact that the species do not readily occur on the forest (despite how the DRFP reads) is a result of human interference, not because of lack of habitat. The fact that habitat is known to exist and the fact that bison are willing to be present on the landscape should address the criteria as stated in the 2012 Planning Rule. We know bison are willing to be present, but what warrants the listing are the genetics. In order to maintain the genetic purity as it is, bison of YNP need to be able to become free-roaming outside the park boundary in order to fulfill their migratory, biologic and historic requirements. On page 21 of the DEIS, it states the following:

"Plan components would support management of bison on the Custer Gallatin National Forest, including a year-round self-sustaining bison population on the national forest."

To further the discussion on bison genetics, GWA would like to refer the CGNF to a document by the International Union for Conservation of Nature (IUCN). The Species Survival Commission, the largest of 6 volunteer commissions under the authority of the IUCN, presented a document entitled "American Bison: Status Survey and Conservation Guidelines, 2010" (Gates, C. C., C. H. Freese, Peter J. P. Gogan, and M. Kotzman. 2010)⁵¹. The Executive Summary of that paper stated the following:

"Herds of 1,000 or more animals are important for conserving genetic diversity, and factors such as non-random mating, skewed sex ratios, and large swings in population size need to be avoided in relatively small herds."

One more piece of documentation to verify the science and this is found in the paper "Effects of Population Control Strategies on Retention of Genetic Diversity in National Park Service Bison (Bison bison) Herds" by (Gross, J. E., et al. 2006)⁵². In the abstract, they state this fact:

"A moderate bison population size - about 1000 animals - is necessary to meet a long-term goal of achieving a 90% probability of retaining 90% of allelic diversity for 200 years."

The science is out there and it is for managers to implement. We know what needs to be done, but we have to be honest and realize the reasons that many wildlife agencies aren't following through on the science are due to politics. We say we want the best available science, but when it is presented, agencies say they have their own science. We need to change the paradigm that we have been trapped in for decades in order to make progress.

GWA believes that the following changes need to be made to the DRFP in order to facilitate progress of bison on the CGNF landscape. Some of these comments we inherited from the Buffalo Field Campaign and some are our own. We urge them to be added to Alternative D. GWA supports Alternative D in the Bison component.

Tribal Considerations for Species of Conservation Concern:

Species of Conservation Concern document (FSEPRD 509599) states that "[a]n initial list of potential 'Species of Conservation Concern' will be included in the Draft Assessment of Existing Conditions." The document goes on to state that "Species Considered Include":

"Species identified by Federal, State, or Tribal entities as high priority for conservation".

The Northern Cheyenne Tribe of Indians submitted comments during scoping asking that bison be considered as a Species of Conservation Concern because it is a high priority for conservation. The Draft EIS does not appear to address the Tribe's request or comments to add bison as a Species of Conservation Concern. A follow up letter, more recent letter will be presented here⁵³.

In addition to the Northern Cheyenne Tribe's individual request, GWA has received copy of a letter from the Rocky Mountain Tribal Leaders Council written to Virginia Kelly, CGNF's Forest Plan Revision Team Leader of the U.S. Forest Service. This letter was presented to John Meyer of Cottonwood Environmental Law Center and upon his request, he wanted the letter to become part of the official record and we are submitting it here as an Appendix and will be referenced here⁵⁴. The request is that bison needs to be listed as a SCC. In that letter, it states the following:

"We ask that the Forest Service add the American Buffalo to the list of Species of Conservation Concern to ensure the Tribes' Treaty Rights are respected."

The IBMP, State laws and Species of Conservation Concern:

The following document is from Darrell Geist, bison habitat coordinator for the Buffalo Field Campaign (Geist, Darrell, 2019)⁵⁵:

Inspired by the American bison e-newsletter: Seeking the Truth

"The self-serving narrative of the American bison as a "conservation success story" hides an historical truth that remains true a century after their near extermination by Euro-Americans: the wildlife species is endangered in North America. At a minimum it is a Species of Conservation Concern that requires proactive management assistance to ensure its long-term recovery, conservation and persistence across the Custer-Gallatin National Forest and other neighboring National Forests and public and private lands in Montana, Idaho and Wyoming.

A primary threat to bison restoration, conservation and persistence to National Forest Service lands including the CGNF is found in the State codes (see brief discussion below). The threat to recovering the imperiled American bison is complicated by the U.S. government's feeble response to make habitat on public lands minimally available for American bison in a severely range restricted livestock centric plan outlined under the Interagency Bison Management Plan.

The American bison in the Greater Yellowstone Region have the unique opportunity of migrating to and across various National Forests in the three States bordering Yellowstone National Park. However, how do Idaho, Montana, and Wyoming view natural emigration of this indigenous iconic wildlife species? An inspection of State codes reveals the absence of any provision for conserving American bison in the wild -- with agriculture and livestock agencies in charge of removing them. Indeed, across most National Forests in the Greater Yellowstone Region, including the majority of the CGNF, American bison remain ecologically if not physically extinct.

For example, the U.S. Dept. of Agriculture officials assist the state of Idaho in the "eradication" of American bison that cross Targhee Pass on the Caribou-Targhee National Forest into the geothermal basin of Henry's Lake and Island Park. "Eradication" is the law. Idaho Code [sect] 25-618(1). Bison migrating along the Shoshone River into the State of Wyoming are managed in restricted ranges in limited numbers for removal on the Shoshone National Forest. With a phone call, the Wyoming Livestock Board can order Game & Fish to remove migratory bison found in the state. Wyo. Stat. Ann. [sect] 23-1-302(a)(xxvii); Wyo. Game & Fish Dept. 2008. In Montana, bison migrating along the Yellowstone and Madison rivers are managed in restricted ranges in limited numbers for removal on the Custer Gallatin National Forest. Under Mont. Code Ann. [sect] 81-2-120, the state veterinarian and the livestock department are firmly in control of the wild species under the Governor/USDA-approved plan the statute calls for: the outdated Interagency Bison Management Plan.

Furthermore, the public pays for the enforcement of Montana's code and the outdated IBMP. A pipeline of taxpayer money has been flowing from the U.S. Dept. of Agriculture Animal & Plant Health Inspection Service to the Montana Dept. of Livestock since shortly after the agency seized management control of American bison in 1995. While the state veterinarian tries to hide the appropriated amounts in a mishmash of subsidized programs, the livestock department has blown through \$12,000,000 of American taxpayer money to enforce [sect] 81-2-120.

National Forests in three Regions have abandoned American bison to State regulatory schemes written by the livestock industry. These three Regions hold 87,000,000 acres of National Forest habitat in public trust for future generations. The unique opportunity for American bison to emigrate to and across our National Forests and other public lands in Idaho, Montana, and Wyoming is met with drop dead State policies and laws calling for their "eradication" and removal. For example, in Montana, the Beaverhead-Deerlodge National Forest and most of the Custer Gallatin National Forest are unavailable to bison because the Interagency Bison Management Plan says all but a small portion of the CGNF is zone 3 or a no go drop-dead killing zone for bison. Furthermore, American bison are ecologically if not physically extinct across the vast majority of their historic range in Montana, Idaho and Wyoming. How can this situation not warrant designating the American bison as a Species of Conservation Concern? The Custer Gallatin National Forest and Region 1 must not abandon American bison to another regulatory scheme that does not sustain them on habitat held in public trust.

As outlined in the outdated IBMP, a severely range restricted ancient remnant and singular population of American bison occupies only a minute fragment of their native range mostly in Yellowstone National Park. This is all that remains of wild bison in the conterminous 48 States, except for a small herd of bison in the Henry's Mountains of Utah. Bison containment and extirpation is being done under the guise of brucellosis control, while elk and other wildlife exposed to this exotic livestock disease walk right on by. This is not a "conservation success story."

Bison science, policy and law (Gates, et al. 2010)⁵⁶ demands CGNF designate bison as a Species of Conservation Concern to ensure their long-term recovery, conservation and persistence across the plan area,

as well as neighboring National Forests. We ask the CGNF to point out the flawed foundation of the IBMP, which wobbles unsustainably on a severely range restricted drop dead line paradigm for American bison. Furthermore, the outdated IBMP is based on a myth that confining and extirpating bison on the outskirts of Yellowstone National Park as they attempt to immigrate/emigrate into historic habitat in Montana and Idaho is controlling brucellosis. As noted earlier, elk and other wildlife exposed to this exotic livestock disease walk right on by. Given recognition of the need to proactively manage the bison as a Species of Conservation Concern, an opportunity for bison restoration, conservation and long-term persistence across the plan area and other native habitat on adjacent National Forests will emerge. Let us start by putting our hearts and minds together to write a new chapter for American bison on the Custer Gallatin National Forest.

Notice the highlighted portions in yellow that provide state statutes in the management of bison. The IBMP, which we have already discussed, and state laws are part of the larger problem in allowing bison to venture forth on what was once their natural range. Once again there needs to be a paradigm shift of policy decision makers, because what they have been trying to implement is not working on behalf of the bison. It is cruel and harsh punishment to such a noble species.

Bison on the Larger Landscape:

GWA has long been a proponent of bison on the larger landscape, more so than just outside the boundaries of YNP. We would like to include here in this document the correspondence we sent to MFWP back in 2012/57. These were scoping comments concerning the restoration and conservation of bison on public lands across Montana, but specifically we want to direct your attention to lands we designated (items 2 and 3) in the letter; they are listed below:

1. All Custer National Forest lands from the Pryor Mountains east including the Crow and Northern Cheyenne Indian Reservations and the Custer National Forest lands east of Ashland and Birney west to the Powder River including adjacent BLM and State lands and authorized private lands.
2. The Greater Yellowstone Area in SW Montana including Yellowstone National Park and portions of the Gallatin National Forest and the Beaverhead National Forest, Red Rock Lakes National Wildlife Refuge, surrounding BLM and State lands and the various state-owned Wildlife Management Areas (Wall Creek, Gallatin, Dome Mountain, etc.) and authorized private lands.

These areas are obviously part of CGNF lands which should be developed as an alternative in the DRFP. This would lead to meaningful bison restoration and conservation outside YNP. Please consider reviewing in detail the suitability of the following proposed "Designated Areas" for wild bison reintroduction and/or restoration and conservation. Wild bison should be authorized on all public lands. If wild bison are not welcome on certain public lands within any given authorized landscape or "designated area", a clear reason must be provided to the public. MFWP must also make it clear which, if any, private lands are not authorized for bison use within any given landscape, Montana Code Annotated (MCA) 87-1-216. Fencing may prove necessary to assist FWP with preventing bison from entering unauthorized private lands as mandated by MCA 87-1-216. Conflict areas or intolerant landowners should be fenced out, if necessary. It is not appropriate to fence wild bison or other wildlife in.

1. Freedom for American bison to roam on a National Forest habitat should be a forest wide standard.
2. Connectivity to desired habitat for American bison should be a forest wide standard.
3. The CGNF should use the best available scientific information in support of strengthening Alternative D with stronger standards for American bison.

4. If bison are considered a keystone species as stated on page 456, why are they not considered a Species of Conservation Concern? The best available scientific information supports the Regional Forester listing American bison as a SCC.
5. The Regional Forester needs to provide a reasoned response to the evidence in support of listing presented in public comment.
6. The DRFP does not acknowledge the importance of genetics as to how the purity factor of YNP bison warrants protection. The maintenance of this purity should be a standard or guideline in the DRFP.
7. The IBMP is a hindrance for bison to enter onto the CGNF landscape and is self-defeating. The IBMP is not based on the best available scientific information.
8. Protecting American bison viability and increasing diversity should be a forest wide standard.
9. The Custer Gallatin should initiate a habitat recovery program and provide funding to recruit scientists and biologists with aboriginal knowledge of American bison and fire.
10. The Custer Gallatin must recognize the best available scientific information of genetically distinct subpopulations of American bison in the Northern and Central Interior herds.
11. It is improper for the Custer Gallatin to adopt the State's "management" as policy on the National Forest - an ongoing stressor that threatens American bison and their habitat.
12. The central herd or subpopulation is under threat and being driven down under the stress of the IBMP.
13. The concerns of the Northern Cheyenne Tribe to request Bison as SCC need to be addressed.
14. The National Forest Service (with all the different forests surrounding and part of the GYE) need to provide a unified front to state agencies to change the structure of the IBMP and allow bison to become part of the natural landscape.
15. The CGNF has a duty to fulfill responsibilities and trust obligations safeguarding treaty rights, sacred species, sacred sites, and traditional cultural places of significance to aboriginal people.

Grizzly Bear:

Grizzly bear status as a listed species on the Endangered Species List has been on again/ off again over the past several decades. Without going through the history, the latest status is that it was relisted due to a court ruling this past September 2018. A conservation strategy was developed by an interagency team of federal, state and tribal agencies back in 2003 and that has been reviewed and updated, the latest which was completed in 2016 by the Yellowstone Ecosystem Subcommittee of the Interagency Grizzly Bear Committee (IGBC). According to page 365 of the DEIS, the Forest Plan (the future DRFP) will be the guiding authority over the management of grizzly bear habitat on CGNF lands. And that authority will be implementing the management recommendations found in the Greater Yellowstone Ecosystem Grizzly Bear Conservation Strategy which was formulated by the IGBC.

The concerns of GWA over the issue of grizzly bears are multifold. We are concerned about the interruptions of their food supply, about bear/human conflicts, about habitat fragmentation, about the lack of connectivity to other ecosystems, and about livestock grazing which preempts connectivity and increases the excuse for mortality. The IGBC can mitigate and alleviate some of those concerns, but not all. Many of those concerns are outside the control of the IGBC. Unless this interagency committee can take on a more political role and insert itself on issues on both sides of the Grizzly Bear Recovery Zone, some issues will still be beyond man's immediate control.

In an online journal entitled BioOne Complete, there is an article entitled "Impacts of Rural Development on Yellowstone wildlife: linking grizzly bear *Ursus arctos* demographics with projected residential growth" (Schwartz, Charles, et al, 2012)⁵⁸. The very first line of that scientific article states the following:

"Exurban development is consuming wildlife habitat within the Greater Yellowstone Ecosystem with potential consequences to the long-term conservation of grizzly bears *Ursus arctos*."

<https://bioone.org/journals/Wildlife-Biology/volume-18/issue-3/11-060/Impacts-of-rural-development-on-Yellowstone-wildlife--linking-grizzly/10.2981/11-060.full>

That single sentence states the reality on the ground. The Big Sky Development area is a large part of the problem when it comes to the loss of habitat and the additional pressures placed upon the ecosystem. The article further explains the following:

"Long-term conservation of grizzly bears is directly related to human activity. This proximity between bears and humans has resulted in a source-sink dynamic (Knight et al. 1988, Schwartz et al. 2006e, Schwartz et al. 2010) in the Greater Yellowstone Ecosystem (GYE) where bears die at higher rates in and adjacent to areas with human activities. Schwartz et al. (2010) demonstrated that grizzly bear survival was negatively associated with increases in roads, human residences, other developed sites (e.g. campgrounds and lodges) and the time bears used areas open to ungulate hunting.

Rapidly accelerating growth of rural residential development (i.e. exurban sprawl) in some areas in Montana, Idaho and Wyoming has been identified as a factor impacting bear habitat (Schwartz et al. 2010) with the potential for an increase in grizzly bear-human conflicts and bear mortalities."

This article is borne out by the DEIS itself. On page 365, under the paragraph title "Key Stressors", there is this statement:

"Interactions with people are by far the leading factors affecting the Greater Yellowstone Ecosystem grizzly bear populations (USDI FWS 2016a, Schwartz et al. 2010), including those bears that inhabit, or pass through the Custer Gallatin National Forest. Motorized access routes (roads and trails) detract from secure habitat. Permitted livestock grazing allotments contain live animals, livestock feed and supplements, and occasionally livestock carcasses that may attract grizzly bears into potential conflict situations with people. Developed sites provide places for people to concentrate use, which can contribute disturbance factors that may displace wary bears, while at the same time often provide facilities for storing, preparing and eating food, or disposing of garbage, which may act as attractants for less wary bears. Availability of secure habitat, key natural food sources, and human-related attractants, can influence grizzly bear survival, reproductive success, and distribution."

Unfortunately, food supply by bears has either been directly or indirectly affected by activities of man. Whitebark Pine has succumbed to the effects of climate change and spawning cutthroat trout have been affected by man introducing Lake Trout within the GYE affecting cutthroat trout numbers. Even livestock grazing has interfered with carcass supplies as livestock can become easy prey which leads to mortality on the grizzly bear. Finally, there is the issue of habitat fragmentation. Whether it be recreationist, timber harvesting, highways or the effects of the wildland/urban interface, man has intruded on and into grizzly bear habitat. It is usually the bear that comes out on the short end of that contact.

Grizzly Bear Connectivity:

One piece of scientific evidence that indicates grizzly bears need connectivity can be found in the Craighead Institute paper, Wilderness, Wildlife, and Ecological Values of the Hyalite-Porcupine-Buffalo Horn Wilderness Study Area on page 94 (Craighead, Lance 2015)59:

"Evidence for historic grizzly bear connectivity suggests that the GYE population was connected to the west and north through the Centennial Mountains to the Selway-Bitterroot ecosystem, to the Cabinet-Yaak ecosystem, and ultimately to Canadian populations (Mattson and Merrill 2002, Merrill et al. 2005). Other evidence indicates historic connectivity to the Northern Continental Divide Ecosystem (NCDE) through the Tobacco Root, Highland, Champion-Thunderbolt and/or Elkhorn mountains (Picton 1986, Merriam 1922). It is also likely that grizzlies had connectivity to the NCDE through the HPBH WSA area, the Bridger and Little Belt Mountains. Grizzlies inhabited the Little Belts as recently as the 1960's (Aune, Pers. Comm. 1996)."

The authority of the 2012 Planning Rule dictates the Forest Service must allow for connectivity to be considered to promote species diversity and integrity. The DEIS admits one of the more likely connectivity corridors is that between the Bridger, Bangtail and Crazy Mountains Geographic Area and the Gallatin, Madison and Henry's Lake Geographic Area.

On page 362, there is this statement:

The Bridger, Bangtail and Crazy Mountains Geographic Area is not currently occupied by grizzlies, and is outside of the Greater Yellowstone Ecosystem grizzly bear distinct population segment (USDI FWS 2016a). However, the Bridger, Bangtail and Crazy Mountains Geographic Area has good potential to provide habitat connectivity for grizzly bears to move between the Greater Yellowstone Ecosystem and the Northern Continental Divide Ecosystem. These three geographic areas are where grizzly bears are present today, where they have the best opportunities for reproduction and survival in the future, and where they may find habitat connectivity suitable for movement between existing grizzly bear ecosystems to promote genetic diversity. Currently, these geographic areas average about 73 percent secure habitat.

Page 370:

"Isolated mountain ranges in the Bridger, Bangtail and Crazy Mountains Geographic Area have been identified as potential travel corridors between the Northern Continental Divide Ecosystem and the Greater Yellowstone Ecosystem (Walker and Craighead 1997, Cushman et al. 2009, Peck et al. 2017), and the Bridger/Bangtail Ranges are included in the Northern Continental Divide Ecosystem Grizzly Bear Conservation Strategy as "Management Zone 2," which denotes areas to be managed for opportunistic movement of grizzly bears between ecosystems."

Alternative Cohesion pertaining to Grizzly Bear:

On page 371, there are the following statements:

All revised plan alternatives include desired conditions for habitat that contributes to species recovery, and for stable or increasing population trends for listed species.

Similar to the current plans, all revised plan alternatives require secure habitat inside the recovery zone to be maintained over the long term in all bear management subunits at or above appropriate baseline levels.

On page 372:

Under all revised plan alternatives, the area within the grizzly bear recovery zone would be managed under concepts outlined in the Greater Yellowstone Ecosystem Grizzly Bear Conservation Strategy (Yellowstone Ecosystem Subcommittee 2016), on both the Custer and Gallatin portions of the national forest, regardless of the federal status of the grizzly bear.

In reading the DRFP, there really isn't much difference between the alternatives as written. But GWA promotes Alternative D as the best approach to manage grizzly bears. The difference between Alternatives B, C, and E to that of Alternative D is based upon the use of targeted grazing by domestic sheep (page 67 of the DRFP). Another change is reflected on page 65 under Objectives. Alternative D will identify seven relocation sites as opposed to lesser numbers in each of the other alternatives. But it is critical not to forget the statement found on page 371:

"In addition to grizzly bear-specific direction, all revised plan alternatives include other wildlife plan components that may affect grizzly bears."

In other words, there are other uses, other conditions, which may affect grizzly bears. One example of this would be the use of motorized or mechanized recreational use in potential wilderness areas. Specifically, this describes Alternative C. Alternative C excludes the Buffalo Horn drainage at the SW corner of the WSA from wilderness protection which is within the Grizzly Bear Recovery Zone, thereby increasing the disturbance and chance of conflict w/mechanized users. It is disingenuous to think there could be that diverse use amongst grizzly bear habitat without some negative impact on the bear. Some of that concern is even stated under Standards listed on pages 65 and 66 in the DRFP. GWA has problems or apprehensions about several of the standards listed. Some of those standards still allow intervention or exceptions in the forest for temporary or permanent changes, development, and grazing; standards 2, 3, 4, and 5 respectively. The policies of BCA with their proposed mechanized use and timber thinning, etc., are basically counterproductive if the Revised Plan is really serious in protecting the habitat of grizzlies and other wildlife. With this in mind, GWA has several questions.

Grizzly bear, Recreation and Wilderness:

The issue of conflicts between recreation and grizzly bear will be discussed later on in the recreation section of this document, but it is such an important conflict and such a contradiction to the purpose of the Grizzly Bear Recovery Zone designation, the issue deserves discussion here. A designation, by the way, which was delineated by the US Fish and Wildlife Service in 1993. The issue involves all three issues: grizzly bears, wilderness and recreation. They are inseparable. In a recent article of Mountain Journal, an online magazine, there was an article entitled "Griz Expert Says Mountain Bikers are a Grave Threat to Bears" by Todd Wilkinson⁶⁰. In this article he interviewed Dr. Christopher Servheen, an adjunct research professor in the Department of Ecosystem and Conservation Sciences at the University of Montana. In his reference to a multi-agency board review of an incident which resulted in the death of a mountain biker by a grizzly bear in 2016, Dr. Servheen states the following:

"According to Servheen and others, capital "W" wilderness areas are biologically important for bears because they are notably different from the busy pace of human uses found on public lands managed for multiple use. Wilderness does accommodate recreation but the emphasis is on users moving at slow speed."

"Wild public lands that currently have grizzly bears present have those bears because of the characteristics of these places: visual cover, secure habitat, natural foods, and spring, summer, fall, and denning habitat," Servheen said. "All these factors can be compromised by excessive human presence, high speed and high encounter frequencies with humans. To compare places without bears, like Utah, to places with bears, like Yellowstone or all the wilderness areas with bears, is a flawed comparison."

This form of recreation and the designated landscape that allows for its approval is just another form of habitat fragmentation. It is GWA's contention that the allowance of mechanized or motorized bikes in potential wilderness areas would be devastating to grizzly bears on CGNF lands.

1. How does the DRFP justify the actions of other components; i.e., land-use designations of wilderness, backcountry areas, the allowance of motorized and mechanized use in remote grizzly bear habitat?
2. How does the DRFP allow actions or standards within the component of grizzly bears to continue knowing that those actions would cause harm or detract from their protection?
3. How do the alternatives differ from each other in achieving the Desired Conditions?
4. Alternative C excludes the Buffalo Horn drainage at the SW corner of the WSA which is within the Grizzly Bear Recovery Zone, thereby increasing the disturbance and chance of conflict with mechanized users. GWA cannot accept such a flagrant disregard for wildlife habitat.
5. The best available scientific information supports including enforceable standards to protect key linkage areas, connectivity to habitat, and food security for threatened grizzly bears.
6. For these reasons, GWA supports Alternative D.

Bighorn Sheep:

Like that of so many other stories of wildlife species, that of bighorn sheep is not much different. Once estimated in the 1800s to be around 2 million sheep in North America, now the estimated number is 35,000 (Toweill, D.E. and V. Geist. 1999)⁶¹. If you were to do the math, only 1.75% of the original population size is intact. The introduction of bighorn sheep on page 60 of the DRFP provides a quick summary of a sad history of this magnificent species:

"Settlement of the western United States led to significant declines of bighorn sheep due to subsistence hunting, range competition with domestic livestock, and contact with domestic sheep, which led to contraction of disease resulting in major die-offs in multiple bighorn sheep herds. Since then, statewide restoration efforts led by Montana Fish Wildlife and Parks focused on habitat improvement projects and bighorn sheep transplants to recolonize areas of historic habitat. Disease transmission from domestic animals, particularly domestic sheep and goats, is considered a primary threat to bighorn sheep populations."

It goes on to say that currently there are no grazing allotments for domestic sheep or goats on the CGNF. All good news as far as it goes, but the discussion ends there. The DRFP only provides two Desired Conditions and one Goal. GWA is greatly disappointed in this effort. In fact, throughout the DRFP, bighorn sheep is only sparsely discussed or mentioned. It appears the CGNF feels nothing else is needed to be done, nothing else is expected or demanded of them as it pertains to the healthy population of bighorn sheep. We obviously disagree and believe bighorn sheep are not in vibrant health individually or population wide, whether it be on the CGNF or across the West.

Where the DRFP fails, the DEIS makes up for as it provides a more detailed description of bighorn sheep on CGNF lands. Section 3.10.4 pertains to bighorn sheep with page 432 listing the stressors of this species. Documentation of Toweill, D.E. and V. Geist from above verifies the stressors listed within the DEIS. Those stressors listed are the following:

1. disease-carrying domestic sheep and goats,
2. conifer encroachment,
3. noxious weeds,
4. human disturbance, and
5. habitat fragmentation from human development.

The DEIS elaborates in the paragraphs remaining, the first being "Environmental Consequences-Management Direction under the Current Plans". GWA found this to be an interesting read. Actions of current plan include the following, which are on page 432.

1. "The Custer Plan specifies that vegetation manipulation will be used to increase the abundance and vigor of bighorn sheep forage species, but that mechanical methods resulting in surface disturbance are not allowed for such projects on bighorn sheep winter range."
2. Closure of the only sheep allotments on the Custer portion of the forest.
3. "The Gallatin Plan acknowledges the Hyalite-Porcupine-Buffalo Horn Wilderness Study Area as home to an important population of bighorn sheep, with an associated goal to maintain and enhance bighorn sheep habitat and a standard to manage the lambing area."
4. Finally, "the Gallatin plan prohibits stocking of domestic sheep in grazing allotments within the grizzly bear recovery zone and primary conservation area. This restriction applies to roughly 44 percent of the Madison, Henrys Lake, and Gallatin Mountains and the Absaroka Beartooth Mountains Geographic Areas, which contain bighorn sheep."

But then there was this statement:

"Bighorn sheep are currently identified as a Regional Forester's sensitive species known to be present on both the Custer and Gallatin portions of the Custer Gallatin National Forest. Under both existing plans, habitat management for sensitive species is subject to special management considerations, as outlined in the Forest Service Manual (FSM 2670)."

GWA was led to believe that the classification of "sensitive species" doesn't exist anymore. Since the 2012 Planning Rule, the new classification of "Species of Conservation Concern" was the new identification. More on this later below.

Disease on the Custer-Gallatin:

Even though "there are currently no sheep or goat-grazing allotments on the national forest" (page 374 of the DEIS), that does not mean there are no threats of disease to bighorn sheep. In fact, just the opposite is true. In

a paper entitled, "Modeling Risk of Pneumonia Epizootics in Bighorn Sheep", published in The Journal of Wildlife Management, (Sells, S.N., et al. 2015)62; there is this distressing statement:

"This paper suggests the Upper Yellowstone and Hilgard bighorn sheep herds on the Custer Gallatin National Forest have an 80% and 85% chance, respectively, of a disease epizootic within 10 years of 2012 if levels of risk factors remain unchanged.

Risk of disease epizootic is estimated for each one of the 42 bighorn herds in Montana."

Under the subtitle "Effects of the Current Plans" within the DEIS itself, there is an excellent explanation of diseases affecting bighorn sheep on the CGNF. The full excerpt will not be reproduced here due to space and time, but brief snippets will be (page 433 of DEIS). GWA is glad to see the acknowledgement as stated at the beginning of paragraph 3 on page 433; that respiratory disease is primarily the limiting factor for bighorn sheep:

"Respiratory disease epidemics are perhaps the primary limiting factor for bighorn sheep populations, and research has confirmed that domestic sheep and goats may carry some of the same strains of disease, and can transmit disease to bighorn sheep in the wild. Separation between domestic and wild sheep is considered an effective way to reduce the risk of disease transmission between domestic and wild species (Montana FWP 2010, Wild Sheep Working Group 2012)."

"Bighorn sheep on the Custer Gallatin carry known disease pathogens, and have experienced respiratory disease epidemics. Some, but not all herds found on the Custer Gallatin have experienced disease-related die-offs, but affected herds generally have recovered either naturally or through population augmentation (Montana FWP 2010, Garrott et al. 2015)."

The DEIS admits that disease does exist on the CGNF (3rd paragraph, page 433). The above paragraphs state one of the current problems; domestic sheep transmitting disease to bighorn sheep. We also know that bighorn sheep on the CGNF have experienced this disease and have had die-offs as a result. With that known fact, it was surprising that the DEIS would state the following at the beginning of the 4th paragraph on page 433:

"Under existing plans, domestic sheep and goats could be permitted on grazing allotments in some areas where disease transmission between domestics and wild sheep could occur."

This raises an interesting question and will be asked below. But there are more questions as we continue to read on in the DEIS (middle of 4th paragraph and bottom of 5th paragraph, respectively on page 433):

"While there is no existing direction specifically addressing disease transmission between domestic sheep and goats and bighorn sheep, both plans contain management direction to maintain or enhance bighorn sheep habitat. Further, both plans contain language for management of sensitive species, and the bighorn sheep is currently on the Regional Forester's list of sensitive species for both the Custer and Gallatin Forests."

"Current plans do not specifically address the primary threat of disease transmission from domestic sheep or goats to bighorn sheep. However, other directives are in place that would minimize risk of disease transmission from livestock to bighorn sheep under the existing plans."

Before we move on, GWA would like to ask several questions before this gets any more confusing.

1. Why does the DEIS keep referring to "sensitive species"? GWA thought the new classification due to the 2012 Planning Rule was "Species of Conservation Concern".
2. Knowing that disease can be easily transmitted from domestic to wild bighorn sheep, why would the CGNF consider permitting "grazing allotments in some areas where disease transmission between domestics and wild sheep could occur?"
3. What is meant on page 433 of the DEIS in the inference of "both plans"?
4. There is a statement on page 433 that there are no current plans which address the threat of disease transmission from domestics to bighorn sheep, but then there is a statement which says other directives are in place which would minimize the risk of disease transmission? Please explain?
5. GWA wants to know what is the current plan that deals with disease transmission?
6. If the current plan does not address disease transmission, why not?

Not to belabor the issue of disease on the CGNF, but as the DEIS states on page 433:

"Respiratory disease epidemics are perhaps the primary limiting factor for bighorn sheep populations, and research has confirmed that domestic sheep and goats may carry some of the same strains of disease, and can transmit disease to bighorn sheep in the wild.

It is a subject worth discussing in some detail. In the Abstract, "Evidence for Strain-Specific Immunity to Pneumonia in Bighorn Sheep" published in *The Journal of Wildlife Management*; there is this statement (Cassirer, F.C., 2017)63:

"Transmission of pathogens commonly carried by domestic sheep and goats poses a serious threat to bighorn sheep (*Ovis canadensis*) populations. All-age pneumonia die-offs usually ensue, followed by asymptomatic carriage of *Mycoplasma ovipneumoniae* by some of the survivors. Lambs born into these chronically infected populations often succumb to pneumonia, but adults are usually healthy."

To combat the amount of distress in small herds who have succumbed to disease, GWA has long time been advocating for larger herd sizes with FWP and anyone else who will listen. CGNF could be an advocate for this type of management. For in the Abstract of a paper entitled "Role of patch size, disease, and movement in rapid extinction of bighorn sheep" published by *Conservation Biology*, (Singer, F.J., L.C. Zeigenfuss, and L. Spicer, 2001)64 they make these statements:

"Persistence in these sheep was strongly correlated with larger patch sizes, greater distance to domestic sheep, higher population growth rates, and migratory movements, as well as to larger population sizes.

Larger populations (250+ animals) were more likely to recover rapidly to their pre-epizootic survey number following an epizootic ($p = 0.019$), although the proportion of the population dying in the epizootic also influenced the probability of recovery ($p = 0.001$)."

Population on the Custer-Gallatin:

The following table shows the population numbers of bighorn sheep as recorded by Montana Fish, Wildlife and Parks in 2010 on the Custer Gallatin National Forest (Reference below). Along with the numbers are the threats that are posed to the sheep on designated herds.

Hunting District	Herd Unit Name	2010 Total	Recent Die-off(s)	Threats
300	Gallatin-Yellowstone	35	1982	Invasive Plants, Livestock, Recreation, Mtn Goats
301	Spanish Peaks	158	1999	Highway Mortality, Invasive Plants on WR, Developments, Domestic Sheep
302	Taylor-Hilgard	105	1987-97	Invasive Plants on WR, Mtn Goats, Artificial Feeding by Private Landowner
303	South Absaroka	20		Domestic sheep, Invasive Plants, Predation
304	Hyalite - Not Hunted	2016	25	2015 Domestic sheep, Invasive Plants, Predation
305	South Yellowstone - Not Hunted	2016	35	2015 Competition with other ungulates
500	Stillwater River	46		Snowmobiles on WR
501	Beartooth Mountains	78		Invasive Plants
502	Hellroaring	41		Snowmobiles on WR, Mtn Goats
503	Pryor Mountains	78	1995	Competition with Wild Horses, Domestic Goats
504	Lower Boulder River - Extirpated	0	1999-2000	Last Count 2000 (2)- Extirpated thereafter (p.254 FWP 2010)
Not Hunted	Mill Creek - Not Hunted	19	29-2017	21-2018 moved to steeper winter range
Total Bighorns		640		
Upper Yellowstone Complex Hds 300, 303, 304, 305 and Mill Crk un hunted		2015	115-135	1981-1982 (60%) Pneumonia
7, 2013	Bridger Mountains		I observed 2 bighorns north of the interstate north of Chestnut Mountain July	
	Crazy Mountains			
	North Absaroka			
	Lionhead/Sheep Mountain			
	Indian Crk/Taylor Fork			
	Beartrap Canyon (BLM)		I observed 12 bighorn sheep in April 2018 (ewes and rams) just below	
Kitchen Sink	Jack Creek (Madison Range)		10-20 BHS observed in 2016 and 2017	

Data was provided by the Montana Dept. of Fish, Wildlife and Parks article entitled Montana Bighorn Sheep Conservation Strategy⁶⁵ of 2010 on pages 82-83. As the CGNF can see, the threats are multifold, aligning with what was said within the DEIS.

Concerning the matter of population size, GWA would further like to include research by J. Berger, "Persistence of different-sized populations: An empirical assessment of rapid extinctions in bighorn sheep" (Berger, J., 1990)66:

"In general, large populations persist longer than small populations. Bighorn populations of 50 individuals or less, even in the short term are not a minimum viable population. This paper documents that 100% of bighorn sheep populations reviewed in this study with less than 50 individuals went extinct within 50 years. A "population" is defined as a bighorn herd confined naturally to a discrete mountainous area. Bighorn populations with >100 individuals persisted for up to 70 years.

There is no mention of 125 animals being a MVP for bighorn sheep in this article. To the contrary, numerous papers mention thousands rather than hundreds of animals are necessary to ensure long term persistence for any given species (Traill et al. 2010, Reed et al. 2003, Snaith, T.V. and K.F. Beasley. 2002, Dratch and Gogan 2010)."

It is GWA's contention, backed up by the science, that small populations do not, have not, and will not work as far as providing a viable population. This statement is verified by the work found in the paper, "The role of disease, habitat, individual condition, and herd attributes on bighorn sheep recruitment and population dynamics in Montana" (Garrott, R., K., et al.)67:

"In Montana, most populations are isolated and number less than 150 animals (Butler, Garrott and Rotella 2013) and this pattern has been described across their range (Berger 1990). This stands in contrast to the comparatively continuous distribution of other ungulates such as deer, elk and antelope. The most obvious factor hindering further bighorn sheep restoration is continued, widespread expression of respiratory disease. However, high predation rates, habitat loss and, poor genetic diversity and "unique factors" are also cited as factors limiting bighorn sheep populations (Festa-Bianchet et al. 2006, Hogg et al. 2006, Johnson et al 2010). Given multiple potential limiting factors, managers often face difficult decisions regarding bighorn sheep conservation with insufficient information on the drivers of demographic processes. The small size of many populations makes management decisions even more challenging by heightening the consequences of these decisions."

We urge the CGNF, along with MFWP if necessary, to conduct an analysis on the species and utilize the best science available. This will be covered below in the suggested standards for management. To further expand the discussion of bighorn sheep population, GWA would like to refer CGNF to the research of (Butler C.J., et al., 2018)68. In their paper, "Respiratory pathogens and their association with population performance in Montana and Wyoming bighorn sheep populations", they place the idea of small populations in perspective:

"Although management actions have increased bighorn sheep (*Ovis canadensis*) numbers and distribution, the species' abundance is still less than 10% of historic levels [2]. Currently, most bighorn sheep populations are small and patchily distributed [3], making them more vulnerable to apparent competition [4], predation [5], inbreeding depression [6], and a variety of other threats that collectively amount to the Allee effect [7]. Moreover, respiratory disease has hindered recovery efforts and dictates most bighorn sheep management policies [8]."

"For decades most bighorn sheep populations have been small, isolated, and, consequently, imperiled by a myriad of threats [52,53,3]. Respiratory disease contributes to this predicament by suppressing population growth, range expansion and connectivity among populations."

"Although disease does influence viability, a population that is currently free from disease but is small and isolated with little potential to expand is not necessarily any more viable than one that is currently affected by disease, but has a broad distribution and connectivity with other populations."

The problems of bighorn sheep populations are not just contingent upon disease or low population numbers, but it is a combination of several threats. This is born out of the research by (Brewer, C.E., et al. 2014)⁶⁹, a research entitled "Bighorn Sheep: Conservation Challenges and Management Strategies for the 21st Century":

"Populations of bighorn sheep that are few in number and geographically isolated are more vulnerable to extirpation than larger populations, due to lower genetic diversity and an inability to replace individuals lost from a variety of causes.

Encroachment of woody vegetation, the presence of domestic sheep or goats, habitat degradation and fragmentation, development, and anthropogenic disturbances are known to be impediments to connectivity among subpopulations of bighorn sheep."

Indeed, research has shown that habitat fragmentation, low numbers, and declines in habitat quality are the factors most likely affecting the long-term persistence of populations of bighorn sheep."

It makes scientific and logical sense that threats upon bighorn sheep would be magnified in herds of low population numbers. This provides more reason that population and density need to be taken into consideration in any wildlife management plan of the future.

Before we leave the subject of population, GWA would like to touch on one more conflict within the bighorn sheep community. There seems to be a difference between the management and the science when it comes to the issue of minimum viable population (MVP). We've touched on the issue above as it relates to disease, but the MVP is a practiced management goal which seems to be pushed by many state wildlife management agencies across the west regardless of disease issues. GWA would like to refer CGNF to a paper (by Uttam, K.R., 2003)⁷⁰, "Minimum Sizes for Viable Population and Conservation Biology". This paper discusses some of the controversies surrounding assigning an arbitrary MVP. In the Abstract, the following is stated:

"Minimum viable population size implies that there is some threshold for the number of individuals that will ensure at some acceptable level of risk that a population will persist in a viable state for a given interval of time. Fundamental to this concept is the effective population size. The so called 50/500 rules have been criticized and a reliable minimum size for viable population is hard to obtain. However, this concept is indispensable in ex situ conservation programs like captive breeding. Minimum area requirement can be deduced for reserve plans. Discussions generated by minimum viable population size concept give insights into conservation biology."

The author suggests that rather than undermining MVP for its failure to provide quick simple numbers, it will be only fair to appreciate some of its better sides. Further on in the conclusion, the following is stated:

"First, it is always helpful to keep MVP in mind because it constantly suggests that there are critical aspects of populations like size, distribution or genetics that governs the probabilistic march towards extinction. Second, it brings to mind that small populations are in imminent need of extra attention than the larger population and directs conservation efforts to specific goal. Third, MVP size generates the MAR [minimum area requirement] concept. This is useful in helping reserve managers or planners in designing protected areas. Fourth, it highlights the significance of metapopulation in the conservation field."

Because of the degree and numerous threats upon bighorn sheep, should not more attention be given to the species? This leads us to this question:

1. Where is the science within the DRFP concerning the fallacy of MVP(s)?

The Need for Large Landscapes:

Besides the need for larger population sizes of herds, there is also the need for larger landscapes. There is this study by Geist; "Mountain Sheep A study in Behavior and Evolution", Wildlife Behavior and Ecology Series (Geist, V. 1971)71:

"Dr. Valerius Geist documents that bighorn sheep rams may have as many as six or seven seasonal home ranges while ewes may have up to four. He notes it is the exception rather than the rule that bighorns have as few as two home ranges (a minority of bighorns), the traditional winter and summer ranges."

1. Just what is the provision or mechanism within the DRFP to provide bighorn sheep to more access of wild lands free from human intrusion?

Effects of the Revised Plan Alternatives:

At the bottom of page 434 and onto page 435, there are paragraphs which go into detail about the differences between the alternatives of the DRFP. This section is entitled "Effects of the Revised Plan Alternatives".

At the bottom of last paragraph on page 434 there is this statement:

"All revised plan alternatives include a range of standards that require mitigation based on risk assessment to effectively minimize potential for disease transmission between domestic livestock and bighorn sheep, whether it be for permitted grazing of domestic sheep or goats for livestock production, outfitter use as pack animals, or targeted use for weed control."

1. Where are those standards? Why aren't they listed in the DRFP? In fact, there is no delineation at all within the DRFP, the actual plan, as to how this issue of disease control is going to be administered any differently based upon the alternatives. Please explain. Why isn't this explanation part of the DRFP? There is no choice (based upon alternatives) provided to the public other than what they may or may not find deep within the DEIS.

2. As we said previously, there is only one goal listed in the DRFP and GWA feels that it will be extremely weak in its effectiveness. Basically, it states that protocols will be developed to minimize transmission of disease. This is too weak and too vague. What are those protocols?

The DEIS sums up the status of bighorn sheep in the conclusion remarks on pages 441 and 442. The majority of those remarks are restated here:

"By limiting presence of domestic sheep and goats on the Custer Gallatin, alternatives B and C minimize risk of disease spread in the geographic areas that are currently occupied by bighorn sheep. Alternative D goes a step further and limits presence of domestic sheep and goats across the entire forest, maintaining a low-risk status for bighorns on current range as well as historic ranges that may be recolonized by wild sheep. Alternative E would allow stocking of domestic sheep and goats anywhere on the Custer Gallatin outside the grizzly bear recovery zone and primary conservation area, with appropriate mitigation. Alternative D goes furthest in terms of minimizing risk of disease transmission, and also has the highest level of forest plan allocation for recommended wilderness, that would place the most restrictions on management actions in bighorn sheep habitat. While establishing new recommended wilderness might result in some changes in recreation impacts on bighorn sheep wintering ranges as described above, such changes would be very minor, since sheep winter range is generally already in areas limited to semi-primitive, nonmotorized use, with controlled access. On the other hand, recommended wilderness allocation would limit tools available to implement habitat improvement projects, such as conifer reduction on bighorn sheep ranges."

GWA doesn't understand why the delineations between the alternatives is not presented to the public in the DRFP. GWA supports Alternative D in regards to bighorn sheep management in the Final Revised Forest Plan. But there are other management actions that can be addressed in the Revised Forest Plan that could be and should be issued as standards, goals, and guidelines. GWA would like to submit those here and have them contained within the DRFP.

Suggested Standards for Management of Bighorn Sheep Habitat to Ensure Genetically Viable Populations are Restored and Conserved across the Forest and adjacent Bighorn Sheep Habitats

The role domestic sheep play in causing pneumonia in bighorn sheep is an important issue in multiple-use management (Cassaigne, I.G., Medellin, and Guasco, J.A. 2010)⁷². A unified set of habitat management standards to ensure genetically viable populations of bighorn sheep are restored and conserved have not been developed specifically for revising Forest Plans and BLM Resource Management Plans. The following standards are recommended to Federal Agencies when they are revising their Forest and Resource Management Area plans. In addition to these habitat standards, site specific herd by herd bighorn recommendations may be included in separate documents.

1. Federal agencies shall identify and manage/restore historic bighorn sheep habitat to achieve inter-connected meta-populations that are large enough to be genetically viable and self-sustaining over the long term (100+ years) (See Reed⁷³ et al. 2003; Traill et al⁷⁴. 2010, p. 31; and Cassirer et al⁷⁵. 2018, p. 41).

1. Rationale: Maintaining fragmented/degraded habitats that provide for only small isolated populations of bighorn sheep is not sufficient. Such small isolated herds are vulnerable to inbreeding, genetic deterioration and local extirpation (Montana Bighorn Sheep Conservation Strategy 2010, pp. 57-58 and Bailey 2018 available at:

<http://www.jamesabailey.com/wildlife%20management/Bighorn%20Sheep%20The%20Small-population%20Strategy%20Does%20Not%20Work.pdf>).

Reed et al. (2003) and Traill et al. (2010) suggest that thousands not hundreds of individuals are required for a population to have an acceptable probability of riding out environmental fluctuations and catastrophic events, and ensuring the continuation of evolutionary processes. Cassirer et al. (2018) further note that "In the long-term, agencies will need better strategies for the management of larger interconnected bighorn sheep populations for species viability."

1. Where bighorn sheep are limited to small isolated populations (fewer than 1,000 inter-connected animals), and thus susceptible to localized extirpation for a variety of reasons (Reed et al. 2003; Traill et al. 2010; Bailey 2018), bighorns shall be designated a BLM "Sensitive Species" or a National Forest "Species of Conservation Concern." Under these two management designations, agencies would be instructed to take proactive management actions to restore historic bighorn sheep habitat and to manage and conserve these habitats to provide for genetically viable and self-sustaining populations of bighorn sheep across National Forests/BLM Resource Management Areas.

1. Rationale: Small isolated populations of bighorn sheep are not genetically adequate, self-sustaining or minimally viable over the long term (100 years or more) (Reed et al. 2003; Montana Bighorn Sheep Conservation Strategy 2010, pp. 57-58; Traill et al. 2010; Bailey 2018; Cassirer et al. 2018). Multi-jurisdictional habitat management plans will likely be necessary to provide for genetically viable populations of bighorn sheep.

2. Domestic sheep and goat grazing/trailing shall not be allowed on public lands, historic bighorn habitat, or where effective separation from bighorns cannot be assured.

1. Rationale: Research has consistently shown that contact between bighorn and domestic sheep/goats can lead to significant respiratory disease and fatal pneumonia in bighorns (Beecham 2007, Besser 2014, Cassirer 2010, Dubay 2003, Foreyt and Jessup 1982, Goodson 1982, Jessup 1981, Jessup 1985, Lawrence 2010, Monello 2001, Schommer and Woolever 2001, Schommer 2008, Suminski 1991) and can persist in populations for decades preventing or delaying recovery (Cassirer 2013, Cassirer 2017, Manlove et al. 2016). Essentially, the presence of domestic sheep/goats makes the habitat unsuitable for bighorn sheep and thus precludes the use of the area by bighorn sheep without tremendous risks.

3. Federal agencies should work cooperatively with State Fish & Game Departments and neighboring private landowners to identify and recognize threats to bighorn sheep emanating from state and private lands. Some examples we are aware of exist in the Madison Valley where domestic sheep are used for weed control and then trailed up Standard Creek on the Beaverhead-Deerlodge National Forest, in the Beartrap Canyon area where Montana State University grazes domestic sheep on the adjacent Red Bluff Ranch/Experiment Station and in the Gardiner area where a private landowner grazes some domestic sheep.

1. Rationale: It may be necessary for State agencies to dispatch foraging bighorn sheep that come into contact with domestic sheep/goats on private or state lands to prevent the risk of pathogen transmission back to the core herd(s) of bighorn sheep. State Fish & Game Departments may also have proactive habitat restoration/conservation programs that can be voluntarily negotiated with private landowners in important

bighorn sheep habitat. One example is the Habitat Montana Program, which allows for habitat acquisition or conservation easements with willing private landowners.

4. Federal agencies shall consult government to government with native tribes to ensure their interests are considered regarding bighorn sheep habitat and population restoration and conservation.

1. Rationale: This is required by law (Executive Order 91 13175, Nov. 6, 2000).

5. To maintain separation, if a bighorn sheep is detected in a location where it may result in association with domestic sheep and goats, the Federal agency shall:

1. Immediately implement actions that minimize the risk of contact between these species. This may involve rerouting domestic sheep within a permitted allotment, moving the domestic sheep to a different allotment, or moving the permitted domestic sheep off the Federal Lands until the situation can be resolved.
2. Actively work with the appropriate state agency to develop actions to minimize risk and immediately resolve interaction events.

c. Rationale: To prevent pathogen/disease transmission to bighorn sheep.

1. The use of pack goats shall not be allowed within occupied bighorn sheep habitat or where separation from bighorn sheep cannot be ensured.

1.

1. Rationale: To prevent pathogen/disease transmission to bighorn sheep.

2. The use of sheep and/goats shall not be authorized for vegetation control within historic bighorn sheep habitat.

1. Rationale: To ensure historic bighorn sheep habitat remains suitable for bighorn sheep population connectivity, recovery and conservation.

3. If permitted, domestic sheep and goats shall be counted onto and off of the Forest/BLM by the responsible agency using an effective counting system.

1.

1. Rationale: A reasonable effort to account for any missing sheep must be made by the permittee and the responsible agencies. When permitted sheep or goats are determined to be missing, the permittee, Forest Service, BLM, and appropriate state wildlife agency personnel shall be notified within 24 hours to assist the permittees in the search for any missing animals.

2. GWA would like to submit items 1-9 above as standards for the DRFP concerning bighorn sheep.

GWA would like to briefly elaborate on the very first item mentioned above concerning "Federal agencies shall identify and manage/restore historic bighorn sheep habitat to achieve inter-connected meta-populations that are large enough to be genetically viable and self-sustaining over the long term." The following quotes are from V. Geist writings, "The Wild Sheep in Modern North America, Proceedings of the Workshop on the Management Biology of North American Wild Sheep, University of Montana, Missoula, MT. June 18-20, 1974"92:

p. 84: "The objective of conservation of mountain sheep is to safeguard the future of the species. As a minimum it means the preservation of a diverse gene pool in interaction with a natural ecosystem unaltered by man. In practical terms it means a system of sanctuaries, reserves or refuges in which mountain sheep, as well as the ecosystem they are found in, live protected from interference by man."

"Such a system of reserves would be the backbone of our efforts to conserve mountain sheep and ensure the availability of animals and knowledge for present and future management needs related to consumptive purposes."

p. 87: "I do not believe that we can afford the luxury of a clean conscience managing relict natural populations for consumptive or non-consumptive purposes, not at least until we have an adequate system of sheep reserves of the type I have discussed earlier."

Population size and land size without interference from man is what is required for bighorn sheep to regain a foothold on the natural landscape. There needs to be a refuge for not just sheep, but for likely many species which need to escape the ravages of man, whether it be from disease, hunting pressures, habitat fragmentation, etc.

The Need for Assessment:

The Forest Service did an assessment in Region 2 of the Forest Service, an assessment completed in 2007 entitled Rocky Mountain Bighorn Sheep (*Ovis canadensis*): A Technical Conservation Assessment (Beecham, J.J. Jr., C.P. Collins, and T.D. Reynolds, 2007)93. GWA would like to refer the CGNF to pages 28, 29, and pages 32-38. But specifically, on page 59 and 60 of this assessment, there is an analysis on herds on three different forests in Wyoming that are part of the GYE. They are the Shoshone National Forest with five herds, the Caribou-Targhee National Forest with one herd, and the Bridger-Teton Shoshone National Forest with four herds. Assessments on two of these three forests will be briefly discussed here:

Caribou-Targhee (Adjacent herd in Region 4):

"While growth is currently stable in this herd unit, the estimated 100 sheep is 20 percent below the management objective of 125. The overall distribution of sheep in this unit is restricted to the Teton Range in western Teton County[hellip]."

"However, the current confinement of bighorns to high elevation ranges is a concern for WGFD biologists (Brimeyer personal communication 2005). Movements between preferred seasonal habitats have been impaired or eliminated due to many factors, including housing development, past domestic livestock grazing, plant succession, hunting, and predation[hellip]"

"Conflicts with domestic sheep have historically been a problem for the Targhee Herd. In 2001, the herd suffered a 40 percent die-off, potentially due to contact with domestic sheep. Fortunately, many domestic sheep allotments have been closed within the past five years. Beginning in 2004, there were no more active domestic sheep allotments north of Highway 22 in the Teton Range..."

Bridger-Teton and Shoshone:

"Accurate population estimates have been problematic due to poor population model performance (Anderson 2004), but a conservative estimate puts the population at 650 animals, well below a pre-disease high of 1,700 (in 1990) and management objective of 1,350. Population modeling has accurately tracked the overall population trend, and whatever the true population size, it is believed to be the lowest in over 20 years. Reasons for this decline are two-fold: 1) the population crashed following a pneumonia outbreak during 1990-91, and 2) average lamb recruitment declined precipitously during subsequent years and has remained low ever since (Anderson 2004)."

An easy conclusion to draw from these events points to the easy transmittal of disease (pneumonia or otherwise) from domestic sheep and goats to that of normally healthy populations of bighorn sheep across the West. The spread of disease has already been exhibited within the GYE. This is nothing new that we didn't already know, but what needs to be recognized is how easy the ability of this disease is to spread across the landscape to locales where sheep grazing allotments have either been retired or had been non-existent. This leads to one other interesting story as laid out in the assessment:

The Tarryall and Kenosha Mountain bighorn herd units of Colorado:

"The Tarryall and Kenosha Mountain bighorn herd units (Units 23 and 27) are located adjacent to one another, with interchange (primarily of rams) between the two units. Thus, the two units are managed as a single herd (George and Davies 2005). Historically, this herd was one of the largest (over 1,000) in the state and was used extensively as a source for translocation stock from 1944 to 1953. The Tarryall/ Kenosha herd is isolated from other bighorn herds, as radio telemetry data and the extent of the most recent epizootic have revealed very little, if any, interaction with other herds[hellip]"

"Unfortunately, this herd has a long history of disease epizootics, which have led to wildly fluctuating numbers over the past century. Epizootics occurred in 1885, 1923-1924, 1950, and most recently in 1997-1999 (Moser 1962, George and Davies 2005). Prior to the most recent pneumonia die-off, the combined population of the two herd units was estimated at 250 individuals. However, the current population is estimated at about 160 animals. In addition to disease related mortality and the concomitant population decline, lamb:ewe ratios fell from pre-epizootic levels of 40 to 50:100 to a post-epizootic level of 0: 100, and they have only increased to about 25:100 since 2002. There is no history of domestic sheep and goat allotments on public lands within the herd units, pointing to hobby flocks on private land as the probable source of exposure to pneumonia. Disease is likely to be a significant, chronic threat to this herd."

Notice the second to last sentence of the second paragraph. The lesson to be learned here is that it isn't just grazing allotments being the danger, but something as innocent as hobby flocks on private land. This is the danger of the disease and why the CGNF needs to pay particular attention to the degree of viability of any herd. This is why the CGNF, and other forests who have not yet done so, need to do a risk analysis or assessment on bighorn sheep. This has been done on the Shoshone National Forest of Wyoming, Risk Analysis of Disease Transmission between Domestic Sheep and Goats and Rocky Mountain Bighorn Sheep. USDA USFS Shoshone National Forest (Pils, A94, and J. Wilder, 2017.

Under Methods on page 21 of the report, it says this:

"As stated earlier, an August 2011 letter from the Deputy Chief of the Forest Service outlined an approach to risk assessment and viability analysis (USDA Forest Service 2011). The analysis process outlined in the letter consists of four steps."

1. "Gather applicable data and information from appropriate sources.
2. Assess spatial and temporal overlap of bighorn sheep core herd home ranges with domestic livestock allotments, use areas and driveways.
3. Assess likelihood of contact (low, moderate, high) based on spatial and temporal overlap between domestic livestock use areas and bighorn sheep herds.
4. Identify management practices with the goal of separation between domestic livestock and bighorn sheep where necessary to provide for Forestwide bighorn sheep viability."

GWA would like to see this approach applied here on the CGNF. The proof of evidence is in. The last sentence of the summary of this paper reads as follows:

"Even minimal direct contact is believed to contribute to the death of individual wild sheep, herds of wild sheep, and entire populations."

1. In light of this and other evidence and acknowledgement by the Forest Service, when was the last time a risk analysis was done on bighorn sheep within the forest?
2. This is why GWA would like to see bighorn sheep listed as a SCC.

1. With this and other knowledge of threats against bighorn sheep, amidst declining numbers of populations across the West, GWA would like to see a risk analysis or the same kind of assessment of bighorn sheep across the CGNF.
2. These are reasons why GWA finds fault with the language in the DRFP and urge responses to the above previous questions. We are urging the CGNF to not only use the best science available, but to apply the best science in actual policy and management practices.
3. To restore connectivity, and conserve viability and diversity of native bighorn sheep populations, the Custer Gallatin National Forest needs to adopt a standard to close and not permit domestic sheep grazing allotments within bighorn sheep range.

It was noted that under Section 2.4.5 (Permitted Livestock Grazing) component in the DRFP, Alternatives B and C do not allow domestic sheep grazing allotments in the Madison, Gallatin, Henrys Lake; Absaroka-Beartooth; or Pryor Mountain Geographic Areas (page 76). Yet they are allowed in the Bridger, Bangtail, Crazy Mountains; Ashland; and Sioux Geographic Areas when a risk assessment is completed:

"Alternatives B and C: Stocking of allotments with domestic sheep or goat for livestock production and associated trailing routes shall not be permitted in the Madison, Gallatin, Henrys Lake; Absaroka-Beartooth; or Pryor Mountain Geographic Areas. Stocking of permitted grazing allotments with domestic sheep or goats for livestock production may be permitted in the Bridger, Bangtail, Crazy Mountains; Ashland; and Sioux

Geographic Areas only if a risk assessment indicates that spatial or temporal separation, or other mitigation can effectively minimize risk of disease transmission between livestock and bighorn sheep."

1. Why the double standard? After knowing what we know about the rapid and perhaps unknown progression of disease among bighorn sheep, why are we taking a chance in this geographic area, especially when FWP has discussed the possibility of reintroducing bighorn sheep in the Bridgers. This seems like a recipe for failure.

Bighorn Sheep: Species of Conservation Concern

GWA has actively and consistently been in discussions with CGNF and the Regional Forester emphasizing bighorn sheep as well as other species as Species of Conservation Concern. We feel managing bighorn sheep as a SCC will help in the preservation of habitat, provide necessary monitoring, and help in the prevention and detection of disease transmission from wherever the source. The 2012 Forest Service Planning Rule states criteria for that determination. Much of that has been discussed previously. But with the issue of bighorn sheep and disease transmittal, we have learned that disease transmission from domestic sheep and goats can be a regional or ecological concern rather than a local or forest wide issue.

According to the definition as stated in the 2012 Planning Rule⁹⁵, bighorn sheep meet the criteria of being listed as SCC. They appear on the landscape, they are not federally recognized as endangered or threatened, and there is concern of a viable population across the West if action is not taken. Just because there are no current grazing allotments on the CGNF shouldn't mean there isn't a concern about healthy populations. This is a moot point because it has already been shown the disease exists on the forest. There seems to be a sense that because there are no current grazing allotments on the forest, there is not a problem. Facts as we learned them show us this is the furthest from the truth. In fact, one of the criteria used in the 2012 Planning Rule is to take connectivity into consideration. And the definition of connectivity according to the 2012 Planning Rule ([sect] 219.19 Definitions)⁹⁶ states the definition of connectivity as follows:

"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."

This means that conditions need to be looked at as they occur on the larger landscape which may or may not occur just on one forest. The GYE is made up of several different forests centered around YNP. If there is a problem on one forest of that ecosystem, it is a problem of the ecosystem. The diseases as related to bighorn sheep occur on the Caribou Targhee National Forest, and grazing allotments do occur on the Beaverhead Deerlodge National Forest just across the Madison Valley on the CGNF. There most likely is connectivity here. This is the issue that needs attention. This has become a problem of the CGNF. This meets the criteria of being on the larger landscape and contained within the same ecosystem.

Moose:

Moose are an interesting species upon the landscape, yet they are just another in a long line of many species suffering a decline in population numbers. Much to our surprise, moose were only mentioned once in the DRFP and that was in an isolated table format on page 199. This is totally not acceptable. Moose, like so many other species, are suffering from stressors upon the ecosystem, but the DRFP fails to shine light upon those conditions. The DEIS covers the species in greater detail, but still lumps the general science and analysis

among that of elk and deer, ignoring the species-specific science. Neither document sheds the necessary detailed information the public needs concerning the future of moose upon the CGNF landscape. This leads us to believe the issues of moose don't rise to the level of necessary concern. That is a sad statement to make, especially when their future can still be salvaged from the threats and stressors upon their environment, but only if the necessary and proper actions are taken.

Moose Populations, Densities and Threats:

One of the problems contributing to moose management seems to be the difficulty of providing accurate population numbers. Either assumptions are being made that population numbers are fine, or attention is being spent on other species leaving moose to fend for themselves. Either way, the lack of knowledge concerning population and density of moose in the park or on the CGNF seems to be ignored. The science of understanding the biology and behavior of moose may not be well understood or known, but some information is available. At first glance, GWA would like to use the online reference by YNP97 as it concerns moose populations in the park. That link is below:

<https://www.nps.gov/yell/learn/nature/moose.htm>

What once was estimated to be around 1,000 moose within YNP in the 1970s, by 1996 it is believed the population declined to less than 200. Much of the loss during that time is blamed upon the fires of 1988. Between the fires and the winter which followed that year, it is believed many moose died due to the lack of available food supply to nourish them through the winter. The National Park Service's (NPS) general rationale for the recent decline in moose population points to some other, more recent stressors: the loss of old growth forests surrounding the park; hunting outside the park; burning of habitat; and predators are to name a few.

Moose Populations in Montana: The DEIS supports this conclusion for the most part, but page 444 also lists a few more reasons for the decline of moose on CGNF lands:

- * hunter harvest,
- * increased predation,
- * vegetation changes due to large-scale disturbances and natural succession,
- * disease,
- * parasite loads,
- * and climate change (DeCesare et al. 2014).

Even though climate change is listed, what is not stated here is the fact that several of these other stressors are also directly or indirectly related to climate change. Fire, disease, parasite loads, etc., all can be related to climate change; even the loss of old growth forests as mentioned by the Park Service can be the result of fire as a result of climate change. But the fact that the "loss of old growth forest" is listed separately from burning of habitat, one could conclude the reference here is to logging.

As it turns out, moose occur in less-dense environments scattered across the landscape, making it difficult to obtain precise population numbers. But as we will see, CGNF and YNP base their estimations upon

observations and some hard-core facts. There is some data out there. There is general agreement that the population has decreased from the 1970s to the 1990s. Interestingly, in an assessment by the CGNF, Assessment Forest Plan Revision, Final Terrestrial Wildlife Report, (Dixon, Bev, et al. 2017, page 110)⁹⁸, one can see a consensus beginning to form. One reason for a decline of moose populations is climate change. The question will be, are some state and federal agencies willing to admit that?

"Montana Department of Fish, Wildlife and Parks, in an interview with the New York Times, noted that there are fewer moose out there, and hunters are working harder to find them (Robbins 2013). The hypothesis for the decline is climate change."

Another way to determine the backdrop of moose populations on the forest is to look at hunting trends. A paper was written by a star-studded class of state Fish, Wildlife and Parks agencies across the West in 2017. The paper, entitled "Status and Trends of Moose Populations and Hunting Opportunity in the Western United States", appeared in a scientific journal specific to moose, a journal called *Alces: A Journal Devoted to the Biology and Management of Moose* (Nadeau et al. 2017)⁹⁹. In the 2017 abstract, there is this statement.

"On average, hunting opportunity has decreased across 56% of the western US, remained stable across 17%, and increased across 27% during 2005-2015. Generally, declines in hunting opportunity for moose are evident across large portions (62-89%) of the "stronghold" states where moose have been hunted for the longest period of time (e.g., Idaho, Montana, Utah, and Wyoming). In contrast, increases in opportunity appear more common at peripheries of the range where populations have expanded, including most of Colorado, northeastern Washington, southern Idaho, and eastern Montana. There are many factors of potential importance to moose in this region, including parasites, predators, climate, forage quality, forage quantity, and humans. State wildlife agencies are currently conducting a variety of research focused on population vital rates, the development of monitoring techniques, forage quality, trace mineral levels, and evaluation of relative impacts among potential limiting factors."

According to that same reference, on page 105, Figure 3 shows that moose hunting permit availability declined 50-99% for the years 2005-2015 on the CGNF. This evidence that moose populations are declining should raise concern among state and federal officials. A recent accounting of hunting licenses in the Madison Valley, Hebgen Basin, Gallatin Canyon, and Bridger Range indicates this trend holds true locally. In a paper dated May 8, 2019, Julie Cunningham¹⁰⁰, a wildlife biologist for MFWP, provided these results:

"Moose declines began to be noticed in the 1980s, and female moose hunting opportunities were closed for some districts. The remainder of these districts closed female moose hunting in the late 1990s. The total number of moose licenses offered decreased over time, from 158 in 1985 to 110 in 1995 to 58 in 2005 to 22 in 2015."

"Given the decline in moose availability and number of moose licenses, as of 2014 MFWP began issuing licenses valid in multiple districts (Figure 1). To simplify the hunting regulations, MFWP may propose officially combining these districts in the 2020 biennium. Moose are no longer so plentiful that we need to force hunter dispersal across the landscape with many small districts, so allowing fewer larger districts with approximately the same number of licenses will make more sense."

GWA is very concerned about these lowering population numbers. These trends will (are) depriving sportsmen and non-sportsmen alike from the enjoyment of wildlife viewing and hunting. All trends seem to indicate a lack of hunting potential.

In order to gain a more accurate population of Moose, whether it be in Montana or on the CGNF, both means analyzing and collecting more research, more data. A collaborated effort between various state offices of the Montana Dept. of Fish, Wildlife and Parks and the Ecology and Management Program of Montana State University published a moose management paper in *Alces* of 2014. The paper, entitled "Moose Status and Management in Montana" by Nicholas DeCesare and others, confirms this trend and helps shed more light on the subject (DeCesare, Nicholas et al, 2014)¹⁰¹. The abstract reads as follows:

"Monitoring of moose largely occurs through annual harvest statistics collected via post-season phone surveys. Recent harvest statistics indicate lower hunter success, increased effort, and lower kill per unit effort, concurrent with >50% reduction in available permits since the 1990s. Aerial surveys also show decline in calf/adult ratios. In combination, these data suggest a declining trend in the statewide population, despite some ambiguity of certain data. Potential limiting factors include harvest, predation, vegetative succession and degradation, parasites, and climatic conditions, which were all identified as concerns in surveys of state biologists. Accordingly, Montana Fish, Wildlife and Parks will direct funds derived from moose permit auctions toward calibrating and refining statewide monitoring methods and research of population dynamics and potential limiting factors of Montana moose."

To bring it even closer to home, the closest number we have concerning populations of moose on the CGNF (only a portion of the CGNF) is a study on the Northern Yellowstone Winter Range (NYWR). This population is not really a herd as it has a tendency to be considered a mega population. This account is probably the best account we have of moose populations on a portion of the CGNF and within YNP. As it states in the very first sentence of the first paragraph, the paper defines the NYWR:

"The Northern Yellowstone Winter Range (NYWR) (Fig. 1) supports over half the wintering ungulates that utilize Yellowstone National Park (YNP) during summer (National Academy of Sciences 2002). While elk (*Cervus elaphus*) and bison (*Bison bison*) constitute more than 80% of the ungulate biomass on the NYWR during winter (National Academy of Sciences 2002), this winter range is essential to several less common ungulates, including moose (*Alces alces*), bighorn sheep (*Ovis canadensis*), mule deer (*Odocoileus hemionus*), and pronghorn antelope (*Antilocapra americana*) (Yellowstone National Park 1997)."

With that knowledge, the abstract places the history of moose in perspective. The paper, entitled "Moose Population History on the Northern Yellowstone Winter Range", once again tells of the moose declining numbers. This paper was published in the *Alces* journal, Vol 42, in 2006 by Daniel B. Tyers (Tyers, Daniel B, 2006)¹⁰². This is a remarkable and sad story:

"Legislative protection of moose from hunting in the first half of the 20th century and suppression of wildfires facilitated moose population growth and range expansion. A hunting season in Montana along the northern boundary of Yellowstone National Park, authorized in 1945 in response to perceived damage by moose to willow stands, evidently reduced the moose population quickly and maintained it at moderate densities through 1988. In 1988, landscape-altering wildfires swept through the Yellowstone ecosystem and impacted old growth forest important for moose survival during winter. The moose population associated with the NYWR declined by 75% or more and has shown no sign of recovery by 2002. Several techniques for assessing population trend for moose on the NYWR were tested. Given the problems associated with monitoring a species at low densities

with a dispersed social organization and occupying habitats where visibility is limited, aerial population censuses were not useful. A horseback trail survey, a road survey, and counts of moose in early winter or late spring in larger willowstands had greater potential as indices to moose population changes."

This is where we are, and now as we will see, there are new threats facing moose across the landscape. All providing greater need for more current and accurate information.

Population: Where do we go from here?

A better question might be: Where do we need to be in terms of moose population numbers? We know what has happened, we know why it is essentially happening, and we know current management practices of moose aren't working very well. Therefore, what needs to change? We should start to listen to the best available science. That can start right here. GWA would like to refer CGNF to a piece of scientific research by Dr. Lochran Traill published on line in a Biological Conservation journal entitled "Pragmatic population viability targets in a rapidly changing world" (Traill, Lochran, 2010)¹⁰³. To use a shortcut, the same information was also found in (e) Science News on October 13, 2009 with a title "Conservation targets too small to stop extinction", source University of Adelaide.¹⁰⁴ In this article there is this quote:

"Conservation biologists routinely underestimate or ignore the number of animals or plants required to prevent extinction," says lead author Dr Lochran Traill, from the University of Adelaide's Environment Institute."

"Our research suggests that the 50/500 rule is at least an order of magnitude too small to effectively stave off extinction," says Dr Traill. "This does not necessarily imply that populations smaller than 5000 are doomed. But it does highlight the challenge that small populations face in adapting to a rapidly changing world."

GWA would like to refer CGNF to another study done with a similar conclusion. This concerns a study conducted on moose in Nova Scotia, Canada. Obviously, Nova Scotia is not the GYE, but application can still be made. The study was done by the School for Resource and Environmental Studies at Dalhousie University in Nova Scotia in 2002. The purpose was to develop a comprehensive population viability assessment for moose in order to develop a moose conservation and forest management plan. Without getting into too much detail, the conclusions are what's important. From the Abstract entitled Application of Population Viability Theory to Moose in Mainland Nova Scotia by Tamaini V. Snaith and Karen F. Beazley (Snaith, Tamaini; Beazley, Karen; 2002)¹⁰⁵:

"Populations of moose (*Alces alces americana*) in mainland Nova Scotia, Canada, have been reduced to approximately 1,000 individuals fragmented into a number of isolated populations. Although the data required for a comprehensive population viability assessment (PVA) are not currently available, there are some general rules concerning minimum viable population (MVP) size that may be applied for a preliminary assessment.

Genetic evidence suggests that, in general, a genetically effective population (N_e) of 50 individuals is required for short-term persistence and 500 to 5,000 individuals are required for long-term survival.

Strategies for moose conservation and forest management should concentrate on:

(1) conducting genetic, population, and habitat analyses to increase understanding of population viability and limiting factors;

(2) reestablishing connectedness among discrete populations to form a viable metapopulation;

(3) protecting/enhancing habitat to meet the critical requirements of a viable population;

(4) increasing carrying capacity of available habitat to support a greater population density."

The CGNF and other government agencies need to change their paradigm in terms of what is necessary for conservation. Obviously, before application can be made on the CGNF, there needs to be a greater understanding of population, density, and even genetic viability. We need to know and understand the dynamics at play on the CGNF. This is what management plans should look like. Currently we have an unknown quantity of knowledge concerning moose viability on the CGNF.

The Fragility of Moose:

We are seeing that climate change can affect moose habitat in many indirect ways, but we must not forget about the most direct way possible, temperature. In the same assessment by Dixon¹⁰⁶, an interesting biological fact about moose needs to be taken into consideration:

"Moose are adapted for cold weather, and when the temperature rises above 23 degrees Fahrenheit in winter, as has happened more often in recent years, they expend extra energy to stay cool. In addition, the warmer weather may result in higher tick loads or other parasites or diseases (DeCesare and Newby 2013)."

That was winter; how about summer? For that we will reference a document by Alyson Courtemanch, a wildlife biologist for the Wyoming Game and Fish Department. In her paper entitled Jackson Moose Herd Unit Population Objective Review (Courtemanch, Alyson, 2015)¹⁰⁷, we see the limits of summer temperature for moose:

"Moose become heat stressed when temperatures exceed 60 degrees Fahrenheit in the summer, which interrupts feeding and causes them to seek shade to cool down."

It is apparent from these facts that moose are very dependent upon temperature in order to sustain themselves in their own habitat. When you take into consideration other factors such as drought, extreme fires, lack of food supply, disease, and parasites, all of which could be and are a result of or exacerbated by climate change, a more serious consideration should be given to the welfare of moose. A more serious consideration should be given to the harmful effects of climate change on wildlife. We must realize that for species like moose and wolverines, there are species out there where climate change is a real threat, a threat they are feeling now. To ignore these conditions is a dereliction of duty.

Disease: Another hardship befalling moose is that of disease. Disease is part of life, but climate change has the potential to exacerbate the severity by increasing infected populations and by increasing the number and types of diseases susceptible to moose. There are reasons for concern. GWA would like to encourage the CGNF to do due diligence and search out the various science documentations on diseases in moose. Within the GYE, a paper by Alyson Courtemanch (already referenced), wildlife biologist for Wyoming Game and Fish Department, Jackson Moose Herd Unit, Population Objective Review states the following:

"Similar to other declining moose herds in the United States and Canada, the Jackson moose herd is affected by a variety of parasites and diseases."

Without going into detail of each one, following is a partial list of diseases facing moose on the landscape:

1. "Moose, especially calves, commonly experience hair loss and stress in late winter due to winter ticks (*Dermacentor albipictus*). Winter ticks seem to be especially prevalent in the southern portion of the herd. Winter tick loads are higher after warm springs, summers, and falls, which favor tick abundance. With climate change, it is reasonable to expect that winter ticks will become more common in northern portions of the herd in the future."
2. "*Elaeophora schneideri* is a filarioid nematode that lives in the carotid arteries of mule and blacktailed deer (normal definitive hosts) and is transmitted by horse flies. One of the aberrant hosts of *E. schneideri* is moose. Aberrant hosts are susceptible to a variety of negative effects caused by reduced blood flow to the head and brain, including antler malformations, frostbite on ears, blindness, difficulty eating, and nervous system damage. Both the prevalence of infection and the parasite's geographic extent appear to have undergone a drastic increase."
3. "In addition, several moose in the Jackson Herd have been observed in recent years with keratoconjunctivitis, which is a bacterial infection of the eye. Many cases have been so severe that individuals have become blind, leading to emaciation, injury, and death."

1. "*Brucella abortus* in moose. This infection with *B. abortus* will kill moose, and progression of the disease is likely rapid under field conditions. Moose appear to be a dead-end host for brucellosis. Article laid out Experimental studies on *Brucella abortus* in moose (*Alces alces*). (Forbes LB, Tessaro SV, Lees W., 1996, abstract)."108

5. "*Parelaphostrongylus tenuis*. Periodic declines in moose (*Alces alces*) populations have occurred repeatedly during the past century on the southern fringe of moose range in central and eastern North America. These slow declines, occurring over a number of years, are associated with higher than usual numbers of co-habiting white-tailed deer (*Odocoileus virginianus*). Numerous proximate causes have been hypothesized but none has gained widespread acceptance among cervid managers. However, current knowledge of the nature of moose declines and the biology of meningeal worm (*Parelaphostrongylus tenuis*) makes this parasite

the most credible explanation. Other suggested disease-related causes are rejected, including infection with liver flukes (*Fascioloides magna*) because there is no clinical evidence that flukes kill moose. As well, this parasite occurs at only moderate prevalence and intensity in some jurisdictions and is completely absent in others where moose declines are known. Winter ticks (*Dermacentor albipictus*), on the other hand, do kill moose but usually have a distinctly different and more immediate impact on populations. It is recognized that moose, albeit at lower density, can persist for extended periods in the presence of *P. tenuis*-infected deer at moderate densities. However, it is argued here that parelaphostrongylosis can, when conditions favour sustained high deer densities and enhanced gastropod transmission, cause moose numbers to decline to low numbers or to become locally extinct. Short, mild winters favour deer population growth in areas previously best suited for moose. Wetter and longer snow-free periods increase the numbers and availability of terrestrial gastropod intermediate hosts and the period for parasite transmission. It is hypothesized that these climatic conditions increase rates of meningeal worm transmission to moose and of disease, primarily among younger cohorts. Reports of overtly sick moose are common during declines but may not account for the total mortality and morbidity caused by meningeal worm. Means by which the parasite may lower recruitment and productivity causing slow declines still needs clarification. Managers in areas prone to declines should monitor weather trends, deer numbers, and the prevalence of meningeal worm in deer. Moose recovery will occur only after deer numbers are decidedly reduced, either by appropriate management or a series of severe winters."

Here we present the entirety of a full Abstract, an abstract from a scientific journal entitled *Alces: A Journal Devoted to the Biology and Management of Moose*. The specifics are frightening and sickening. This disease needs to be placed on alert status with the understanding that diseases have a strong tendency to move across the country. This disease currently is known to be centered in the central and east portions of North America, but westward expansion is always possible. The sub-article posted above is entitled "Understanding the Impact of Meningeal Worm, *Parelaphostrongylus Tenuis*, on Moose Populations" written by Murray Wayne Lankester, (Lankester, Murray, 2010)109.

1. Chronic Wasting Disease found in Moose. "Chronic wasting disease (CWD), a prion disease that resembles bovine spongiform encephalopathy (BSE), has been found in a wild moose for the first time, Colorado wildlife officials announced recently.

A bull moose that was killed by a bow hunter in September tested positive for the disease, the Colorado Division of Wildlife (DOW) announced Sept. 29. Previously the disease had been found in the wild only in deer and elk."

This final listing presented here is a reporting done by the Center for the Infectious Disease Research and Policy out of the University of Minnesota by Robert Roos dated October 26, 2005. (Roos, Robert, 2005).110 The link is listed below:

<http://www.cidrap.umn.edu/news-perspective/2005/10/chronic-wasting-disease-found-moose>

Moose as a Species of Conservation Concern:

With the fragility of moose, the susceptibility of moose to numerous diseases and parasites, the lack of knowledge concerning populations and densities, habitat loss, and climate change, why on earth isn't moose becoming a more focal point among the wildlife management agencies. Moose should strongly be considered as a species of conservation concern. The inadequacy of scientific evidence and explanation concerning moose in this forest plan revision process is unacceptable. We can use the best available science; just because it wasn't used in this documentation doesn't mean it doesn't exist. We know they exist on the GYE; we

know they can persist on the GYE; we know their numbers have declined making them eligible; and we do have the available science.

1. How do moose benefit from the DRFP with the alternatives as written?
2. Has there ever been a risk analysis for moose within the CGNF? If not, why not?
3. What does the future hold for moose on CGNF lands?
4. How will Alternative D benefit moose and/or their habitat?
5. There are no standards, guidelines, goals or objectives. How can or how will improvements be measured? Or will there be improvements based upon this plan? How will we know?
6. GWA fears that this species is going to be one that will disappear on the landscape just because of inaction by federal and state wildlife management agencies. How can the CGNF ensure this will not be the case?
7. The lack of interest in climate change will be detrimental to moose and other wildlife species. CGNF and other agencies have a responsibility to mitigate effects.
8. GWA strongly believes that moose should be considered as a SCC.

Wolverine:

This largest terrestrial member of the weasel family lives an isolated existence on a large and harsh landscape, or at least the scientific evidence seems to point in that direction. It's only been in the last decade or so that our knowledge of wolverines has increased to what it is today. Now we know more about their habitat, their behavior, and their biology. The species has been and is being scrutinized for listing under the Endangered Species Act as threatened or endangered species with good reason. Their habitat is under threat, their population numbers are low, and they're preference to avoid contact from man is high.

Because of the wolverine's tenuous existence in North America, GWA believes it is better to err on the side of caution than not. We support the federal listing of wolverines as a threatened and endangered species, but in light of that, we support the listing on the forest as a SCC. GWA also supports the land management and designation authority which would provide the greatest protection to their habitat. Yet GWA sees a preference to user groups as is evident in Alternatives B, C, and E. What these alternatives offer is an increased intrusion into and onto the forest, all of which would either conflict or harm the success rate of connectivity and species integrity, both of which is a mandate of the 2012 Planning Rule.

Wolverine: Their Habitat, Population and Reproductivity

The DEIS is a good read in presenting scientific evidence to the public in terms of recognizing wolverine habitat behavior on the CGNF. We know wolverines prefer a harsh environment and a large landscape (page 397, page 393, respectively of the DEIS):

Page 397:

"The best available scientific information indicates a very strong association between wolverines and cold temperatures, persistent snow conditions, and relatively high elevations across the landscape (Aubry et al. 2007, Ruggiero et al. 2007, Copeland et al. 2010, Inman et al. 2011, 2013, and McKelvey et al 2011)[hellip].

[hellip]..Wolverines on the Custer Gallatin and surrounding areas show most consistent use at elevations of at least 2,600 meters (8,530 feet) and tend to avoid areas below 2,150 meters (7,050 feet) in elevation. They are typically found at or above tree line in summer and shift to slightly lower elevations, usually right around tree line, in winter. Although wolverines move to slightly lower elevations in winter, they still tend to stay above 2,450 meters (8,040 feet) and may even range up to 3,050 meters (10,000 feet)."

Page 393:

"Home range sizes for most mammals are associated with body size, and individuals living in less productive habitats typically have larger home ranges. This association holds true for wolverines, as inhabitants of harsh, relatively unproductive environments, their home range size is large relative to their body mass. Home range sizes for wolverines in the Greater Yellowstone Ecosystem, which includes the Custer Gallatin National Forest, average about 303 square kilometers (117 square miles) for independent females (for example, without young), and about 797 square kilometers (308 square miles) for adult males. Females with dependent young still have fairly large annual home range size at roughly 100 square kilometers (39 square miles)."

Because of the habitat, the isolation, and the small numbers of individuals who live in a harsh environment, gaining research and population status of wolverines is not an easy task. Page 394 of the DEIS puts wolverine reality in perspective:

"Even with this new research, there is no reliable historic or current population census for wolverines in the continental United States, so there is uncertainty in population trend estimates; however, it is widely accepted that wolverine densities are naturally low in the lower 48 states."

Based upon research, the most accepted number of wolverine populations seems to hover around the low bar of 300 or less. Page 101 of *Wilderness, Wildlife, and Ecological Values of the Hyalite-Porcupine-Buffalo Horn Wilderness Study Area*, (Craighead, Lance 2015)111, the research settles on a range:

"There are an estimated 250 to 300 wolverines in the contiguous U.S. Wolverine are a Species of Concern in the state of Montana."

The research paints a picture that wolverines have found refuge in a harsh environment on a large landscape, all of which places limitations on the species survivability in a warming world. Yet, this is not their only weakness in maintaining a viable population. Reproductive rates of the species also do not favor the wolverine. Again, referring back to the DEIS on page 393, we gain more detail on their reproductivity:

"Although most female wolverines are capable of annual reproduction, high energetic demands associated with pregnancy in a harsh, unproductive environment, result in loss of pregnancy for about half the reproductive population each year. Consequently, wolverines have one of the lowest reproductive rates of any mammal (USDI FWS 2013b)."

Wolverine on the Custer Gallatin and Connectivity:

"The Wolverine is the 'poster child' of connectivity: both males and females travel extensively throughout the year to find food and mates; they also disperse long distances when they are subadults."

The importance and proof for connectivity of wolverines is summed up in the above quote from the Craighead Institute (Wilderness, Wildlife, and Ecological Values of the Hyalite-Porcupine-Buffalo Horn Wilderness Study Area on page 106 (Craighead, Lance, 2015))¹¹² The quotes below are once again from the Craighead Institute, a research paper previously referenced (page 104, 105 respectively). The DEIS and Craighead's paper indicate and prove that wolverines are on the CGNF landscape. Not only are they on the landscape, living here, but the wolverine is on the move across the broader landscape. That means individuals are moving from north to south and vice-versa attempting to explore other ecosystems. See last paragraph from Lance Craighead's report¹¹³ below. This also helps to indicate there is a wildlife corridor between the Madison, Henrys Lake, and Gallatin Mountains Geographic Area with the Gravelly Mountains to the west. This also helps to indicate there is movement between two different forests, the Custer Gallatin and the Beaverhead Deerlodge. And this helps to verify the 2012 Planning Rule in its attempt to maintain species diversity on larger landscape, based on an ecosystem wide basis.

Page 104:

"The Greater Yellowstone and Central Linkage subpopulations are believed to contain a considerable proportion of wolverines found in this distinct population segment, with an estimated 63 individuals in the Greater Yellowstone Area, and about 50 animals in the Central Linkage Region (Inman et al. 2013). No estimate is available for the number of wolverines that occupy the Custer Gallatin portion of these areas. However, estimates at the larger landscape scale equate to roughly 3.5 wolverines per 1,000 square kilometers (386 square miles) of suitable habitat (ibid.)."

"Wolverine are year-long residents of the HPBH WSA and it is considered to be a major block of wolverine habitat (Figure 19) according to modeled data from all recent wolverine studies (Inman et al. 2013). Dr. Robert Inman conducted a 10-year study of wolverine in the Madison Range with the Wildlife Conservation Society, but only visited the Gallatin Range a few times. During his visits he found one active wolverine den. Several GPS locations (n=26) of wolverines from the Madison Range were recorded in the HPBH WSA showing that there is movement between these core areas (Inman, pers. comm. 2015)."

Page 105:

"All of the HPBH WSA (except the low-elevation NW tip at the headwaters of the North Fork of Trail Creek and Pine Creek; north of Eightmile Creek), and most of the Inventoried Roadless Areas in the GNF are primary wolverine habitat."

Note the last part of this statement, "most of the Inventoried Roadless Areas in the GNF are primary wolverine habitat." This is key as to why increased mechanized and motorized use on backcountry areas are not amenable to wolverine habitat.

Page 106:

"The HPBH WSA is an integral part of an important wolverine movement corridor going north-south connecting the GYE with the Bridger and Big Belt mountains and the NCDE. Wolverine connectivity was modeled by Robert Inman and Scott Bergan as part of a PhD Dissertation (Inman 2013: Figure 20)."

Threat of Climate Change:

With harsh environments, low densities, isolation, and low reproductivity rates, the wolverine experiences a strident existence under the best of circumstances, but climate change poses a serious threat. The lack of snow cover and warming temperatures interferes with their security, behavior and preferred habitat. Beyond the harshness of their normal existence, climate change amplifies the stressors on their way of life. According to General Technical Report RMRS-GTR-374, an agency report by the Forest Service entitled Climate Change Vulnerability and Adaptation in the Northern Rocky Mountains Part 1 (Halofsky, Jessica E, 114 et al, 2018, Page iii), habitat quality for the wolverine will decline as climate change effects become more pronounced:

"Few data exist on the direct effects of climatic variability and change on most animal species. Therefore, projected climate change effects must be inferred from what is known about habitat characteristics and the autecology of each species. Habitat for mammals that depend on high-elevation, snowy environments, whether predators (Canada lynx, fisher, wolverine) or prey (snowshoe hare), is expected to deteriorate relatively soon if snowpack continues to decrease."

Threat of human conflict:

Outside of climate change, man is perhaps the greatest threat. The Craighead Institute's paper, Wilderness, Wildlife, and Ecological Values of the Hyalite-Porcupine-Buffalo Horn Wilderness Study Area, (Craighead, Lance 115, 2015, pages 102, 103, 106) places the history of wolverines in Montana in perspective:

Page 102:

"Wolverines in Montana have persisted despite a past history of unlimited trapping and hunting solely because of the presence of designated wilderness and remote inaccessible habitat (Hornocker and Hash 1981)"

Page 103:

Wolverine have been reported to avoid areas of human activity (Copeland 1996; Copeland and Harris 1993, 1994; Krebs et al. 2007) and habitat requirements may show more parallels with those of the grizzly bear than with those of more closely related carnivores. They require large areas of habitat with little or no human disturbance (Hash 1987), although it may be their preference for higher elevations, not avoidance, that keeps them away from humans to some extent (Copeland et al. 2007).

Page 106:

"A review of wolverines and recreation recommended that managers should avoid placing new recreational trails and roads through previously unfragmented habitats, and they also should be located away from potential denning areas. Negative impacts on wolverines were found from snowmobiles, skiing, hiking, and human presence (Snetsinger and White 2009). No data were found on effects of biking and horseback riding."

Within the DEIS on page 400, there is this truth stated about the threats of human conflict.

"Given the strong association between wolverine habitat and snow cover, winter recreation uses such as skiing and snowmobiling may also be key stressors for this species."

The scientific evidence stating the negative impacts which man seems to inflict upon the wolverine is growing. Whether it is a direct impact as man/wolverine contact or an indirect impact such as humans simply invading wolverine habitat, the result can be the same. A very important research paper entitled Wolverine - Winter Recreation Research Project: Investigating the Interactions between Wolverines and Winter Recreation (Heinmeyer, Kimberly S.116 et al. 2017, page 42, 43 respectively) lays out the premise as stated:

"Clearly, at some point, displacement from high quality habitats would affect the reproductive and survival fitness of animals. Given the low density and fragmented nature of wolverines in the contiguous United States, impacts to the relatively few reproductive females should be minimized. We found that the effects of winter recreation on wolverine habitat are dependent upon the relative intensity of recreation and that winter recreation patterns are highly variable at the scale of wolverine home ranges."

"Our results suggest that winter recreation should be considered when assessing wolverine habitat suitability, cumulative effects and conservation. Our research provides land managers with a more detailed understanding of important habitat characteristics used by wolverines within home ranges and should inform management of wolverine habitats across the large landscapes they require. Further, it shows that female wolverines are sensitive to dispersed winter recreation which results in indirect habitat loss during the critical denning season. The functional responses to dispersed winter recreation provide insight into these negative effects, and suggest that lower levels of dispersed recreation will have less effect on wolverines than more widespread and intense recreation."

We include one more final piece of scientific evidence indicating the sensitivity that wolverines have on man's intrusion into the forest. In a scientific study conducted by Matt Scrafford, a wolverine biologist in Alberta, Canada, trapped and collared three wolverines in northern Alberta. Justina Ray (Ray, Justina117, 2018), President and Senior Scientist of Wildlife Conservation Society of Canada, wrote of the research in Canadian Geographic. The link and snippets of the last few paragraphs are below:

<https://www.canadiangeographic.ca/article/why-wont-wolverines-cross-road>

"These findings led both researchers to a similar set of recommendations. The first and foremost is to limit road building as much as possible in high quality habitat areas for wolverines and grizzly bears. The second is to reduce the overall road footprint by "clustering" roads in an area as much as possible, especially high traffic routes. Finally, Scrafford and Lamb note that roads that do run through key habitat areas must be carefully managed. Public access to backcountry roads, for example, should be restricted when wolverines are denning. Similarly, disused roads should be decommissioned to reduce stress and mortality for wildlife."

"Wolverines are listed as a Species of Special Concern in Canada and may be at risk in Alberta, though due to the elusive nature of the animal, precise population data is lacking. Still, unchecked road building in the forests predators depend on is a key factor in the disappearance of these and other iconic animals. If we want wolverines (and grizzlies) to thrive in our wild areas, we need to put up a stop sign on indiscriminate road building."

This brings up the next subject concerning wolverines, status of listing. If the wolverine is listed as a Species of Conservation Concern in Canada, a location and habitat one would assume would be much more expansive than here, they should be listed here in the United States and in Montana as well.

The Status of Wolverine: Species of Conservation Concern

As best we could determine, wolverines are not currently listed as threatened or endangered under the Endangered Species Act (ESA) of 1973. After a number of prior attempts to petition the U.S. Fish and Wildlife Service (USFWS) for listing, the agency changed course in 2013 and found scientific rationale for listing due to the proposed loss of habitat due to climate change. GWA would like to refer the CGNF to the following link where the recent history of the ESA listing for wolverine is presented (Rubin, Ben, 118 2016):

<https://www.endangeredspecieslawandpolicy.com/2016/10/articles/fish-wildlife-service/wolverine-status-review-reinitiated/>

"However, things appeared to be changing in 2013, when, after denying a number of prior listing petitions at various stages of the process, the U.S. Fish and Wildlife Service (Service) announced its proposal to list the wolverine as a threatened species under the ESA, citing anticipated habitat loss due to climate change. (See our February 3, 2013 post for a summary of this history.) While this put the wolverine squarely on the path to ESA listing, approximately 18 months later, the Regional Director for the Service directed federal biologists to withdraw the proposed rule. (See our July 7, 2014 post and August 12, 2014 post for a further discussion of the Regional Director's justification.) An environmental group challenged this abrupt change in course, and on April 4, 2016, the U.S. District Court for the District of Montana vacated the Service's withdrawal of the rule, concluding that the decision was not based on the best available science. (See our April 7, 2016 post for a discussion of the court's decision.) On October 18, 2016, consistent with the direction from the court, the Service issued a notice that it was reopening the comment period on the February 4, 2013 proposed rule to list the distinct population segment of wolverine occurring in the contiguous United States as threatened. Thus, after more than three years, the wolverine again appears to be on the path to ESA protection."

Even though the last sentence seems to assume that the wolverine is on the path to ESA protection, as best we can determine, no decision has been made. Now it has been three years (April 7, 2016) since this court decision in Montana, and we have no proof that we are any closer to a determination. GWA finds the lack of action on the wolverine deplorable, and we find the possibility of any positive action being taken under this administration as highly unlikely.

We understand that federal listing is not the Forest Service's decision nor that of CGNF. But we have presented the case that the wolverine meets the criteria for SCC. Their population densities are low, their habitat is changing and/or disappearing, they are very susceptible to human conflict, yet they are present on the landscape. They are present and we have a viable reason for concern. Until a decision is made whether to list or not list the wolverine as an endangered species by the USFWS, it would not hurt the Regional Forester to list the wolverine as a SCC. Hopefully this would mean the forest would have to make administrative management changes to protect the species. The lack of inaction by the USFWS leaves the wolverine not listed and vulnerable. Just because the wolverine is still proposed to be listed doesn't mean it will be. We urge the wolverine to be listed as a species of conservation concern immediately.

The wolverine is sparsely covered in the DRFP. There is one Desired Condition and there is one Guideline, but there are no standards, goals or objectives. The Desired Condition is just that, desired with no methodology of how to get there or how to maintain that condition. GWA finds the DRFP severely lacking in its attempt to preserve the habitat of this species and others. There are no alternative differences for wolverine, and we find the other Alternatives of A, B, C, and E would be counterproductive to the health and well-being of the wolverine.

1. GWA questions the decision-making process by not making the wolverine a SCC. GWA supports wolverine listing as a SCC.
2. We question the lack of attention given to this species in the DRFP by not preserving their habitat and not taking climate change into the decision-making process.
3. Why didn't the wolverine component consist of standards, goals or objectives?
4. Where was the best available science used in this write-up pertaining to wolverine in the DRFP? We see none.
5. Where is the concern that by designating less wilderness and more backcountry areas will result in an increase in more human/wildlife conflicts, more intrusion into the wilderness, and less adaptability of wolverines with their fragmenting habitat?

Finally, there are these statements as the DEIS summarizes the discussion on wolverines on page 409:

"Finally, the revised plan alternatives contain desired conditions for habitat connectivity, including specific plan components to limit management impacts in key linkage areas in alternatives B, C and D. Collectively, the revised plan alternatives are more proactive and specific for managing to conserve wolverines, as well as providing for ecological integrity in the face of climate change, making the revised plan alternatives more favorable for wolverines than the current plans. In summary, all alternatives would provide ecological conditions that would contribute to the long-term persistence of wolverines, through maintenance of protections that limit human disturbance in maternal and primary habitats."

This statement is stating that there are no differences between Alternatives B, C and D in their ability to achieve desired conditions and enhance ecological integrity. This paragraph states the revised plan alternatives are better than current plans. GWA finds this hard to believe when there are no standards or goals or objectives listed.

1. How are these conditions to be measured?

1. In lieu of the statement above, how can there be no distinct differences between the alternatives when three of the five alternatives weaken wilderness protection and one maintains the status quo?

1. How can those other alternatives be just as proactive to wolverine protection as Alternative D?
2. What is being done to minimize wolverine/recreational conflict?
3. GWA finds no rationale for DRFP's indifference to wolverines, but what we do find is the CGNF's preference to user groups, a decision which would conflict with the 2012 Planning Rule pertaining to connectivity.

Climate Change:

"The current levels of carbon dioxide in the atmosphere far exceed the concentrations found over the past 650,000 years (Ryan et al. 2010b). As a result, global surface temperatures have increased since the late 1800s, with the rate of warming increasing substantially. This warming will have an impact on the earth's climate, climate variability, and ecosystems (IPCC 2007)."

This statement, found in Section 3.8.1 entitled "Carbon Storage and Sequestration" on page 263 in the DEIS, states it just as well as any other scientific fact. Realizing that rising carbon levels in the atmosphere is the major cause of climate change is the first step in acknowledging these rising levels of carbon is an increasing threat to the planet as we know it. It is not enough for the DRFP to accept or acknowledge the science; the Forest Plan must address the changes. But we are not sure the CGNF is even acknowledging the science, let alone how these changes can be mitigated.

"The Earth's remaining tracts of wildlands are being altered by increased human pressure and climate change. Yet, there is no systematic approach for quantifying change in the ecological condition of wildland ecosystems."

These are the opening words in an abstract of a scientific article entitled "Trends in vital signs for Greater Yellowstone: application of a Wildland Health Index", (Hansen, Andrew; and Phillips, Linda; 2018)119. The article was found in an online journal called Ecosphere, a publication of the Ecological Society of America. The paper further states:

"The GYE, while large, intact, and with substantial management capacity, is undergoing increasing human pressure and climate change."

The DRFP acknowledges that climate change exists and that it is and will be a driver of change on the forest, but the document fails in how it is going to mitigate those effects. What's surprising is that climate change doesn't even enter into the discussion (within the DRFP) concerning wildlife. The only way climate change is discussed relative to wildlife is in the definition of connectivity. GWA believes that the DRFP is woefully inadequate in its discussion of this very important stressor on wildlife and the forest ecosystem. Further on in the paper by Hansen and Phillips is this finding:

"However, increasing human pressure and climate change have the potential to degrade ecological integrity of the GYE (Hansen et al. 2016b). While conservation infrastructure and capacity are relatively well developed, no systematic evaluation of change in the ecological health is regularly conducted across the full GYE."

There is scientific rationale as to why climate change is emphasized by so many in the scientific and environmental community. In a scientific report entitled "Disproportionate magnitude of climate change in United States national parks", scientific rationale provides a basis as to why climate change in high altitude and high latitude regions of the world need to pay particular concern. The report is an online journal of Environmental Research Letters published by IOP science. In the September 24, 2018 published letter (Gonzalez, Patrick, et al 2018) *Environ*, it states the following:

The magnitude of the historical temperature increase and fraction of the area with significant increases were greater for the national park area than the US as a whole. This disproportionate temperature increase occurs because a large fraction of national park area is in the Arctic or at high elevations, where warming occurs more quickly due to a thinner atmosphere, melting of reflective snow cover, which uncovers darker heat-absorbing surfaces, and other factors (ACIA 2005, Vaughan et al 2013).

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Climate change will have a more exaggerated role in many of our National Parks because of latitude or altitude issues when applicable. Obviously, the DRFP is addressing issues on the CGNF not within YNP, but CGNF lands include part of and contain much of the same landscape found within the GYE and the park. It is safe and easy to make the application.

It is obvious that climate change is and will be responsible for affecting the quantity and quality of the water resource, for the rejuvenation of the forests, and for the health of the vegetation, but it also will affect the health of the wildlife. Whether climate change is the cause for lack of food supply such as the scarcity of Whitebark Pine for grizzly bears or the actual life and death struggle of the pika, climate change will have a severe affect on the ecosystem as a whole. The cause and effect of climate change is discussed in an online science-based journal called Greater Yellowstone Ecosystem, a website sponsored by the Landscape Climate Change-Vulnerability Project. An article dated February 2014, "Climate Change Brief", provides insight into the future of the GYE. Tony Chang and Andrew J. Hansen¹²¹ paint a different picture of the GYE in the year 2100 based upon current conditions:

"The projected changes in climate are expected to influence ecosystem processes, such as soil moisture, runoff in streams and rivers, and primary productivity. The projected warming results in April 1 snow pack declining by 80-110 mm by 2100.

The reduction in snow pack is most pronounced in spring and summer, with the GYE projected to be largely snow free on April 1 by 2075 under RCP 8.5 (representative concentration pathways). Average annual soil water projections show considerable inter-annual variability, but have a shallow positive trend, increasing about 10 mm by 2100 with increases mostly in spring and a slight decline in summer.

Stream temperatures are projected to increase between 0.8 to 1.8[ordm]C by 2050-2069 (Al-Chokhachy et al. 2013). Yellowstone cutthroat trout growth rates are projected to increase at high-elevation sites in the future, but decline by 23% between June and August at low-elevation sites. In uplands, warming temperatures are projected to result in severe wildfires becoming more common within the GYE (Westerling et al. 2011), which could result in major changes in vegetation type and seral stage."

There is plenty of science available in discussing climate change within the GYE. Another piece of science literature can be found in the Proceedings of the National Academy of Sciences of the United States of America journal, a highly prestigious peer-reviewed multidisciplinary scientific assemblage of scientific research and writings. The article, "Continued warming could transform Greater Yellowstone fire regimes by mid-21st century", paints a dire warning for the GYE (Westerling, Anthony, et al., 2011)¹²². And what we learn is that

climate change is here now. In a recent research paper dated this year 2019, entitled Wildfires and climate change push low-elevation forests across a critical climate threshold for tree regeneration (Davis, Kimberley, 2019),¹²³ tells us that fires and climate change have already taken a toll on existing ecosystems, resulting in changes beyond our lifetime to repair:

"Climate change appears to have changed soil moisture and surface temperatures so much that the forests have passed a threshold where conditions no longer favour new growth after a fire. Unlike mature trees, seedlings' roots are too shallow to reach water deeper underground[hellip].."

"[hellip]..High fire severity and low seed availability further reduced the probability of postfire regeneration. Together, our results demonstrate that climate change combined with high severity fire is leading to increasingly fewer opportunities for seedlings to establish after wildfires and may lead to ecosystem transitions in low-elevation ponderosa pine and Douglas-fir forests across the western United States."

To put it more bluntly as reported on Montana Public Radio (Speier, Maxine, 2019),¹²⁴ there is this statement in referring to the science article from Kimberley Davis:

"Climate change in the West is crossing a perilous threshold, Davis says, and some of Montana's iconic pine and fir forests might not be able to regenerate if they get hit by wildfire."

1. GWA has heard that the CGNF doesn't take the threats of climate change seriously. Hopefully this is not true. How is the CGNF going to address these changes? Should they address these changes?

1. Should the CGNF implement policies and practices that exacerbate the problems of climate change? Practices which dry out the forest faster; i.e., forest thinning, logging, practices that release carbon into the atmosphere?

This is what needs to be discussed and the CGNF needs to educate the public that the decisions they make on the forest are in response to the severity of the climate change crisis. That has not yet happened.

1. GWA suggests that the CGNF and the Forest Service take advantage of the knowledge and research as it pertains to climate change and make application. To ignore the science is nonfeasance.
2. The CGNF needs to alter the existing document (the DRFP) with the knowledge and acceptance that climate change will have impacts upon the forest. CGNF needs to state how they are willing to address these changes.
3. The lack of coverage of climate change is a holdover comment from those comments submitted in early March of last year. It is disappointing to see this issue not resolved or addressed.

Climate change and the 2012 Planning Rule:

There must be something totally amiss in either how we are interpreting or how we are reading the DRFP. We say that because GWA sees a total disconnect between the DRFP and the DEIS and between the DRFP and

the 2012 Planning Rule. We opened this discussion on climate change with words right out of the mouth of the DEIS. But we aren't seeing the appropriate concern in the draft plan itself. The 2012 Planning Rule specifically addresses climate change. On page 21176 of Federal Register 125 / Vol. 77, No. 68 / Monday, April 9, 2012 / Rules and Regulations, there is this:

https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5362536.pdf

"Forest Service scientists have been studying and assessing climate change effects on forests and rangelands. Forest Service Research and Development provides long term research, scientific information, and tools that can be used by managers and policymakers to address climate change impacts to forests and rangelands. Climate change related activities are carried out within research stations covering the whole country. In 2009, the Agency issued guidance for climate change considerations to provide the Agency with the support needed to incorporate climate change into land management planning and project-level NEPA documentation."

1. Why aren't we seeing "Agency issued guidance" on climate change being adapted into this policy, the DRFP?

Following up with that reference, we can go back again into the Federal Register 126 on pages 21264 and 21265 under sections 219.8.a and 219.9.a.1 respectively, talking about ecosystem sustainability and ecosystem integrity. There is this statement:

The plan must include plan components, including standards or guidelines, to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area, including plan components to maintain or restore structure, function, composition, and connectivity, taking into account:

(iv) System drivers, including dominant ecological processes, disturbance regimes, and stressors, such as natural succession, wildland fire, invasive species, and climate change; and the ability of terrestrial and aquatic ecosystems on the plan area to adapt to change.

Where is the discussion on climate change in the DRFP and how it is affecting the forest flora and fauna?

1. Shouldn't climate change be in and of itself; its own component?
2. Shouldn't there be standards and guidance in how the forest is going to address climate change as it pertains to species of flora and fauna?

Fire and Fuels:

It is hard to talk about fire and fuels without talking about climate change. Therefore, we will discuss fires and fuels knowing that climate change lies underneath the surface. We know fire has been on the forest landscape ever since the beginning of time. Fire is an ecological rejuvenation of the forest, but 20th century mankind has co-opted the natural course of events. Now we are trying to restore fire to the landscape but only on our terms.

We think we have to manage fire as we think we have to manage the forest, all those processes; we know best (being satirical).

The Nature of those Catastrophic Wildfires:

But now we not only have fires, we have catastrophic wildfires. Climate change has taken those forest and all that biomass accumulation and making those fires burn hotter, faster, and all on a larger landscape. Now those fires are too big to handle, too big to manage. GWA would like to refer CGNF to a scientific journal in Science Magazine, Volume 313 edition, Aug. 18, 2006. In an article entitled "Warming and Earlier Spring Increase Western U.S. Forest Wildfire Activity" (Westerling, A L., et al, 2006)¹²⁷, they state these known facts:

"Forest regrowth after extensive logging beginning in the late 19th century, combined with an absence of extensive fires, promoted forest structure changes and biomass accumulation, which now reduce the effectiveness of fire suppression and increase the size of wildfires and total area burned. The effects of land-use history on forest structure and biomass accumulation are, however, highly dependent upon the "natural fire regime" for any particular forest type."

The problem is some management agencies are under this mistaken idea that old solutions will work in today's climate regime. Again, we refer to Westerling's article in Science Magazine:

"If increased wildfire risks are driven primarily by land-use history, then ecological restoration and fuels management are potential solutions. However, if increased risks are largely due to changes in climate during recent decades, then restoration and fuels treatments may be relatively ineffective in reversing current wildfire trends."

"In some forest types, past land uses have probably increased the sensitivity of current forest wildfire regimes to climatic variability through effects on the quantity, arrangement, and continuity of fuels. Hence, an increased incidence of large, high-severity fires may be due to a combination of extreme droughts and overabundant fuels in some forests. Climate, however, may still be the primary driver of forest wildfire risks on interannual to decadal scales. On decadal scales, climatic means and variability shape the character of the vegetation [e.g., species populations and their drought tolerance (23) and biomass (fuel) continuity (24), thus also affecting fire regime responses to shorter term climate variability]. On interannual and shorter time scales, climate variability affects the flammability of live and dead forest vegetation (13-19, 25)."

To restate the obvious, our society had better get a handle on climate change. And the Forest Service better have an answer on the best mitigation efforts to lessen impacts of that change. Our forests are changing because of a changing climate. They are changing in regards to forest composition, their drought tolerance, and their biomass. Climate change is the ultimate driver of wildfires and the sooner we recognize that fact, the sooner we can place those policies into each and every Revised Forest Service Plan. Another article exposing the wildfire season is by Steven Running in the same Science Magazine. In the same issue and date of that magazine, Steven Running published a journal entitled "Is Global Warming Causing More, Larger Wildfires?" (Running, Steven, 2006)¹²⁸. He states what many consider to be the obvious:

"Higher spring and summer temperatures and earlier snowmelt are extending the wildfire season and increasing the intensity of wildfires in the western United States."

In that article, he refers to (Westerling, et al) where the following was found:

"In the 34 years studied, years with early snowmelt (and hence a longer dry summer period) had five times as many wildfires as years with late snowmelt. High-elevation forests between 1680 and 2690 m that previously were protected from wildfire by late snowpacks are becoming increasingly vulnerable. Thus, four critical factors - earlier snowmelt, higher summer temperatures, longer fire season and expanded vulnerable area of high-elevation forests - are combining to produce the observed increase in wildfire activity."

One more source for reference on the subject can be found in the science journal, Quaternary International, an article entitled "A 1,500-year synthesis of wildfire activity stratified by elevation from the U.S. Rocky Mountains" (Carter, V, et al, 2017)¹²⁹. They state the following scientific fact:

"[hellip].future wildfire conditions in response to warmer temperatures and more protracted droughts. We conclude that wildfire activity increased in most elevations during periods of protracted summer drought, warmer-than-average temperatures, and based on modern climate analogs, reduced atmospheric humidity."

Again, the story here isn't wilderness, or the lack of proper forest management, or any one particular community at fault for recent catastrophic wildfires, but it is the driver, climate change. GWA urges the CGNF and the Forest Service in general to adopt proper fire management plans that will mitigate the effects of climate change. Logging, thinning and fuel management will not be the proper anecdote. And as stated above in Westerling's article, "restoration and fuels treatments may be relatively ineffective in reversing current wildfire trends." We don't want to release more carbon into the atmosphere; we want less. We don't want to dry out the forests more by thinning or logging, etc., but maintain humidity levels high as we can. More on all this later in the discussion.

The Wildland Urban Interface (WUI):

On page 245 of the DEIS, there is this statement concerning the WUI:

"As human development expands into more remote areas, the wildland urban interface will continue to grow. The wildland urban interface designation affects all fire management decisions in those interface areas. Although a wide variety of fire management strategies are available to implement, these options are usually narrowed down due to concerns that fire may move from Federal to private lands. Hazardous fuels treatments in the wildland urban interface focus on manipulating the vegetation to enhance the success of fire suppression activities."

This is the problem. Another way to highlight the severity of this trend is found in a recent copy of the U.S. News and World Report last year (Levy, Gabrielle, 2018)¹³⁰:

"In recent decades, the number of homes in regions where settled areas abut uninhabited lands - called the "wildland-urban interface" - has increased dramatically, rising 41 percent from 30.8 million homes in 1990 to 43.4 million homes in 2010 and covering nearly 300,000 square miles, according to the Department of Agriculture. Homes in these areas are at higher risk for wildfires - and protecting them is a major driver of fire suppression costs."

But GWA takes slight issue with the first sentence in the DEIS. Although it may be true the WUI will continue to grow as human development expands (that certainly has been the trend), but let's not assume this trend has to continue. Let's not assume we have no control over this scenario. That trend has obviously taken root here in the Gallatin Valley and adjacent to all lands near the CGNF. But local governments do have control over such matters, matters which pertain to growth policies, zoning, and availability of water, etc. County commissioners and other government officials do have a say in what is allowable. But if they choose a pro-development approach, the forest will pay the consequence and the taxpayer will, too. For in that final statement above by Gabrielle Levy, she refers to the other problem; costs. This reference is from a White Paper entitled Solutions to the Rising Costs of Fighting Fires in the Wildland-Urban Interface (2009)¹³¹, a White Paper from Headwaters Economics. The link is below:

<https://headwaterseconomics.org/wp-content/uploads/HeadwatersFireCosts.pdf>

"The U.S. Department of Agriculture's Office of Inspector General (OIG) recently completed an audit report on the costs of large fire suppression. From fiscal year 2003 to 2004, 87 percent of the large fires OIG investigated referenced "protecting private property as a major strategy for the suppression effort." When land managers were asked what portion of the firefighting costs were attributable to the defense of private property, some estimated it ranged between 50 to 95 percent. Based on this figure, the cost of protecting private property from fires ranged between \$547 million to \$1 billion between 2003 and 2004."

In summation then, we have climate change driving the course and intensity of wildfires, governments allowing for the continuing intrusion of private human development into, adjacent to, and in some cases among public forest lands, and the American taxpayer is footing the bill for the fire prevention and protection of private property.

The Costs of Fire Prevention and Protection:

There is something wrong when most of the public money spent on wildfire protection and prevention is spent in the WUI, protecting private property, depriving the rest of the forest from utilizing badly needed financial resources. In a very interesting publication by the U.S. Forest Service, GWA would like to refer the CGNF to The Rising Costs of Wildfire Operations: Effects of the Forest Service's Non-Fire Work (2015)¹³²:

"In 1995, fire made up 16 percent of the Forest Service's annual appropriated budget[mdash]this year, for the first time, more than 50 percent of the Forest Service's annual budget will be dedicated to wildfire. 1 Along with this shift in resources, there has also been a corresponding shift in staff, with a 39 percent reduction in all non-fire personnel. Left unchecked, the share of the budget devoted to fire in 2025 could exceed 67 percent, equating to reductions of nearly \$700 million from non-fire programs compared to today's funding levels. That means that in just 10 years, two out of every three dollars the Forest Service gets from Congress as part of its appropriated budget will be spent on fire programs."

"Climate change has led to fire seasons that are now on average 78 days longer than in 1970."

"While the Forest Service and its firefighting partners are able to suppress or manage 98 percent of fires, catastrophic mega-fires burn through the agencies resources: 1-2 percent of fires consume 30 percent or more of annual costs. Last year, the Forest Service's 10 largest fires cost more than \$320 million dollars. The cost of fire suppression is predicted to increase to nearly \$1.8 billion by 2025. This trend of rising fire suppression costs is predicted to continue as long as the 10-year average serves as the funding model and presents a significant threat to the viability of all other services that support our national forests."

The costs of fighting fires have increased exponentially on the forest since the days of "Smokey the Bear". There are costs spent on fighting fires and then there are the costs of fire prevention and protection of fires within the WUI. We've talked about some of those costs above, but as the Forest Service knows and understands all too well, the majority of the Forest Service budget is spent on fire. We again refer to the Forest Service's publication, *The Rising Costs of Wildfire Operations: Effects of the Forest Service's Non-Fire Work*:

"Over the last few decades, wildfire costs have increased as a percent of the Forest Service's budget as fire seasons have grown longer and more costly. The projected continued growth in the 10-year average cost of fire suppression through 2025 is rising to nearly \$1.8 billion. This amounts to a nearly \$700 million decrease in non-fire program funding in the next 10 years."

Note that the budget prediction for 2025 eventually shifted

up in time to the prediction for 2021. Credit: USDA Forest Service

This graph is a revised projection by the Forest Service, superseding the graph found in the 2015 *The Rising Costs of Wildfire Operations: Effects of the Forest Service's Non-Fire Work*. Along with this graph, found on the website *Fire Adapted Communities Learning Network*, is an article concerning the "Wildfire Funding in the Omnibus Bill: What You Need to Know" by Cecilia Clavet¹³³ of the Nature Conservancy dated April 26, 2018. It is always best to see facts and figures in graphic form and this graph makes it easy to understand that in the year 2021, two-thirds of the Forest Service budget will be spent on fire protection and mitigation. This graph has moved up that spending milestone by four years, meaning the condition is getting worse as we move through time. Climate change is having a greater impact at a faster pace than we first thought.

The DEIS and the DRFP:

When it comes to climate change, forest health, fires and fuels, carbon storage, and sequestration, it is hard to talk about one without talking about the other; yet this is what has happened in the DRFP. This is a huge disappointment and it is disingenuous. In fact, climate change was not mentioned once in section 2.3.12 "Fires and Fuels". It is hard to have a serious discussion of a topic when you don't even discuss the source of the

issue. A discussion of climate change and its relationship to fires and fuels would make the DRFP more creditable. Considering the amount of dollars and manpower spent on fire protection and prevention, you would think that critical piece of information would be presented and incorporated into the DRFP before the public. Dollars spent are a resource. The public needs to understand the money pit that climate change has placed upon their government, their forests, and their pocketbook. Perhaps that will make them realize that climate change is real. But there is also a cost paid for improper and unscientific management. The costs we've seen can't continue.

Within the DRFP, there are also two goals listed. The first is stated below:

"The Custer Gallatin National Forest works with community leaders, service providers, business owners, homeowners and permittees who are invested in or adjacent to the Custer Gallatin to provide education about wildfire risk and that wildland fire is an essential ecological process."

This goal could easily be stated to expand communications and collaborations between Forest Service and local county governments to mitigate, halt or even reverse the process of human development into and onto the wildland-urban interface. The continued expansion of the WUI needs to be halted. The WUI is bad for fire prevention and it is bad for wildlife connectivity. This should be a nationwide effort, but in terms of this DRFP, it applies here.

The only delineation between the alternatives on the component of Fires and Fuels is found under Objectives, page 50 of the DRFP. That difference between alternatives pertains to hazardous fuels mitigation: Alternatives B and C claim to mitigate 6,000 acres per year, while Alternative D mitigates 7,000 acres per year, and Alternative E 4,000 acres per year. Why the difference and what are the differences other than acreage size between these alternatives? What is meant by hazardous fuel mitigation? To that we turned to the Glossary where we were referred to the definitions of fuels management and fuels treatment.

The definition of fuels management is:

"An act or practice of controlling flammability and reducing resistance to control of wildland fuels through mechanical, chemical, biological or manual means, or by fire, in support of land management objectives."

The definition of fuels treatment is:

"The manipulation or removal of dead or live plant materials to reduce the likelihood of ignition and/or lessen potential damage and resistance to fire control (example treatments include, lopping, chipping, crushing, piling and burning.)"

This is not the solution to the problem. It magnifies it. It is an excuse to intrude further into forest, building roads, timber thinning and fuel mitigation; all acts which will disrupt and fragment wildlife habitat, disrupt wildlife connectivity, and increase costs of Forest Service's budgets with little benefit of fire protection.

Alternative Solutions:

We believe there is a better way, another way to spend federal dollars more wisely than trying to perform fuel mitigation on the entirety of the CGNF. If we were to apply the goal of Alternative D onto the forest, at a rate of 7,000 acres a year for fuel mitigation, we figure it would take nearly 443 years before the entirety of the forest was mitigated for hazardous fuels. Now obviously many acres of the forest would succumb to natural mitigation via fires in the meantime speeding up the process, but the point being this approach is not practical. To what end and to what cost? There are more practical solutions. There are other approaches that can be taken and some of those ideas are presented here.

One solution was found in a pilot program on the Sierra National Forest in California. GWA would like to refer you to the research paper in *Forest Ecology and Management*, "Examining alternative fuel management strategies and the relative contribution of National Forest System land to wildfire risk to adjacent homes - A pilot assessment on the Sierra National Forest, California, USA", (Scott, Joe H., Thompson, Matthew P., Gilbertson-Day, Julie W., 2015)134.

https://www.fs.fed.us/rm/pubs_journals/2016/rmrs_2016_scott_j001.pdf

Toward the end of the first paragraph under Discussion, there was this recommendation.

"Nonetheless, the analysis suggests that mitigation of wildfire risk to homes through fuel treatment on some landscapes could be best accomplished by treating where the homes are, not on federal land further away. This finding cements the importance of landscape-scale assessment and evaluation of exposure and risk transmission as prerequisites for design of fuel treatment strategies to protect the WUI."

In other words, spend the time, energy and money on where the problem is, not where it isn't. And the problem which always arises during wildfires are those wildland urban interface lands with homes and infrastructure, not the on the forest. This seems to echo the thought that GWA mentioned last year in our comments. In that regard, GWA is a little disappointed that our comments of last year did not seem to be addressed to the degree necessary. From a source of last year which we will reuse here, this ideology is very similar to that of GWA. In the journal, *Ecologist: The Journal for the Post-Industrial Age*, Brett Haverstick presents a school of thought in the journal's April 10, 2017 edition, "Catastrophic anti-infestation logging threatens US National Forests", (Haverstick, Brett, 2017)135.

<https://theecologist.org/2017/apr/10/catastrophic-anti-infestation-logging-threatens-us-national-forests>

"America's national forests are not unhealthy. Some people may want forests to look a certain way, but that desire or perception ignores scientific research, which suggests that fungi, bacteria, insects, disease and wildfire are key components of forest function and resiliency. If you want a healthy forest, these natural processes must be allowed to play out.

Efforts to 'thin the threat' and use thinning for 'fire hazard reduction' across Western landscapes is largely unsubstantiated in scientific literature.

Recent studies suggest forests with stands of 'dead trees' are at no more risk of burning - and possibly less - than thinned forests. Dead trees generally burn slower because they do not have oil-rich needles or resins.

To the contrary, thinning 'live trees' places fine fuels like needles and cones on the ground, and opens the forest canopy to greater solar penetration and wind, resulting in overall drier forest conditions and flammability."

The science of "ecology" must be understood and must be applied. Man's idea that we have to tinker with nature because we know best is arrogant and ill-conceived and has been proven wrong over and over again. We must concede or at least be open to the fact that other policies, practices or preparations can achieve the desired effect. There are other ways to look at things; ways that might be safer, more ecologically preferred, and fiscally beneficial. Another source along the same thought is one expressed by Brad Plumer. At the time of this writing he was a senior editor at Vox Media. The article, "There's a better way to tame large forest fires. So why don't we do it?" (Plumer, Brad, 2015)136, is presented here along with the link to the web:

<https://www.vox.com/2015/9/17/9347361/wildfire-management-prescribed-burn>

"By way of reform, they recommend that forest managers create new zoning plans for national forests, the way Parks Canada does. Forests near populated areas would be managed through a mix of mechanical thinning and fire suppression. More remote forest areas could be thinned via prescribed fires or by letting smaller natural fires burn themselves out, so long as weather conditions are right.

That would require dedicated crews that work on reducing fuel build-up in forests [mdash] crews that don't get diverted into suppression during wildfire season, as currently happens. (Note that there's some move toward this already: the authors have high hopes for the US government's National Cohesive Wildland Fire Management Strategy, drawn up in 2014.)

Crucially, the US government would also need to stop encouraging people to build homes in fire-prone zones. Right now, state and local governments have every incentive to develop these areas [mdash] knowing that the feds will pick up the tab for fire suppression."

Notice the first and last paragraph. This thought matches those expressed earlier concerning funding fires in wildland urban interface. GWA can't emphasize this enough, there needs to be a campaign to discourage home building and infrastructure demands next to or in federal wildlands. The Federal Government and local governments could spend some of that money in education in this regard. Money was spent on the Smokey the Bear campaign years ago, the same could be done here. This thought will emerge as a theme throughout these scientific journals.

One of the better articles which comes close to GWA's position on the matter was found in a journal Wildfire Today, an article entitled "217 Scientists sign letter opposing logging as a response to wildfires" by Bill Gabbert (Gabbert, Bill, 2018)137. GWA suggests that CGNF read the entirety of the article, only a portion thereof will be presented here.

<https://wildfiretoday.com/2018/09/22/217-scientists-sign-letter-opposing-logging-as-a-response-to-wildfires/>

"Thinning Is Ineffective in Extreme Fire Weather - Thinning is most often proposed to reduce fire risk and lower fire intensity. When fire weather is not extreme, thinning-from-below of small diameter trees followed by prescribed fire, and in some cases prescribed fire alone, can reduce fire severity in certain forest types for a limited period of time. However, as the climate changes, most of our fires will occur during extreme fire-weather (high winds and temperatures, low humidity, low vegetation moisture). These fires, like the ones burning in the West this summer, will affect large landscapes, regardless of thinning, and, in some cases, burn hundreds or thousands of acres in just a few days. Thinning large trees, including overstory trees in a stand, can increase the rate of fire spread by opening up the forest to increased wind velocity, damage soils, introduce invasive species that increase flammable understory vegetation, and impact wildlife habitat. Thinning also requires an extensive and expensive roads network that degrades water quality by altering hydrological functions, including chronic sediment loads."

"Wilderness and Other Protected Areas Are Not Especially Fire Prone - Proposals to remove environmental protections to increase logging for wildfire concerns are misinformed. For instance, scientists recently examined the severity of 1,500 forest fires affecting over 23 million acres during the past four decades in 11 western states. They found fires burned more severely in previously logged areas, while fires burned in natural fire mosaic patterns of low, moderate and high severity, in wilderness, parks, and roadless areas, thereby, maintaining resilient forests."

There is so much in this article that we can't produce all of it here, but GWA encourages the CGNF to review this article. The point is made, the science is growing, and the word is slowly getting out to the public. But there does need to be a second look as to the best alternatives. Most likely not every solution will fit every scenario. There is another thought, perhaps a more common-sense approach, presented here in the article, "An Alternative Incentive Structure for Wildfire Management on National Forest Land". Following is an excerpt from an article, copyrighted by Society of American Foresters in 2005, that was published in Forest Science (Donovan, Geoffrey H. and Brown, Thomas C., 2005)138:

Wildfire is an emotive topic, and any attempt to change significantly the way wildfire is managed will likely meet political resistance. For example, few people would argue with the general proposition that wildfire suppression should be economically efficient. However, the reality of suppressing wildfires less aggressively is unpalatable to many people and their political representatives. For this reason, budget considerations seldom significantly limit wildfire suppression. This situation is summarized by Pyne et al. (1996), ". . . no federally managed fire has been abandoned for lack of funds; no American fire regime has been withdrawn from protection because of strict economic analysis." Therefore, it is unrealistic to suggest the wholesale adoption of an alternative wildfire management incentive structure.

This is most likely the sad reality, but we feel we must try. But these are the reasons why GWA cannot support any alternative in the DRFP. We feel there are no good alternatives, just as there really isn't a good discussion or sense of reality. The proposal seems to support the same old concept with the same old ideas, pouring money down a rat hole and expecting a different result. What is that called again?

1. While GWA cannot support any alternative, we do support the elements of Desired Conditions and Goals as listed on pages 49 and 50 of the DRFP.
2. GWA does not support Objective 1 under Fires and Fuels, page 50. We also find that Objective 2 will be hard to administer and manage. How did this number come to be?
3. GWA can support Standard 1 and Guideline 1 on page 50 of the DRFP.
4. GWA adamantly rejects Guidelines 2 and 3 on page 50 of the DRFP. This is contrary to the points we were making above.

5. We feel that several points of discussion could have been made in this component. The issue of fiscal responsibility comes into play and this topic was ignored in the discussion.
6. We believe that standards and guidelines could have been enhanced by including language in support of collaboration between Forest Service and local governments and authorities to discourage expansion of the WUI.
7. Financial resources and manpower should be redirected to those locations of the WUI and leave wilderness areas and IRAs alone.
8. GWA does not support fuel mitigation practices on the forest in wilderness areas, IRAs or other sensitive areas. We do not support forest thinning, logging, the removal of dead or fallen trees, the manipulation of live or dead plant material, or any supportive or construction measures to support such action on the forest.
9. GWA does not support any chemical or mechanical treatments unless necessary for safety or protection of property in and around the WUI.
10. We feel that the CGNF needs to have a clear plan on how to mitigate the effects of climate change and how that will impact the forest.
11. There needs to be a public educational campaign about climate change and inform the public as to how these changes are going to direct the Forest Service in their actions.
12. Climate change should have been part of this discussion component on Fires and Fuels. It was not.

Forestry and Forest Health:

To begin the subject of Forest Health, we need to clarify the reason for the title. We recognize this term might be considered a misnomer (scientifically speaking) as it has become more or less a social term with a misplaced focus. Yet the phrase has come to represent several elements within forest ecology, and rather than separate all the intricacies here, we decided to compose all of those elements into one discussion.

As we stated earlier, issues and components such as climate change, fires and fuels, forest health, and carbon sequestration are all related. The latter two will be discussed here. Forest health is not a component listed in the DRFP; in fact, forestry issues are scattered throughout the DRFP making it difficult to cover all related issues in the fashion they are presented in the DRFP or the DEIS.

Carbon Storage and Sequestration:

Since this subject matter ties in so close to climate change and fires and fuels, we want to begin our discussion here before we get into the details of other forest ecology issues. The definition of carbon sequestration is provided in the DRFP in the very first paragraph of Section 2.3.13 on page 51. It defines carbon sequestration this way:

"Carbon sequestration is the process by which atmospheric carbon dioxide is taken up by trees, grasses, and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils. The sink of carbon sequestration in forests and wood products helps to offset sources of carbon dioxide to the atmosphere, such as deforestation, forest fires, and fossil fuel emissions."

We will go with this definition; it is as good as any other. We actually began our comments on climate change from the DEIS, using the first paragraph of Section 3.8.1, "Carbon Storage and Sequestration".

"The current levels of carbon dioxide in the atmosphere far exceed the concentrations found over the past 650,000 years (Ryan et al. 2010b). As a result, global surface temperatures have increased since the late

1800s, with the rate of warming increasing substantially. This warming will have an impact on the earth's climate, climate variability, and ecosystems (IPCC 2007)."

The relationship between carbon sequestration, or the lack of it, to climate change is a prime example of cause and effect. As man introduces and increases the amount of carbon into the atmosphere, it over taxes the natural world to capture it, thus increasing atmospheric temperatures. GWA is not going to present tons of scientific evidence that proves that point. The evidence is out there, everywhere. But we are going to list one, that from Dr. Steven Chu, a physicist and a former Secretary of Energy from 2009-2013 under President Obama. In an editorial in Science Magazine, Vol. 325, issue 5948, dated Sept. 25, 2009, he said this:

"Overwhelming scientific evidence shows that CO₂ emissions from fossil fuels have caused the climate to change, and a dramatic reduction of these emissions is essential to reduce the risk of future devastating effects."

<https://science.sciencemag.org/content/325/5948/1599>

The trees and forests capture carbon, but not at the rate we are increasing it in our atmosphere, and certainly not at the rate our forests are declining across the planet. It truly is a vicious cycle. GWA firmly believes it is one principal reason to maintain the forest in its wild condition. Maintaining the forests, we have today help stabilize the amount of carbon around the planet and helps mitigate the harmful effects of climate change. That is the goal.

The discussion of carbon sequestration in the DRFP is brief, very brief. Only two paragraphs long and one desired condition is all that is present. GWA disagrees with the premise of the second paragraph.

"Sustainable forestry practices can increase the ability of forests to sequester atmospheric carbon while enhancing other ecosystem services, such as improved soil and water quality. Planting new trees and improving forest health through thinning and prescribed burning are some of the ways to increase forest carbon in the long run. Harvesting and regenerating forests can also result in net carbon sequestration in wood products and new forest growth (also see Terrestrial Vegetation and Soils sections)."

The CGNF is obviously following USFS policy that thinning or harvesting trees is perhaps the best way to control increased carbon levels in our atmosphere. (If you think about it, that doesn't even make sense.) The above paragraph states this in black and white; again, from the DRFP, it says, "[hellip]thinning and prescribed burning are some ways to increase forest carbon in the long run." This indirectly states we are going to increase the amount of carbon now in order to gain benefits of fighting climate change in the future. There are two problems with this thought. One, we can't afford to not take advantage of this planet's ability to sequester carbon now. It is the compounding ability of that carbon in the present term that will be driving the climate change of the future. If we decrease the dynamics of carbon sequestration now, future generations will be the worse for it. Secondly, according to the science, it is the older trees, the old growth forests, that sequester more carbon than younger forests composed of smaller trees. This directly contradicts the rationale of the USFS. Yet those are the trees the USFS and CGNF are promoting to harvest and thin. GWA would like to refer the CGNF to a technical paper published by the Natural Resources Conservation Service, Alaska Forestry Technical Note 1, "Carbon Sequestration and Forest Land Thinning" (April 2008)140:

<https://efotg.sc.egov.usda.gov/references/public/AK/ForestryTechNote1.pdf>

"Current literature and research indicate that the use of thinning to increase the amount of total carbon sequestered does not always achieve the desired results."

"An important consideration in the carbon sequestration abilities of forest is that forests composed of larger older trees sequester more carbon than younger forests composed of smaller trees, in healthy fully stocked forest stand conditions."

"Once a tree is harvested it ceases to add growth and stops sequestering carbon and the decomposition process will begin. Once a new tree establishes itself, either naturally or through planting, it begins to sequester carbon but when compared to an older mature tree it does not sequester as much carbon, even if there are thousands more younger trees than larger trees. Young trees will be thinned or will be self-thinned resulting in carbon production thus producing carbon."

To be honest and true to the paper, the first paragraph on page 2 of the paper does state it would take approximately 30 years after treatment before the trees would provide for a net increase of carbon sequestration. There is even a disclosure in the DEIS stating this point on page 265:

"This is usually a temporary effect before the disturbed forests begin to re-grow and resume their function as carbon sinks."

GWA feels it is wrong to describe this period of time for positive carbon sequestration as temporary; perhaps in geologic time, but not in reality time as in time we have to make positive changes. GWA does not feel we have the time, not if we want to mitigate climate change from getting worse.

Man is his own worst enemy and the USFS, other land management agencies, and politicians are complicit in this regard when it comes to climate change, and carbon sequestration is the cause of climate change, so you do the math. In an article in Earth Island Journal, "Logging Is the Lead Driver of Carbon Emissions from U.S. Forest - If we want to effectively mitigate climate change, it's time for bold action to protect forestlands." (Smith, Danna; Hanson, Chad; and Koehler, Matthew, 2019) 141 There are these outtakes:

"But the promotion of logging to supposedly curb carbon emissions is just part of the Administration's ongoing alignment with industry and troubling pattern of climate science denial. Carbon emissions from logging in the US are ten times higher than the combined emissions from wildland fire and tree mortality from native bark beetles. Fire only consumes a minor percentage of forest carbon, while improving availability of key nutrients and stimulating rapid forest regeneration. Within a decade after fire, more carbon has been pulled out of the atmosphere than was emitted. When trees die from drought and native bark beetles, no carbon is consumed or emitted initially, and carbon emissions from decay are extremely small, and slow, while decaying wood helps keep soils productive, which enhances carbon sequestration capacity over time."

"Consider this: About 28 percent of tree carbon is contained in branches, and this is emitted when they are burned after logging operations. An additional 53 percent of the carbon in trees removed from forests is emitted as waste in the manufacturing and milling process. Overall, about two-thirds of the carbon in trees that are logged for lumber quickly become greenhouse gas emissions."

These concerns must be addressed and answered. Is it truth or not? We need to be good stewards of our resources and understand what it is we are doing. We must stop ignoring the results of our actions. This science is verified by the statistics as shown in an article "Keep Carbon in The Forest" by George Wuerthner in The Wildlife News, (Wuerthner, George, 2019)142.

<http://www.thewildlifeneeds.com/2019/04/11/keep-it-in-the-forest/>

"Even forests charred by wildfire store far more carbon than a thinned/logged forest. For instance, in Oregon, more than 35% of the state-wide Green House Gas (GHG) emissions are the result of logging, while wildfires emit about 4-5% of carbon. Across the country, wood product production emits more than 10 times the amount of carbon as do the combined emissions of wildfires and bark beetle."

In another scientific article, we have this interesting bit of forest ecology news from Oregon State University. There was an article in the University's online publication entitled "Oldest trees are growing faster, storing more carbon as they age". "The study was led by Nate L. Stephenson of the U.S. Geological Survey Western Ecological Research Center." Three Oregon State University researchers were coauthors (Harmon, Mark; Pabst, Rob; and Thomas, Duncan; 2014)143.

<https://today.oregonstate.edu/archives/2014/jan/oldest-trees-are-growing-faster-storing-more-carbon-they-age>

"In a letter published today in the journal Nature, an international research group reports that 97 percent of 403 tropical and temperate species grow more quickly the older they get. The study was led by Nate L. Stephenson of the U.S. Geological Survey Western Ecological Research Center. Three Oregon State University researchers are co-authors: Mark Harmon and Rob Pabst of the College of Forestry and Duncan Thomas of the College of Agricultural Sciences."

"In a finding that overturns the conventional view that large old trees are unproductive, scientists have determined that for most species, the biggest trees increase their growth rates and sequester more carbon as they age."

The science is out there and GWA believes that the USFS and the CGNF needs to explore other scientific methods and theories and apply those to the forest. We cannot support the path of timber thinning and harvesting as an excuse for more intrusive exploitation of the forest when the effects are questionable.

1. GWA does not support the policy as stated in the DRFP as it relates to carbon sequestration. We urge restraint in removing live trees to help reduce fires and to promote carbon sequestration. We believe the policy is counterproductive.
2. GWA can agree with the one and only Desired Condition on page 51, but not through the means to get there as stated in the DEIS and DRFP.
3. There should be standards and guidelines stating that thinning and timber harvesting will not be done for the sole purpose to enhance carbon sequestration.
4. Since there are no alternatives that delineate treatment options, GWA would like to suggest that Alternative D supports the "no thinning" option.
5. GWA strongly suggests that a change in policy is in order as it relates to carbon sequestration. The CGNF and the USFS needs to fully address the realization of carbon sequestration.

Forested Vegetation Treatments:

After learning about this component for over a year now, we still don't understand the purpose of such action. What is the science behind the intent? What is the intent? To begin with, Objective 2 under Alternative D on page 41 of the DRFP says this:

"Each decade 800 acres treated by forested vegetation management projects have explicit primary or secondary purposes of benefitting wildlife, whitebark pine and other at-risk species habitat, pollinator habitat, non-commercial vegetation, and general terrestrial ecosystem conditions."

What is the purpose of treating 800 acres every 10 years using forested vegetation management practices? First, what does it mean when we say "forested vegetation management"? In the DRFP, that phrase is only used six times and is done so in each of the alternatives under Objectives 1 and 2 on pages 40 and 41. There is no explanation or definition provided. Even in the DEIS, it is only mentioned once in the heading on page 721, again without any definition or explanation. We cannot expect such broad usage of terms without knowing what they mean.

On the other hand, we've already discussed the definition of the phrase "vegetation management" as stated in the glossary of the DRFP. Again, that term means the following:

"A process that changes the composition and structure of vegetation to meet specific objectives, using such means as prescribed fire, timber harvest, or thinning. For the purposes of this document, the term does not include removing vegetation for permanent developments like mineral operations, ski runs, trails, or roads for example, and does not apply to unplanned wildland fire or permitted livestock grazing."

Yet, if this is the purpose here, the first question to ask is: What are those specific objectives? Who decides those objectives? We get the strong opinion from reading Tables 4-13 of the DRFP, that there is an attempt to manually reconstruct or engineer the forest for a specific purpose. If we use the phrase "vegetation management" in forestry circles, it most likely will mean the following based upon Forestry Research Partnership¹⁴⁴:

https://www.forestresearch.ca/index.php?option=com_content&view=article&id=216:vegetation-management-mnr&catid=41:other-projects

"Vegetation management: Selectively manipulating forest plant communities to ensure the desired tree species achieve a dominant position in a mature forest within a desired period of time (Wagner and Mclaughlan, 1996).

If this is the goal here, GWA cannot agree with man trying to selectively manipulate the forest for a desired tree species. This is unacceptable. We are going to repeat some of the comments we raised a year ago last March when we commented on the Proposed Action-Revised Forest Plan:

"First, we all would love to see a desired condition on the forest or in all aspects of our lives, but the trouble is life doesn't work that way. That is not the way nature works either. Everyone might have a different interpretation as to what that desired condition might be. Second, we would all love to see ecological integrity, diversity, and resiliency on the forest, but we're fairly sure we all might have different opinions as to how we get there. Do we get there through man-made manipulation of the natural process or do we let the natural process evolve on its own course, on its own time? There is an arrogance involved in the idea that man has a better idea as to what constitutes a better forest. GWA absolutely decries this method as described[hellip]."

We applaud the willingness to benefit wildlife and at-risk species, but at what price? Will the harm be more damaging than the cure? On top of that, 800 acres over 10 years; what benefit, if any, will that be? We oppose all the alternatives that propose any man-made manipulation of the forest or the forest floor to transition the forest from a wild forest to that of a domestic forest. We will refer CGNF to Dr. Jim Bailey's article entitled "Healthy Forests: Science or Slogan?" (Bailey, Jim, 2017)145.

"Domesticated forests have extensive roads to facilitate tree inventory, fire control and tree harvesting in an accelerated cutting cycle that may include thinning operations. Tree planting methods and thinning may be used to encourage monotonous "proper spacing" of trees for maximizing growth of wood products. In some places, wildlife has been reduced to eliminate their nibbling on regenerating trees. Even more domesticating methods of forest management have been proposed, such as genetically-modified trees to increase growth and to combat insects and diseases."

If what is being promoted here is the beginning of a domesticated forest, GWA will always strongly object.

1. GWA needs more definition or explanation of what "forested vegetation management" is. How is this going to be accomplished? Where and When?
2. What is the intent of this practice? How can 800 acres (as suggested in Alternative D) of treatment in a decade be effective? How were these numbers derived?
3. What is the science behind this effort?
4. GWA cannot support these efforts without more information.
5. Objective 1 on page 40 of the DRFP states the following:

"the explicit primary or secondary purposes of benefitting wildlife, whitebark pine and other at-risk species habitat."

What does this mean? If these practices aren't done for the primary purpose, what would the explicit primary purpose be?

1. GWA finds the man-made manipulation attempt of the forests simply wrong and arrogant.
2. GWA supports Alternative D, but not this aspect of the Alternative. Why does Alternative D have more acreage of treatments than Alternative B or C? This fact alone goes against the premise of Alternative D.

Old Growth Forests:

GWA is disappointed and perhaps confused in the discussion of "old growth forests", especially as specified or not in the DRFP. This subject was a component of our comments of March 2018 and will be so today. We will also echo our comments of a year ago as we want to make sure there is an appreciation for the niche of "old growth forest". The confusion comes into play as the DEIS had more scientific information and discussion than the DRFP, making us doubt the seriousness or actuality of an effort to carry forth an "old growth policy". The lack of attention in the DRFP was surprising since you would think this niche would secure favor as an example of ecological diversity as stated in the 2012 Planning Rule.

There is a huge benefit of having old growth forests as part of an ecosystem as it provides diversity for plant and animal species. But as we have learned, these forests have other benefits to the overall ecosystem. That is why it was surprising to read page 212 of the DEIS:

"Current forest plans have no direction for retaining large trees but the 1987 Gallatin Plan has a standard, added as an amendment, to maintain a minimum of ten percent old growth forest on lands classified as forested at the mountain range scale. The current plan does not distinguish between old growth forest types. The 1986 Custer Plan has a standard to maintain sufficient old growth to support minimum viable populations of old growth dependent species."

The above statement seems to conflict with the statement below found on page 234 of the DEIS. I guess we ask, which is the policy on "old growth"?

"In summary, given the projected trends in large tree size class and plan components designed to protect and recruit old growth, it is expected that old growth will increase relative to current levels under all alternatives. However, in contrast to the current forest plans, all revised plan alternatives have a desired condition to specifically maintain or increase all old growth types above current levels (including lodgepole pine) and a guideline that limits timber harvest in old growth (with the exception of lodgepole pine)."

GWA would like to refer CGNF to an article found on EcoWatch, an online journal of environmental news and scientific research. On a Jan. 17, 2014 article entitled "Importance of Old Growth Forests: Carbon Capture Potential Grows with Age" (Beans, Laura, 2014)146:

<https://www.ecowatch.com/california-schools-organic-food-2636703661.html>

"Beyond providing essential biodiversity, the oldest trees in a forest capture the most carbon from the atmosphere, a new study finds."

"Forests store large amounts of carbon that would otherwise contribute to climate change. They store nearly 300 billion tons of carbon in their living parts (biomass)[mdash]roughly 30 times the annual amount of emissions created by burning fossil fuels. But when forests are degraded or destroyed, this carbon is released into the atmosphere."

"The researchers have found that carbon uptake of trees (as measured by growth rates) continuously increases with their size because the overall leaf area increases as they grow. This enables bigger trees to absorb more carbon from the atmosphere. Thus, the oldest trees in a forest capture the most carbon from the atmosphere. These oldest trees are to be found in ancient forests. Importantly, older trees are also more valuable for biodiversity than younger trees because they support a wider range of species. For example, hollows and snags provide habitats for nesting birds."

Yes, we've already discussed carbon sequestration, but here again we see how forest ecology is so inter-related. Not only do these large trees provide such biological diversity, but they have such an importance for carbon sequestration. They have such value and yet they seem to have no importance to the CGNF. If we are wrong in this assumption, then we will stand corrected, but the DRFP just doesn't seem to place value in this niche in our forest ecology. The comments below are those we made last March and we echo them today:

"In GWA's experience in the North Bridger Forest Health Project, a project funded or proposed under the 2014 Farm Bill, there were actions proposed that would harvest timber in a few stands of old growth timber. GWA has previously asked where is the science that harvesting old growth timber makes a forest healthier? Does CGNF have actual management plans for protecting "old growth forests"? What is the current status and condition of current stands of old growth on the totality of the forest? It is believed that these old growth stands are fragmented and isolated from each other preventing any homogeneity. GWA recommends that CGNF perform a complete inventory of these lands to determine best ways to maintain and protect these iconic and unique forest characteristics."

As we have learned with the North Bridger Forest Health Project, "old growth forest" did not seem to thwart or change the perception of thinning. There did not seem to be any conscientious effort to "work around" the stands of "old growth forest".

1. GWA believes that there should an inventory of old growth forests completed across the CGNF landscape.
2. There should be a standard in the DRFP (perhaps in the forested vegetation component) stating that forest should maintain an "x" amount "percent" of "old growth forest" on the landscape. (Obviously to be determined once an inventory is completed.)
3. There needs to be a discussion of this niche on the forest landscape listing the value, future management, and protection.

Timber Harvest:

Some of our comments below are carried over from our March 2018 comments concerning the Proposed Action-Revised Forest Plan. In the perusal of this DRFP, we still see many of our old concerns omnipresent in this component. Section 2.4.6 of the DRFP, Table 15 on page 79 indicates that 553,950 acres are suitable for timber production under Alternative D. The DEIS on page 218 places this in perspective:

"Alternative D has the least amount of land that would be suitable to use timber harvest as a management tool while the current plans and alternatives B, C, and E are relatively similar (Table 2)."

Part of Table 2 (that part pertaining to timber production) is reproduced here. As the table indicates, the amount of timber production acreage as a result of Alternative D amounts to 18% of total CGNF land use designation. But in reference to Table 2 on page 27 of the DEIS, there is also a line item which states another purpose.

"Forested acres unsuitable for timber production but where timber harvest may occur for other purposes; percent Custer Gallatin National Forest".

Issue	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Forested acres suitable for timber production; percent Custer Gallatin National Forest	665,24722%	582,33819%	570,14619%	553,95018%	604,50220%
Forested acres unsuitable for timber production but where timber harvest may occur for other purposes; percent Custer Gallatin National Forest	246,1278%	608,05620%	523,88317%	592,26119%	563,83919%

For this line item, it states an additional 246,127 acres could also be set aside for timber harvest. This amounts to another 8% of land for potential timber harvest bringing the total land use for that purpose to 26%, slightly over a quarter of CGNF lands. This is 8% more than what we had commented on in March of 2018. And this is only if Alternative D were to become the active plan. If other alternatives are chosen, then we are looking at 38-40% of land subjected to the potential of timber harvest. This is concerning. From what we've learned about the benefits of forests with all their ecological diversity, ecological integrity, climate change, etc., we must rethink policies of old. We can't manage the forests under the same old multiple use concept that the National Forest has been obligated to follow for the past century. We must change our paradigm. We realize that these decisions are beyond those of the CGNF. A greater change must take place at the institutional level. But the quotes below indicate this same old paradigm problem. The first two quotes are from a section of paragraph on page 235 of the DEIS, and the third from Desired Condition 3 in the DRFP on page 80. We assume these quotes are representative in how the CGNF sees its role on the forest:

"Timber management is one of the tools available to change vegetation conditions for purposes of maintaining or moving towards desired vegetation conditions[hellip].

[hellip]In total, the plan components addressing timber harvest will result in harvest activities helping to move vegetation towards desired conditions and, in turn, promote ecological diversity and integrity."

"Timber production and harvest contribute to ecological sustainability and ecosystem health while contributing to economic sustainability, providing jobs, and income to local economies."

Apparently, the Forest Service sees its role as changing the conditions on the ground, in nature if you will. This is greatly disturbing. Whatever happened to letting the forest become a forest? Whatever happened to letting nature take its course? What the Forest Service is proposing is way beyond the paygrade of CGNF and man. GWA challenges the science of those last previous statements. Where is the ecological proof and evidence that timber harvesting contributes to the ecological integrity of a forest? This rationale seems to be used as justification by the USFS for a wide assortment of timber projects all across the west; CGNF is no exception. The GWA continues to ask, where is the science that these statements are based upon? GWA submits our previous science article found in the link below. In a scientific journal Phys.Org, an article entitled "Proposed forest thinning will sabotage natural forest climate adaptation, resistance to drought, fire, insect outbreaks"; this article raises some questions which need further research (Lee, Derek E, Phd, 2017)147.

<https://phys.org/news/2017-01-forest-thinning-sabotage-natural-climate.html>

A few points of consideration from the article:

"These logging schemes are the latest in a series of Forest Service attempts to chainsaw their way out of a perceived problem. However, forests in the western United States have evolved to naturally self-thin uncompetitive trees through forest fires, insects, or disease.

Forest fires and other disturbances are natural elements of healthy, dynamic forest ecosystems, and have been for millennia. These processes cull the weak and make room for the continued growth and reproduction of stronger, climate-adapted trees.

Remaining live trees are genetically adapted to survive the new climate conditions and their offspring are also more climate-adapted, resistant, and resilient than the trees that perished."

There seems to be more and more scientific research and study that are coming to the same conclusion, and it is our responsibility as well as the Forest Service to seek out those works. We seem to be learning new things about the forest. Man just never took the time to research forest ecology like we are doing today. GWA realizes we aren't going to halt the timber industry from harvesting trees, nor are we wanting to do so. But we do want the Forest Service to put forth better alternatives, those utilizing the best science available.

Sustainability?

Finally, concerning the last segment of Desired Condition 3 on page 80 in the DRFP, (stated above) "contributing to economic sustainability, providing jobs, and income to local economies". This justification for further logging just does not sustain itself according to stats by Headwaters Economics¹⁴⁸. They report that in the year 2015 only 5.0% of personal income in the rural west was earned by the extractive industries of mining, timber, oil and gas combined. Timber alone would be a percentage of that, meaning only a small fraction of personal income in the rural west earn their income from the timber industry. Are we really offering up 18-26% of the CGNF lands to support a small fraction of economic activity?

If we want to justify our actions in terms of economics, we will find that other management policies on the forest are a better driver than timber.

https://headwaterseconomics.org/wp-content/uploads/Todays_Economy_Federal_Public_Lands.pdf

One more statistic from Headwaters Economics (Rasker, Ray Phd., 2012)¹⁴⁹ in another report. In a December 2012 writing, "West Is Best: How Public Lands in the West Create a Competitive Economic Advantage", they place the economics of western counties in perspective:

"Western non-metropolitan counties with more than 30 percent of the county's land base in federal protected status such as national parks, monuments, wilderness, and other similar designations increased jobs by 345 percent over the last 40 years. By comparison, similar counties with no protected federal public lands increased employment by 83 percent."

<https://headwaterseconomics.org/economic-development/trends-performance/west-is-best-value-of-public-lands/>

These stats indicate that values of how we use our federal lands is shifting. We want to appreciate the land for its beauty, wildness, wildlife and for its recreation potential. The old economic ties of how man relates to the land is still there, but with a different emphasis. The policy of the multiple use concept needs to be reanalyzed.

One more point of emphasis on the subject of timber production before we leave the subject, and perhaps it should be the most influential. Just as we received notice from the United Nations during this comment period of a predicted mass extinction of plant and animal species, there was this report which was released on May 21, 2019 by the Center for Sustainable Economy (Talberth, John DR., 2019)¹⁵⁰. In the article, "Destructive Federal Timber Sale Program Loses Nearly \$2 Billion A Year" by Dr. John Talberth, he says this:

"According to Dr. John Talberth, Senior Economist from the Center for Sustainable Economy, 'Federal forests represent the last remaining islands in a sea of forestlands degraded by industrial logging activities on state and privately owned lands. Our federal forests are far more valuable as carbon sinks, recreation destinations, wildlife habitat and natural water filters than they are for timber production. As such, the economic damage from these logging subsidies is twofold: taxpayers lose money and local economies lose opportunities to diversify and use the land for much more valuable purposes.'"

"Key findings of the report include:

1. Federal forestlands are far more valuable when managed for carbon and other ecosystem services yet logging on these lands continues to be subsidized.

1. Taxpayers subsidies for the federal logging program ranged from \$1.6 to \$1.8 billion per year in fiscal years 2013 through 2017. The estimated losses are conservative as they do not include logging related damages to water, soils, wildlife and other resources.

2. The Forest Service attempts to justify these losses by hiding commercial timber sale projects within larger ecological restoration projects - a move that consistently lands the agency in court.

3. Selling timber from federal lands below cost is a form of environmentally harmful subsidy that runs afoul of international agreements."

1. Congress can remedy the situation by decoupling funding for ecological restoration projects from commercial logging and ensuring that minimum bid prices for federal timber offset all agency costs."

And finally, there is this statement from Dr. John Talberth:

"The report also challenges the claim made by the Forest Service that logging projects help reduce fire risk and result in improvements in watershed function and wildlife habitat. 'Best available science and experience on the ground have shown over and over that commercial logging is the problem, not the solution, and that ecological goals can be achieved far more effectively through legitimate restoration activities that are not distorted by perverse logging incentives,' Talberth said."

GWA believes these findings and has been trying to showcase this science, this argument over time, but we believe this study may state our position best of all.

1. GWA supports Alternative D.
2. The CGNF and Forest Service keep repeating this mantra that: "Lands suitable for timber production are resistant to natural disturbances." Where is the proof of this? Where is the science for this claim?
3. The DRFP also continues to make this statement: "Timber production and harvest contribute to ecological sustainability and ecosystem health." Where is the science for this claim?
4. GWA questions the location, the potential wildlife habitat, and the ecological importance of comprised lands designated as: "Forested acres unsuitable for timber production but where timber harvest may occur for other purposes?" What other purposes?
5. GWA urges the CGNF to look at the economic viability of the timber industry. It is not the role of CGNF or the Forest Service to sustain or prop up a private industry.
6. The CGNF and the Forest Service need to look at changing their paradigm, especially as we enter into the next 20 years or so. The Forest Service needs to be forward thinking and not continuing on with the same old practices and paradigms.
7. Objective 3 on page 81 concerns itself with vegetation management treatments. GWA has already presented comments in that regard prior to this component. We do not support vegetative treatments in the backcountry, wilderness areas or recommended wilderness areas, or inventoried roadless areas. This could be allowable only in those areas classified as the wildland-urban interface near structures and infrastructure.
8. GWA would like to see the science which refutes that made by the Center of Sustainable Economy.
9. The logging interests of 40 years ago or more are the forests that are burning today.

Recreation:

GWA wants to make it perfectly clear from the beginning that recreation is not the same as conservation. There is a tendency to conflate the two issues, but they are totally different based upon their premise. One interest (that of recreation) wants to utilize the forest for their own particular enjoyment, and the other seeks to preserve the forest for the betterment of the ecosystem to sustain its viability. But in truth, whether we are hikers, bikers, skiers, hunters, motorized or non-mechanized in how we access the forests, we all have an impact. And that impact is not positive. That fact is acknowledged in Chapter 11 (Cole, David N., Landres, Peter B.)151; "Indirect Effects of Recreation on Wildlife", the writings of Wildlife and Recreationists--Coexistence Through Management and Research (Knight, Richard L.; Gutzwiller, Kevin J., 1995):

"Virtually all types of recreation alter some characteristics of soil, vegetation, or aquatic systems. By directly impacting these components, people affect an animal's food supply and availability as well as shelter, or living space. In turn, impacts on food and living space influence behavior, survival, reproduction, and/or distribution."

But even before this statement under the first paragraph of "Recreational Influences", there is an opening paragraph which reads as follows:

"Recreational activities can change the habitat of an animal. This, in turn, affects the behavior, survival, reproduction, and distribution of individuals. Although more difficult to isolate and study, these indirect impacts may be as serious and long-lasting as direct impacts for many species."

Obviously, some access and uses leave less impact than others, but even minimal usage can be severe when multiplied by hundreds over the same inch of ground time and time again. Ideally, decisions are made in favor of protection before those impacts start changing the integrity of the landscape. GWA thinks we are at that point on the CGNF.

According to Headwaters Economics, Montana's outdoor recreation economy generates \$7.1 billion in consumer spending and creates 71,000 jobs¹⁵². No doubt, recreation is a big business and is a driving force in Montana's economy. The DRFP states it correctly when it says on page 92 the following:

"Outdoor recreation helps create balance in one's life. Users of the Custer Gallatin seek to reduce stress and regain physical or mental health. It provides fun, excitement, and adventure, the chance to get out and do something different. The Custer Gallatin also offers recreation with rewards[mdash]both tangible (such as for hunters) and intangible such as new knowledge, experiences, and a sense of self-worth."

But we have to remember the clich[eacute] that is becoming all too common: "Are we loving our Public Lands to death?" Originally referring to our National Parks, this can be applied to our other wild lands as well, all public lands which are becoming overused. And in the Custer Gallatin, that is probably no more accurate than applying it to the Hyalite region of the Gallatin Range. Recreation more than any other demand of the forest seems to be placing the greatest pressure upon our landscape and wildlife.

The DEIS goes into detail on pages 678 and 679 over the regulator framework directing the U.S. Forest Service to provide accessibility and opportunities for recreation to the American public. GWA doesn't remember seeing that sort of effort in providing documentation on other components of the forest such as wilderness or wildlife. GWA understands the pressure being placed upon the forest by certain user groups. Even with that, the Forest Service has a mission. That mission is below:

"To sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations." Its motto is "Caring for the land and serving people."

At times, sustaining health and diversity of the nation's forests can be in conflict with serving the needs of the American people. GWA believes we are getting close to that inflection point on the CGNF. And when that conflict comes (some think that time is already here), the Forest Service has the responsibility to protect the forest first, overriding the urges and wishes of the any user group.

Recreational effects on wildlife has already been covered to some degree in our comments, but there is more to the issue, more than what can even be stated here. GWA is not against recreation on the forest, but we are against inappropriate recreation on certain landscapes in certain spatial and temporal zones on the forest. If there is going to be an error made, GWA believes it is necessary to err on the side of preservation and conservation of wildlands and wildlife than recreation.

Soils and Vegetation:

There is a rush to think of ourselves rather than man's (our) impact upon the landscape, upon the forest and the forest floor. The smallest footprint can have impacts. GWA would like to refer the CGNF to the issues contained in the reference from Chapter 11 of the Wildlife and Recreationists--Coexistence Through Management and Research, (Cole, David N., Landres, Peter B.)153.

Page 184:

"Numerous studies have documented the effects of recreation on vegetation and soils. Most of these studies report results of human trampling caused by hiking, camping, fishing, and nature study. Significantly fewer studies report the consequences of horse and bicycle riding or that of off-road vehicles and snowmobiles."

"Impacts on soil include:

- * loss of surface organic horizons
- * compaction of mineral soil
- * reductions in macro and total porosity
- * reductions in infiltration rates and increases in soil erosion
- * localized changes in soil chemistry have also been reported, but the precise changes noted have been inconsistent
- * both reductions and increases in soil moisture (Settergren and Cole 1970; Blom 1976)
- * increases in the diurnal and, perhaps, seasonal range of soil temperature (Liddle and Moore 1974)."

"These changes in soil characteristics adversely affect the germination, establishment, growth, and reproduction of plants. Compaction reduces the heterogeneity of soil surfaces and, therefore, the density of favorable germination sites (Harper et al. 1965). Compaction increases the mechanical resistance of the soil to root penetration and can reduce the emergence of seedlings. Reduced macroporosity can result in oxygen shortages and less water being available to plants. These physical changes, along with reductions in organic matter and changes in soil microbiota, can seriously disrupt ecosystem processes (e.g., decomposition). They can impede soil-plant-animal interactions (e.g., nutrient cycling), causing decreased primary productivity."

"The most obvious direct impacts on vegetation come from the crushing, bruising, shearing, and uprooting of vegetation that often accompanies recreational use. Various changes in individual plant characteristics occur, including reductions in plant height, stem length, leaf area, flower and seed production, and carbohydrate reserves (Liddle 1975; Hartley 1976). Plants are often killed outright. Those that survive typically are not as vigorous and reproduce less successfully. Consequently, recreation areas characteristically have vegetation that is less abundant (reduced density and cover), of a reduced stature, and with a different species composition from undisturbed areas (Cole 1982; Luckenbach and Bury 1983; Cole 1993)."

The amount of material in this document describing the ecological damage from recreation overuse upon the forest flora and floor is abundant. GWA urges the CGNF to read pages 184-186. We could reproduce those pages here as to how impacts of winter recreation have on soils and vegetation and how water recreation impacts riparian sources, but time and space are becoming critical and it is something that the CGNF can investigate itself. The reading of this document surely presents an awesome picture of how complex the forest ecosystem dynamics are. Impacts at the smallest level on the forest floor will indirectly influence terrestrial wildlife on a large dynamic scale.

On page 193, there is a discussion on "Management Options for Coexistence":

"Indirect impacts differ from direct impacts in two ways: (1) Indirect impacts are inevitable, occurring wherever and whenever recreational use occurs; and (2) they generally occur over long periods of time, with effects that are long-lasting and that may take place only after a time lag. Consequently, the timing of activities has less influence on indirect than on direct impacts.

These differences suggest that the appropriateness of various management strategies will vary given the nature of the activity. In particular, strategies that restrict the amount, type, and spatial distribution of use, as well as those that enhance site durability, seem well-suited for managing indirect impacts. Strategies that emphasize visitor education and temporal restrictions, while worthwhile in some situations, are less effective on indirect impacts than on direct ones."

Basically, a deeper discussion is detailed on the following pages 193-195 with the following headings:

1. Restrictions on the amount of use.
2. Restrictions on the type of use.
3. Restrictions on the spatial distribution of use.
4. Enhancing site durability.

GWA finds no discussion of such matters within the DRFP. If we are mistaken, we apologize and retract the statement. But there seems to be no acknowledgement as to how recreational actions impact microhabitats and how those impacts affect the more dynamic impacts on the large landscape. This is the ecological connection that gets lost in the wants, needs, and desires of a booming community in southwestern Montana. But it's all related and GWA wants to make sure that the recreational demands don't overrule the common sense of recreational management.

Recreation and Wildlife:

Wildlife/human conflicts are going to happen and recreational opportunities are likely one of the more common sources. In an abstract by the Montana Chapter of the Wildlife Society, (Canfield, Jodie, et al. 1999)¹⁵⁴, there is this fact:

Hunting, wildlife viewing, and photography generate economic benefits in excess of \$450 million annually.

If we want to keep wildlife wild, enhancing, encouraging, or facilitating recreational values onto wildlife habitat does not make good policy. That conflict is going to happen at its own pace. Why be an enabler in the cause? Why make those encounters more likely to happen? One could argue that the danger and the health risks of these conflicts are an equal opportunity employer. Both have suffered from the experience and both have suffered loss. But one could also argue that it is wildlife that have suffered most, especially long term. They may lose part of their habitat from human encroachment. They lose those secure areas where they can escape from danger. They lose their migration routes or their food supply because of this human influence, sometimes from increased recreation.

Again, from the Abstract in Chapter 6, by the Montana Chapter of the Wildlife Society entitled "Ungulates, Effects of Recreation on Rocky Mountain Wildlife, A Review for Montana", there are these considerations:

"However, recreational activities have the potential not only to displace ungulates to private land where they may cause damage, but also to have negative direct and indirect effects to the populations themselves. During winter, many ungulates are seasonally confined to restricted geographic areas with limited forage resources. In these conditions, physiological adaptations and behavioral adaptations tend to reduce energy requirements. Despite lowered metabolic and activity rates, most wintering ungulates normally lose weight. Responses of ungulates to human recreation during this critical period range from apparent disinterest to flight, but every response has a cost in energy consumption. Snowmobiles have received the most attention compared to other wintertime disturbances, and the majority of reports dwell on negative aspects of snowmobile traffic. However, snowmobiles appear less distressing than cross-country skiers, and for several ungulate species, the greatest negative responses were measured for unpredictable or erratic occurrences. In addition to increasing energy costs for wintering animals, recreational activity can result in displacement to less desirable habitats, or in some situations, to tolerance of urban developments."

"[hellip].The potential for impacts increase and options for acquiring high quality nutrition, with the least possible effort, decline as the size of the area affected by recreationists expands to fill an increasing proportion of the summer range. Disturbance of the highly productive seeps and wet sites may cause animals to withdraw to less productive areas."

These arguments are only the beginning as to why deference should be given to wildlife when it comes to enacting a Revised Forest Plan. Being proactive and utilizing the best-available science is key in making the hard choices. The scientific evidence is out there. We urge the CGNF to review this and other scientific publications which exist online. Another source is called Applied Conservation Science Lab, an online publication sponsored by Dr. Sara Reed at Colorado State University. (Reed, Sara 2016)¹⁵⁵ Their link is found here:

<http://sarahreed.squarespace.com/news/2016/12/9/new-publication-outdoor-recreation-impacts-wildlife>
In an article entitled "Outdoor Recreation in Protected Areas Negatively Impacts Wildlife Globally", she states the following:

"Newly published research in the journal PLOS ONE by scientists at WCS (Wildlife Conservation Society), Colorado State University (CSU), and University of California-Berkeley finds that human recreation activities in protected areas are impacting wildlife, and more often than not, in negative ways.

Nature-based, outdoor recreation is the most widespread human land use in protected areas and is permitted in more than 94 percent of parks and reserves globally. Inspiring an estimated eight billion visits per year to these areas, outdoor recreation is typically assumed to be compatible with conservation. Increasingly, however, negative effects of recreation on wildlife are being reported.

People generally assume that recreation activities are compatible with conservation goals for protected areas," said Courtney Larson, CSU PhD student and lead author of the study. "However, our review of the evidence across wildlifesppeciesand habitat typesworldwide suggests otherwise."

The seriousness of this and other scientific reports cannot be dismissed. There is one more article to be included here and that is evidence promoted by Bruce S. Thompson, a professional natural sciences education specialist. Mr. Thompson presents scientific evidence in talks and writings around the subject of "The Ecological Impacts of Recreation on Wildlife and Wildlands". The latest article occurred in the Mountain Journal written by Todd Wilkinson¹⁵⁶ on March 20, 2019. In that article Todd Wilkinson quotes Mr. Thompson in the following manner:

Hikers with dogs:

"A single hiker walking down a trail causes wildlife displacement of 150 feet. But a hiker with a dog on leash results in a wildlife displacement of 280 feet in one direction. When the panoramic radius on both sides of the trail is combined to create total diameter, it means a zone of 560 feet. It's one thing if the displacement causes an animal to flee and it is able to return to its preferred habitat after the person and dog are gone, but the disruption can become chronic, if not permanent, when the trail receives a stream of near-constant or heavy use.

This displacement comes at a cost, not only by the stress it causes and amount of energy expended by the animal to leave, but it might mean abandoning the prime places where it finds the best forage and security cover, Thompson says. Such scenarios are playing out across the Greater Yellowstone region, he adds."

Mountain biking:

"Often, mountain bikers insist they are no more disruptive to wildlife than hikers and equestrians, Thompson says.

The problem is that riders travel faster and cover much longer distances than hikers; they tend not to make noise; riders while navigating trails are more concerned about avoiding rocks and trees than being fully attentive to their surroundings, and the way they ride makes their presence less predictable, he says.

If a single mountain biker is traveling twice the distance as a hiker, then it could be argued. Thompson says, that the cyclist is having twice the spatial impact in terms of potential wildlife disruption. And, with rising numbers of mountain bikers and local clubs pressuring the Forest Service to let them upgrade and build new trails, the impacts are hardly benign."

Recreation and Grizzly Bears:

Just as recreation can have a negative effect on wildlife, the opposite is true. The chances of grizzly bear/human conflicts from recreational mountain biking are on the rise. These conflicts having already occurred in the West are sure to occur again as the sport increases in favorability. The DRFP does not seem to acknowledge the danger or potential of these type of conflicts; in fact, the lack of mention is perhaps a little naïve. But to allow mountain biking in known grizzly bear habitat is perhaps irresponsible. GWA would like to refer CGNF to a letter dated July 11, 2013 from Tim Manley, a Grizzly Bear Management Specialist with Montana Fish, Wildlife and Parks, to Chip Weber, the Flathead National Forest Supervisor. GWA urges the CGNF to read the entirety of the letter on your own, but segments from that letter are included below:

"As Grizzly Bear Management Specialist for Montana Fish, Wildlife & Parks, I wanted to write you this letter regarding mountain biking in portions of the Whitefish Range."

"My concern lies primarily with mountain bikers having serious negative encounters with grizzly bears which could result in serious bodily injury or even death to the mountain bikers[hellip]."

"In recent years, technology has created mountain bikes that are able to be ridden on a wide variety of trails and terrain. This has caused an increase in negative encounters between mountain bikers and grizzly bears, often resulting in a very bad situation for the mountain bikers. While there is always the potential for conflicts between recreationists and grizzly bears, mountain bikers provide a unique situation. Mountain bikers typically travel quietly, at fast speeds, with their attention on the immediate trail in front of them, rarely able to scan the trail and surrounding area for bears. This type of activity in prime grizzly bear habitat is a recipe for disaster."

"I have discussed the use of mountain bikes with other grizzly bear biologists in Alaska, Alberta, British Columbia, Idaho, Montana, and Wyoming. None of the biologists I spoke with felt that mountain biking in areas with a high number of grizzly bears is a good idea."

To further the discussion and to help reinforce the point, GWA would like to refer the CGNF to the research paper by the Craighead Institute (Craighead Institute, 2015)¹⁵⁸. On page 89 of Wilderness, Wildlife, and Ecological Values of the Hyalite-Porcupine-Buffalo Horn Wilderness Study Area, it states the following:

"Recreational development increases bear mortality risk and alienates bears from preferred habitats such as riparian areas. The effect of developments on mortality extends up to 6 km from the recreational site (Mattson and Knight 1991). Even non-motorized trails may be avoided to a distance of 300 m (Kasworm and Manley 1990, Mace et al. 1996). Mace and Waller (1998) found that in the Jewel Basin hiking area east of Kalispell, Montana, bear use increased with greater distance from trails and lakes with campsites."

According to the DRFP, there are proposed areas where mechanized and even motorized use is allowed to occur in the newly designated BCA. It is thought that some of these areas hold the potential for wilderness. It is also believed that some of these areas are known to be where grizzly bears currently exist. It should be mentioned that the Buffalo Horn area of the WSA is within the Grizzly Bear Recovery Zone, and releasing that from WSA recommendation and thus allowing mechanized transport/use, increases the probability of conflicts. GWA urges that deference be given to the grizzly bear in this regard. Doing so won't eliminate all potential grizzly bear conflicts, but it could lessen the potential. The ability to mountain bike does not always have to exist deep within wildlife habitat. We urge common sense here. We urge reconsideration of the placement of mountain biking activities in the vicinity of grizzly bear habitat. We urge the adoption of a more wilderness-oriented plan and remove or lessen the acreage of BCA.

1. There seemed to be very little credence given to the dangers and conflicts between grizzly bears and recreational opportunities.
2. How can the DRFP justify increased recreational opportunities in grizzly bear habitat, especially when the grizzly bear is listed as endangered?
3. We question the wisdom of releasing the Buffalo Horn area of the WSA from WSA recommendation as this area is a known Grizzly Bear Recovery Zone. Allowing mechanized transport/use increases the probability of conflicts.

General Recreation:

Item number 2 above (restrictions on type of use) means that not every type of recreational use needs to be provided on the landscape by the forest. We believe that CGNF is trying to be all things to all people, but that is not their role. Section 2.4.15 (page 94) entitled "General Recreation" is weak in its presentation. There are five Desired Conditions, but only one, item 5, in any remote way discusses the impacts of recreational sites on resources. And even then, the CGNF states the desired condition as managing those sites to achieve minimal impact. The others seem to support or promote the component of recreation in a more robust fashion, implying the needs and wants of the people overrule the protection of the resource.

The only difference between the DRFP's Alternatives B, C, D and E under Section 2.4.15 is the number of recreational facilities to be removed or relocated from riparian and dispersed sites. While this is a step in the right direction, it falls well short of the work needed. It is not exactly clear what type of structures or locations are included in the term recreational facilities. It could be campsites, firepits, trails, etc. but it is not defined. The same holds true for the classification of suitability. The suitability issue only describes the possibility of utilizing pack goats on the landscape. Yet so much more needs to be discussed.

Trails and Accessibility:

One of the largest, if not the largest, conflict upon the CGNF is the use of the trail system. According to page 668 of the DEIS, there are approximately 3,500 miles of trails within the CGNF; 3,040 miles of those are summer use and the remainder purposed for winter. Of the slightly more than 3,000 miles of summer trails, approximately 1,120 miles are designated for motorized use and another 735 miles are designated for mountain biking (Cummings, 2019)159. This means 61% of the totality of the trail system is devoted to either motorized or mechanized use. The remainder of trails (although not all) occur in wilderness. We have to remember that these miles and the associated acres along with them potentially remove habitat from wildlife's use.

The discrepancy between the amount of trail use among Alternatives is easy to see in Table 149, page 739 of the DEIS. This clearly shows that Alternative D, along with the corresponding and prescribed wilderness

designation, makes a large difference in the number of increased trail miles within the HPBH WSA. Alternative D would prohibit an increase of motorized and mechanized trails within the Grizzly Bear Recovery Zone.

Table 149. Hyalite-Porcupine-Buffalo Horn Wilderness Study Area (WSA) land allocations and management direction by alternative.

From this table, it is obvious there would be a potential for increased conflict between recreational use and grizzly bears. On top of that, there would be an increased potential of grizzly bear displacement, once again adding difficulty for grizzly bears to reach connectivity, running counter to a main purpose under the 2012 Planning Rule.

Accessibility to the forest is not the problem. What is the problem is the overuse or abuse of what is available. This is all in CGNF's decision-making ability; how to manage that recreational demand. But there have to be alternatives and solutions other than just opening up more acreage to face the same problem. GWA's rationale is not to be against motorized or mechanized recreation; it is to be for the wildlife which inhabit the area. It is for the protection of the forest integrity and biodiversity which exists. It is to protect the resource from all sorts of ills brought in by society; those being introduced into a wilderness environment. GWA has certainly made mention of many of those, specifically ones threatening wildlife.

Adding to those concerns and in addition to those listed on page 138 under "Soils and Vegetation" of our comments, there is an additional threat. The issue of invasive weeds was brought to the public's attention as stated in the Gallatin National Forest Travel Management Plan, Record of Decision, of 2006160.

"I am concerned about the spread of invasive weeds because they can alter the native plant species composition resulting in a decrease in habitat quality for wildlife and livestock, an increase in sediment levels of streams, and a decrease in aesthetic/recreational quality (FEIS, page 3-350). On the Gallatin Forest, the majority of mapped weeds are adjacent to motorized travel routes (FEIS, page 3-352). According to the Gallatin weed survey data as of 2002, 53 percent of the weed patches are within 100 feet of motorized Forest Service routes, and 65 percent when including state highways within the Gallatin Forest boundary, with only 3 percent on non-motorized routes (id.)."

Even though the Forest Supervisor at that time, Rebecca Heath, went on to rationalize her decision on the travel management alternatives by not fully allowing this one issue to take full ownership of her final decision, that decision does not make these facts any less accountable or relevant. This issue is just one more consideration on top of many that needs constant monition.

Recreation Settings Recreation Opportunity Spectrum:

One more discussion point on Section 2.4.16 entitled "Recreation Settings Recreation Opportunity Spectrum". In this section, the types of recreation are broken down into six classifications.

- * Primitive
- * Semi-primitive nonmotorized

- * Semi-primitive motorized
- * Roaded natural
- * Rural
- * Urban

In Table 18 on page 97 in the DRFP, there is a breakdown by alternative via each type of recreational type and the amount of summer and winter acreage allowed by each. Just a portion of that is presented here, those portions showing the greatest contrast. And that contrast is between the Primitive and Semi-Primitive Nonmotorized use. Basically, this is comparing the difference between those lands which could be designated wilderness and those areas which could be open to BCA, areas open to biking. This table is indicating that the CGNF has sacrificed potential wilderness for recreation, a type of recreation open to the mountain biking community, a type of recreation allowing for more people to intrude deeper onto the forest.

Summer Winter

Alternative B Acreage Percent Acreage Percent

Primitive	1,053,064	35	1,047,147	35
Semi-primitive Nonmotorized		698,606	23	608,495

Alternative C

Primitive	1,199,656	39	1,193,871	39
Semi-primitive Nonmotorized		589,157	19	498,148

Alternative D

Primitive	1,760,685	58	1,758,890	58
Semi-primitive Nonmotorized		121,988	4	143,504

Alternative E

Primitive	1,053,070	35	1,047,148	34
Semi-primitive Nonmotorized		681,116	22	595,617

The accessibility of more people recreating on the landscape is inevitably going to diminish the quality of wilderness character, harm connectivity routes of wildlife, degrade watershed protection and forest integrity. Technology is changing the world of recreation; how fast we go, where we go and how we get there. The Forest Service and the CGNF cannot fulfill all those specific needs by specific user groups. If the forest does not or cannot provide those opportunities, it is not incumbent upon the CGNF to try to appease those wishing to force the issue.

1. GWA finds fault with Alternatives B, C, and E. GWA supports Alternative D.
2. How has the science or knowledge of recreational impacts on the resources arrived at these alternatives?
3. Have any restrictive management options been considered in the formation of this DRFP; options such as restricting amount of use, time of use, spatial distribution, type of use and facility enhancement? If not, why not?
4. What is the potential or likelihood of resource monitoring these recreational facilities? Manpower, funds?

5. Has there been the acknowledgement that sacrificing wilderness lands for recreation will lead to negative vegetative and wildlife impacts?
6. What is the potential that increased recreation will have on endangered or threatened species or species which should be listed as SCC?
7. Technology is changing the demands of the recreational user. Are we at the point where technology has surpassed the ability of the forest to make application?
8. Where are the specifics, the guidelines or standards in the protection of the resource as they relate to recreation?

1. Where is the suitability argument on certain types of recreational use; i.e., mountain biking in grizzly bear habitat, within the Grizzly Bear Recovery Zone?
2. How would Alternates B and C provide proactive steps in helping grizzly bears reach connectivity when they would provide increased motorized and mechanized use on the trail system?

Airfields, Aircraft Landing Strips:

GWA will make their comments on this component brief. We are not sure why this subject rose to the attention of deserving a component discussion while others of far more serious nature did not, but it is a concern. Hence our comments here. Even if it is a legal requirement to examine policies/rules for potential back country air strips, they should never be considered an appropriate recreational use on the Custer Gallatin National Forest (CGNF). Such facilities would be a trivial and intrusive component of forest recreation. In the United States there are currently only 212,000 active certified private pilots and numbers have been declining since 1980. Scarce USFS recreational funding should not be used to coordinate with or supplement private efforts to plan, construct and operate air strip related facilities such as field construction, maintenance of grass strips, and related infrastructure such as outhouses. Potential harmful aspects of back country airstrips include the following:

1. Increased ease of access for the public and outfitters creating technological advantages over wildlife and other users.
2. Noise that disturbs wildlife and creates conflicts in primitive recreational settings.
3. Potential hazardous material cleanup from spilled and leaking aircraft fluids.
4. Emerging conflicts from new recreational technologies/inventions.
5. Safety issues for all pilots.

The average altitude of potential air strips on CGNF would be between 6,000 and 7,000 feet above sea level. The altitude density factor on a hot day would necessitate safe departure paths of about 3,000 feet for common private aircraft to clear a 50-foot high barrier. Construction of safe air strips as described above would be a considerable costly disturbance on the CGNF.

If pilots want to be able to have easy access to the CGNF, they can already do so at West Yellowstone and other airstrips around the CGNF. Just because a user group wants to utilize public land for their own individual purpose, doesn't mean the CGNF has to meet that demand. The protection of the resource overrides any one demand from a user group.

GWA definitely accepts the position of Alternative D on this matter. It states the following:

Alternative D: Backcountry aircraft landing strips are not suitable anywhere on the Custer Gallatin National Forest.

The Watershed:

Lastly but not any less importantly, the issue of watersheds has been one of the few driving missions of the Forest Service since the Forest Reserve Act of 1891. According to USLegal.com¹⁶¹, the Forest Reserve Act had two purposes:

<https://definitions.uslegal.com/f/forest-reserve-act/>

1. To protect watersheds from erosion and flooding;
2. To preserve the nation's timber supply from over exploitation.

The importance of watershed protection has been carried through those 121 years of time to the year of 2012, the year the latest Planning Rule was placed into effect, a rule which the Forest Service is still mandated to follow today (Federal Register / Vol. 77, No. 68 / Monday, April 9, 2012 / Rules and Regulations; 219.8a(2) and (3)¹⁶².

https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5362538.pdf

The Current Condition:

According to the DRFP, page 22 under Section 2.3.4, "Watershed, Aquatic and Riparian Ecosystems," bullet point 8 describes the fact that a Watershed Condition Framework Assessment was completed on the CGNF in 2016. At that time, 226 out of the 273 (83%) sub-watersheds on the CGNF were in class 1 condition meaning they are appropriately functioning. Forty-seven of those (or 17%) remaining watersheds were rated as class 2 condition, meaning they were functioning at risk. The DRFP states the percentage at 37%, but this must be in error. There are no class 3 rated watersheds on CGNF lands. This is certainly good news, but our concern is focused on the years to come.

With the advent of climate change, water quality and water quantity will suffer. According to Appendix C on page 65 of the DRFP, the 2012 Planning Rule mandates any forest plan must take into consideration all the stressors on the ecosystem as it pertains to the watershed:

"The 2012 Planning Rule requires all plans to include components to maintain or restore the structure, function, composition, and connectivity of aquatic ecosystems and watersheds in the plan area, taking into account potential stressors, including climate change, and how they might affect ecosystem and watershed health and resilience."

The 2012 Planning Rule (36 Code of Federal Regulations 219.7(f)(1)) requires that plans are to address or identify those watersheds that are in need of priority maintenance or restoration (page 10 of the DRFP). The

results of the Watershed Condition Framework Assessment have highlighted three watersheds which are a priority:

"Three subwatersheds are currently designated as "priority" within the watershed condition framework where planning or ongoing restoration work is occurring; the Bozeman, Hyalite, and Shields Watersheds. Restoration work is also planned or ongoing in other drainages as priority under the watershed condition framework. The watershed prioritization process will occur intermittently throughout the life of this plan."

While 17% of the total watersheds are listed as class 2 and may seem insignificant, these are primarily watersheds for Gallatin Valley and Bozeman's water supply. Also, there are other streams and rivers within the CGNF which still have impairment issues. Those are listed here and found in the DRFP under Section 2.3.4, Watershed, Aquatic and Riparian Ecosystems:

1. "A decline in westslope and Yellowstone cutthroat trout numbers in the montane portion of the planning area has occurred during the past several decades due primarily to invasive species, habitat alteration, and changes in climate. Westslope cutthroat trout and Yellowstone cutthroat core or conservation populations currently occupy approximately 9 percent and 46 percent, respectively, of their historic range within the plan area."
2. "Stream flow alterations occur throughout the planning area from both private and Federal lands. Flow alterations have resulted in habitat degradation leading to dewatering of critical habitats, stream alterations, and decreased low flows during critical times."

1. "Many inventoried road culverts are confirmed to be partial barriers or total barriers to native fish species during some part of the year. In some cases, these barriers may be beneficial for retention of native fish populations by creating refugia that excludes nonnative fish."
2. "The Montana Department of Environmental Quality (2014) lists 34 stream reaches on the Custer Gallatin National Forest as water quality impaired under the Clean Water Act, some of which are a result of forest activities. However, the Custer Gallatin has improved roads and watershed conditions such that those streams remaining listed have degraded conditions due to high background levels of sediments, contaminants, etc., and conditions that are outside of Forest Service control."

As we can see, while overall watershed conditions on the CGNF may be good overall, they are not without problems, problems which could metastasize especially with the influx of climate change.

The DRFP and Suggested Objectives:

Section 2.3.5 of the DRFP entitled "Watershed and Aquatics" lists 12 different Desired Conditions. While we can applaud the CGNF for the rosy scenario, we don't see the methodology of how these are to be achieved. Again, Desired Conditions are not necessarily the conditions as they are, but what we want them to be. So, with 12 Desired Conditions and one goal, there is much work to be done. The one goal states the following:

"The Forest Service cooperates with Montana Fish Wildlife and Parks and South Dakota Fish and Game to reintroduce genetically pure native fish species in their historic range or introduce in locations the state(s) and the Custer Gallatin agree to for native fish species conservation."

While GWA definitely supports this goal, there are more actions which could be and should be taken.

1. The CGNF should identify beaver habitat and implement a program to increase beaver population on the watershed. This should be done especially in those areas where beaver habitat exists today. Beaver would not only enhance the abundance of other wildlife species, but they would help mitigate some effects of climate change by keeping increased volumes of water within the respective drainages. It could help fisheries, birds and mammals such as moose, while help maintain or improve water quality and quantity. See section on Beaver above.
2. In other action, an inventory should be taken to identify those streams and watersheds where non-native species have prevented those native species of fish from inhabiting their previous watershed.
3. Stop exacerbating the effects of climate change. This can be done by preventing any unnecessary logging, timber thinning or forest management activities which can be counterproductive to the mitigation of climate change. The construction of roadways should cease and the decommissioning of roadways and overused trails should be undertaken.
4. GWA supports Alternative D along with the three Objectives listed on pages 23 and 24 of the DRFP, but we also support their enhancement.

Water and Climate Change in Montana:

Within the Executive Summary of the Montana Climate Assessment (MCA), there is this definition:

"The Montana Climate Assessment (MCA) is a product of the Montana University System's Montana Institute on Ecosystems, in collaboration with the Montana Climate Office, Montana Water Center, and MSU Extension. The MCA, the first in a series of assessments, focuses on climate trends and their consequences for three of Montana's vital sectors: water, forests, agriculture."

According to page 76 of the 2017 Montana Climate Assessment report, climate change will have a negative impact on the state's water supply (Cross, Wyatt F. et al., 2017) 163.

<http://montanaclimate.org/sites/default/files/thumbnails/image/2017-MCA-Water-Chapter-Ir.pdf>

Changes in temperature near the Earth's surface will have large effects on how water enters Montana (e.g., as rain or snow), how it is distributed among the major storage pools, and how it moves or changes from one component of the water cycle to another.

According to the Executive Summary of the same report:

1. Montana's snowpack has declined over the observational record (i.e., since the 1930s) in mountains west and east of the Continental Divide; this decline has been most pronounced since the 1980s. [high agreement, medium evidence]

1. Warming temperatures over the next century, especially during spring, are likely to reduce snowpack at mid and low elevations. [high agreement, robust evidence]
2. Historical observations show a shift toward earlier snowmelt and an earlier peak in spring runoff in the Mountain West (including Montana). Projections suggest that these patterns are very likely to continue into the future as temperatures increase. [high agreement, robust evidence]
3. Earlier onset of snowmelt and spring runoff will reduce late-summer water availability in snowmelt-dominated watersheds. [high agreement, robust evidence]
4. Groundwater demand will likely increase as elevated temperatures and changing seasonal availability of traditional surface-water sources (e.g., dry stock water ponds or inability of canal systems to deliver water in a timely manner) force water users to seek alternatives. [high agreement, medium evidence]

We must recognize that changes in our climate will have a huge impact on our forests, our wildlife and our watershed. The complexity of forest ecology is highlighted by changes in its climate. Water levels on creeks and rivers within CGNF will mean less volume for longer periods of time causing rising water temperatures potentially harming certain species of fish and wildlife. Since climate change is the driving force behind changes on the forest, climate change will also be the major driver of changes on the watershed.

Even the CGNF has conducted their own report on aquatic and riparian ecosystems. In the latest report entitled "Assessment Forest Plan Revision, Draft Aquatic and Riparian Ecosystems Report" dated November 29, 2016, it specifically states the projections expected on the forest (Barndt, Scott; Reid, Kim; Chaffin, Jake; 2016)¹⁶⁴:

"Climate has been warming for the Montane portion of the Custer Gallatin, and that trend is expected to continue in the future (Halofsky et al. 2016). In general, the Montane portions of the Custer Gallatin are projected to be a relatively cooler habitat island (Halofsky et al. 2016). Therefore, perennial stream reaches in higher elevation areas that have fully functioning habitats and groundwater entry will be most resilient to warming conditions and changing weather patterns. Conversely, lower elevation stream reaches with less than fully functioning habitats and losing flows to groundwater will be the least resilient reaches to changing conditions. However, changing precipitation patterns, along with warming temperatures are predicted for most of the Custer Gallatin, which may change flow regimes (timing, duration) and disturbance patterns (floods, drought, fire; Halofsky et al. 2016). Thus, it is likely that plant phenology, community structure, and successional patterns will be impacted, with possible changes to aquatic habitat structure as a result. The potential climate change impacts to vegetation are discussed in more detail in the Vegetation report."

1. Just how is the DRFP addressing the effects of climate change on the watershed, specifically in terms of water quantity and quality? The acknowledgement is there, but we don't see the plan.

How do we Condition the Watershed to fight Climate Change?

For some answers to this, we ask that the CGNF refer to the United States Dept. of Agriculture, Forest Service publication, General Technical Report PNW-GTR-812 of June 2010 (Furniss, Michael J. et al. 2010)¹⁶⁵. The report, "Water, Climate Change, and Forests: Watershed Stewardship for a Changing Climate", is a remarkable discussion of how to manage the forests in terms of the watershed in an era of climate change. This report lists several points of discussion, all of which won't be reproduced here especially in detail, but some answers to this question will be listed (page 51 of the report). It should also be noted that the reintroduction of beaver was also suggested, but not included here as it was just previously addressed:

1. Optimizing long-term water yield, water quality, and healthy aquatic and terrestrial ecosystems will best be accomplished by keeping watersheds forested and in good condition and using available supplies as efficiently as possible. Page 28.

2. To improve watershed resiliency will require a renewed commitment to collaboration. The Forest Service expects that its work will be conducted using an integrated, participatory approach. For example, interdisciplinary teams comprising people with skills in diverse disciplines (e.g., geology, soils, hydrology, fisheries, engineering, ecology, forestry) are used to design and implement projects. Page 42.
3. Minimize temperature increases by maintaining well-shaded riparian areas and limiting groundwater withdrawals.
4. Protect and restore riparian near-stream habitats and wetlands.
5. Disconnect road drainage from stream networks to restore natural patterns of flow. GWA suggest that this should be the case for trails as well.

These are just some, but not all suggestions. We believe the CGNF could utilize some of the ideas in this documentation.

1. GWA would like to include each of the above listed suggestions to be incorporated into Guidelines or Standards of Riparian Management Zones or Watershed or Aquatics. We would especially like to highlight element number 1 above: keeping watersheds forested. We cannot stress this enough.

How has Multiple Use Affected the Watershed?

One way to summarize or describe the beginnings of the USFS is to use the words of Doug MacCleery, Senior Policy Analyst for the Forest Management Staff in Washington D.C. He describes the management of the Forest Service from the turn of the 20th century to World War II as more of a "custodial in nature" approach (MacCleery, Doug, year unknown)¹⁶⁶. But since the 1950s, the demands and scope of the Forest Service had changed to that of meeting demands placed upon it by the country. MacCleery states this further in his paper, "Re-inventing the United States Forest Service: Evolution from Custodial Management, to Production Forestry, to Ecosystem Management":

"The increased demands on national forests led to an interest in legislatively expanding their authorized uses from watershed protection and timber production as elaborated in the 1897 Organic Act. The Multiple Use-Sustained Yield Act of 1960 (MUSYA), which was hailed by the Forest Service as a significant accomplishment, gave the agency permissive and discretionary authority to administer national forests 'for outdoor recreation, range, timber, watershed, and wildlife and fish purposes'."

The change in demand has also led to an increase in conflicts especially in terms of protecting the watershed. This will hopefully become evident as we discuss how some of these actions have negatively affected the water quality and quantity of the watershed.

We will begin with the research paper found online through the National Center for Biotechnology Information entitled "Impact of summer cattle grazing on the Sierra Nevada watershed: aquatic algae and bacteria" by (Derlet, RW, et al; 2012)¹⁶⁷:

<https://www.ncbi.nlm.nih.gov/pubmed/22505950>

As noted in the Introduction and Methods paragraph, it states the approach and purpose of the work:

"We evaluated periphytic algal and microbial communities to assess the influence of human and cattle impact on Sierra water quality.

64 sites (lakes and streams from Lake Tahoe to Sequoia National Park, California) were sampled for suspended indicator bacteria and algae following standardized procedures. The potential for nonpoint pollution was divided into three categories: cattle-grazing areas (C), recreation use areas (R), or remote wildlife areas (W)."

The conclusion stated on the website is simple:

"Higher periphytic algal biomass and uniform presence of periphyton-attached *E. coli* corresponded to watersheds exposed to summer cattle grazing. These differences suggest cattle grazing compromises water quality."

This study of 2012 was apparently a follow up study to a similar study performed in 2006 by the same lead author. That study presented here as "Coliform bacteria in Sierra Nevada wilderness lakes and streams: What is the impact of backpackers, pack animals and cattle?" states the premise of the report in its abstract (Derlet, RW; Carlson JR; 2006)168.

<https://www.ncbi.nlm.nih.gov/pubmed/16538940>

"Objective: The presence of coliform bacteria indicates a watershed risk for harboring microbes capable of causing human disease. We hypothesized that water from watersheds that have different human- or animal-use patterns would have differing risks for the presence of coliform bacteria. METHODS; Water was collected in wilderness areas of the Sierra Nevada range in California. A total of 60 sites from lakes or streams were selected to statistically differentiate the risk categories: 1) high use by backpackers, 2) high use by pack animals, 3) cattle- and sheep-grazing tracts, and 4) natural areas rarely visited by humans or domestic animals. Water was collected in sterile test tubes and Millipore coliform samplers during the summer of 2004. Water was analyzed at the university microbiology lab, where bacteria were harvested and then subjected to analysis by standardized techniques. Confirmation was performed with a Phoenix 100 bacteria analyzer. Statistical analysis to compare site categories was performed with Fisher exact test.

Results: Only 1 of 15 backpacker sites yielded coliforms. In contrast, 12 of 15 sites with heavy pack-animal traffic yielded coliforms. All 15 sites below the cattle-grazing areas grew coliforms. Differences between backpacker and cattle or pack-animal areas were significant ($P < \text{or} = .05$). Only 1 of the 15 wild sites rarely visited by humans grew coliforms. All coliforms were identified as *Escherichia coli*. All samples grew normal aquatic bacteria of the genera *Pseudomonas*, *Ralstonia*, and *Serratia* and nonpathogenic strains of *Yersinia*. No correlation could be made with temperature or elevation. Sites below cattle-grazing tracts and pack-animal usage areas tended to have more total bacteria.

Conclusions: Alpine wilderness water below cattle-grazing tracts or areas used by pack animals are at risk for containing coliform organisms. Areas exclusively used by backpackers were nearly free of coliforms."

This leads GWA to the question, what impact is grazing or other recreational activities having on water quality on the CGNF landscape? This thought will be expounded upon with the presentation of one more Science Journals found at the website Journal Storage. The science report, which is very timely and relevant to the topic at hand, "Impacts of Livestock Grazing, Mining, Recreation, Roads, and other Land Uses on Watershed Resources", describes quite well the intricacies and complexities of how man affects those resources around him (Brock, John H; Green, Douglas M, 2003)169:

"Land uses such as livestock grazing, mining, recreation, road development and housing directly impact watersheds by accelerating soil erosion, fragmenting habitats, changing plant cover, and contribute to decreases in air and water quality. Livestock grazing is the most extensive of these land uses. Assessing grazing impacts can be difficult because of faults in the collection of grazing data. However, sound watershed and riparian grazing management strategies have been developed. Environmental disturbance will vary among mining practices, and mining will alter the direct impact area of the mine site. With carefully planned ecological restoration mined lands can be returned to functioning watersheds and habitats. Human activities on watersheds such as recreation, road developments and building of residences can be dispersed, or concentrated. These activities can visually impact the watershed, accelerate soil erosion and contribute pollutants to air and water. The human actions are obvious, but a more insidious change on southwestern watersheds is resulting from bioinvasions. Most concern centers on invasive plants. The invaders can reduce biodiversity, change biogeochemical cycles and strongly influence historic fire frequency and intensity. Watersheds, when properly functioning, provide habitats with multiple niches, but poorly managed watersheds do not support species diversity nor do they provide quality natural resources."

Outside of the direct impacts on wildlife, there is most likely no more main focus by GWA on the impacts of recreation, grazing, roads and trails than what these actions have on the water quality and quantity on CGNF lands. These concerns bring up many questions; questions that don't seem to be answered by the DEIS or the DRFP. There is some hinting around the edges, but no clear Standards and Guidelines providing a direct approach. Some of our concern is and has been covered in the subject "Recreation". The impacts on our soil and vegetation stemming from an overused or abused recreational emphasis also has an impact on the watershed.

Without repeating what's already been said on recreation, let's simply say that GWA is concerned about the impacts of soil compaction, erosion, sedimentation in lakes and streams, etc. High-use trails, recreational emphasis areas, campgrounds, etc., seem to be located in close proximity to riparian areas or lakeside designated campgrounds. This is never more true than what is evident along the Hyalite Recreational Emphasis Area and the Fairy Lake area in the Bridger Range. Specifically, Fairy Lake is overused and heavily trampled as is evident of the soil compaction and vegetation loss due to human traffic. Not only does this detract from the beauty of the area, but one has to question the impact to the water resource especially in terms of sediment intrusion and bacteria.

Sections 2.3.5 and 2.3.6, components dealing with Watershed and Aquatics and Riparian Management Zones respectively, discuss the mitigation of sediment intrusion into the waterways. But in surprising fashion, GWA cannot find any DRFP reference made of sediment intrusion resulting from trails and high-use recreational areas to wetlands and riparian areas. And where there is sediment intrusion, there is also likelihood of nutrients and bacteria as the sediment provides a method of transport. It should be as no surprise then why riparian lengths of streams and rivers which have been degraded the most on the CGNF are the same ones with a higher degree of recreational and roadway impact.

Other than section 2.3.5, the Watershed and Aquatics component, there are no distinctions between the Alternatives. This seems to leave several issues unresolved, causing us to ask the following questions and make the following comments on watershed management:

1. What water quality analysis has been made on watersheds across CGNF lands, especially land where there could be impacts from livestock grazing, recreational emphasis areas, roadways and trails?
2. With actual examples of degradation evident along riparian areas and lakes, what improvements can we expect to see in the Hyalite Recreation Emphasis Area and Fairy Lake? How will soil compaction, erosion, vegetation loss be corrected or mitigated, be made whole?
3. Has there been any bacteria sampling done on the CGNF watershed?
4. To repeat No. 4 above, GWA supports Alternative D as opted in 2.3.5, Objectives of the DRFP, but there needs to be additions as suggested and stated in these comments.
5. There does not seem to be a concerted effort to redesign or redirect high-use trails and campgrounds away from riparian areas and wetlands. This would make a great objective for Alternative D.
6. Has there been any inventory done on trails (hiking, biking or horse guided) which are in most need of closure or repair from soil erosion, compaction or vegetation loss? Has there been an inventory of watersheds which indicate sediment intrusion into waterway drainages?
7. There should be routine monitoring of water resources for sediment, bacteria and nutrients.

Conclusions:

We first want to thank the CGNF and the U.S. Forest Service for giving the public the opportunity to comment on the DEIS and DRFP; the purpose of which is to provide direction concerning future management of public lands on the CGNF. It is critical that we get this right. The CGNF lands are and will face unprecedented pressure. We began this commentary with those same thoughts. Pressures from climate change, fire, disease, social demands, and uncontrolled growth and development are going to change the face of the forest in the next 20 years. We also began this commentary with the thoughts of E.O. Wilson. Since that time, we learned of a United Nations study that indicates that this planet is on the verge of having one million species of plants and animals becoming extinct in our lifetime. What will this planet look like if that were to come to fruition? What will the forest look like after that time? Will we recognize the CGNF? Is the goal to try and mitigate those changes to the best of the CGNF's ability, or is the goal to accept those changes as they come? It is not clear from this draft which direction the Forest Service is willing to take.

As far as the mechanics of the DRFP and DEIS, these documents are not the easiest to follow or comprehend. Several component topics seemed to be scattered throughout each document making it hard to fully understand CGNF's proposed policy. At times this led to what seemed to be conflicting policy statements. GWA acknowledges that this could be a hard "ask" to follow since many components are interrelated with several others, but perhaps better referencing would have helped the issue. Secondly, GWA believes that the lineup of alternatives seems like a divisive approach when we are trying to establish the best policy. It sets up a voting process, a process which pits one choice against another. We recognize that the alternative approach is setup by the 2012 Planning Rule and the Forest Service is mandated to follow this approach. But we are not sure it is the best method to determine the best solution to some of public lands more complicated issues.

On a contextual basis, our first impression in preparing these comments was that there seemed to be a disconnect between the DEIS and the DRFP. The science was definitely located within the DEIS with a few exceptions, but the DRFP did not match the reality. The DRFP appeared to be looking at the future with rose-colored glasses while the DEIS supported a much more robust set of alternatives in terms of protection than what exists. Alternative D was described as the alternative supporting an emphasis on natural processes. That

certainly seems to be true in most but not all cases. Alternative D definitely seems to stand alone in that regard and that alone concerns us.

With that being said, even Alternative D could have been improved in many areas. GWA

will support Alternative D, both in terms of wilderness and in terms of policy management and practices, but we still have severe reservations with some forestry practices. There needs to be a reconsideration and reanalysis of several components or issues besetting the forest. Some of those issues are listed here.

Species of Conservation Concern is one of those issues. GWA realizes the decision is in the hands of the Regional Forester, but there is something wrong in the way the 2012 Planning Rule was applied. There has to be when numbers and species are compared to the classification of "sensitive species" to that of today's SCC. To leave several species in limbo to face threats that man created himself is unforgivable.

Climate Change: We are also concerned with the lack of seriousness given to climate change. Climate change is scientifically proven to be one of the most driving forces upon the natural world in this century, yet it was barely given lip service in the DRFP. The forest will be affected by climate change in the years ahead and that needs to be considered in planning. The forest needs to be protected as much as possible from sources that would exacerbate these effects.

The over emphasis and appeasement on recreation. It was also evident that there was an attempt to secure favor of the biking community over preservation of the forest resources. Only one alternative emphasized the natural processes while the others either established the status quo or lessened the protection of inventoried roadless areas.

Continued practice of vegetative treatments: And finally, we are against Alternative D as with the other alternatives with the approach the Forest Service has taken on vegetative treatments. The continued reliance on old forestry practices such as thinning and manipulation of the forests are tired and have not proven to be successful. It is time to listen to the scientist on policies of carbon sequestration keeping in mind that trees have more value alive than cut.

There are other shortcomings we have with the DRFP including Alternative D, yet in spite of those shortcomings, this alternative has the best overall approach. But we strongly urge the CGNF to not blindly pick and choose one alternative over the other, but to choose the best practice and approach which favor wilderness, wildlife and one that emphasizes those natural processes overall. We thank the CGNF for listening to the environmental community and for including those policies in Alternative D, but it was also clear there was more participation by user groups and like-minded collaboratives which placed Alternative D as an extreme ideology.

GWA focuses its concerns on wildlife and wilderness, realizing it is really hard to maintain wildlife without wilderness being present. Only one alternative included the existing boundary of the HPBH WSA, a Congressional act which took place over 40 years ago. Intrusions into that wilderness by recreational users, roads, timber harvesting, etc., will have a devastating toll on connectivity, habitat and forest integrity.

GWA wants to be clear. We support the totality of the original HPBH WSA.

This is a must. The CGNF and the lands around the GYE represent the last large remaining intact ecosystem in the lower 48 states. We must say the majority of the alternatives do not reflect that fact. Wildlife connectivity was discussed throughout the DRFP, but there was no resolution of how to achieve that goal; another failing of the forest plan. The action should coincide with the science, not ignore it, but there are other shortcomings. We believe there is a purposeful lack of action concerning bighorn sheep, bison, wolverines, moose, etc. not intentionally but with the belief these issues are out of their control.

Finally, there is this. It is not GWA's intent to just sit back and complain about the work the CGNF has done. The comments and suggestions we made are done so with the intent of making this product more in tune with the ecological approach we feel the forest needs. In fact, we appreciate the work and effort the CGNF has committed to this task. We realize the manpower and time the CGNF has given to this task. But many of our comments are similar to those we submitted back in March of 2018 during the roll out of the Proposed Action-Revised Forest Plan. The issues haven't changed and the questions seem to have gone unanswered. We find this frustrating. In that regard we urge the CGNF to answer our comments and questions (in blue) that are found throughout these comments.

GWA wants to once again thank the CGNF and all their personnel for working with us and listening to our concerns. We will anxiously look forward to working with you in this ongoing process.

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