Virginia Kelly

Forest Plan Revision Team Leader

Custer Gallatin National Forest

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Re: Custer Gallatin National Forest Draft Revised Forest Plan and DEIS

Dear Virginia:

Thank you for the opportunity to comment and contribute to the Draft Revised Forest Plan and corresponding DEIS for the Custer Gallatin National Forest (CGNF). The Greater Yellowstone Coalition (GYC) is uniquely positioned to provide relevant and existing information about land, water, wildlife and trends across the Greater Yellowstone Ecosystem (GYE) and CGNF landscape.

Background

The Greater Yellowstone Coalition is a regional conservation organization based in Bozeman, MT with offices in Idaho and Wyoming and over 90,000 supporters from across the country. Our mission is to work with people to protect the lands, waters, and wildlife of the GYE, now and for future generations. Our members include residents living in communities across southwest Montana and visitors enjoying the GYE and CGNF from across the nation. GYC works with diverse stakeholders to ensure lands are managed to function in harmony with the natural world. This includes forest planning processes within the GYE that set management direction for the next 15-20 years.

We look forward to working with the Forest Service in the revision process to help inform, craft and update the forest plan. This is a once-in-a-generation opportunity to create a plan that manages the forest long into the future. We recognize the CGNF is responsible for managing many uses in a very diverse landscape. There are numerous pieces and parts to evaluate and make decisions about but we trust the Forest Service will thoughtfully and completely incorporate public comment to create a plan that will manage for a connected landscape and healthy core habitats, protect water resources and reduce and manage user conflict among local or visiting users of the forest's resources. The GYE is a place where people can experience the unparalleled wonders of one of the world's most vibrant ecosystems. There is no place on Earth like the GYE. The GYE is fire and ice. It is jagged mountain peaks and verdant valleys. It is acres of lush forests bathing mountainsides in vivid greens and stark sagebrush plains stretching to the horizon. It is the hissing and spewing of geysers and the serenity of meadows carpeted in wildflowers. The CGNF is an important and integral part of the GYE. The CGNF is the doorstep for connectivity to other northern Rocky ecosystems to the north and west. This area is key to connecting some of Greater Yellowstone's most iconic wildlife, such as the grizzly bear and wolverine,

with other large protected areas. It is our responsibility to be good stewards of one of the last intact temperate zone ecosystems in the world.

The framework of this GYC comment letter is grounded in our program work and areas of expertise—land, water, wildlife, and people. For the purposes of GYC's comment letter, we provide information and resources based on the Forest Service's areas of interest outlined in the 2012 Planning Rule, Current Conditions, and our previous Assessment comment letter. We also consider current policy regarding land, water, and wildlife as well as system drivers and stressors. We are mindful of your time and resources in this process and trust we can help provide information to develop a balanced approach to forest management.

General Observations of Draft Plan

The Forest Service is facing several new challenges in drafting this revised forest plan, including rising recreational demand and climate change, along with the historic challenges that come with diverse stakeholder interests, varied landscapes, and limited resources. Crafting an effective forest plan will certainly require creative solutions and adaptive management. In general, we see great potential in many of the ideas represented in the DEIS, such as the approach to manage for ecosystem resilience while acknowledging and attempting to work with natural landscape-shaping forces.

The central issue with the draft plan as currently written is that many of these ideas are not substantiated with enforceable and actionable plan components. Desired conditions are often general, unmeasurable, and at times even lofty, while standards and objectives provide insufficient means to build progress toward those conditions. Management approaches contribute by providing potential strategies, but they are simply suggestions and therefore inherently unenforceable and unreliable.

We recognize the need for the new forest plan to be adaptable and flexible. However, there is a balance to be struck, and the draft plan errs too far on the side of flexibility without providing the specific management direction needed to reliably and predictably manage forest resources throughout the life of the plan. In particular, the monitoring questions provided in chapter four are extremely limited in scope and will not provide enough information to inform adaptive management strategies. Again, we acknowledge the limited resources provided to the Forest Service and the challenges that come with monitoring. However, improved and expanded monitoring components are absolutely necessary to understand and respond to changing threats on the landscape. The 2012 Planning Rule explicitly calls for adaptive management based on good information, and extensive monitoring must be at the heart of these decisions. Anything short of this will fail to reflect the true status and needs of forest resources.

Another central issue with the draft plan is a lack of connection between human impacts and forest resources. Consideration of human-wildlife conflict is almost entirely absent, as is a proactive approach to understanding and managing the potential impacts of recreation on wildlife, vegetation, connectivity, and more. These issues of human impacts have been the center of public discussion in the communities where we work, yet the draft plan provides little clarity on how the Forest Service will manage them in the coming decades. Many of the benefits provided by the forest, such as healthy wildlife populations and wild spaces, are rare and irreplaceable in the American landscape. Without substantial

improvements to the draft plan and a more proactive management approach, we can only expect these resources to continually dwindle under the mounting pressures that come with a growing population.

In the following comments we address the main issues we see with the draft plan as it applies to the GYE. Each section contains a general observation piece followed by specific recommendations. We ask that the Forest Service meaningfully consider our suggestions, and recognize that our recommendations represent the knowledge of a variety of experts as well as a multitude of our constituents and partners.

Recommendations:

Link desired conditions to enforceable, measurable goals, objectives, and standards.

Improve monitoring questions and indicators to provide a clearer picture of the status of important species and ecological components, progress toward desired conditions, and to inform adaptive management as required by the 2012 planning rule.

Include additional plan components that will meaningfully address human impacts on forest resources and provide clarity on how these impacts will be proactively managed.

Collaboration – Gallatin Forest Partnership

From the Gallatin Community Collaborative (GCC) to the Gallatin Forest Partnership (GFP), the Greater Yellowstone Coalition has been a long-time participant in collaborative efforts to find agreement around the Gallatin and Madison ranges. The Forest Service is well aware of the conflict around these areas, especially the Hyalite Porcupine Buffalo Horn Wilderness Study Area (HPBH WSA), as well as our commitment to finding solutions. GYC and the other diverse stakeholders within the GFP found agreement around several areas including wildlife, water, recreation, land designations, invasive weeds, outfitting and guiding, and wildland-prescribed fire and timber. We thank the Forest Service for considering aspects of the agreement in Alternative C of the draft plan.

However, while Alternative C contains portions of the GFP agreement, it does not fully and accurately represent the entirety of the GFP's proposal. Overall, Alternative C included the correct land designation boundaries but fell short in several areas. Most notably, plan components to balance recreation and wildlife conservation are lacking in all designated areas.

The specifics of the GFP's agreement are crucial for it to protect the landscape as intended. The Partnership's public comments on the draft plan and DEIS go into full detail on which points Alternative C accurately represented, and what needs to be corrected. GYC fully endorses these comments.

Recommendations:

Fully incorporate the Gallatin Forest Partnership Agreement into the final Forest Plan by including the changes detailed in the Partnership's public comments.

Environmental Justice (General Contributions to Society)

The introduction within the DEIS does a great job describing the different aspects of how the forest benefits people. Generally, GYC agrees with this overview. Within the Draft Plan, the Forest Service defines social sustainability, economic sustainability and environmental justice. The Forest Service's job is to strike the balance among all three of these areas with equal consideration among them. However, based on the monitoring section we see that this balance has not quite been struck.

Desired Condition 02 states "Sustainable levels of forest provided goods and services (such as, wilderness, fish and wildlife, livestock grazing, recreation opportunities and access, timber, energy resources, infrastructure, etc.) are available and contribute to the social, cultural, and economic sustainability of local communities. The flow of these goods and services align with existing and emerging industries, growing and vulnerable populations, and overall economic conditions of forest communities." This is an aspirational and lofty Desired Condition. Partnerships will be necessary which is addressed in Goal 01 "The Forest Service engages with local agencies, partner organizations and the public in ecosystem goods and services related planning, *particularly in environmental justice communities where residents are more vulnerable to shifts in social and economic conditions."* Unfortunately, the monitoring section only addresses Desired Condition 02, nothing exists to address or evaluate or understand environmental justice issues. Further, within the environmental justice definition, the tribal communities were identified with special emphasis. Based on the importance of tribal communities and the emphasis on environmental justice, the Forest Service should include specific environmental justice Desired Conditions and Goals that are developed with tribes to ensure true collaboration to do better in the area of environmental justice.

Recommendations:

Forest Service should include specific environmental justice Desired Conditions and Goals that are developed with tribes to ensure true collaboration to do better in the area of environmental justice.

Areas of Tribal Importance

GYC acknowledges and respects tribal communities within and around the Greater Yellowstone Ecosystem in the past, today and into the future. Native Americans are the historic stewards of the lands, including the CGNF, and their cultures are entwined at their core with the forest and surrounding lands. The CGNF, a land management agency, is responsible for many of these sacred places and resources, the National Forest's role is paramount and directly affects the health of indigenous communities. Historic migration routes, wildlife populations, traditionally-utilized plants and minerals, and sacred sites are just a few examples of resources managed by the Forest Service that affect tribes. This adds a layer of significance to forest management beyond the ecological, economic, and recreational focuses that are often emphasized. We are glad to see many of these specific concerns discussed in the DEIS section on Areas of Tribal Importance, Methodology and Analysis Process, and support the idea that resource management is essential to supporting treaty rights to "hunt, fish, graze, and gather on the lands ceded to the United States," as stated on page 539. However, we feel the draft

plan does not include adequate plan components in the Areas of Tribal Importance section to support the desired conditions and goals.

Meaningful consultation is one of the key issues we see with the draft plan in regard to tribal considerations. Improved, continual consultation is essential for a diversity of goals, including but not limited to:

- Work with Tribes to identify culturally significant sites and resources including native plant and wildlife species.
- Effectively manage sites and resources already identified including the setting of closure dates.
- Preventing disturbance of cultural practices and traditions by recreationists.
- Review and update outdated ethnographic information.
- Work with Tribes to meaningful incorporate Traditional Ecological Knowledge (TEK) to help manage the landscape and adapt to the uncertainty of climate change.

While consultation is discussed in the DEIS and mentioned in Management Approaches, no plan components commit the Forest Service to improved consultation efforts. Frequent, early consultation prior to any relevant decision-making is critical for equitable inclusion of Tribal interests, and as such it merits enforceable, binding plan components. We also want to emphasize that these consultation systems be developed in collaboration with the 18 individual tribes listed in the DEIS to ensure government-government protocols address the unique priorities of each. For example, improved notification systems are an important precursor to meaningful consultation, and adequate methods can only be identified in collaboration with individual Tribal entities. Consultation with Tribal Colleges represents one possible avenue for improved outreach. Forest Service staff involved in this process should also receive training with information on existing relationships and concerns of individual Tribes. We feel that this approach will yield the most effective management of resources as well as the most respect and acknowledgement for the Greater Yellowstone Ecosystem's historic custodians.

In addition, although Tribal treaties are government to government responsibilities rather than US federal laws, we feel that listing them separately from the regulatory framework could lead to confusion about their enforcement compared with that of other regulations. Treaty enforcement is especially critical given historic instances where off-reservation treaty rights have been ignored or infringed upon by US economic and cultural interests. We therefore ask that the Forest Service include relevant treaties within the regulatory framework, either by listing them there or by adding an entry that references a table elsewhere in the document or appendix. We would also like to see clarifying language in the DEIS explaining how treaties fit into the overall regulatory landscape.

<u>Recommendations</u>:

Include a new monitoring plan component that directly addresses environmental justice issues with tribal communities in a meaningful way.

Include an objective calling for collaboration with individual tribes to develop improved notification and consultation systems that address the priorities of each. Include a timeline and collaborate on the matters listed above, as well as others identified through conversations with tribal entities including Tribal Colleges.

Include a monitoring question for occurrences of consultations with tribes.

Include plan components calling for public education materials crafted from an indigenous lens. Education materials should work to address the disturbance of cultural practices and use of culturally significant sites by recreational users in the National Forest.

Specify what is meant in FW-STD-TRIBAL-01 by "subject to valid existing or statutory rights and other ongoing or permitted activities". The existing language is vague and highly permissive, effectively rendering this standard pointless.

Include a list of relevant treaties in the Regulatory Framework for Areas of Tribal Importance or include a reference there to a treaty list elsewhere in the document.

Clarify in the DEIS how treaties fit into the overall regulatory landscape.

Recreation

GYC acknowledges that, while Congress presses the Forest Service to focus management on timber production and fuel control, recreation is perhaps the greatest driving factor for the Custer Gallatin. The Forest Service is well aware of rising recreational demand on National Forest lands. Over time, this increase in human presence on the landscape can lead to increased spread/introduction of invasive species (DEIS Effects from Recreation management p. 304), increased disturbance of wildlife (DEIS Key Stressors p. 415 (sage grouse), p. 432 (bighorn sheep), p. 448 (big game), p. 461 (bison), p. 486 (connectivity), Larson et al. (2016)), destruction of native vegetation (DEIS Effects from Recreation Management p. 238 (terrestrial veg), p. 133 (at risk plants)), and other harm to forest resources (see appendix H for a full GYC review of recreation impacts). But while Desired Condition FW-DC-REC-03 calls for recreational opportunities that are "adaptable to changing trends... and increasing demands," the draft plan does not elaborate on what this will look like or how it would be accomplished. Meeting this desired condition will require 1) monitoring recreational use; 2) understanding how trends and demand are changing over time; and 3) ongoing monitoring and management to ensure that recreation does not degrade land, water, or wildlife resources that make recreation attractive in the first place. Sustainable Recreation Management Approaches further substantiates these needs by calling for "Management strategies to mitigate recreation use and resource conflicts" (Draft Plan Appendices, p. 43) as well as "determinations about how increasing human populations and associated levels and types of use are affecting the national forest" (Draft Plan Appendices, p. 44). These approaches, while important, are vague and unenforceable. The Forest Plan itself must include adequate plan components to ensure that recreational impacts on resources are understood and managed.

This question of recreation impacts, especially on wildlife movement, has been at the center of public debate in the Bozeman community, as well as other surrounding areas. However, the Forest Service does not address the impacts of recreation on wildlife, except in MON-WL-03, which only assesses the number of conflicts resulting from food attractants. The lack of acknowledgement regarding recreational use and increasing pressure within the Draft Forest Plan and monitoring section is a significant issue in the National Forest. If trends are to continue, this will be the challenge for the CGNF to address and is only going to become more so over time. Further, GYC is including comments on winter recreation impacts in wolverine habitat, big game winter range closures, as well as user impacts to waters and

potential spread of invasive species. We ask the Forest Service to add language around mitigating recreation impacts and add an additional desired condition to this effect.

Managing recreation impacts will require more monitoring than is currently proposed. While we acknowledge the challenges and significant resource demand that come with monitoring, we support the Forest Service and urge them to explore partnerships, collaboration, and other strategies to adequately monitor, understand, and manage recreation. These efforts are only going to become more important as recreational demand increase, and this collaborative approach should be represented by additional Goals in General Recreation.

Managing recreation as demand changes will also require identifying and managing emerging recreation technologies. While the draft plan section on Emerging Recreational Technologies (RECTECH) acknowledges the likelihood of new recreation technology and the need to incorporate these technologies into the recreational spectrum, it does not provide guidance on how to do this. The draft plan must include standards that require timely assessment of any new technology and its compatibility with the Recreational Opportunity Spectrum. It must also explain how these technologies will be identified. Regarding electronically powered technologies like e-bikes and drones, these forms of recreation should be explicitly categorized as motorized uses in both the RECTECH and ROS sections.

Recommendations:

Include an additional monitoring question to track amounts and types of recreation by area as well as levels of nonconforming use incursions to understand recreational demand beyond the forest-wide National Visitor Use Monitoring (NVUM).

Include an additional Desired Condition that the Forest Service understands recreational demand across the landscape and tracks its changes over time.

Include additional monitoring questions to assess how recreation and rising demand are affecting wildlife, land, water, and other natural resources by tracking which recreational uses are creating conflicts, whether these conflicts are fragmenting habitat, and what types of conflicts are occurring. This connects to FW-DC-REC-03 and 05.

Include a Desired Condition that rising recreation levels and demand are managed to avoid impacting wildlife, natural resources, or visitor experience (see appendix H for GYC's literature review on recreation impacts).

Include guidelines or goals for "leave no trace" and bear safety education for organizational camps.

Develop guidelines around mitigating human/wildlife conflict or human impacts on sensitive wildlife habitats for any new recreational opportunities.

Include a goal or objective for education around minimal impact practices for dispersed recreation and safety in bear country.

Include a goal for collaboration and partnerships with various federal, state, and private entities to monitor and understand recreation demand so that it is managed effectively.

Include a standard in Emerging Recreational Technologies (RECTECH) that new recreation technology is evaluated for its compatibility with the setting defined in the Recreation Opportunity Spectrum.

Include a goal in Emerging Recreational Technologies (RECTECH) to collaborate with community interests to identify emerging technologies so that they can be evaluated.

Explicitly categorize drones and e-bikes as motorized recreation in both the RECTECH and ROS sections.

Include a Goal to collaborate with user groups to identify non-system trails suitable for system inclusion during travel planning, and non-system trails to be restored/removed.

Expand FW STD ROSP 1 to prevent the construction of new temporary or permanent motorized *or mechanized* routes in primitive settings. This connects to FW-SUIT-ROSP-01.

Expand FW-SUIT-ROSP-03 to prevent mechanized trails and travel in winter primitive settings. This connects to FW-SUIT-ROSP-01.

Remove the suggestion in Opportunities – Recreational Special Uses Management Approaches to create an open season to resolve capacity to facilitate permits.

Recreation Emphasis Areas

The Recreation Specialist report (Oswald, 2017) discusses increased visitation on the Forest and indicates existing and anticipated changes in activity participation on public lands in Montana. The Custer Gallatin experiences high visitation, the vast majority of which is in the Montane Ecosystem and a large percentage within some type of designated area. A wide range of available opportunities, settings, and development levels are both desired and used by the recreating public. National Recreation, Historic and Scenic Trails, and the Beartooth Scenic Byway are a few examples of areas in addition to wilderness that highlight the unique role of recreation on the Forest. Emphasizing these areas and others for the purpose of sustainable recreation is critical toward long-term persistence of forest resources and high-quality recreation opportunities, especially in the face of rising recreational demand.

Within the Draft Revised Forest Plan, twelve Recreation Emphasis Areas are listed in Table 30 on page 133. In addition to the areas called for in Alternative C, there are several other areas GYC suggests including, which are listed below.

- The West Fork of Rock Creek on the Eastern side of the Absaroka Beartooth Geographic Area, as called for in Alternative E. This area sees intense recreational demand from Billings and Red Lodge.
- Mill Creek on the Western side of the Absaroka Beartooth Geographic Area, up to the designated wilderness boundary. This area sees year-round recreational demand from Livingston, Bozeman and Gardiner and is likely to see an increase in visitor use as the recreational demand continues to grow.

Regarding regulations within Recreational Emphasis Areas, there are several points that should be added both for the health of resources and the experience of users. First, the Forest Service did not include any language around defining standards or thresholds for recreational use beyond which management action would be taken to ensure resources aren't degraded or compromised in recreation

emphasis areas. GYC considers this an important point based on the information described in the Recreation and Designation Specialist reports for the Assessment. In both reports, the specialists clearly state that use is only going to increase. Second, the Recreational Emphasis Areas should disallow the extraction of saleable minerals, as called for in Alternative C for Hyalite Recreational Emphasis Area.

Recommendations:

Designate West Fork of Rock Creek Red Lodge Mountain Recreational Emphasis Area, as called for in Alternative E.

Designate Mill Creek (Main Fork, East Fork & West Fork) as a Recreational Emphasis Area up to the existing boundary with designated wilderness.

Include plan components that define standards or thresholds for recreational use beyond which management action for mitigating resource degradation or adverse impacts on wildlife would be taken in these areas.

Disallow the extraction of saleable minerals in Recreational Emphasis Areas, as called for in Alternative C for Hyalite Recreational Emphasis Area.

Use the Recreation Emphasis areas to monitor, collect data and make informed decisions about recreation use, intensity of use, conflicts and effectiveness of education.

Vegetation / Ecosystem Integrity

GYC takes an ecosystem/landscape level approach to protect terrestrial and riparian habitat, climate refugia and corridors, and iconic species. Because this is a new approach for federal land managers and GYC has been thinking about this for many years, we have suggestions for the Forest Service to consider.

The specificity of ecosystem components listed in the monitoring table (MON-VEGF-01) is encouraging, and we would like to see pollinators added to this list, given their global decline as mentioned in the DEIS, page 167. We are also pleased to see an emphasis in the DEIS on ecosystem integrity and resilience. One method the Forest Service proposes to create and maintain ecosystem integrity and resilience is “managing for landscape patterns that would be resilient to uncharacteristically large disturbance events” (DEIS p. 234). This would involve using vegetation management and natural processes to restore a patchwork landscape with a diversity of tree species and age classes contributing to habitat heterogeneity and, ultimately, resiliency. GYC supports this habitat-based approach. However, we have concerns about the Forest Service’s emphasize on Silvicultural treatments in mature lodgepole pine stands, as explained on DEIS pages 233 and 234. By excluding lodgepoles from old growth retention standards (FVEG-GDL-01) and increasing clear-cut size limits, there may be unanticipated consequences for other forest resources. The Forest Service should therefore conduct a rigorous analysis on this tactic and its potential to impact wildlife habitat/connectivity, sensitive plant species, pollinators, and other organisms and ecological processes.

The Forest Service notes that challenges have increased in recent decades as a result of factors such as increased public use, climate warming, invasive species, insects, disease, and past management decisions related to fire suppression, grazing, and other land uses. We appreciate this acknowledgement of the shifting management landscape and support the Forest Service in their efforts to rise to these new threats. The challenges posed by climate change are particularly daunting due to the inherent uncertainty. Climate change has the potential to exacerbate the spread of invasive species, magnify the negative impacts of native pests like pine bark beetles, increase fire severity, etc. (Climate Change Consideration and Assumptions p. 147 of DEIS and p. 41 Guidelines (FW-GDL-VEGF) 01 Draft Plan).

The Forest Service draws from Miller et al. (2007) to answer this threat, stating that their approach must be "flexible, emphasize ecological processes; and have the capacity to change, and to adapt, to new information as it becomes available (Millar et al. 2007)" (DEIS p. 151). Hansen et al. (2018) further emphasizes this strategy, and emphasizes that "Well-designed monitoring of climate, vegetation, and ecological conditions" (DEIS p. 152). This underscores the need for effective monitoring and adaptive management to respond to climate change, as required by the 2012 Planning Rule (219.12(a)(5)(vi)). We understand and acknowledge the substantial resources required to implement effective large-scale monitoring efforts. However, we also believe that innovative monitoring is paramount to effective, long-term forest management, particularly given the uncertainties of climate change. The DEIS states that the Draft Revised Forest Plan "incorporates strategies to address the uncertainties associated with climate change and its potential impacts to vegetation" (p. 150), but we do not see this substantiated by specific, enforceable plan components.

This effort is especially critical given the likelihood of climate change altering landscape-shaping forces like fire and pests. Management Approaches for Terrestrial Vegetation emphasizes the potential of natural fire, insects, and disease to do the work of direct management (Draft Plan Appendix A p. 9), demonstrating their potential to impact vegetation. We see the benefits of this approach and acknowledge the inevitable impact of these forces, but we also understand their destructive potential. Desired Conditions FW-DC-VEGF-06 and 09 assert the importance of natural ranges for these forces, underscoring the risks should these ranges be exceeded. Because climate change has the potential to do exactly that, an additional monitoring question is essential to understand the true effects of shifting fire, insect, disease, and water regimes, and to ultimately avoid harming human and forest resources.

We therefore encourage the Forest Service to commit to collaboration, monitoring, and experimentation to address the uncertainties associated with climate change and its potential impacts to vegetation and ecosystem integrity. While natural range of variation can be a useful management guide, the uncertainty of climate change necessitates large-scale monitoring of diverse environmental metrics to ensure that historic and desired ranges are indeed effective in supporting ecosystem integrity. If the Forest Service cannot address these types of research questions, we encourage them to partner with researchers and institutions that can play this role. Rather than simply creating "more work", we ask that these collaborative efforts be planned in partnership with the participating agencies in order to accurately identify the most effective role for Forest Service employees to play. This kind of rigorous monitoring, experimentation, research, and collaboration is strongly supported by findings within the DEIS (first bullet p. 153) as well as the conclusions of Hansen et al. (2018). Simply monitoring tree regeneration (DEIS p 152) is inadequate for understanding and adapting to this complex, multifaceted challenge.

Objectives for Forested Vegetation and At-Risk Plant Species also include management projects to benefit the given resource and various other ecosystem components. GYC is entirely supportive of these ecosystem resistance objectives as they are called for in Alternative D, and we would like to see how the Forest Service will prioritize projects. We also see potential for these management projects to inform adaptive management efforts. For this reason, we propose that all management projects for Forested Vegetation and At-Risk Plant Species are followed by monitoring to determine their effectiveness toward achieving their stated goals. The Outcome Objectives for Invasive Species monitoring question MON-INV-02 provide example language that we would like to see replicated in these other sections. We would also like to see a protocol detailing how the results of this monitoring will inform following projects and other forest management decisions through adaptive management.

Carbon sequestration was highlighted as an important ecosystem service provided by the forest. The balance and importance of the forest's ability to act as a sink and store carbon is a key service for the communities beyond the forest boundaries. Because forest carbon loss contributes to increasing climate risk and climate change may impede regeneration following disturbance, avoiding deforestation, and promoting regeneration after disturbance should receive high priority (McKinley et al. 2011). Depending on how timber is managed, it could contribute to the long-term capacity of forests to sequester carbon. For example, the DEIS points out that thinning in young forests is a beneficial treatment to achieve forest conditions that improve resistance and resilience and to achieve climate change mitigation though carbon sequestration. There are other management strategies discussed in the DEIS that look at short-term and long-term impacts. However, the CGNF doesn't include plan direction beyond one desired condition and no monitoring to determine if the strategies mentioned in the DEIS will be used as a mitigation measure for climate change and carbon sequestration. GYC would like to see management direction in the Draft Forest Plan beyond one desired condition and monitoring question(s) included within the vegetation section or soils. An example of a monitoring question based on the DEIS could be: Are short-term loss of carbon stores with prescribed burning or other fuel treatments providing long-term benefits in the event of a future wildfire, with lower fire severity in the treated stands? This will not be a heavy lift because the DEIS on page 281 outlines specific management strategies that would contribute to carbon sequestration (Harmon and Marks 2002, Kobziar et al. 2006, Krankina and Harmon 2006, Millar et al. 2007):

- managing forests to favor rapid growth
- increasing abundance and distribution of large diameter trees of fire-resistant species
- lowering forest densities and forest fuel conditions
- rapid reforestation after disturbances
- maintaining healthy, vigorous trees
- keeping sites fully occupied with trees
- sequestering carbon after harvest in wood products
- providing wood and biomass for fuel

These strategies seem to be absent from the vegetation, soil and carbon sequestration sections. There also needs to be monitoring attached to these management directions once they are incorporated into the Forest Plan. The theme of managing to maintain and increase forest resilience and resistance is

great and the planning components and monitoring need to lead to an adaptative management strategy that gets the Forest Service to that goal. On page 281 in the DEIS the CGNF states "The desired conditions are designed to sustain and create forests with the composition and structure that are able to accommodate gradual changes related to climate and with the capacity to return toward a prior condition after disturbances." Again, this sounds great but GYC would like to see plan components that specifically acknowledge carbon sequestration as part of the equation when monitoring soil and vegetation.

Recommendations:

Include a Goal that federal, state, and private agencies in the Greater Yellowstone Ecosystem coordinate monitoring efforts to better understand climate, vegetation, and ecological conditions in the context of environmental change. This is supported by the findings of Hansen et al. (2018) (second bullet, p. 152). Include the Greater Yellowstone Coordinating Committee's subcommittee on climate change.

Include a Goal to partner with researchers and research institutions to address the uncertainties of climate change and to verify which desired conditions will actually lead to ecosystem resilience in a climate change scenario.

Include an Objective calling for monitoring and experimentation to address the uncertainties associated with climate change and its potential impacts to vegetation and ecosystem integrity. Pair this with an additional monitoring question to assess how climate change is affecting vegetation and ecosystem integrity through factors like fire, insects, disease, precipitation, temperature and more. This relates to the findings of Hansen et al. 2018.

Include a plan component that the results of climate change monitoring inform adaptive management of forest resources.

Identify carbon sequestration areas to use as mitigation measures for GHG emissions.

Conduct a programmatic review to assess the agencies efforts to adopt broad-scale sustainable practices for energy efficiency, GHG emissions avoidance and emissions reduction measures, petroleum product use reduction, and renewable energy use, as well as other sustainability practices.

Complete management projects for forested vegetation and at-risk plant species at the rates and amounts called for in Alternative D. Relates to FW-OBJ-VEGF-01, FW-OBJ-VEGF-02, and FW-OBJ-PRISK-01.

Monitor outcome indicators for forested vegetation management projects to assess their benefits to wildlife, whitebark pine and other at-risk species habitat, pollinator habitat, non-commercial vegetation, and general terrestrial ecosystem conditions. Relates to FW-OBJ-VEGF-01 and 02.

Monitor outcome indicators for at-risk plant species conservation projects to assess their benefits to species' habitat and/or populations. Relates to FW-OBJ-PRISK-01.

Provide the methodology used to prioritize management projects on the landscape.

Assess how pollinators are contributing to ecological integrity by including an additional outcome indicator within MON-VEGF-01 for pollinator species/assemblages associated with forested vegetation.

Connect monitoring MON-VEGF-01 so that the vegetation conditions are tied to the habitat needs for connectivity and wildlife movement.

Include an additional standard requiring surveys for populations of or suitable habitat for at-risk plant species prior to any ground disturbing activities.

Include an additional monitoring question to track status and long-term viability of known populations of at-risk plants. Prioritize monitoring for populations most threatened by invasive encroachment, habitat loss, proximity to high-use areas/trails, etc.

Add additional language to FW-OBJ-PRISK-01 explicitly necessitating the use of the mitigation or protection measures provided to maintain the populations or sustain habitats of at-risk plants when potentially impacted by management activities.

Include an additional desired condition and supporting plan components and/or monitoring questions to keep native pests and diseases as well as their ecological impacts within historic ranges.

In order to adequately protect old-growth forest, replace FW-GDL-VEGF-01 and GW-GDL-VEGF-02 with the standard used in the Flathead National Forest Plan:

> "In old-growth forest, vegetation management activities must not modify the characteristics of the stand to the extent that stand density (basal area) and trees per acre above a specific size and age class are reduced to below the minimum criteria in Green et al. Vegetation management within old-growth forest (see glossary) shall be limited to actions that:
>
> - Maintain or promote old-growth forest characteristics and ecosystem processes
> - Increase resistance and resilience of old-growth forest to disturbances or stressors that may have negative impacts on old-growth characteristics (such as severe drought, high-severity fire, epidemic bark beetle infestations);
> - Reduce fuel hazards in the wildland-urban interface; or
> - Address human safety."

Prioritize invasive species monitoring and mitigation actions for areas affected by burns and other ground-disturbing activities via an additional goal, standard, or guideline.

Develop additional plan components specific to each Potential Vegetation Type for both forested and non-forested vegetation that support their Desired Conditions. Relates to FW-DC-VEGF-03 through 10 and tables 6 through 13 (forested) as well as FW-DC-VEGNF-04 and table 14.

Conduct a rigorous analysis of possible impacts from excluding lodgepole pine from old growth retention standards and increasing clear cut sizes. Assess unintended consequences for ecosystems, wildlife, vegetation, invasive species encroachment, at-risk plant species, recreation quality, and more with consideration of compounding impacts from climate change.

Include the following mitigation measures to reduce greenhouse gases: maintain healthy, vigorous trees; manipulate vegetation to favor rapid growth; keep sites fully occupied with trees with minimal spatial or temporal gaps in non-forest conditions; promote reforestation; minimize severe disturbance by fire, insects and disease; and sequester carbon after harvest in wood products *(Harmon and Marks 2002, Kobziar et al. 2006, Krankina and Harmon 2006)*.

Through monitoring efforts implement adaptive management practices for carbon sequestration.

Connect the Carbon Sequestration Desired Condition to vegetation, soil and riparian area in monitoring outcome indicators in MON-VEGF-01, MON-SOIL-01 outcome indictors within the Detrimental Soil Disturbance and MON-WTR-01 outcome indicators under Stream and habitat conditions.

Provide a map identifying carbon stores, baseline carbon pool estimates and carbon sequestration area/opportunities based on management actions and natural disturbances.

Management of Current Wilderness Areas

The Custer Gallatin National Forest's two existing Wilderness areas—the Lee Metcalf and Absaroka Beartooth Wilderness—provide important core habitat for Greater Yellowstone's wildlife as well as high quality wilderness experiences for backcountry enthusiasts seeking remote adventure and solitude. But while the Draft Plan mentions five general qualities (natural, solitude, undeveloped, untrampled, primitive recreation) to guide wilderness stewardship, it does not mention the "2020 Vision" (2020 Vision: Interagency Stewardship Priorities for America's National Wilderness Preservation System. 2014) or existing wilderness management plans to guide these efforts and achieve stated Desired Conditions. GYC acknowledges that the existing wilderness management plans are old (developed in the mid-1980s) and wilderness management direction has been embedded in several different Custer Gallatin level plans (eg: Gallatin Travel Plan, Fire Plan and Weeds). However, while we recognize the need for the new Forest Plan to be adaptive and flexible for the future, the management of existing wilderness requires more specific and prescriptive management in order to ensure the long-term persistence of these special and irreplaceable resources.

The 2020 Vision has this level of specificity, and plan components should link to it explicitly in a clear, measurable way. Overarching wilderness management plans are also still necessary to provide the clear, measurable standards needed to track changes in wilderness character, and the Draft Plan should commit the Forest Service to revising them within the next two years. Regarding the various wilderness zones, the Draft Plan should include Objectives, Standards, and/or Guidelines specific to each zone to support stated Desired Conditions. In particular, Zone 1 (Pristine) should have an additional plan component that disallows any system trails as well as language that restricts management actions that may impact its untrampled nature.

As we consider impacts to existing wilderness, it is clear that these areas face mounting threats from increasing recreational demand. The DEIS lists examples of these effects, including crowding in high use areas, soil compaction or erosion, and threats to native plant species from the spread of noxious weeds from sources outside the wilderness (p. 735). However, the DEIS also states that "the effects of urbanization and population growth on wilderness use and resource conditions are likely to be gradual" (p. 736), yet table 148 shows a doubling in wilderness visitation over five years. This is conflicting information. The Forest Service needs to provide clarity as to how they will manage changing recreational conditions in wilderness areas.

<u>Recommendations</u>:

Use the 2020 Vision to build measurable and achievable Objectives and Goals for management in wilderness. Specifically, “conduct climate vulnerability and adaptation assessments across the National Wilderness Preservation System to improve ecological resiliency across broad landscapes (2020 Vision, Introduction).”

Include an additional Goal or Objective with a timeline for revising overarching wilderness management plans.

Provide additional language that emphasizes the need to manage increased recreational demand and elaborate on how this will be accomplished.

Incorporate Objectives, Standards, and/or Guidelines to support the Desired Conditions for each zone and opportunity class in each wilderness. This will help the public understand what to expect in terms of management for these valued wilderness areas.

Include an additional plan component that states that there shall be no system trails within wilderness Zone 1.

Provide additional language to ensure that any management actions within Zone 1 preserves the wild, untrampled nature of the area, and that indirect management methods predominate.

Recommended Wilderness Areas

GYC asks that you do not allow non-conforming uses such as motorized and mechanized activities in Recommended Wilderness Areas (RWA), as called for in Alternative C. Recommended Wilderness Areas (RWA) and Wilderness Study Areas (WSA) are intended to manage the existing and recommended wilderness resource to maintain its wilderness character and to provide for its use and protection. In the past, the Forest Service has allowed activities in RWAs and WSAs that are not allowed in Wilderness areas. It is understood that the Forest Service has management discretion by allowing motorized and mechanized uses in these areas but allowing these uses sets up a situation that may not actually maintain the character and therefore those areas won’t be included in the National Wilderness Preservation System. If an area is designated by Congress into the National Wilderness Preservation System that had continued use by the mountain biking and motorized communities, a significant conflict is inevitable. This is avoidable by managing the WSA and RWA to maintain wilderness character and to not allow activities in these areas that are not allowed in Wilderness areas. The Forest Service in Region 1 addressed this challenge by providing guidance which states the following points (See Appendix A).

1. Eliminate those uses that threaten the capability and availability either through a standard in the forest plan or a subsequent record of decision.

2. Adjust the management area boundary to eliminate the area with established uses.

3. Not recommend the area for wilderness designation.

This guidance was developed to help resolve the ongoing problem of inconsistent management of RWAs, the lack of understanding of wilderness characteristics and the eventual loss of opportunity to consider areas for wilderness recommendation.

Recommendations:

Review and follow the guidance produced for Region 1.

Do not allow non-conforming uses such as motorized and mechanized activities in Recommended Wilderness Areas, as called for in Alternative C.

Include a standard mirroring FW-STD-BCA-07 that says that new access to and development of minerals shall minimize impacts to recommended wilderness areas.

Bridger/Bangtail and Crazy Mountains Geographic Area:

GYC supports Recommended Wilderness in the Crazy Mountains with boundaries matching those of the proposed backcountry area in Alternative C. Recommended Wilderness is the best solution to protect the range's cultural values as well as its ecological integrity. We are aware of the challenges posed by the checkerboard of public and private land in that range, but if it is possible to manage isolated sections of backcountry, the same is true for recommended wilderness seeing as it requires even less management action than other designations.

The Crazies hold immeasurable cultural and traditional value for the Crow (Apsaalooke) people, who have and continue to recognize the range as one of the most important, sacred places in their homeland. Yet promises made by the US Forest Service to Apsaalooke Tribal members to amend the 1987 forest plan to recognize the cultural, historic, and spiritual qualities of the Crazies remain unfulfilled. We stand with the Apsaalooke people in asking that the Crazies be managed to not allow expanded mechanized or motorized travel, mining, building of any new roads, construction of any new energy or utility corridors, or development of any new recreation sites or facilities.

The Crazies are also the highest, largest, and wildest of Montana's island ranges. They are vital for headwater streams, plants, native fish, and wildlife. They supply water for a number of creeks and the Shields River, which support native cutthroat trout. Outstanding habitat also exists here for wildlife species including grizzly bears, wolves, elk, bighorn sheep, and wolverine.

As communities like Livingston and Bozeman continue to grow, it is more important than ever to permanently protect the unique and irreplaceable cultural and biological values of the Crazy Mountains. Recommended wilderness is the only surefire way to do this as well as to accomplish the goals of the Apsaalooke Nation.

Recommendations:

Include Recommended Wilderness in the Crazy Mountains with boundaries matching those for the backcountry area proposed in Alternative C.

Madison, Henry's Lake, and Gallatin Mountains Geographic Area:

GYC fully supports the Gallatin Forest Partnership proposal for all the Recommended Wilderness Areas. Please see comments on Collaboration for more information.

GYC also supports recommended wilderness boundaries for Lionshead as suggested in the Proposed Action, as it strikes the appropriate balance between varied recreational access and resource conservation without incorporating cherry stems.

Recommendations:

Fully consider the Gallatin Forest Partnership recommendations for Recommended Wilderness Areas. Refer to comments in the section on Collaboration – Gallatin Forest Partnership.

Include Lionshead Recommended Wilderness Area as called for in the Proposed Action.

Absaroka Beartooth Mountains Geographic Area:

In addition to the recommended wilderness areas in Alternative C, the Greater Yellowstone Coalition advocates for recommend wilderness for the Chico Peak, Emigrant Peak and Dome Mountain roadless backcountry on the west side of the Absaroka mountain range. We support the mapping and recommendations made by Outdoor Alliance Montana for this region of the Custer Gallatin National Forest (Appendix I). The Outdoor Alliance Montana recommended wilderness for Chico Peak, Emigrant Peak and Dome Mountain is a modification of Alternative D in the Custer Gallatin National Forest Draft Environmental Impact Statement. Our recommendation includes the three inventoried roadless areas (Chico, Emigrant and Dome) as marked on the map for Alternative D in the Custer Gallatin National Forest Draft Environmental Impact Statement (DEIS Appendix A pg. 44) as well as surrounding roadless lands that were not included in the RARE II mapping. A corridor for the existing two-track road and for a future connecting trail between Emigrant Gulch and Arrastra Creek is intentionally left out of the OAMT recommended Wilderness for Chico Peak and Emigrant to account for future mechanized recreation opportunities.

Emigrant Peak and Chico Peak offer world-class backcountry skiing opportunities that are only a 30-minute drive from Livingston. While significantly quieter than backcountry skiing locations like Hyalite Canyon, Beehive Basin and the northern Bridger Range, the Emigrant Gulch area has grown in recreation popularity in the past decade. Part of the growth in backcountry skiing interest here was due to the threat of a gold mine from Lucky Minerals and the desire for skiers to protect the landscape by bringing local, regional and national attention to its outstanding scenery, wildness, and alpine skiing terrain. According to Thomas Turiano's *Select Peaks of the Greater Yellowstone*, the first ski descent of Emigrant dates back to the 1950's with Dave Wessel skiing off the north summit (Peak 10,567). Legendary skiers Tom Jungst and Jim Conway skied off the true summit in 1983. Now, on a weekend with stable snowpack in February, March or April it is possible to find six or more parties enjoying different aspects of Emigrant Peak. Nevertheless, due to its massif-geology with three distinct bowls and roughly a dozen couloirs both short and long, solitude and wildness is easy to come by. Chico Peak continues to be Emigrant's quieter neighbor in terms of recreation traffic but yields the same high-quality ski terrain with open bowls, faces and couloirs. Both areas are used by our supporters and staff.

Members of the Montana Backcountry Alliance and Southwest Montana Mountain Bike Association (both Outdoor Alliance Montana members) worked together in 2018 to reach agreement on recommended wilderness management for the aforementioned three roadless areas (Chico, Emigrant and Dome). Both groups agreed that there is no current mechanized trail use in the area and all motorized use is restrained to the road systems in the center of Emigrant Gulch and Arrastra Creek. This agreement came out of vetting the discussion with avid mountain bikers and backcountry hunters in the Livingston and Paradise Valley community – none of which ride mountain bikes within the roadless areas or along trails accessing existing wilderness boundaries such as Six Mile Creek. Both groups also agreed that the exceptional wildlife values in Chico Peak, Emigrant Peak and Dome Mountain roadless areas associated with wolverine, elk and grizzly bear appropriately elevate the three landscapes to recommended wilderness. All three species have been observed with regularity across these roadless areas; and Dome Mountain is recognized across the region for its important winter range for elk. For these reasons, the Greater Yellowstone Coalition advocates for recommended wilderness in Chico Peak, Emigrant Peak and Dome Mountain as a modified and slightly expanded version of Alternative D in the Custer Gallatin National Forest Draft Environmental Impact Statement.

On the Northeastern edge of the geographic area, GYC recommends the East Rosebud to Stillwater Recommended Wilderness Area, as called for in Alternative D. This area provides critical wildlife habitat and is directly upstream from the West Rosebud River, as well as Montana's newest Wild and Scenic River, the East Rosebud. A Recommended Wilderness Area designation would protect this valuable habitat and benefit the river below it. It would also help ensure adequate buffering from the Stillwater mining Complex.

Recommendations:

Include the Chico Peak, Emigrant Peak, and Dome Mountain Recommended Wilderness Areas as defined and called for by Outdoor Alliance Montana.

Include the East Rosebud to Stillwater Recommended Wilderness Area as called for in Alternative D.

Pryor Mountains Geographic Area:

In addition to the Lost Water Canyon Recommended Wilderness Area, GYC recommends the creation of Big Pryor, Bear Canyon, and Punch Bowl Recommended Wilderness Areas as called for in alternative D. There are over 100 miles of motorized routes in the Pryors providing ample motorized access. These new Recommended Wilderness Areas would allow for quiet, primitive recreation opportunities and the development of a few non-motorized, non-mechanical hiking trails to allowing access to the wild sections of the range and to escape the noise of the motorized corridors. Stated Desired Conditions of natural processes playing their role, modern human use leaving little permanent or long-lasting evidence, and a predominance of quiet non-motorized recreation opportunities are best provided by a Recommended Wilderness Designation. A Recommended Wilderness Designation is further supported by the area's outstanding and unique ecological, geological, and biological values.

Recommendations:

Include the Lost Water Canyon, Big Pryor, Bear Canyon, and Punch Bowl Recommended Wilderness Areas as called for in alternative D.

Wild & Scenic Rivers

Based on our review of the Custer Gallatin National Forest's Draft Environmental Impact Statement for Forest Planning and based on the proposed action, the Greater Yellowstone Coalition has supplemental comments on Wild and Scenic Rivers eligibility that should serve as additional input to our *Greater Yellowstone Coalition Report on Recommended Wild and Scenic Rivers on the Custer Gallatin National Forest (2017)* (see Appendix B) and the addendum comments proposed for the *Proposed Action (2018).* Please see the former document for a more thorough analysis on recommendations for eligible Wild & Scenic Rivers on behalf of the Greater Yellowstone Coalition.

Streams Recommended as Eligible Wild & Scenic Rivers by the Greater Yellowstone Coalition				
River	Watershed		River	Watershed
Broadwater River	Clarks Fork Yellowstone		Glacier Creek	Stillwater
Clarks Fork of the Yellowstone River	Clarks Fork Yellowstone		Goose Creek	Stillwater
Lake Fork of Rock Creek	Clarks Fork Yellowstone		Stillwater River	Stillwater
Rock Creek	Clarks Fork Yellowstone		West Fork Stillwater River	Stillwater
Sky Top Creek	Clarks Fork Yellowstone		West Rosebud Creek	Stillwater
West Fork of Rock Creek	Clarks Fork Yellowstone		Bark Cabin Creek	Upper Yellowstone
Alp Creek	Gallatin		Big Creek	Upper Yellowstone
Buffalo Horn Creek	Gallatin		Big Timber Creek	Upper Yellowstone
Gallatin River	Gallatin		Boulder River	Upper Yellowstone
Hyalite Creek	Gallatin		Cedar Creek	Upper Yellowstone
Lightning Creek	Gallatin		Davis Creek	Upper Yellowstone
Maid of the Mist Creek	Gallatin		East Boulder River	Upper Yellowstone
North Fork Spanish Creek	Gallatin		Lower Deer Creek	Upper Yellowstone
Porcupine Creek	Gallatin		Mill Creek	Upper Yellowstone
Shower Creek	Gallatin		Pine Creek	Upper Yellowstone
South Fork Spanish Creek	Gallatin		South Fork Pine Creek	Upper Yellowstone
Taylor Creek	Gallatin		West Boulder River	Upper Yellowstone
Wapiti Creek	Gallatin		Bear Creek	Yellowstone Headwaters
Beaver Creek	Madison		Buffalo Creek	Yellowstone Headwaters
Cabin Creek	Madison		Grizzly Creek	Yellowstone Headwaters
Cub Creek	Madison		Hellroaring Creek	Yellowstone Headwaters
Middle Fork Cabin Creek	Madison		Horse Creek	Yellowstone Headwaters
Madison River	Madison		Lake Abundance Creek	Yellowstone Headwaters
Sentinel Creek	Madison		Middle Fork Hellroaring Creek	Yellowstone Headwaters
Sheep Creek	Madison		Slough Creek	Yellowstone Headwaters
South Fork Madison River	Madison		Wounded Man Creek	Yellowstone Headwaters
West Fork Beaver Creek	Madison		Yellowstone River	Yellowstone Headwaters
Cottonwood Creek	Shields			
Shields River	Shields			

Similar to what we noted before in our addendum comments, the three topics that we still wish to bring to the Forest Service's attention that have been unresolved by Forest Service staff include: the need to place more emphasis on wildlife-specific Outstandingly Remarkable Values across the Forest; the need to recognize climate refugia as an Outstandingly Remarkable Value on the Forest; and, the justification

for including the Taylor Fork of the Gallatin River, South Fork of the Madison River, and Hellroaring Creek of the upper Yellowstone River as eligible Wild and Scenic Rivers.

Wildlife as an ORV

The Greater Yellowstone Coalition is encouraged to see that the Custer Gallatin National Forest recognizes 30 streams as eligible Wild and Scenic Rivers (managing 13,808 acres in this administrative protection) in the Draft Environmental Impact Statement of the Forest Plan (pgs. 838-839). These recognized streams hold important values related to native fish, recreation, scenery, geology and heritage. We'd like to note that Chapter 3.7 in the Proposed Geographic Area Direction lacks a summary and table for eligible Wild & Scenic Rivers in the Gallatin, Madison and Lionhead Area (pgs. 187-188 are blank). What's more, The *Appendix E: Wild and Scenic Rivers Eligibility Study Process* from the Proposed Action, lacks substantial recognition of high value wildlife habitat that is both: 1) river related, and 2) unique or exemplary in the region of comparison. It is a significant oversight for the Forest Service to only identify two streams as holding exemplary wildlife habitat across more than 3 million acres of public lands. Much of the Custer Gallatin National Forest lies within the world-renowned Greater Yellowstone Ecosystem (GYE) – a place understood to be the last, relatively intact temperate ecosystem in the world. Riparian habitat, which is without a doubt "river related" hosts extremely important vegetation cover and food sources for species that migrate such as ungulates, and species that are moving to re-colonize historic ranges, like grizzly bear and wolverine. With high profile species such as elk, bighorn sheep, moose and bison, as well as sensitive species such as the grizzly bear and wolverine throughout the GYE of the Custer Gallatin, it is hard to fathom that the important wildlife habitat along riparian zones, does not fit within the guise of "river related" and "exemplary."

The Greater Yellowstone Coalition recommends that the Forest Service, again, take a closer look at streams such as the Taylor Creek and its tributaries (Alp and Lightening Creek), South Fork of the Madison, Hellroaring Creek, Davis Creek, and the East Fork of the Boulder River and recognize the wildlife Outstandingly Remarkable Values associated with these drainages. The GYC Report on Recommended Wild and Scenic Rivers includes mapping that showcases high value core grizzly bear habitat and ungulate migrations associated with these streams. The narratives also include information about documented wolverine presence along these streams.

<u>Recommendations</u>:

Recognize the wildlife outstandingly remarkable values associated with migratory ungulates and sensitive species such as grizzly bear and wolverine in drainages such as the Taylor Creek and its tributaries (Alp and Lightening Creek), South Fork of the Madison, Hellroaring Creek, Davis Creek, and the East Fork of the Boulder River.

Climate Refugia as an Outstandingly Remarkable Value

The Greater Yellowstone Coalition disagrees with the Forest Service's conclusion that climate refugia does not fit an "Other" ORV because there is so much of it on the Custer Gallatin National Forest.

Perhaps this is the shortsightedness of using the Greater Yellowstone Ecosystem as a region of comparison for climate refugia. The Forest Service writes in Appendix E of the Proposed Action:

"…an accepted fisheries climate vulnerability model for this area (Isaak et al.) finds many streams in the ROC [region of comparison] that would be climate refugia and therefore would not meet a definition of outstandingly remarkable."

In a January 8, 2018 meeting at the Forest Supervisor's office in Bozeman, Forest Watershed Program Manager, Jake Chaffin, reiterated the agency's stance that the Custer Gallatin has a lot of climate refugia streams, and that because there are many scientifically identified areas of climate refugia, none of it rises to the top for being considered outstandingly remarkable. We would appreciate that the Forest Service reconsider this position. While climate refugia models (i.e. Isaak et al.) point out the importance for protecting and maintaining cold water streams across the Greater Yellowstone Ecosystem (and beyond) these models are based on current water temperature calculations and future water temperature projections. In the GYC Report on Recommended Wild and Scenic Rivers, we took the water temperature projections for 2040 in climate refugia models and overlaid that GIS shapefile with prime habitat layers for fish and wildlife to make recommendations for an Outstandingly Remarkable Value associated with climate refugia. We encourage the Forest Service to perform the same analysis. This approach inevitably parses out a subset of streams that will support both climate refugia and provide important habitat for native fish and wildlife. In our perspective, this approach further validates climate refugia as an ORV on the Custer Gallatin National Forest. We appreciate the fact that the Forest Service has included climate change and climate adaptation into the focus of Conservation Watershed Networks and we strongly believe the same approach should go in to using climate refugia as an Outstandingly Remarkable Value for recognizing eligible Wild and Scenic Rivers.

Recommendations:

Acknowledge that certain rivers on the Custer Gallatin National Forest are indispensable climate refugia for species and therefore climate refugia should be considered an "outstandingly remarkable value" where pertinent.

South Fork Madison River as Eligible Wild and Scenic

The *Greater Yellowstone Coalition Report on Recommended Wild and Scenic Rivers on the Custer Gallatin National Forest* recommends that the South Fork of the Madison River be included as eligible Wild and Scenic. The report highlights the fish, wildlife and climate refugia values associated with this stream. While our explanation for qualifying climate refugia as an Outstandingly Remarkable Value has been described above, we also find it important to emphasize the high value wildlife habitat in the South Fork of the Madison that elevates it to "outstandingly remarkable."

High value wildlife habitat is described in the GYC report as:

"The South Fork of the Madison River contains high value core grizzly bear habitat above Highway 20, according to Craighead Institute models. The habitat includes thick willow, wetlands, beaver dams, and has green healthy conifers above riparian zone with little sign of beetle infestation and no sign of recent

wildfire. Moose tracks were observed throughout the riparian zone and in the creek during a field visit." (GYC, Report on Recommended Wild and Scenic Rivers on the Custer Gallatin National Forest, 22)

In addition to this explanation, GYC would like to point out that the Forest Service's own Travel Plan Final Environmental Impact Statement brings attention to the importance of riparian and aquatic habitat for mammal and bird species in the South Fork of the Madison River:

> Large riparian systems provide a high degree of habitat structural complexity and create a high potential for wildlife species diversity. They also tend to be where many roads are located on the Gallatin Forest. For example, moose winter habitat corresponds to large lower-elevation drainages with wider valley bottoms and/or riparian development. This would include, but is not limited to, the following areas:
> 1) Upper Shields Basin in the Crazy Range (Shields TPA).
> 2) Boulder Canyon (Main Boulder TPA).
> 3) Soda Butte Creek (Cooke City TPA) and Mill Creek (Mill Creek TPA) in the Absaroka Range.
> 4) Rock Creek (Tom Miner/Rock TPA) and adjacent Big Creek (Gallatin Crest TPA) on the east slope of the Gallatin Range.
> 5) South Fork Madison River, Duck Creek, Cougar Creek (Hebgen Lake Basin TPA).
> 6) Wapiti Creek (Taylor Fork TPA) in the Hebgen Basin/ Madison Range.
>
> Riparian areas provide more breeding habitat for birds than any other vegetation type in North America (Kauffman et al. 2001). In the Rocky Mountain region, they contain more listed and vulnerable bird species than any other habitat type (Finch 1991). Numerous migratory songbird species are relatively restricted to the shrubs or deciduous trees associated with riparian environments (Hutto and Young 1999). These species include ruffed grouse, willow flycatcher, cedar waxing, yellow warbler and song sparrow, all of which occur on the Gallatin National Forest. Additional species that occur in the Travel Planning Areas (TPAs) that are restricted to riparian bottomlands include the belted kingfisher, bank swallow, least flycatcher, veery, gray catbird, and
>
> American goldfinch. See Issue 14: Migratory Birds and Issue 3: Biological Diversity and Ecological Sustainability for more information.
>
> Mammals use riparian zones disproportionately more than upland habitats. This is because of the high structural diversity, proximity to water, and favorable microclimates that create high plant diversity resulting in a varied and abundant forage supply. Riparian areas are found throughout the Forest in association with perennial and intermittent streams, springs, seeps and perched water tables.
>
> According to Cherry (unpublished paper), the following Figure 3.17. 1 gives a relative comparison of perennial stream habitat or riparian area by mountain range. The Crazy Mountains (Shields, Ibex and East Crazies TPAs) have the greatest percentage of existing riparian habitat at 16%. The Bridger/Bangtails (North Bridger, West Bridger North and South, Fairy Lake, Bridger Canyon and Bangtail TPAs) not only have the least riparian habitat at 7%, but also are the most affected by roads with 46% of riparian habitat potentially impacted (see Figure 3.17.2). The Gallatin, Madison, and Crazy Mountains have over 20% of riparian habitat influenced by roads.

(Gallatin National Forest Travel Plan FEIS Chapter 3-485-486)

The South Fork of the Madison also receives considerable fishing interest and summer motorized and winter motorized recreation along the road corridor. As such, the Greater Yellowstone Coalition recommends a fourth ORV for the South Fork Madison: recreation. An internet search for fishing and snowmobile recreation on the South Fork Madison River yields many web pages results. In terms of fishing, it is described as a place where one can fish in solitude and peace and still catch large trout. The internet contains visually stunning fishing videos, such as the following by Josh Blumental: https://vimeo.com/104420334, as well as several blog posts such as http://flyfishyellowstone.blogspot.com/2010/09/ and http://www.greater-yellowstone.com/West-Yellowstone-MT/fishing.html. The South Fork of the Madison appears to be on the radar for angler

guides from Big Sky, Montana to Driggs, Idaho. Three Rivers Ranch Outfitters, based in Idaho, describes the South Fork Madison as, "a favorite amongst fly fisherman…The fish typically range between 14 to 18 inches with some into the 20 inch category. (https://trroutfitters.com/river-information/other-places-we-fish/) Other well-known guest ranches such as the Bar N Ranch, Under Canvas and the Firehole Ranch also emphasize the beauty and solace of fishing the South Fork of the Madison.

Due to the dirt road that parallels the South Fork of the Madison for much of its length, the corridor affords easy motorized access. Summertime tourists and locals alike ride ATV's along the road to view wildlife and access fishing holes. In the winter, when snow typically piles up deep in the Hebgen Basin, the road along the South Fork Madison becomes a very popular snowmobile route. In fact, Destination West Yellowstone ranks it the second-best snowmobile trail in West Yellowstone; only second behind riding in Yellowstone National Park. (http://www.destinationyellowstone.com/the-7-best-snowmobile-trails-in-the-west-yellowstone-area/)

Recommendations:

Include South Fork of the Madison as an eligible Wild & Scenic River.

Taylor Creek and Hellroaring Creek as Eligible Wild and Scenic due to Wildlife ORV

The Greater Yellowstone Coalition Report on Recommended Wild and Scenic Rivers on the Custer Gallatin National Forest recommends that Taylor Creek be given eligible Wild and Scenic River status due to scenic, recreation, wildlife and climate refugia outstandingly remarkable values. The report also endorses Hellroaring Creek of the Yellowstone Headwaters as Wild and Scenic eligible due to its fish, wildlife and scenic values. As GYC has recommended 58 of the 761 streams on the Custer Gallatin National Forest as Wild and Scenic, we recognize this represents a bit of a discrepancy with the 31 streams that the Forest Service has recommended. While we have thorough justification for all 58 streams within our recommendation report, GYC feels that of all the streams not initially considered eligible Wild and Scenic by the Forest Service, Taylor Creek and Hellroaring Creek absolutely rise to the top of the list as high profile – outstandingly remarkable streams – due to their wildlife habitat.

An important wildlife ORV habitat consideration for the Taylor Creek and Hellroaring Creek is the fact that both streams have gravel-bed river floodplains. A recent article by Hauer et al. in *Applied Ecology,* titled *Gravel-bed river floodplains are the ecological nexus of glaciated mountain landscapes* (June 2016) concludes that gravel-bed river floodplains in mountain landscapes, particularly from the Yellowstone to the Yukon regions, disproportionately concentrate diverse habitats, nutrient cycling, productivity of biota and species interactions, contributing (again, disproportionately) to landscape-scale ecological integrity. Hauer et al. explain:

Many large mammals, such as moose (*Alces alces*), beaver (*Castor Canadensis*), and river otter (*Lutra Canadensis*), are obligate users of wetlands, rivers, and floodplain habitats. However, the wide variety of large mammals generally considered as upland species but which rely heavily on gravel-bed river floodplains for many portions of their life histories is often overlooked…Gravel-bed river floodplains in the region provide the overall highest annual primary productivity, the earliest appearance of spring emergent vegetation, and the latest continuance of fresh vegetation in the fall. Critical grasslands and shrub and aspen stands required for winter maintenance of large ungulates, such as bison (*Bison bison*),

elk (*Cervus elaphus*), and deer (*Odocoileus spp*.), dominate the vegetation of alluvial fans, which extend onto broader gravel-bed river floodplains at the lower elevation valley bottoms. Gravel-bed river floodplains provide boreal lichens for woodland caribou (*Rangifer tarandus*) and a key habitat for large carnivores such as wolves (*Canis lupus*), grizzly bear (*Ursus arctos*), and mountain lion (*Felis concolor*).

Other research further supports these claims. Additional information can be found in: Hansen et al. *Spatial patterns of primary productivity in the Greater Yellowstone Ecosystem*, Landscape Ecology 2000; Hebblewhite et al. *Modeling wildlife-human relationships for social species with mixed-effects resource selection models,* Applied Ecology 2008; Hebblewhite el al. *A multi-scale test of the forage maturation hypothesis for a partially migratory ungulate population,* Ecological Monographs 2008; and, Chetkiewicz et al. *Use of resource selection functions to identify conservation corridors*, Applied Ecology 2009.

The Greater Yellowstone Coalition strongly encourages the Forest Service to acknowledge the outstandingly remarkable wildlife values associated with the Taylor Creek and Hellroaring Creek. In both drainages, the gravel-bed substrate contributes significantly to existing ungulate migratory paths and associated carnivore activity. This ungulate activity and high value core grizzly bear habitat is mapped in the *Greater Yellowstone Coalition Report on Recommended Wild and Scenic Rivers on the Custer Gallatin National Forest*. We strongly believe Wild and Scenic eligibility is justified on both the Taylor Creek and Hellroaring Creek due to the exemplary wildlife values in both drainages.

Recommendations:

Include Taylor Fork and Hellroaring Creek as eligible Wild & Scenic Rivers.

Energy and Minerals (EMIN)

Greater Yellowstone Coalition has a 35-year history of involvement in energy and mining issues throughout the Greater Yellowstone Ecosystem. This includes explorations and mines at every level including major projects such as the New World District near Cooke City, the phosphate patch of eastern Idaho, oil and gas leasing on the Beartooth front in Wyoming, the Stillwater Mine and the Emigrant-Crevice Withdrawal. Our emphasis in these comments resides in the GYE portions of the Custer Gallatin National Forest (Hebgen, Bozeman, Yellowstone and Beartooth Ranger Districts), but our interests extend forest wide.

The Greater Yellowstone Coalition does not approach this work from an anti-mining position. Rather, we consider every project with particular attention to the nature of the ore-bodies, unique threats posed to the surrounding water, lands and wildlife, impacts to surrounding economies and property rights and other factors. Since the Gallatin and Custer Forest Plans in 1986/87 there has been a massive amount of local and national public interest in preventing large scale gold mines in the New World, Emigrant and Crevice Mining Districts; all in tributaries to the Yellowstone River. During that same time frame the major Stillwater mine near Nye has gone on-line and since expanded across drainages and is today the largest employer in the state of Montana.

Forest Planning provides a rare opportunity for the US Forest Service to clearly address how the agency will fulfill all its commitments to the interests of the public, Congress and to statutes such as the National Forest System Land Management Planning Rule (part 219 of Title 36 of the Code of Federal Regulations) as well as relevant mining regulations. The Energy and Minerals (EMIN) Desired Conditions, Goals, Objectives, Standards and Guidelines section is really at the 30,000' level and lacks granular guidance needed to provide direction to forest managers as well as give certainty to the industry. The Draft Forest Plan abdicates responsibility for management of these resources entirely to the regulatory framework at the project level without consideration of the discretionary elements available to the agency to best manage for "other resource values that may be present" (FW-DC-EMIN 01).

GYC acknowledges that, while Congress and the regulatory framework presses the Forest Service to focus management on energy and mineral production, interest in protecting water quality, wildlife habitat and recreation are among the primary values driving public participation across the forest. As proven by Congressional designations like the New World mineral withdrawal, Emigrant-Crevice withdrawal, and East Rosebud Wild & Scenic River as well as many other collaborative and NEPA projects across the ecosystem, the Forest Service is well-aware of rising demands to fairly consider other values in addition to natural resource extraction.

Draft EIS Section 3.17 goes to great lengths to outline the regulatory framework (Pages 644-646) regarding energy and minerals development. GYC recognizes how this framework directly influences the management of mineral and energy resources but the Forest Plan retains considerable discretion, if not responsibility, to provide adequate guidance to current and future forest managers as well as the minerals industry by including the monitoring questions, desired conditions, standards and other elements of the Forest Plan that provide adequate opportunity for future projects to consider other resource values and ecosystem services regardless of the statutory framework at any given time in history.

Thus, it is noticeable that the Draft Revised Forest Plan has ZERO monitoring questions relative to energy and minerals (EMIN), arguably one of the most impactful and controversial management areas. This noticeable lack of monitoring questions and standards at the Forest Plan level does not provide the clear guidance required by both forest managers and industry operators.

In fact, a January 2016 report from the United States Government Accountability Office (GAO) recommends that the BLM and US Forest Service "could do more" to expedite the mine plan review process (GAO-16-165). The report cites a key factor in delays being a lack of "quality of mine plans." As proven time and time again, any energy and mine development in the GYE creates a significant volume of public interest. For example, information obtained in a Freedom Of Information Act (FOIA) request by GYC and Earthjustice on July 1, 2015 showed the Custer Gallatin National Forest consulting with Lucky Minerals for many months prior to the June 2, 2015 scoping notice sent to the public regarding a categorical exclusion Lucky Minerals were pursuing a permit for gold exploration on public lands in Emigrant Gulch. By December of that same year, tremendous public interest and hundreds if not thousands of public comments proved that the information provided by Lucky Minerals did not address cumulative impacts nor identify reasonably foreseeable future conditions when combined with their simultaneous applications with the State of Montana. Thus, their request for a categorical exclusion was denied, sending the company back to the drawing board. As proven by this experience and the government's own GAO report, we can not always rely on the information and analysis provided at the

project level. What is needed is clear direction of what is expected and required of potential operators before any permits, leases or plans of operation are granted. This certainty and context for the industry and future forest managers is paramount, if not welcomed. There is no better opportunity to set these standards than during the Forest Plan process.

Recommendations:

Develop adequate and specific monitoring questions to guide future land managers when analyzing energy and mineral development in the GYE outside of the Stillwater Land Allocation. Such monitoring questions might involve, Canada lynx habitat, expanding occupied grizzly bear habitat, sage grouse habitat, big game impacts, connectivity and key linkages, base-line water quality monitoring, valid existing rights, cumulative impacts, and consultation with other agencies.

Geologic Areas of Interest

The two goals listed in the EMIN Section 2.4.8 relate only to caves and CERCLA sites. Meanwhile five of the nine overall standards all relate to caves (05-09).

For example, the recent Flathead Forest Plan includes these valuable resources under "Soils and Geology." Where the CGNF includes caves and karst is not as important as it is to clearly emphasize that the often-controversial *extractive* industries of oil and gas leasing and minerals mining require adequate consideration and of direction on their own and in a manner that is clear to all stakeholders including industry.

Once you remove the cave and karst specific components (which GYC is not qualified to comment on), it becomes clear how the limited the Desired Conditions, Standards, Goals and Guidelines are for Energy and Minerals (EMIN) development. They lack any discrete guidance needed to provide direction to forest managers as well as give certainty to the industry.

Recommendations:

Geologic areas of interest such as caves and karst, paleontological and geologic hazards and the unique management requirements for these resources, including desired conditions, standards, guidelines and goals, should be independent of the overall Energy and Minerals direction.

Due to their unique and irreplaceable values and contributions to ecosystem services, GYC strongly recommends appropriate monitoring questions regarding cave, karst, and paleontological resources. Furthermore, monitoring questions should be included to properly manage geologic hazards, their threat to human safety and appropriate mitigation.

Desired Conditions (FW-DC-EMIN)

Desired Conditions 01 & 02 of the Draft Revised Forest Plan states, "Energy and mineral resources (and renewable energy sources) are available in consideration of other resource values that may be present."

This is ambiguous and given the lack of associated Standards and monitoring questions, vague. As proven time and time again in the GYE, there is considerable public interest and outright controversy

over any mineral or energy development despite the current regulatory framework. This framework is subject to interpretation and change throughout the life of the Forest Plan just as are the number and scope of competing resource values "that may be present."

These include but aren't limited to urban growth, recreational pressure, Congressional actions, market demands, availability of nearby resources, mining law reform, de-regulation, expanding (and shrinking) wildlife populations and many impacts related to climate change. As such, it is incumbent on the agency to include a primary Desired Condition for energy and minerals that more strongly recognizes changing conditions throughout the life of the plan and is adaptable and encouraged to analyze cumulative impacts, reasonably foreseeable conditions, alternative uses and resource values which have been proven by the courts to be legitimate considerations within the current regulatory framework.

Desired Condition 03 of the Draft Revised Forest Plan states, "Abandoned mines land and areas impacted by past mining activities are returned to a state of site condition comparable to pre-mineral activity and provide comparable form and function based on site potential." Similarly, proposed Standard 04 is the only guidance provided on how to manage for this Desired Condition stating (page 86), "Potential effects to human health and safety and to infrastructure investment from geologic hazards such as abandoned mine lands, mass wasting, naturally occurring acid rock drainage, naturally occurring radioactive materials, and naturally occurring fibrous materials shall be mitigated, reduced, or eliminated during land management activities in areas where they are known to or may reasonable occur."

DC 03 and STD 04 together are vague and incomplete. Due to the historic nature of most mining districts in the GYE, "site potential" and "pre-mineral activity" (which in some cases pre-dates the existence of the US Forest Service) is unclear and does not adequately account for the current ecosystem services that may be dependent on these areas. More direction is required.

GYC recommends strengthening the Desired Conditions applicable to abandoned mines to direct the forest in a pro-active manner consistent with other resource values. Or alternatively, this could be included as a Goal.

<u>Recommendations:</u>

Desired Condition 01: Energy and mineral resources are available based upon public interest, in-service needs, material availability, and valid existing rights, where consistent with desired conditions for other resources.

Desired Condition 02: Renewable energy resources (geothermal, hydropower, solar and wind energy) is available based upon public interest, in-service needs, material availability, and valid existing rights, where consistent with desired conditions for other resources.

Include an additional plan component that abandoned mines that present physical or chemical hazard are identified, inventoried and reclaimed in the appropriate manner, with priority given to those that pose a human health risk.

Standards (FW-STD-EMIN)

Standard 01 states, “New mineral and energy management activities shall only be authorized when the associated reclamation plan includes provisions to return the disturbed areas to stability and land use comparable to adjacent lands and pre-operational site conditions to the extent practicable” (page 86 of the Draft Revised Forest Plan). The language “pre-operational site conditions and to the extent practicable” is vague at best. Since locatable mineral activity will almost always occur in a historic district, past evidence of mining will most likely be present. Yet these failed mining districts are recognized to be home to past, new and emerging resource values like recreation, migration corridors, endangered species habitat, and water refugia in the face of climate change. Hence the definition of pre-operational site conditions is debatable. Furthermore, the phrase “to the extent practicable” (which could be extended to incorporate any number of factors including the bonding and solvency of the operator), and the distinct lack of monitoring question or standards leaves the door open for operators to define pre-operational conditions and a reclamation plan without proper consideration of public interest, in-service needs, cumulative and reasonably foreseeable impacts and desired conditions for other resources.

Additionally, by including the various effect analysis from Minerals Management across the various sections in the Forest Plan, direction for energy and minerals development is confusing and GYC is concerned it will prove difficult for both industry and forest managers to adequately address all resource values which will lead to very permitting delays and the added expenses that the plan is attempting to address.

Standard 02 is baffling as it specifically calls out the “extent and mode of new access for mineral activity shall be commensurate with the stage of mineral activities.” Again, this leaves open the door for operators to define these conditions with no consideration of other resource values or impacts. As one plausible example, forest managers or the industry could arbitrarily determine, “this stage of mineral activity only requires a categorical exclusion.” Clarity and specificity in the Desired Conditions and Standards, as well as the regulatory framework provided by the National Environmental Policy Act and others should provide the guidance required here, not the project managers. Since most mineral development projects are approached in phases, in most cases over many years or field seasons, the proponents should have an idea of their overall intention or desired project scope. To analyze projects without considering cumulative impacts or reasonably foreseeable conditions undermines the intention of the Forest Plan’s ability to consider and mitigate impacts on other resources.

Standard 04 may not account for past or future human-caused acid rock drainage. GYC recommends clarifying Standard 04 to include human-caused hazards.

<u>Recommendations:</u>

Standard 01: New mineral and energy management activities including special use permits for access shall only be authorized when the associated reclamation plan includes provisions to return the disturbed areas to stability and land use comparable to adjacent lands and pre-site conditions that are based upon public interest and consistent with desired conditions for other resources.

Include an additional Goal or Guideline (along with corresponding monitoring questions) that requires mineral developers outside of the Stillwater Land Allocation to disclose current and reasonably foreseeable operational plans. At a minimum there should be adequate monitoring questions developed to address the notion and definition of “stage of mineral activities.”

GYC supports Standard 03 with regards to closing underground mine features.

Addition to Standard 04: Human-caused hazards such as acid mine drainage, hydraulic fracturing chemicals, all radioactive materials including *in-situ* leaching, and any other exposed hazards due to mining or leasing activities

Effects Analysis for Mineral Development

In general, the Effects Analysis of Minerals Development found in each section for the Draft Environmental Impact Statement for the Draft Revised Forest Plan, is insufficient. It can best be summarized as "a plan to have a plan." GYC recommends specific Goals or Guidelines under Energy and Minerals that clearly outlines each of the critical mitigation and reclamation considerations required for energy and mineral operators. At the very least, these elements should point directly to each section of the Forest Plan that needs to be address as indicated by the effects analysis within the Draft EIS. This should include wildlife (grizzly bears, lynx, big horn sheep, big game, sage grouse, and at-risk species), watershed, aquatic and riparian zones, invasive species, terrestrial vegetation, recreation, socio-economic factors and tribal concerns.

In one example, reviewing the effects analysis for Energy and Minerals specific to Watershed, Aquatic Species and Habitat, and Riparian Ecosystems (Section 3.4), it states, "All revised alternatives include direction that would provide adequate protection to water quality and other aquatic resources from the potential impacts due to energy or mineral extraction" (Page 100). It goes on to declare, "Standards and guidelines direct the implementation of new operations by requiring measures to mitigate for potential impacts to vegetation and potential water table alterations." Where in the Standards is this direction? It is assumed they are left to future managers at the project level. The Guidelines offer some support through FW-GDL-EMIN 02. GYC recommends a broader set of Guidelines specific to mineral development to address other critical ecosystem services and resource values. For example:

<u>Recommendations:</u>

Include an additional Guideline that new mineral development operations outside the Stillwater Land Allocation should minimize adverse effects to grizzly bear and big game security in the Primary Conservation Area (PCA), occupied grizzly bear habitat, key linkage zones and recognized migration corridors. If these management zones cannot be avoided, then operators shall submit mitigation and reclamation plans commensurate with the associated resources that may be affected by the operations. Required bonding must consider (in the estimation of bond amount) the cost of reclamation and mitigation required on the area of operations and surrounding lands.

Suspended Leases

Oil and gas leases covering 100,531 acres of the historic Gallatin National Forest are currently suspended under the Conner v Buford decision [605 F. Supp. 107 (D.Mont.1985)] and upheld by the 9th Circuit Court of Appeals (amended July 1, 1988). The Conner v Buford case requires these existing leases to undergo an EIS and this plan explicitly states, "a leasing decision will not be part of this analysis" (page 649, Draft Environmental Impact Statement for the Draft Revised Forest Plan). However, it is critical that the

overarching architecture for oil and gas development in the revised Forest Plan is robust enough to provide management direction and certainty for future analysis independent of any court rulings. The required EIS, should it happen, will need direction and the revised Forest Plan may well outlive any court rulings.

Recommendations:

Appropriate standards should be developed that apply to the 68 suspended leases as well as future new oil and gas leases.

Consultation

Transparency in the energy and minerals sector is paramount to everyone involved including the agency, the industry and the public. GYC recognizes the CGNF often, if not always, consults with other agencies responsible for minerals and/oil and gas development. However, it is important for the public to maintain this reasonable expectation through a clear Standard in the Forest Plan and at every stage of analysis and permitting. It is not uncommon for operators to be pursing multiple applications with different agencies which have a high probability of cumulative impacts that MUST be considered by forest managers.

Recommendations:

Include an additional Standard that mineral development including special use permits shall not be allowed or granted without prior consultation with nearby or appropriate regulating agencies. These may include but are not limited to the Montana Department of Environmental Quality, Montana Fish, Wildlife & Parks, Bureau of Land Management, National Park Service, and US Fish and Wildlife Service.

Include appropriate monitoring question(s) should for occurrences of any special use permits or plans of operations related to mineral and energy projects.

Mineral Withdrawals

In addition to mineral withdrawals for Wilderness, Wild and Scenic, recreation and administrative sites, there are two high-profile Congressionally designated withdrawal areas near Yellowstone National Park. These are 26,223 acres in the New World Mining District that are withdrawn from all forms of entry, appropriation, and disposal under the public land laws, from location, entry and patent under the mining laws, and from disposition under all mineral and geothermal leasing laws. And more recently, 30,370 acres went under a locatable mineral withdrawal for the combined Emigrant and Crevice areas, subject to valid existing rights.

When the Draft EIS was published, the Emigrant-Crevice area was under a 20-year mineral withdrawal created by Public Land Order (PLO) #7578 signed by then-Secretary of Interior Zinke and published in the Federal Register October 12, 2018. This withdrawal, the maximum allowed by law, was recommended by the Custer Gallatin National Forest on September 21, 2018. The agency cited the underlying purpose, “to protect and preserve the scenic integrity, important wildlife corridors, and high-quality recreation values” (Emigrant Crevice Mineral Withdrawal Draft Environmental Assessment, page

5). On March 12, 2019, President Trump signed Public Law No. 116-9, the "John D. Dingell, Jr. Conservation, Management, and Recreation Act." This act included the "Yellowstone Gateway Protection Act" making the 30,370 acre administrative withdrawal permanent.

Unpatented mining claims exist throughout these areas and continue to be maintained by the owners, as is their right. Of course, ownership of a documented and up-to-date unpatented mining claim does not mean that claim has a "valid existing right." This is only defined after a field examination by a qualified minerals examiner using the general procedure given in BLM Manual 3920 (1976). The mining claimant must prove that the valid existing right existed and was physically disclosed at the time of segregation or withdrawal. For Emigrant and Crevice this date is November 22, 2016, the date then-Secretary of Interior Jewell published the original withdrawal application, triggering the initial mineral segregation. The Interior Board of Land Appeals (IBLA) has stated that a "distinct difference exists between evidence of mineralization which will induce men to engage in further prospecting or exploration in search of valuable mineral deposits and that which will induce them to expend their means in attempting to develop a valuable mine. Only the latter constitutes a valid discovery." *United States v. Jones, 2 IBLA, 140, 149 (1971).*

"Valid Existing Rights," therefore, only exist when a claimant can demonstrate that a reasonably prudent person would be justified in expending effort to further the actual development of the claim. The courts have consistently upheld this higher burden of proof required to claim a valid existing right. In other words, a mining claimant must have established by the time of a mineral withdrawal that "the mineral can be extracted, removed, and marketed at a profit" in order to have valid existing rights. *United States v. Coleman, 390 US 599, 600 (1968).*

This brief summary is provided as a snapshot to demonstrate the legal realities, if not the common mis-perceptions and confusion, of what rights are available to the holder of an unpatented mining claim within a Congressionally designated withdrawal area like the New World, Emigrant and Crevice. Considering the high number of unpatented claims (particularly in Emigrant and Crevice), the high cost of maintaining them and the added burden required to determine Valid Existing Rights, GYC recommends introducing a standard to this revised Forest Plan, that despite stating the obvious, will encourage mine operators and owners of unpatented claims to adequately pursue their legal rights before making exploration or mine applications. Again, this simple and clear standard provides certainty to the mining industry. This is not unique as this same standard is included in the recently approved Flathead National Forest Plan (Nov 2018).

<u>Recommendations:</u>

The Final EIS must be updated to acknowledge passage of Public Law No. 116-9 and ensure the Desired Conditions in the revised Forest Plan represent the agencies previous analysis in recommending the original 20-year withdrawal.

Include an additional Standard that mineral development shall not be allowed in areas withdrawn from mineral entry, subject to valid existing rights as determined by the appropriate process.

Stillwater Land Allocation

The Draft Environmental Impact Statement for the Draft Forest Plan (Section 3.22.6) specially recognizes that mining activities will take place in the "Stillwater Land Allocation" of 102,945 acres. This designation appears to emphasize the unique nature of the Stillwater Complex (SWC), the unique geology and presence of the rare and strategic PGM group metals (platinum and palladium) as well as the contributions to socio-economic values.

GYC generally supports the Stillwater Mine and its value to the local economies, national strategic importance and contributions to industry and technology. As such, the two Desired Conditions for the SWC under section 3.5.7 are certainly valid and important. However, a lack of Standards, Goals and Monitoring questions around these Desired Conditions leaves a question mark as to what the exact purpose of this special land allocation is for. That is, the Forest Plan goes to great lengths in other sections to explain how the agency is compelled by the General Mining Law of 1872 (and other regulations) to facilitate and allow for mining operations. The Draft EIS suggests, "the area would receive forest plan allocation to recognize such use in alternatives B, C, and E" (page 349). But the question remains, what additional guidance does the special "Stillwater Land Allocation" provide forest manager and industry that is not already contained in the regulatory framework?

As described in the effects analysis in the Draft Environmental Impact Statement for the Draft Forest Plan, at least two key species intersect with the Stillwater Land Allocation area. These are Canada lynx (page 348-9) and big horn sheep (page 439-40). Big horn sheep in particular are identified to have abandoned habitat in the Stillwater Complex. Grizzly bear, moose, elk and white bark pine are additional species of note that are found in the area of the Stillwater Land Allocation. There are also recreation interests for access to the Absaroka Beartooth Wilderness, Stillwater River, Fishtail Creek, East Boulder River and other areas. It is entirely unclear how these values and species are to be managed in the Stillwater Land Allocation. These uncertainties must be addressed with proper monitoring questions and other plan components.

This recommendation is not intended to delay or stop any current or future approved mining operations in the SWC. GYC believes wildlife values and other public interests like recreation can be adequately maintained and balanced in coordination with the future goals and objectives of the Stillwater Mine. Our recommendation is that specificity and clarity at the Forest Plan level will improve future project level plans proposed for the Stillwater Land Allocation zone and elsewhere.

<u>Recommendations:</u>

Develop proper monitoring questions, standards, and goals for the proposed Stillwater Land Allocation. These should address wildlife concerns (particularly big horn sheep monitoring and reclamation of habitat and potential presence of grizzly bears), water resources, recreation access and timing.

No Surface Occupancy

It is clear the Forest is required to follow the regulatory framework for leasable minerals. It does, however, retain considerable discretion and management control over the surface occupancy of oil and gas development. GYC recommends a number of critical instances where the Forest Plan should set a clear Standard for No Surface Occupancy (NSO). Not only does this identify and protect important other

resources, it provides the clarity required and demanded by industry. These areas will be address individually below.

These NSO recommendations can be made as a modification to any of the plan revision alternatives and are consistent with FW-DC-EMIN 01.

The Beartooth Front includes previous management areas known as West Rosebud, Black Butte, East Rosebud, Butcher Creek, Red Lodge Creek, West Fork Rock Creek, Grizzly Peak, Palisades, Rock Creek, Glacier Lake, Scenic Byway, and Line Creek. This area is comprised of roughly 93,000 acres.

As shown in the current DEIS as well as the "Beartooth Mountains 1993 Oil & Gas Leasing EIS," the entire area ranks high in other resource values such as scenery, wildlife habitat, winter range, endangered species, recreation, and even renewable energy (West Rosebud). Throughout the same area, there are very few acres of "high" oil and gas potential and a preponderance of "very low" to "moderate" potential. It is strongly encouraged and recommended that the Forest Plan include a standard for a no surface occupancy (NSO) stipulation within the Stillwater Land Allocation and in all non-Wilderness forest lands south of the proposed Stillwater Land Allocation, also known as the "Beartooth Front," subject to existing rights.

The clear direction of NSO and no new leases in the revised forest plan provides the necessary certainty required by the oil and gas industry.

To be clear the NSO stipulation applies only to leasable minerals. Due to the value and importance of the Stillwater complex to the socio-economic and strategic minerals values, a NSO standard for leasable minerals will limit the cumulative impacts that would be inevitable with oil and gas leasing and prevent potential delays and unintended consequences impacting the intention of the Stillwater Land Allocation. Again, this provides an important level of certainty for all stakeholders, including the Stillwater mine and oil and gas developers.

As discussed elsewhere in these comments, Standards and Guidelines in the draft plan that ensure secure habitat for grizzly bears are only applicable to the recovery zone or Primary Conservation Area (PCA). This fails to account for not only current grizzly bear distribution but also grizzly bear expansion into historic habitat and recognized management directions that may be developed during the life of this plan. For the mineral development industry, this lack of clarity is challenging and only encourages weak permit applications that create delays and uncertainty.

To address this, GYC recommends that, at minimum, an additional standard for a No Surface Occupancy Stipulation be applied to all existing and future oil and gas leases within the grizzly bear Primary Conservation Area (PCA), subject to existing rights. However, as shown in our grizzly bear section of these comments, the proposed Forest Plan revision does not go far enough to provide direction for management beyond the PCA into current (and future) occupied grizzly bear habitat. With this in mind, we encourage an additional standard that includes both the PCA and documented occupied grizzly bear habitat.

Overall, the Forest Plan should provide clear direction for the management of energy and minerals within the Yellowstone grizzly bear Primary Conservation Area (PCA) as well as occupied grizzly habitat. For example, the recent Flathead National Forest plan provides no less than nine clear standards. This direction at the Forest Plan level will create clarity and help avoid incomplete plans at the project level.

The greater sage-grouse is one of the species of conservation concern identified by the Regional Forester. As stated on page 597 of the Draft Environmental Impact Statement for the Draft Forest Plan, "The primary concerns for sage-grouse are loss and fragmentation of their habitat." The Draft Plan identifies 2,200 acres of priority habitat in four allotments (all in eastern districts). Although GYC focuses our comments on the GYE portion of the forest, our concerns for wildlife and the impacts of energy and minerals development extends forest wide.

Recommendations:

Include an additional Standard that within the Stillwater Land Allocation and in all non-Wilderness forest lands south of the proposed Stillwater Land Allocation, also known as the "Beartooth Front" and subject to existing rights, all leases for leasable minerals shall include a no surface occupancy (NSO) stipulation.

Include an additional standard that, within the grizzly bear Primary Conservation Area (PCA) and documented occupied grizzly bear habitat and subject to existing rights, all leases for leasable minerals shall include a no surface occupancy (NSO) stipulation.

Include an additional standard that, within any designated big game migration corridors or key linkage areas (as recommended elsewhere in GYC's comments) and subject to existing rights, all leases for leasable minerals shall include a no surface occupancy (NSO) stipulation.

Follow the lead from the Flathead National Forest (FW-STD-E&M) and add clear human health and safety Standards to ALL Energy and Minerals projects found *outside* of the Stillwater Land Allocation.

Include an additional standard that, within priority habitat identified for the greater sage-grouse and subject to existing rights, all leases for leasable minerals shall include a no surface occupancy (NSO) stipulation.

Cumulative impacts of private land minerals development

Should any plans of operation on private lands within the PCA or occupied grizzly bear habitat intersect with Forest management for access or any other reason, these applications should by analyzed and permits only granted provided the operator follows the Forest Plan standards. Bears do not know private or public land boundaries and including this Standard is in the best interest of human and bear safety for all forest visitors. No one wants to see bear-human conflict with visitors on forest land that is propagated by a sloppy operator on nearby private land. In a nutshell, this provides the forest a much-needed opportunity for more in-depth analysis than what is typically available under the traditional categorial exclusion offered on special use permits like road use in sensitive and controversial areas such as the Emigrant Crevice Withdrawal area. In this example, this standard also protects the intention of the Forest Services' recommended mineral withdrawal for these areas.

Recommendations:

Include an additional Standard that, within the Primary Conservation Area (PCA) as well as documented occupied grizzly bear habitat (outside of the Stillwater Land Allocation), any Forest Service special-use permits or similar access granted to locatable and saleable minerals and oil and gas leasing on private

lands will require a plan of operations to be analyzed for cumulative impacts under all existing Forest Plan Standards.

Summary for EMIN Comments

By not exerting clear direction and expectations on energy and mineral development for areas found in the GYE, the Draft Revised Forest Plan misses the rare opportunity to recognize truly unique ecosystem services, alternative socio-economic and resource values while also providing clarity to an industry plagued by inconsistent direction and oversight. Our recommended Monitoring Questions, Desired Conditions and Standards are required to provide more of the certainty required for both forest managers and the industry regarding mineral development. This will lead to better applications and plans of operations while providing the transparency and opportunity for the public to be part of the process and properly consider other valuable resource values. To be clear, GYC relied heavily on the Flathead National Forest Plan (Nov 2018) in developing these comments. But these comments were also developed after recent and historical experience with public processes and litigation regarding locatable mineral proposals. These comments reflect the analysis and comments made by others in the courts, various Environmental Analyses (both state and federal) as well as recent and past Congressional actions.

Watershed, Aquatic, and Riparian Resources

As discussed in previous sections there are many aspects of the plan related to watershed, aquatic and riparian resource management the we find encouraging and valuable. Notably lacking however is the recognition of westslope cutthroat trout (WCT) as a species of conservation concern (SCC) and the associated management actions that designation would provide. While it is accepted that many elements of the draft plan will provide enhancement and support for native species, additional protections could be achieved with the designation. Also, with western pearlshell mussels an SCC in the Custer Gallatin being directly affected by the decline of WCT it stands to reason that WCT should be designated as an SCC. Custer Gallatin forest staff have previously identified westslope and Yellowstone cutthroat trout as “potential species of conservation concern”. The forest is participating in several working groups that support those determinations. The Regional Forester’s determination should be reversed, and native trout should be listed as SCC for the Custer Gallatin. At that time the Forest can evaluate plan area distribution and could find that the current distribution is sufficiently distributed for viability.

RECOMMENDATION: The Regional Forester should support forest staff and designate native trout as an SCC for the Custer Gallatin.

Future projects developed under the plan need to define outcomes and standards more clearly to best protect aquatic SCC’s and water resources that support them better. It is not clear how “habitat and ecological conditions” are defined on a decision-making level are defined. When upholding outcomes under DC-WTR-03 and DC-WTR-04 project managers know their actions along stream reaches or in riparian habitat locations fulfill on plan criteria like “express(es) physical integrity…within their aquatic natural range of variation” are being met. Another ambiguous definition is a condition of “within their

natural range of variation." These DC's do not set conditions that can be met in the proposed forest plan.

RECOMMENDATION: The plan should define criteria for determining defensible standards and conditions to measure objectives and outcomes.

Custer Gallatin National Forest Proposed Action—Revised Forest Plan Chapter 2 Riparian Management Zones (RMZ)

Inner and outer RMZ zone dimensions

"The RMZ widths extend either to the distance listed below or to the top of the inner gorge slope break, whichever is greater. The inner RMZ will extend to the top of the slope break where side slopes exceed 35 percent, as these areas have the highest potential for sediment delivery to water bodies."

30ft (10m) slope buffer distances should be added to "on the ground" RMZ area definitions. As stated, areas with steep slopes have the highest potential for sediment delivery to water bodies. Changes management actions and treatments should occur away from slope breaks to minimize increases of sediment delivery to water resources.

RECOMMENDED Zone Boundary Definitions:

Category 1: Perennial and intermittent fish-bearing streams*: consist of the stream and the area on either side of the stream extending from the edges of the active channel to top of the inner gorge* **plus 30 feet***, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300-feet slope distance (600 feet, including both sides of the stream channel), whichever is greatest.*

Category 2: Perennial non-fish-bearing streams*: consist of the stream and the area on either side of the stream extending from the edges of the active channel to top of the inner gorge* **plus 30 feet***, or to the outer edges of the riparian vegetation, or to a distance equal to the height on one site-potential tree, or 150-feet slope distance (300 feet, including both sides of the stream channel), whichever is greatest.*

Category 3: Intermittent non-fish-bearing streams: *consist of the stream and the area on either side of the stream extending from the edges of the active channel to top of the inner gorge* **plus 30 feet***, or to the outer edges of the riparian vegetation* **plus 30 feet***, or to a distance equal to the height on one site-potential*

tree, or 100-feet slope distance (200 feet, including both sides of the stream channel), whichever is greatest.

Category 4: Wetlands greater than one acre, natural lakes/ponds, and constructed ponds/reservoirs*: consist of the body of water or wetland and: the area to the outer edges of the riparian vegetation* **plus 30 feet***; or to the extent of the seasonally saturated soil* **plus 30 feet***; or to the extent of unstable and potentially unstable areas; or to the distance of the height of one site-potential tree; or 150-feet slope distance from the edge of the wetland greater than 1 acre or the maximum pool elevation of constructed pond and reservoirs with shorelines comprised of riparian vegetation whichever is greatest...*

Category 5: Wetlands, seeps, and springs less than or equal to one acre and/or lands identified as landslide prone: *consist of the body of water or wetland or the extent of unstable or potentially unstable areas* **plus 30 feet** *and: the area to the outer edges of the riparian vegetation* **plus 30 feet***; or to the extent of the seasonally saturated soil* **plus 30 feet***; or to the extent of unstable and potentially unstable*

areas **plus 30 feet***; or 100-feet slope distance from the edge of the wetland, whichever is greatest. RMZs do not apply to seasonal ditches that were constructed to deliver water to downstream users.*

Additional Recommendations:

Complete restoration projects for stream, headwater springs, lake, pond, and wetlands at the rates and amounts called for in Alternative D. Relates to FW-OBJ-WTF-01

Monitor outcome indicators for stream, headwater springs, lake, pond, and wetland restoration projects to assess their benefits the resource. Relates to FW-OBJ-WTF-01.

Wildlife

Introduction

As one of the last remaining intact temperate zone ecosystems on the planet, the GYE hosts important habitat for a variety of important and iconic wildlife species. The CGNF encompasses much of the Montana portion of the GYE. With large amounts of wild, secure land, the CGNF hosts crucial core habitat for a wide variety of native species and provides the doorstep for wildlife connectivity to other ecosystems in the Northern Rockies.

Our supporters have a strong interest in management that affects wildlife of the GYE. We advocate for thriving populations of grizzly bears, wolves, and ungulates in Greater Yellowstone and work to maintain important ecological processes like migrations and long-distance dispersal. Our work blends policy advocacy with on the ground projects that reduce conflicts with wildlife, remove barriers to wildlife movement, and build public support for the iconic species of Greater Yellowstone.

GYC provided extensive science-based comments in our assessment letter (appendix C). We maintain many of the concerns outlined in the wildlife section of those comments. In general, the draft forest plan could be improved through including more plan components that provide actionable and measurable stepping stones toward achieving the lofty goals outlined in the desired conditions. GYC is encouraged by the progress made around connectivity, through application of rigorous modeling and proposed designation of key linkage areas. While this aspect of the draft plan is promising, it does not go far enough to ensure habitat connectivity for dispersing species like grizzly bears and migrating species like elk, deer, and pronghorn. Additionally, both the wildlife and recreation portions of the draft plan and associated analysis fail to adequately consider the potential impacts of recreation on wildlife.

We also raise concerns in the following comments regarding the overall strategy the CGNF appears to be taking for ensuring viable wildlife populations, as well as the ways in which the monitoring plan could be greatly improved. The sections that follow are structured by overarching observations/themes of the wildlife sections of the draft plan and DEIS, with general recommendations and species-specific recommendations relevant to each of those broader themes.

Logical flaw in strategy

The National Forest Management Act (NFMA) 16 U.S.C. § 1604(g)(3)(B) requires the Forest Service to manage for diverse plant and animal communities and maintain viable populations. The approach taken by the CGNF in the draft revised forest plan to building management direction that ensures species viability is based upon the coarse-filter/fine-filter approach. The assumption underlying this approach is that healthy ecosystem characteristics- vegetation, soils, water, and air quality- within the natural range of variation create the conditions needed to maintain viable populations of animal communities. This ignores the reality that for some species, the limiting factors may not be related to any of these ecosystem characteristics and stem from stressors external to ecosystem integrity and function. Therefore, for the approach to be successful, there need to be enough species specific or fine filter plan components to ensure limiting factors unique to a given at risk species are addressed. In general, the CGNF fell short in capturing species specific plan components needed to mitigate the effects of limiting factors for a variety of species. Throughout the sections that follow, we include species specific recommendations as examples.

Within this coarse-filter/fine-filter strategy, it appears the secondary approach to ensuring species viability is to rely on land designations that offer protections of some kind as a proxy for protecting habitat for wildlife. This strategy decouples management direction from an understanding of the limiting factors for species. Once again, we wonder whether the Forest Service has adequately examined their assumption that there are not stressors either present in or unique to various land allocations that might be limiting factors for some species. There are cases where the logic that land designations like recommended wilderness provide adequate species protections do not hold. Again, we provide species specific examples throughout the sections that follow.

The DEIS abuses the concept of natural range of variation throughout the analysis of effects on wildlife. For the same reasons mentioned above, it is illogical to assume that conditions within the natural range of variation are adequate to ensure species viability. Climate change poses substantial uncertainty around future conditions and potentially limiting factors for wildlife. The Custer Gallatin NF needs to demonstrate how they have considered the effects of management direction on at risk wildlife species in the context of best available science around the specific conditions and stressors for each individual species, and climate driven changes in stressors over time.

Recommendation:

Given the flaws associated with the strategy for ensuring species viability, incorporate additional species-specific plan components that account for limiting factors not captured through the coarse-filter, to ensure maintenance of viable populations. Specific recommendations for several species are included throughout these comments.

Key indicators and monitoring

As an initial matter, the key indicators portion of the wildlife diversity section of the DEIS mentions key indicators for wildlife tier up to ecosystem indicators listed in other sections. The Forest Service needs to be explicit about which of these ecosystem indicators are being used to consider effects of management direction on wildlife species and progress toward desired conditions for wildlife. For example, which of the ecosystem characteristics and associated indicators from Table 30: Terrestrial vegetation key ecosystem characteristics (Page 144, DEIS) are being considered as indicators for which

wildlife species? It is very difficult for the public to effectively review the draft plan and DEIS without clarity and transparency around what indicators the CGNF is using to assess wildlife status. The Forest Service needs to resolve ambiguity and inconsistency around key indicators, how they are tied to species, and how they are used.

With regards to monitoring, the 2012 planning rule directives state: "The Responsible Official has discretion to set the scope, scale, and priorities for plan monitoring within the financial and technical capabilities of the administrative unit but shall include one or more monitoring question(s) and associated indicator(s) for the eight items set out in the Planning Rule at 36 CFR 219.12(a)(5).

(5) Each plan monitoring program must contain one or more monitoring questions and associated indicators addressing each of the following:

(i) The status of select watershed conditions.

(ii) The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.

(iii) The status of focal species to assess the ecological conditions required under § 219.9.

(iv) The status of a select set of the ecological conditions required under § 219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.

(v) The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.

(vi) Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.

(vii) Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.

(viii) The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 U.S.C. 1604(g)(3)(C)).”

Wildlife monitoring questions and indicators are grounded in substantial assumptions around what coarse filter measures of habitat characteristics can tell us about the health of wildlife populations. Many of the outcome indicators for wildlife are vegetation related. Given vegetation conditions are not necessarily limiting factors for all at risk species, the monitoring plan design does not meet the requirement of providing information about status of focal species or progress toward wildlife related desired conditions.

Additionally, there are no aspects of recreation monitoring geared toward tracking changes in recreational demand or use pattern, and in turn the potential impacts of recreation on wildlife.

<u>Recommendations:</u>

Provide clarity around what ecosystem and vegetation indicators are outcome indicators for which wildlife species.

Build a more rigorous wildlife monitoring plan that allows for assessment of progress toward desired conditions and status of wildlife species.

Plan components that ensure progress toward desired conditions and plan clarity

We recognize and appreciate many of the strong desired conditions outlined for wildlife, however believe the plan would be greatly improved and better meet NFMA and 2012 planning rule requirements around species viability and connectivity through more plan components that guide the design of projects (standards and guidelines) and thus ensure progress toward desired conditions.

Additionally, the plan could be improved by ensuring species specific plan components are consistent with stated desired conditions for all wildlife. The Forest Service also needs to provide more transparency, clarity, and detail around several aspects of the wildlife effects analysis and draft plan.

Recommendations:

FW-DC-WL-02: *Habitat conditions contribute to species recovery needs such that population trends of listed species are stable or increasing across their range. Lands within critical habitats designated by the U.S. Fish and Wildlife Service provide the physical and biological features identified as essential to the conservation and recovery of listed species.*

We support this desired condition but believe the geographic scope of habitat protections for grizzly bears in the draft plan is inconsistent with this desired condition. It is logical that achieving this desired condition requires addressing the effects of forest activities on species across their distribution on the forest. To ensure species specific plan components are compatible with this desired condition, we suggest extending grizzly bear habitat protections to reflect current grizzly distribution (see grizzly bear section for more detail).

Incorporate standards and guidelines that provide certainty around progress toward desired conditions. Species specific recommendations are included throughout these comments.

Provide more transparency around what constitute desired non-native species, and the process for determining these species.

Provide more specific information about the types of human infrastructure considered in the wildlife analysis of proportions of unique habitat types and other habitat types falling within areas impacted by infrastructure. For example, was recreation infrastructure considered in this analysis? (page 313, DEIS).

Species specific examples regarding progress toward desired conditions and plan clarity

Lynx

Lynx are a rare carnivore listed as threatened under the Endangered Species Act in 2000 and are to be managed consistent with the 2007 *Northern Rockies Lynx Management Direction*. The U.S. Fish and

Wildlife Service designated critical lynx habitat in 2014 (see appendix C, page 55, figure 26). The draft plan simply references the 2007 lynx management direction. For the public to assess possible conflicts between the draft plan and the 2007 lynx management direction/2014 critical habitat, the relevant lynx plan components need to be integrated into the draft plan.

Recommendation:

Rather than including lynx management direction by reference, incorporate plan components that address desired conditions, goals, objectives, standards and guidelines that will integrate 2007 lynx management direction and 2014 critical habitat updates.

Bats

Recommendation:

Given the potential for humans to be vectors for spread of white nose syndrome, which is the primary limiting factor for bats in the North America right now, the CGNF should consider proactive plan components around the suitability of important roost sites or winter hibernacula for recreational caving.

Bighorn sheep

The draft forest plan contains a desired condition for bighorn sheep that seeks to establish habitat conditions supporting robust bighorn sheep populations that could ultimately serve as source populations for facilitating restoration in other areas. However, the only additional plan components specific to bighorn sheep are related to mitigating disease spread. While disease has certainly been a substantial factor in bighorn sheep decline and therefore must be addressed, there are other stressors that could inhibit maintenance of robust populations, such as human recreational disturbance on winter range and habitat fragmentation from highways. Evidence suggests bighorn sheep avoid areas of human activity in the winter, thus reducing available habitat during a stressful and vulnerable time of the year (Courtemanch 2014). The CGNF could include additional plan components that mitigate potential recreation impacts on ungulates like bighorn sheep (more information provided in the recreation and wildlife section below). We also suggest a goal around permeability of highways adjacent to National Forest lands.

Recommendations:

We maintain our comments on the proposed action: “Similar to what the Bridger-Teton and Caribou-Targhee National Forests in Wyoming have instituted (See the “Don’t Poach the Powder” program - https://jhalliance.org/campaigns/dont-poach-the-powder/; Figure 4), we recommend that the CGNF consider big game winter closures that prohibit all human presence/activities during critical time periods to mitigate the potential for significant recreational impacts to big game.”

Include plan components that reference permeability of adjacent highways (see connectivity and key linkage area comments below for more detail around example language).

Connectivity and key linkage areas

GYC appreciates CGNF leadership in incorporating rigorous connectivity modeling and proposing key linkage area designations as part of the draft forest plan. We believe the restrictions outlined in the key linkage areas are an important first step toward facilitating connectivity for a variety of species.

However, the restrictions associated with the key linkage areas are not enough to ensure connectivity is achieved and maintained into the future. For example, we suggest the CGNF be more explicit about commitment to facilitating connectivity across interstate 90. Interstate 90 separates the Gallatin key linkage area from the Bridger key linkage area and represents a substantial barrier to movement for a variety of wildlife species. At the Montana Wildlife and Transportation Summit in December, stakeholders had the opportunity to hear from Washington Department of Transportation and Forest Service employees who shared a variety of insights related to their success in accomplishing a suite of Snoqualmie pass wildlife crossings. One lesson learned was that connectivity language in the Okanogan-Wenatchee National Forest plan that specifically referenced wildlife permeability across Interstate 90 allowed for a more collaborative, efficient process when Washington Department of Transportation began work on highway improvements adjacent to National Forest lands. An MOU between the Federal Highways Administration (FHWA) and the U.S. Forest Service allows the Forest Service to adopt a FHWA NEPA without a separate decision if the highway project is designed to be consistent with the Forest land management plan (e.g. ecological connectivity included as part of the purpose and need for the Washington Department of Transportation highway improvement project). Another example is the Carson National Forest in New Mexico, which included the following plan components in their draft revised forest plan (2019):

"Consider identifying linkages and barriers to wildlife movements and to mitigating such threats during project design by working with NMDFG, New Mexico Department of Transportation, and others." And:

"Consider working collaboratively with NMDGF and NMDOT to identify wildlife migration routes and important habitat, to improve or maintain connectivity for terrestrial species."

In addition to barriers such as highways, it's important for the Forest Service to consider that the cover and species diversity offered by riparian ecosystems through stream corridors provide important habitat for wildlife movement through landscapes. The CGNF emphasizes coarse filter ecosystem characteristics as foundational to providing the habitat conditions needed for ensuring wildlife species viability yet falls short in providing specific plan components with clear and predictable direction that link wildlife connectivity to riparian ecosystems. The CGNF could be explicit about management for stream corridors that provide dispersal and connectivity opportunities. The forest plan could provide more specificity around desired riparian conditions and plan components for achieving those conditions. For example, specificity around native species, woody debris, litter, root masses, vegetation, overstory cover, water temperature, spatial extent of riparian communities within the context of natural range of variation, and ecological resiliency are all important and not adequately addressed (WTR-DC-03, page 22, draft plan is vague). The CGNF needs to be more specific about desired habitat characteristics around streams, water bodies, seeps and springs, etc. Scales or levels of management activities in riparian areas could be defined to not inhibit progress toward desired conditions, and management direction could include avoidance of motorized equipment in riparian areas.

In addition to lack of consideration for the impacts of highways and importance of riparian corridors for wildlife connectivity, the proposed management direction for key linkage areas is inadequate for ensuring viable metapopulations of wildlife at varying spatial scales. Functional connectivity requires conditions suitable for occupancy and in cases of long-range dispersal, conditions that will contribute to foraging, denning, cover, interspecific relationships, and other vital functions for wildlife to survive. In addition to restricting additional facilities and the number of years in a 10-year period when high disturbance projects are allowed, management in key linkage areas should be proactive and create conditions needed for connectivity. This could include:

-Removal of unneeded structures or other barriers to wildlife movement

-Timing restrictions for human use of sensitive habitat like winter range or nesting areas

-Removal or eradication of invasive species to improve foraging opportunities in wildlife movement corridors

-Quick rehabilitation of temporary roads in key linkage areas

-Closure and rehabilitation of unneeded roads and trails

-Restoration of decommissioned routes still being used

-Requirements around mitigation of some kind when new routes are constructed

-New trails cannot be constructed in important wildlife corridors regardless of whether or not the area falls within a designated key linkage zone

-Design facilities to minimize human/wildlife conflict.

We also have a few critiques of the analysis the CGNF used to assess areas important for connectivity. The analysis extent of 100 miles around the CGNF boundary is arbitrary, and appendix B of the DEIS (page 140) does not acknowledge this or attempt to explain why broader scales were not considered. We recognize there were likely substantial computational limitations, but if this is the reason for the arbitrary analysis extent, then the CGNF should provide transparency around those limitations.

The more important issue is our concern with the human modification index used in the connectivity modeling. Our understanding is that this index does not take into consideration recreation related infrastructure. The DEIS states that human use/trails may play a role in habitat fragmentation and connectivity, yet recreational infrastructure wasn't a factor considered in the connectivity models. Given the abundant evidence that recreation may influence wildlife behavior and in turn habitat selection (Larson et al. 2016), the connectivity modeling exercise may not have fully captured the true permeability of the landscape for a variety of wildlife species. While recreational infrastructure doesn't necessarily equate to recreational use, our recent recreation inventory indicated that hotspots of recreation infrastructure at least correspond to recreation demand in some cases (Regan 2018). Given there is little spatially explicit data on recreational use (other than what can be found in digital applications like Adventure Projects, Strava, etc.), recreational infrastructure may be the best proxy the forest can use to evaluate potential recreation influences on connectivity. Incorporating recreation infrastructure into the connectivity modeling may have influenced model outcomes and provided differing results in areas with a high density of trails and other recreation sites. Perhaps this would have altered key linkage designations.

Regardless of the model outcomes, recreation is another stressor that wasn't adequately considered in developing more specific plan components that will ensure progress toward desired conditions for connectivity. With regard to recreation infrastructure in the context of connectivity, it appears the Forest Service proposed key linkage designations in areas not otherwise protected by a designation such as Wilderness, Recommended wilderness, Backcountry areas, etc. As alluded to in our comments about the strategy of the draft plan, we believe this premise is problematic because it assumes there are not stressors present in Wilderness, Recommended wilderness, or Backcountry areas that may impact habitat connectivity for wildlife. With rapid growth in visitation to Yellowstone National Park and the Custer Gallatin National Forest, as well as the growth rate of Gallatin county and the city of Bozeman, there may be rising recreational pressure and changing recreational patterns in many areas of the forest. Increasing recreational pressure in Wilderness, Recommended wilderness, and Backcountry areas could potentially fragment habitat through proliferation of user created trails (Ballantyne et al. 2014, Barros et al. 2013, Pickering et al. 2012, Monz et al. 2010). The CGNF needs to demonstrate how the potential effects of recreation and recreation infrastructure on vital functions for species, such as movement, feeding, breeding, etc. have been considered and accounted for in the draft plan. Key linkage areas and the associated restrictions on no additional infrastructure should include other important areas for connectivity, regardless of other land designations. The effects analysis doesn't describe how other land designations will serve as an adequate proxy for a key linkage area designation in protecting migrating or dispersing wildlife.

Recent research on grizzly bear habitat connectivity between the GYE and NCDE (Peck et al. 2017), an analysis of important areas for connectivity between isolated wolverine populations (Inman et al. 2013, Inman 2013), and current knowledge of potentially important migratory routes for elk, mule deer, and pronghorn (appendix C, pages 27-32, figures 8-11) all highlight the importance of the Madison mountain range as a stepping stone to low elevation valleys and the Tobacco Root and Gravelly mountain ranges on the Beaverhead-Deerlodge NF. Additionally, the CGNF lands in the Gardiner basin play an important role for ungulates moving out of Yellowstone National Park into lower elevation lands of the Paradise valley in the winter (appendix C, pages 31-35, figures 1-3). However, no portion of either the Madison mountain range or the Gardiner basin was included as a key linkage area, presumably because the assumption is that habitat connectivity through the area will be protected by some other proposed or existing land designation. We disagree with this logic given stressors inhibiting wildlife movement may not be eliminated by other land designations.

<u>Recommendations:</u>

FW-DC-WL-05: *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 strongly support FW-DC-WL-05 for wildlife habitat connectivity, and we are concerned there are not adequate fine-filter plan components to ensure progress toward this desired condition. We provide more specific recommendations in each species-specific section below.

Include a desired condition for permeability of highways adjacent to Custer Gallatin National Forest lands, including Interstate 90.

Include more specific plan components for desired ecological characteristics and progress toward to those conditions in riparian areas and stream corridors.

Incorporate additional proactive key linkage plan components to facilitate conditions needed for wildlife to forage, den, seek cover, nest, avoid human stress, and engage in interspecific relationships, such as:

- Removal of unneeded structures or other barriers to wildlife movement
- Timing restrictions for human use of sensitive habitat like winter range or nesting areas
- Removal or eradication of invasive species to improve foraging opportunities in wildlife movement corridors
- Quick rehabilitation of temporary roads in key linkage areas
- Closure and rehabilitation of unneeded roads and trails
- Restoration of decommissioned routes still being used
- Requirements around mitigation of some kind when new routes are constructed
- New trails cannot be constructed in important wildlife corridors regardless of whether or not the area is designated as a key linkage zone
- Design facilities to minimize human/wildlife conflict.

Assess the effects of not considering recreation infrastructure in connectivity modeling

Consider additional key linkage designations in important connectivity areas regardless of other lands designations already in place.

Species specific recommendations regarding connectivity and key linkage areas

Grizzly bear

Connecting Greater Yellowstone grizzly bears to the Crown of the Continent is a priority for Greater Yellowstone Coalition because it is key to ensuring the persistence of grizzly bears in the lower 48 over the long-term. We provided extensive science-based comments on this topic as a part of the Northern Continental Divide Ecosystem (NCDE) Forest Plan Amendment process, as well as for Helena Lewis and Clark National Forest Plan revision (see appendices E, F, and G). As detailed in our assessment letter, GYC had substantial concerns over the 2016 delisting rule and conservation strategy failing to adequately address lack of connectivity as a threat to the long-term persistence of grizzly bears in the lower 48 (see appendix C).

The grizzly bear was listed as a threatened species in the contiguous lower 48 states under the U.S. Endangered Species Act (ESA) (40 Fed. Reg. 31,734 (July 28, 1975), and should be recovered and managed as a large well-connected Northern Rockies meta-population. The recent ruling by Chief District Judge Dana Christensen in *Crow Indian Tribe et al. vs. United States of America et al.* (2018) over the 2016 delisting rule underscores the importance of considering population segments like the GYE within a broader context. Judge Christensen found that the U.S. Fish and Wildlife Service, "Failed to consider how reduced protections in the Greater Yellowstone Ecosystem would impact the other grizzly populations" (page 3). Additionally, the judge found the U.S. Fish and Wildlife Service to be arbitrary and capricious in their application of the ESA threats analysis for two reasons, one of which related to the "illogical" conclusion that the Greater Yellowstone grizzly population can remain genetically self-

sufficient (page 3). The U.S. Fish and Wildlife Service must consider how the currently isolated GYE grizzly bear population can qualify as recovered without regulatory mechanisms to provide for connectivity between this population and the NCDE population. The Custer Gallatin Forest Planning process offers the Forest Service an opportunity to commit to and provide for such connectivity.

Connectivity between the GYE and NCDE populations is key to restoring the meta-population structure that historically characterized grizzly bear presence within the intermountain west (Merriam 1922, Picton 1986, Craighead and Vyse 1996). Genetic isolation poses a threat to self-sustainability of the GYE grizzly bear population over the long-term (Haroldson et al. 2010), and management that restores and supports a meta-population structure will be important to the future of grizzly bears in the United States (Proctor et al. 2005). The grizzly bear management plans for both western Montana and southwestern Montana (respectively, Dood et al. 2006 and Montana Fish, Wildlife, and Parks 2013) articulate connectivity between the NCDE and GYE grizzly bear populations as a long-term management goal. The 2006 Dillon Resource Management Plan (page 70) includes habitat requirements that support connectivity for dispersing species like grizzly bears (BLM 2006). The Interagency Grizzly Bear Committee included enhancing connectivity between ecosystems as a goal in its 2018-2022 plan (IGBC 2018). The National Forest Management Act (NFMA) 16 U.S.C. § 1604(g)(3)(B) requires the Forest Service to manage for diverse plant and animal communities and maintain viable populations. Ultimately, grizzly bear viability will depend on a meta-population structure with functional connectivity between recovery areas. As detailed in appendices E and F, section 7 of the ESA also requires that the Forest Service consider effects of forest plan components on the viability of GYE grizzly bears within a broader context, given the viability of lower 48 grizzlies depends on connectivity between populations that are currently isolated (https://www.fws.gov/endangered/lawspolicies/section-7.html).

We are very disappointed to see that the CGNF did not address concerns GYC previously raised (appendix C). Standards and guidelines that ensure secure habitat for grizzly bears are only applicable to the grizzly bear recovery zone/Primary Conservation Area (PCA) in the draft plan, and therefore fail to account for current grizzly bear distribution. The recovery zone is only roughly half of currently occupied grizzly bear habitat in the GYE. The 2016 *Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem* requires managing for a stable population of grizzly bears. To manage for a stable population, there need to be habitat protections that at a minimum reflect the area in which population health is monitored (the Demographic Monitoring Area) and should reflect current grizzly bear distribution. This shortcoming undermines the NFMA requirement to maintain viable populations.

We are encouraged by the attempts in the draft plan to establish plan components to support connectivity for a variety of species, including wide ranging habitat generalists like grizzly bears. We also recognize the efforts to include connectivity related plan components specific to grizzly bears. However, we are confident these plan components do not do enough to ensure functional connectivity, especially given habitat standards are limited in scope to the recovery zone/PCA.

With regards to grizzly bear specific connectivity components, it appears the premise of the stated objectives is that identifying suitable relocation sites will facilitate connectivity. While we strongly support identification of relocation sites as one tool to facilitate connectivity, as quoted in our comments on the Proposed Action, “Translocation-based strategies do not create self-sustaining populations as mandated under the ESA “but rather rel[y] on long-term intensive management to counteract the effect of connectivity loss on species viability” (Carroll et al. 2001, page 2). The

characteristics associated with effective linkage zone function for large carnivores and ungulates include low open road density, low concentrations of human occupancy and development, an abundance of productive foraging habitat, and a healthy mix of forested and nonforested lands (Craighead et al. 2001; Walker and Craighead 1997; Servheen et al. 2003; Olimb and Williamson 2006)."

Currently occupied ranges in the NCDE and GYE are around a minimum of 110 kilometers apart (Peck et al. 2017). While this distance between occupied ranges is within the range of dispersal distances identified for male grizzly bears (Blanchard and Knight 1991, McLellan and Hovey 2001, Proctor et al. 2004), dispersal over these distances would likely take place over a year or even several (Peck et al. 2017). Therefore, dispersal over this time frame requires conditions suitable for seasonal occupancy; others have shown secure habitat is important for connectivity for this very reason (Primm and Wilson 2004). As a result, the success of bears in connectivity areas will depend on many of the same habitat characteristics in the recovery zone that have driven successful population recovery.

Given habitat conditions must facilitate seasonal occupancy for functional connectivity between the GYE and NCDE to occur, it is reasonable to assume that the conditions needed in areas beyond the recovery zone/PCA to encourage functional connectivity would not be all that different than those necessary to foster demographic connectivity, which in the NCDE conservation strategy are structured around consistent evidence that roads negatively impact grizzly bears. An NCDE population level model containing covariates for indicators of human use such as road density was among the best fitting models out of the entire set of candidates in the Peck et al. (2017) study, providing another piece to the already large body of evidence indicating that grizzly bear habitat selection and as a result movement is influenced by roads and motorized access. Roads also influence grizzly bear survival (Proctor et al. 2018). Motorized access management in linkage areas between occupied habitats is an important component of maintaining genetic and demographic connectivity, and thus healthy and sustainable grizzly bear populations (Proctor et al. 2018). Demographic connectivity areas to the Cabinet-Yaak (CYE) and Bitterroot (BE) ecosystems require no increase in road density using conditions that have allowed for female occupancy in zone 1 as the baseline.

As we previously emphasized (appendix C), "The Forest Service must consider that roads (permanent or temporary, open or closed) and site development will increase human-bear conflicts and grizzly bear mortality and affect the potential for connectivity through important linkage areas. Both roads and development significantly contribute to habitat deterioration and fragmentation and are the two strongest predictors of grizzly bear survival/mortality on the landscape (Mace et al. 1996, Schwartz et al. 2010). Road density is also strongly related to secure habitat, which is critical to the survival and reproductive success of grizzly bears (Mattson et al. 1987; IGBC 1994; Schwartz et al. 2010) and is primarily achieved through motorized access management. As such, connectivity and secure habitat are often described in terms of open road density and large non-motorized habitat blocks. Managing the landscape to reduce hazards to bears requires balancing road density standards with the amount of secure habitat available (Summerfield et al. 2004); "[I]f road densities become too great, secure areas become isolated islands surrounded by heavily roaded areas. Travel among secure islands then becomes more hazardous, effectively fragmenting the landscape" (Schwartz at al. 2010, page 661)."

Recent research on potential grizzly bear movement corridors used a randomized shortest path algorithm and step selection functions based on individual grizzly bear movement data within the GYE and NCDE (Peck et al. 2017). This approach allows for a more realistic look than least cost path

modeling at the movement characteristics of a dispersing grizzly bear (Peck et al. 2017). In other words, the highest quality habitat that provides the least resistance to movement may not actually be the most likely corridor for a species like the grizzly bear, where movements are much more exploratory in nature (Peck et al. 2017). The model predictions in currently unoccupied range were validated by 21 confirmed observations (Peck et al. 2017). Model predictions highlight the importance of the Northern Gallatins as an important linkage area to the Bridger mountains, which could facilitate movement North, as well as the Madison range as a stepping stone for connectivity to the Gravelly mountains and beyond to the Tobacco Roots. See appendix C for a variety of grizzly bear connectivity figures included in our assessment letter.

While the CGNF acknowledged the importance of the Norther Gallatins and Bridgers through the proposal for key linkage areas in those zones, we are concerned the plan components specific to the key linkage areas are not enough to ensure secure habitat for grizzly bears. Additionally, we are concerned that no portion of the Madisons were included as a key linkage area. The DEIS analysis alludes to there being no need for a key linkage designation given so much of the area is designated Wilderness, Recommended Wilderness, or given some other special designation. This assumption fails to account for the potential impacts of increased human use of wild places that could lead to increased conflicts with bears, as well as the potential loss of secure habitat that could occur in the small portions of the Madisons outside of any designated area, thus allowing potential opportunities for new barriers to grizzly bear movement and population sinks.

As a safeguard, grizzly bears should be designated a Species of Conservation Concern for the reasons we previously outlined (appendix C):

“The USFWS determination to remove the GYE population of grizzly bears from the federal list of endangered and threatened wildlife is not a surrogate for a NFMA determination of absence of concern within the planning area. In fact, the 2012 Planning rule (p. 36) states that species in the following categories must be considered for SCC designation (emphasis added):

a. Species with status ranks of G/T1 or G/T2 on the NatureServe ranking system. See exhibit 01 for description of NatureServe Conservation Status Ranks. Note: Species with NatureServe G/T1 or G/T2 status ranks are expected to be included unless it can be demonstrated and documented that known threats for these species, such as those threats listed for the species by NatureServe, are not currently present or relevant in the plan area.

b. Species that were removed within the past 5 years from the Federal list of threatened or endangered species, and other delisted species that the regulatory agency still monitors. Grizzly bears are an umbrella species and a “conservation reliant” species, in that they will perpetually require efforts to conserve them on the landscape (Scott et al. 2005).

Arguably, this reliance, the current genetic isolation of the Yellowstone population, and the relatively limited occurrence of bears within their historic range in the lower 48 calls for additional caution and therefore protections. These factors should warrant designation and the accompanying protections as a Species of Conservation Concern.”

Conflicts with livestock are increasingly a source of mortality for grizzly bears as they expand their range into different landscape contexts where livestock are more prevalent (IGBST 2019, MFWP 2019). This will continue to be a challenge as bears move out of Greater Yellowstone and will be a challenge that

requires constant commitment to solutions if the NCDE and GYE populations are ever connected. There are a variety of proactive conflict reduction measures allotment permittees can take to prevent conflicts and in turn prevent losses of both livestock and grizzly bears. However, recent research has shown that bear density is in itself an important factor related to probability of depredation (Wells et al. 2019), further emphasizing the need to create conditions that 1) allow GYE bears to move beyond the GYE and 2) do not add more opportunities for conflict (in the form of restocking vacant allotments) to the landscape, unless restocking these allotments is alleviating chronic conflict elsewhere.

Recommendations:

Plan components should secure some level of habitat protection on lands that reflect grizzly bear distribution in order to ensure a stable population.

2016 Conservation Strategy habitat standards and guidelines should extend beyond the recovery zone/PCA and into the DMA (at a minimum)

FW-DC-WLGB-02 (page 65): *Outside the primary conservation area and recovery zone, grizzly bears occur where habitat is biologically suitable and grizzly bear occurrence is socially acceptable. Availability of secure habitat contributes to habitat connectivity, which facilitates grizzly bear movement between the Greater Yellowstone Area and other grizzly bear ecosystems.*

This desired condition is strong but there are no stated goals, objectives, standards, or guidelines that will ensure maintenance of secure habitat for grizzly bears outside the recovery zone/PCA an in important connectivity areas. Additionally, the Forest Service must provide transparency around what areas are socially acceptable, and how the forest will make this determination. All the CGNF in southwest Montana is biologically suitable habitat. We recommend less restrictive language around where bears can occur outside the PCA and DMA, given statewide and IGBC goals for connectivity between the GYE and NCDE. We also recommend the same standards we suggested in our comments on the CGNF proposed action be applied to all areas outside the recovery zone/PCA that will facilitate grizzly bear dispersal to the north and west (appendix C):

“Standards that limit future increases in open road densities in areas where secure core is adequate, and standards that reduce open road densities where it is currently too high to promote use by male grizzly bears through an area (see Schwartz et al. 2010). Open road densities above 1.0 mi/ mi2 and total road densities above 2.0 mi/mi 2 have been shown to suppress local habitat use by grizzly bears (Mace and Manley 1993, Wakkinen and Kasworm 1997), while survival rates for grizzly bears decreases relative to high road density with sub-adult male survival decreasing sharply with road densities above 1.0 mi/mi 2 (Boulanger and Stenhouse 2014). Specifically, areas with road densities at or below 1 mi/mi 2 should be maintained at this level, and areas with high road densities (>2mi/mi 2) should be reduced to 2mi/mi 2 . In the very least, a standard that “there shall be no net increase in miles of roads open to public motorized use on NFS lands above the baseline” should be applied to lands throughout the DMA as well as potential connectivity areas (including lands outside the PCA and DMA).

We also recommend inclusion of a standard pertaining to and limiting site development to one increase above baseline per decade throughout connectivity areas, including outside the PCA. Though food storage orders help reduce the potential for conflicts associated with unsecured attractants, enforcement is often difficult, and compliance not guaranteed. Limiting the number of developed sites

on public lands is another means to prevent increased bear-human conflicts and associated mortalities as bears begin using these areas as desired.

The Forest must also consider that motorized use of trails including ATVs and dirt bikes can displace grizzly bears (see Ladle et al. 2018) and mountain biking can increase the likelihood of conflicts with bears. Similarly, to roads, we ask CGNF to consider managing trails in such a way that doesn't increase conflict and mortality and to include specific plan components to support this. For example, before new trails are developed and/or opened to mountain biking in grizzly bear habitat, there should be careful evaluation of the safety of enhancing mountain bike access in to an area where bear density is high (See:https://bloximages.chicago2.vip.townnews.com/helenair.com/content/tncms/assets/v3/editorial/f/51/f5163100-6bd2-518d-b95f-ffab9b03c829/58c3179d5fa81.pdf.pdf). To help mitigate displacement from motorized use, Ladle et al. 2018 referred to the importance of access management and suggested that "restricting trail use by motorized recreationists will allow grizzly bears to maximize foraging opportunities and reduce required investment in avoidance behaviors". The forest should consider seasonal closures of trails for mountain bike and ATV use during key bear use seasons."

Grizzly bears should be designated a Species of Conservation Concern in Region 1

FW-GO-GRAZ-02 (Alternative D, page 76 draft plan): *When evaluating vacant livestock allotments, the Forest Service may emphasize allotment closure for accelerated ecological enhancement in areas of greatest conservation concern This includes, but not limited to proposed or established research natural areas or special areas, at risk species habitat, under-represented reference areas, native species restoration areas, key linkage areas, conservation watershed networks, areas with opportunities for reduced risk of disease transmission between domestic and wild animals, or retention for forage reserves (grassbanks) or opportunities to enhance management or improve resources through combination with adjacent allotment(s). The Forest Service may de-emphasize use demand as a consideration in these types of conservation areas.*

We support this plan component proposed in alternative D and recommend revising to add areas important for wildlife connectivity (not limited to key linkage zones) and areas of high grizzly bear density and thus higher probability of conflict (Wells et al. 2019) to the list of factors considered in evaluating allotment closure.

FW-STD-GRAZ-02/03 (alternatives B and C, pages 76-77 draft plan): We support these restrictions on sheep or goat stocking in certain geographic areas with stocking in some areas contingent on disease risk mitigation. However, we strongly recommend these contingencies include potential risk for conflicts with grizzly bears, especially in the Bridger/Bangtail/Crazy Geographic area, given the potential of these corridors for grizzly bear dispersal to the NCDE. If risk of conflict is determined to be low, sheep and goat stocking for the purposes of weed control should only be allowed if robust predator/livestock conflict prevention measures will be applied. These conflict prevention measures could be captured in the draft plan in the form of standards.

Given the role of livestock conflicts in grizzly bear mortality, we recommend the Forest Service establish a goal to work with livestock permittees on identifying and incorporating proactive conflict prevention measures in allotment management plans.

Given active livestock allotments within the recovery zone are below the 1998 baseline (DEIS, page 383) and restocking of vacant allotments is possible, we ask that the Forest Service commit to maintaining

vacant allotments that were previously retired for the purposes of reducing conflicts between bears and livestock.

Big game

We described the importance of big game migrations in our assessment letter (appendix C):

"Each year, thousands of elk migrate back and forth between distant winter ranges in Wyoming, Montana, and Idaho to high-elevation summer ranges near the core of Yellowstone National Park. Their abundance sustains diverse carnivores and scavengers, attracts tens of millions of dollars to gateway communities, and inspires national and global interest in America's premier national park. These migrations define and unify Greater Yellowstone, both ecologically and culturally, and are considered by scientists to be the "engine of the ecosystem." The Custer Gallatin is home to and used by many of these elk, including the Madison herd (see Figures 2 and 3) and provides access to critical big game winter range for many GYE species (see Figure 3). However, The Greater Yellowstone Ecosystem, of which the Custer Gallatin is an integral and essential part, is not immune to a growing number of ecological changes and conservation challenges. Subdivision of critical winter range, human and energy development, increased recreation, and roads have reduced and fragmented the corridors and habitats needed to sustain seasonal wildlife movements. In addition, some populations are being impacted by hotter and drier summers, invasive species, and introduced diseases. A combination of these factors has led to declines in several elk herds across the region (see Wyoming Migration Initiative – www.migrationinitiative.org and Greater Yellowstone Migrations – www.greateryellowstonemigrations.com).

Additionally, as elk migrate from Yellowstone's core to winter ranges each fall, they cross an incredibly complex terrain of land ownership and management regimes. Moving from the national park, to Forest Service, Bureau of Land Management, state, and private lands, wildlife are forced to navigate roads, subdivisions, fences, pump-jacks, livestock operations, and many other challenging features that stem from a diversity of land ownership and increasing development. Even within federal agencies, land management provisions can change radically at jurisdictional borders. The incremental loss of critical seasonal habitat outside park boundaries threatens Yellowstone's migratory wildlife. Simply put, if migration corridors are severed, there will no longer be elk, pronghorn, mule deer, bighorn sheep, or moose in Yellowstone National Park or beyond (see Figure 1 showing migration pathways for these species).

The Forest Service clearly states the importance of wildlife corridor connections between mountain ranges within the Proposed Action under Distinctive Roles and Contributions. It highlights the three unique mountain ranges (Bridger, Bangtail, Crazy mountains) that include most native species and is a potential wildlife corridor between the Greater Yellowstone Ecosystem and other large blocks of wildlife habitat to the north, such as the Northern Continental Divide Ecosystem in northwest Montana (Page 131, Proposed Action). GYC also includes the Gallatin and Madison mountain ranges as unique and important for wildlife migration to the north and west of those ranges."

Given the role of the CGNF in facilitating migrations for several big game species (see assessment letter, appendix C), we maintain our previous recommendations, including those related to coordination with state agencies around Secretarial Order 3362:

Recommendations:

Work with Montana Fish, Wildlife, and Parks to identify and designate critical big game habitat and migration pathways using best available science and data.

Develop forest plan components that will protect and preserve these designated areas, including:

- No surface occupancy for oil and gas leases in designated corridors
- Seasonal closure of important big game winter ranges
- Commitment to working with Montana Department of Transportation to ensure permeability of highways adjacent to designated migration routes

Develop coordinated administrative actions that result in cross-boundary recognition and protections for migration routes to ensure Yellowstone National Park's iconic wildlife survive in a time of climate change and increasing human pressure.

Use the FIA data and VMAP data to model vegetation patterns on the landscape

Create and implement ecosystem integrity targets

Review and fully consider Department of Interior Secretarial Order 3362 to leverage the directives, resources and partnerships for the benefit of wildlife corridor conservation.

Develop "action plans" if enough, existing plans do not exist, in coordination with states that include:

- Habitat management goals and associated actions related to big game winter range and migration corridors;
- Measurable outcomes; and
- Budgets necessary to complete respective action(s).

Assess state-derived migration data "early in the planning process for land-use plans and significant project-level actions that bureaus develop." (from S.O. 3362)

Update existing Memorandums of Understandings with state agencies so that they address the conservation needs of winter range and migration routes.

Establish a goal to communicate with agencies across jurisdictions (including states) so that adjacent land use plans that host winter habitat or migration routes are consistent with one another.

Recreation and wildlife

We consistently noticed inadequate consideration of the potential impacts of recreation on wildlife. A recent systematic literature review indicated that in general, recreation has negative effects on wildlife, especially snow-based recreation (Larson et al. 2016). We recently conducted a thorough review of recreation impacts on lands, waters and wildlife which indicated a variety of negative effects of

recreation aren't adequately considered in land management frameworks (appendix H). While there remain a lot of questions regarding the population and community level effects of recreation on wildlife, and while effects may vary depending on the scale of study, the substantial evidence indicating negative effects of recreation on wildlife behavior and habitat selection (Larson et al. 2016) hasn't been well considered in the Custer Gallatin DEIS.

Recommendations:

Include plan components to account for potential recreation related impacts on wildlife. Recreation is a potential stressor to wildlife (Larson et al. 2016) and is not accounted for in the stated goals, objectives, standards, and guidelines that presumably will achieve desired conditions for wildlife forest-wide.

Provide clarity and specificity around how the CGNF will accommodate rising recreational demand while also maintaining balance and ensuring other resource values aren't degraded.

Species specific recommendations regarding recreation and wildlife

Wolverines

The wolverine is an imperiled species facing loss of habitat from climate change and recreational disturbance. Small populations are increasingly isolated. In our assessment letter (appendix C), we explained the outcome of the 2016 court ruling around the USFWS withdrawal of their proposal to list the North American wolverine as a threatened species under the ESA. Specifically, "Summary judgement was awarded to the plaintiffs on April 4, 2016 vacating the Service's August 13, 2014 withdrawal of its proposed rule to list the North American wolverine as threatened under the ESA. The Court agreed with the plaintiffs that: (1) the Service unlawfully ignored the best available science by dismissing the threat to the wolverine posed by climate change; (2) the Service unlawfully ignored the best available science by dismissing the threat to the wolverine posed by genetic isolation and small population size. And, "As such, the Custer Gallatin plan is required to conserve the species under 36 C.F.R. § 219.9(b)(1), by providing ecological conditions that "protect, preserve, manage, or restore natural environments and ecological communities to potentially avoid federally listing of proposed and candidate species" as defined by 36 CFR § 219.19. The EIS must demonstrate that the plan direction will meet these regulatory criteria."

Recent research further highlighted the effects of motorized and non-motorized dispersed recreation on wolverine habitat use, yielding a substantial amount of loss of high-quality winter habitat for females (Heinemeyer et al. 2019). The Custer Gallatin draft plan acknowledges the potential effects of winter recreation on wolverines but falls short by not establishing any plan components to address the potential impacts of increasing dispersed winter recreation in high quality wolverine habitat. Given the threats posed to wolverine by winter recreation, the CGNF must demonstrate that management direction will protect habitat in a way that will avoid federal listing of this proposed candidate species.

Recommendations:

FW-GDL-WLWV-01: *To provide secure habitat for reproductive wolverines, there should be no increase in special use authorizations or designation of winter routes in maternal habitat for wolverines during the reproductive denning season.*

This guideline could be modified to account for the potential impacts of dispersed winter non-motorized recreation on wolverines documented by Heinemeyer et al. 2019, through winter closure areas to all uses in important female wolverine reproductive/denning habitat. If mandatory closures aren't feasible, the CGNF could create "humility zones" where emphasis is placed on educating the public about their potential impacts on wolverines if they choose to recreate in important reproductive/denning habitat.

Consider a key linkage designation in the Madison range, given the importance of the area for Wolverine habitat connectivity and potential for impacts from non-motorized recreation despite other designations like Wilderness that already exist in the area.

Big game and Bighorn sheep

In our assessment letter (appendix C), we stated:

"The Gallatin County is one of the fastest growing counties in the nation and with this we can expect to see a continued increase in recreational pressures and impacts. An important and effective way to protect big game species, including their critical habitat and migration pathways, is through winter range closures. Winter closure areas can be essential to the survival of certain wildlife species when they are especially vulnerable (i.e. their energy reserves are low, pregnant females are in their final trimester, deep snow limits movement and access to forage, and plants have not yet begun to green-up). Like what the Bridger-Teton and Caribou-Targhee National Forests in Wyoming have instituted (See the "Don't Poach the Powder" program - https://jhalliance.org/campaigns/dont-poach-the-powder/; Figure 4), we recommend that the CGNF consider big game winter closures that prohibit all human presence/activities during critical time periods to mitigate the potential for significant recreational impacts to big game."

Recommendations:

Consider winter closure areas in important big game winter range.

Other Species-Specific Issues

Bison

GYC has a long history of involvement with issues of bison management surrounding Yellowstone National Park and our members consider bison one of the most treasured and iconic species in the region. Ultimately, we are working to ensure wild bison are valued and managed like other wildlife in Greater Yellowstone. We envision a day when Yellowstone bison are sustainably managed as healthy, free roaming wildlife throughout national parks, national forests and other suitable habitats within the GYE and across the West. Specifically, we want to see Yellowstone bison freely use and broadly distributed year-round throughout existing tolerances areas outside the Park.

We provided substantive comments regarding bison in our Custer Gallatin Assessment Letter (pages 43-49) as well as a joint letter for the Proposed Action (PA) and ask that both be referred to and considered here as well (see Appendix C and D respectively). The joint letter includes our responses to proposed plan direction for bison from the PA along with specific bison management recommendations and a science-based rationale for why the Forest Service should reconsider their Species of Conservation

Concern (SCC) determination for bison. While we still feel strongly that bison should be listed by the Regional Forester as an SCC, our comments below focus on the CGNF plan components that would support an arguably "at risk" species deserving of SCC status, and provide the ecological conditions necessary to maintain and contribute to the long-term viability and persistence of bison in the plan area and beyond.

The Custer Gallatin National Forest surrounds much of Yellowstone National Park and is critical habitat for and used by wild, migratory and resident bison. Approximately 88% of lands in the newly designated tolerance zone (~380,000 acres in total) outside of the Park are on Custer Gallatin lands (Montana, 2013). As an SCC for which the Forest Service likely does not have the capability to maintain a viable planning area population, the Forest has an obligation to maintain or restore ecological conditions on the Forest that contribute to maintaining a viable population of bison within their range (36 CFR 219.9(b)(2)(ii)). Facilitating dispersal throughout the tolerance areas is the necessary ecological condition that the Forest should provide to contribute to bison viability.

As discussed in previous comments (see Appendix C and D) the best available science demonstrates that bison are threatened by restricted distribution, among other factors, and are considered many to be ecologically extinct across their former range. Plumb et al. (2009) noted the concern over restricted distribution for the conservation of the Yellowstone herd stating that "management agencies should continue to prioritize conservation of bison migration to essential winter range area within and adjacent to the park." Bison require access to large areas of land and habitat for viability, this is one of the ecological conditions necessary for their persistence. Though bison historical distribution once covered much of the state of Montana, including many areas of the Custer Gallatin (see Figures 1 and 2, Appendix D), currently the only truly "wild" bison in the state are those essentially confined to the boundaries of Yellowstone National Park. Historically, bison inhabited about 20,000 square kilometers (4,942,108 acres) in the headwaters of the Yellowstone and Madison Rivers (Plumb et al. 2009). As of 2008, they occupied only 3,175 square kilometers (784,560 acres), predominantly inside Yellowstone National Park.

Though Yellowstone bison now have access to ~380,000 acres of land outside the Park, they are still only using a small fraction of this area. The significantly constrained distribution of bison within the CGNF planning area not only raises concerns over the resiliency, adaptability and persistence of the planning area population, and therefore is a viability concern for the population and the species as a whole (see Appendix D), it also further perpetuates the significant management issues surrounding this population (i.e. dependence on the unacceptable practice of shipping bison to slaughter, unsafe and inhumane hunting in overcrowded small patches of land, etc.). While we realize constraints on their current distribution are due in part to current and past management actions and hunting, there is much more the forest can do, from a habitat perspective, to help facilitate dispersal and use throughout current tolerance areas. Certainly, range expansion within current tolerance zones is acceptable and should be encouraged given the expansion was made considering social tolerance issues and the low potential for conflict in this area. The Forest should prioritize providing for significant suitable habitat for bison throughout current tolerance areas as a critical and essential piece to improving the future of Yellowstone bison management *and* contributing to the restoration of species viability.

<u>General Bison Management Recommendations</u>

"The key role of Custer Gallatin National Forest relative to bison is to provide and improve suitable habitat" (emphasis added, Forest Plan Revision Assessment, page 134). Thus, forest plan components must include direction to manage for bison habitat on Forest lands and encourage habitat restoration projects aimed toward improving habitat for bison in appropriate areas. For example, thinning, prescribed burns, meadow and aspen restoration, restoration of native grass species and fertilization can enhance forage production in lodgepole pine stands (Lindgren and Sullivan, 2014) that predominate over much of the lower elevation Forest lands west of the Park. Such prescriptions could also likely address other key wildlife species needs, so long as such activities take careful consideration of the effects and potential impacts to other species.

While plains bison are known to use a variety of habitats including forested areas, they are primarily grazers and therefore thrive in open grasslands and meadow complexes. Suitable (general and winter) habitat for bison exists in a patchwork of areas throughout the Forest, including in the new western tolerance area. However, as shown in Figure 18 from the Terrestrial Wildlife Report, there is a lack of contiguous suitable habitat providing effective corridor areas for bison to migrate and disperse farther out on the landscape and in to places such as the Taylor Fork and Upper Gallatin. The Forest should identify and manage for corridor/migration route areas for bison migrating from the Park to the Forest to facilitate dispersal throughout new and existing tolerance areas. Specifically, routes to the Taylor Fork and Upper Gallatin tolerance area should be identified in the forest plan, and habitat improvement projects implemented to provide a contiguous pathway of suitable habitat to facilitate the restoration of native bison to this area.

As stated in our joint PA letter, the following general management recommendations should be incorporated into specific plan components, including Desired Conditions, Guidelines, Goals, and Standards, as part of the Forest Plan Revision Process:

- The forest plan should aim to improve utilization of expanded bison habitat, especially in the new west side tolerance area. This includes working with the Park Service and MFWP to identify areas outside the Park that could serve as suitable winter and year-round habitat (taking into consideration private lands and inholdings) as well as identify the most likely migration corridors for bison to reach these areas from the Park.
- The forest plan should direct the Forest to work closely with the Park, MFWP, and other IBMP partner agencies to assess options for how to effectively restore bison to suitable habitat areas throughout tolerance zones, and establish objectives to implement plan components to support such restoration.
- The forest plan should commit to and prioritize (through plan components and other plan content) improving and maintaining potential habitat and corridor areas for bison through habitat improvement projects including: thinning, prescribed burns, meadow and aspen restoration, and restoration of native grass species and fertilization to enhance forage production.
- The forest plan should encourage volunteer grazing allotment retirement, acquisition of private lands/conservation easement opportunities as those opportunities arise, and work with other jurisdictions and agencies to facilitate safe highway crossings for bison (and other wildlife).

Comments Related to Specific Plan Components in Proposed DEIS Alternatives.

In general, we support bison direction that actively provides for bison habitat and promotes access to year-round forage and presence on National Forest System lands as included in Alternatives B and C, in addition to direction supporting a year-round self-sustaining bison population on the national forest as supported in Alternative D. We do not support Alternative E which does not seek to facilitate bison habitat improvement projects and aims to minimize impacts to livestock operations at the expense of supporting native bison within tolerance areas. The Forest has an obligation to do more in terms of recognizing and prioritizing the conservation and restoration of bison as a native, at-risk wildlife species than what Alternatives A and E, and to a lesser extent B and C, provide alone. We believe the Forest can sufficiently meet their obligation to provide habitat and necessary ecological conditions for bison by incorporating the following recommendations for specific plan components in the new Forest Plan.

Desired Conditions (FW-DC-WLBI)

> **01** Native bison have access to forage, security and movement corridors to facilitate distribution of the species to suitable habitats within the plan area.
>
> **02** Suitable habitat accommodates bison migrating out of Yellowstone National Park in winter, as well as supporting year-round bison presence on the Custer Gallatin National Forest. Adequate connecting corridors exist between suitable habitats to facilitate bison on the landscape with sufficient distribution to be resilient to stressors, adaptable to changing conditions, and contributing to stable or increasing genetic diversity.
>
> **03** Educational materials, including signage at trailheads and campgrounds where bison may occur, are available to help forest users understand wild bison behavior and act accordingly in order to avoid conflicts.
>
> **04** Alternative D: Bison are present year-round with sufficient numbers and adequate distribution to provide a self-sustaining population on the Custer Gallatin National Forest.

In general, we support the above Desired Conditions (**FW-DC-WLBI-01, 02, 03, 04**) and thank the Forest for their inclusion, and specifically for adding the desired condition (**FW-DC-WLBI-02**) in response to our PA recommendation to provide for suitable bison habitat and adequate connecting corridors between habitats to promote improved bison distribution on the landscape. We do however recommend that the first desired condition **FW-DC-WLBI-01** be amended to read **"**Native bison have access to forage, security and movement corridors to facilitate broad distribution and dispersal of the species to suitable habitats within the plan area." Also, the Desired Condition **FW-DC-WLBI-04** to have bison presence year-round with "sufficient numbers and adequate distribution to provide a self-sustaining population on the Custer Gallatin National Forest" is critical for meeting population viability requirements for bison within the plan area (36 CFR 219.9(b)(2)(ii)) while supporting broader bison recovery efforts (see Appendix C and D for supporting literature and additional justification).

Goal (FW-GO-WLBI)

> **01** The Forest Service engages with State, Federal, Tribal, and other willing partners to expand the science of bison ecology, foster awareness of the important biological, ecological and

cultural roles of bison on the landscape, and cooperatively develop adaptive strategies to manage bison and their habitats to facilitate natural movement of bison into and between suitable habitats.

We support the above Goal and thank the Forest for its inclusion. However, we recommend the addition of a goal for the Forest Service to work with state, federal, tribal, and NGO partners to identify suitable habitat and corridor areas for bison to use throughout current tolerance zones and to help guide habitat improvement projects.

Objectives (FW-OBJ-WLBI)

01 Alternatives B and C: Complete one habitat improvement project within, or for the purpose of creating or connecting, suitable bison habitat every three years.

Alternative D: Complete three habitat improvement projects within, or for the purpose of creating or connecting, suitable bison habitat per year.

We support the above Objective (FW-OBJ-WLBI-01) as outlined in Alternatives B and C, and are tremendously thankful to the Forest for its inclusion. Though we appreciate the inclusion of the Objective to complete three habitat improvement projects per year as defined in Alternative D, we feel that this is highly unrealistic. Instead, we recommend the Forest modify FW-OBJ-WLBI-01 to read, "Complete one habitat improvement project within, or for the purpose of creating or connecting, suitable bison habitat at a <u>minimum</u> of every three years."

Guidelines (FW-GDL-WLBI)

01 Alternatives B, C and D: To promote bison expansion within management zones, vegetation treatment projects and management actions taken to resolve bison-livestock conflicts should favor bison within these zones.

Alternative E: To minimize impacts to livestock operations, vegetation treatment projects and management actions taken to resolve bison-livestock conflicts should favor livestock.

02 To facilitate progressive expansion of bison management zones over time, bison habitat improvement projects should be strategically placed within and in close proximity to existing management zone boundaries.

03 Alternatives B, C and E: To facilitate bison expansion into unoccupied, suitable habitat, management actions should not impede bison movement unless needed to achieve interagency bison population and distribution.

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

We support the Guideline FW-GDL-WLBI-01 as defined in Alternatives B, C, and D and strongly oppose it as defined in Alternative E. We also support the Guideline FW-GDL-WLBI-02 as well as FW-GDL-WLBI-03 as defined in Alternative D. Because IBMP population objectives and tolerance zones are subject to

change over time and are currently based on an outdated and unacceptable plan (see Appendix C and D), we do not think the Forest should be implementing management actions that could in any way restrict bison use of the landscape or affect population abundance. Furthermore, as we've previously argued, the Forest has an obligation outside of the IBMP context to support a viable population of wild bison on forest system lands and to contribute to the broader restoration of this species as a whole. Therefore, we feel that the FW-GDL-WLBI-03 under Alterative D is a more appropriate, straightforward, and flexible guideline. If needed, the Forest could clarify the language to read: "To facilitate bison expansion into unoccupied, suitable habitat within current tolerance areas, management actions should not impede bison movement.

The Forest should also include one or more guidelines to allow for the phase-out of grazing allotments if there is a willing permittee both within and adjacent to current tolerance areas, acquisition of private lands/conservation easement opportunities as those opportunities arise, and collaboration with other jurisdictions and agencies to facilitate safe highway crossings for bison (and other wildlife). Specifically, the voluntary phase-out of grazing allotments to the northwest and west of the Park both within and outside tolerance areas could have significant benefits to bison restoration on forest lands including the potential to adjust current tolerance zones to allow for bison dispersal into new areas of the forest, including areas where they are currently allowed but have no way to access given current tolerance boundaries and existing conflicts with cattle.

Monitoring Guidelines

The new forest plan should include direction that specifically promotes bison dispersal and broad distribution throughout suitable habitat areas within tolerance zones. The required 2012 Planning Rule Monitoring Plan should reflect this as well. Specifically, the selected plan components for the Monitoring Plan should also include the desired condition **FW-DC-WLBI–01** as amended above and the monitoring question **MON-WL-07** should be amended to read "What management actions have occurred to improve/facilitate bison use of and broad distribution throughout new and existing tolerance areas?" By simply asking what management actions have occurred "to facilitate bison movements" is too vague. Movements to where and for what purpose? The monitoring language should be more explicit to reflect these goals and desired conditions. Under the **Implementation indicators**, the first **Bison management action** should read "# and types, locations of actions that improve or facilitate opening corridors for bison movement and use of unoccupied suitable habitat".

Recommendations:

The Desired Conditions (**FW-DC-WLBI – 01, 02, 03)**, Goal (**FW-GO-WLBI – 01)**, and Guidelines (**FW-GDL-WLBI-01, 02)** common to Alternatives B, C, and D to provide for bison habitat and promote use on forest service lands.

An Objective (i.e. **FW-OBJ-WLBI- 01)** for habitat improvement projects "within, or for the purpose of creating or connecting, suitable bison habitat" at a minimum of every three years (*Alternatives B, C, D*).

Plan components from Alternative D including the Desired Condition **FW-DC-WLBI-04** that **"**Bison are present year-round with sufficient numbers and adequate distribution to provide a self-sustaining population on the Custer Gallatin National Forest", and the Guideline **FW-GDL-WLBI-03 "**To facilitate bison expansion into unoccupied, suitable habitat, management actions should not impede bison movement."

The inclusion of a **Goal** that the Forest Service work with state, federal, tribal, and NGO partners to identify suitable habitat and corridor areas for bison to use throughout current tolerance zones to help guide habitat improvement projects.

The inclusion of one or more **Guidelines** to allow for the phase out of grazing allotments if there is a willing permittee both within and adjacent to current tolerance areas, acquisition of private lands/conservation easement opportunities as those opportunities arise, and collaboration with other jurisdictions and agencies to facilitate safe highway crossings for bison (and other wildlife).

Geographic Areas

Absaroka Beartooth Mountains Geographic Area

The Forest Service paints a picture of solitude, primitive recreation, and a diversity of wildlife species within the Vision section the Absaroka Beartooth Mountains GA section on page 158. It also speaks to the need for active management of front country areas, as well as the varied recreational opportunities found there. Beyond the current vision description, it needs to include management of a growing recreational and tourism economy that seeks out the places described in the Absaroka Beartooth Mountains. While the General Overview notes high visitation due in part to the area's proximity to Billings and Bozeman, we would like to see an acknowledgement of the likelihood of increasing use and the need to manage for sustainable recreation. This issue is bound to become increasingly significant as more people move to Bozeman and seek out the less recreated areas like the Bridger and Gallatin ranges. Within the Special Emphasis Areas and the Other Resource Emphasis Areas the challenges and resources available to address increased pressure need to be part of the GA focus. GYC believes the growing recreational uses in this GA must be a part of this plan in a very intentional and forward-thinking way to ensure the character and ecological values of the Absaroka Beartooth mountains and the quality of the outdoor experiences for everybody can be maintained. We would particularly like to see this emphasized with additional plan components for the Beartooth National Forest Scenic Byway (3.5.9) and Bad Canyon Backcountry Area (3.5.10).

<u>Recommendations:</u>

Explicitly state the challenge for managing the GA to include increased recreation, wilderness management and considerations for climate change. Build that into the management direction for this geographic area.

Include additional Desired Conditions for the Beartooth National Forest Scenic Byway and Bad Canyon Backcountry Areas that increasing recreational use is managed sustainably and does not impact the areas' scenic, natural, historical, cultural, or archaeological qualities.

Refer to the recommendations for Recreation, Recreation Emphasis Areas, and Recommended Wilderness Areas in this document.

Bridger/Bangtail and Crazy Mountains Geographic Area:

We are glad to see that the Draft Plan references the Crazy Mountains for their special historical, spiritual, and cultural significance for the Apsaalooke (Crow) Nation, who have and continue to utilize the range for fasting, visions, and other traditional practices. The importance of the range to the Apsaalooke people cannot be understated. Therefore, we ask that the plan be enhanced to protect those cultural values and practices, guarantee tribal treaty rights, and protect the wild character of the Crazy Mountains. We stand with the Apsaalooke Nation in asking that the range be managed to not allow expanded mechanized or motorized travel, mining, building of any new roads, construction of any new energy or utility corridors, or development of any new recreation sites or facilities. To accomplish these goals, we recommend the Crazy mountains be designated as recommended wilderness to give them the highest level of protection possible. We also recommend the inclusion of desired conditions that express the need to enhance the public's understanding of the range's cultural history as well as to preserve the range's primitive natural character. Additional standards should call for management in close consultation with the tribe as well as management activities that do not pose adverse effects to the traditional cultural landscape.

This section also highlights that the three mountain ranges in this geographic area include most native species and is a potential wildlife corridor between the Greater Yellowstone Ecosystem and other large blocks of wildlife habitat to the north, such as the Northern Continental Divide Ecosystem in northwest Montana. On page 167 under the Social and Economic Characteristics the Forest Service describes the high use recreational areas including the "M" trail. The "M", along with many other trails are highly used and the area experiences intense recreation year-round. The challenge within the Bridger/Bangtail ranges is the important and distinct role the Bridger/Bangtail ranges could play for wildlife connectivity, especially for wide-ranging dispersing species like grizzly bears. The Forest Service needs to make the connection between how high levels of recreational use in these ranges may impact secure habitat for dispersing species in order to manage resources for the highest and best use. GYC considers the vision of this GA to be lacking in this regard.

<u>Recommendations:</u>

Refer to the recommendations in the Recommended Wilderness, Recreation, and Recreation Emphasis Areas in this document.

Explicitly state the challenge for managing the GA to include increased recreation and wildlife connectivity with considerations for climate change and build that into the plan components for this geographic area.

Include the following as additional Desired Conditions:

- Interpretation and adaptive use of cultural resources provide public benefits and enhance understanding and appreciation of Crazy Mountains prehistory and history.

- The Crazies are characterized by a natural environment where ecological processes such as natural succession, fire, insects, and disease function and exist. Impacts from visitor uses do not detract from the primitive natural setting.

Include the following as additional Standards:

- The Crazy Mountains shall be managed in close consultation to fulfill Crow treaty obligations, and the federal trust responsibility. The area shall be managed to protect and honor Crow reserved rights and sacred land. The uses of this area must be compatible with desired conditions and compatibility shall be determined through government-to-government consultation.
- Management activities within the Crazy Mountains shall not pose adverse effects to the Crazy Mountain proposed traditional cultural landscape. Management activities shall consider scientific research and ethnographic research as they relate to Crow cultural land-use identities when analyzing project effects.

Madison, Henrys Lake and Gallatin Mountains Geographic Area:

The Madison, Henrys Lake and Gallatin Mountains Geographic Area is the second largest GA sitting at 952,813 acres with 805,299 of those acres managed by the Forest Service. Under the Ecological Characteristics section of the Proposed Action the Forest Service describes the headwaters, Wilderness, Wilderness Study Area and Inventoried Roadless Areas as they relate to existing Wilderness in the Beaverhead-Deerlodge NF and Yellowstone National Park. The land and water configuration provides a large expanse of mostly undeveloped land, which underscores the importance of the CGNF for wildlife connectivity and habitat. In the Social and Economic Characteristics section of the Proposed Action, the diverse economic opportunities related to timber, grazing and recreation are highlighted. Recreation is an important consideration given the communities of Big Sky, Belgrade, Bozeman and Livingston are growing as people are attracted to the high quality of life and recreational opportunities surrounding these places. At the same time, the Yellowstone National Park gateway communities of Gardiner and West Yellowstone experience millions of park visitors each year.

GYC finds the vision for this GA in the Draft Plan to be lacking. Wildlife and recreation are mentioned, but the draft plan does not address how these two important resources in the forest are managed to minimize conflict, provide for wildlife movement, or reduce human to human recreation conflicts. GYC would like to see the vision include a description of how the resources will be managed sustainably, especially those that could be in conflict, such as rising recreational demand and viable wildlife populations. Further, the importance of wildlife movement and connectivity needs to be explicitly mentioned in the vision.

<u>Recommendations:</u>

Fully incorporate the Gallatin Forest Partnership Agreement into the final Forest Plan by including the changes detailed in the Partnership's public comments.

Refer to the recommendations for Recreation, Recreation Emphasis Areas, and Recommended Wilderness Areas in this document.

Include a goal to partner with agencies, organizations and groups to monitor recreation, conflicts and impacts to wildlife.

Cabin Creek Recreation and Wildlife Area:

MG-DC-CCRW-02 states the Wilderness character is present with the recreation opportunities provided for in legislation. Please provide a Guideline that provides balance for wilderness character with growing recreational use.

Change MG-GDL-CCRW (page 178) from "new recreation" to "current and new special uses should not detract from wildlife protection and wilderness character."

Buffalo Horn Backcountry Area:

Fully consider the GFP proposal to manage the BHBCA for wildlife as the priority value.

Develop an additional DC to manage habitat and recreation for the wildlife in the area including grizzly bear and elk.

Include a goal to partner with Montana Fish, Wildlife and Parks to best manage for habitat, wildlife and recreation use.

Include an additional Suitability point (MG-SUIT-BHBCA) to say: The backcountry area is not suitable for mineral and oil/gas development.

Pryor Mountains Geographic Area:

The Pryor Mountains are unique ecologically, geologically and biologically. The area is recognized for its exceptional birding opportunities and it hosts bird species found almost nowhere else in the state of Montana, such as Gray Flycatcher and Blue-Gray Gnatcatcher.

Bear Canyon supports breeding populations of more than a dozen species on the Montana Priority Bird Species List. The riparian corridor is home to a rich diversity of neotropical migrants, and the adjacent uplands are inhabited by Common Poorwills, Loggerhead Shrikes, Sage Thrashers, Green-tailed Towhees, Pinyon Jays, and Greater Sage-Grouse. Because of its unique value for bird habitat and biodiversity, a section of Bear Canyon has been designated as an Important Bird Area by Montana Audubon through a global initiative by BirdLife International. (see http://www.audubon.org/important-bird-areas/bear-canyon).

The Pryors are also recognized as providing breeding habitat for Greater Sage-grouse. Research has documented Greater-sage grouse nesting in Bear Canyon, and the broods subsequently moving to summering areas on Big Pryor Mountain. We support the Greater Sage-grouse guidelines (FW-GDL-WLSG) in the draft plan and granting Recommended Wilderness designation in the Pryors, especially the Bear Canyon Area, will provide further protection to sage-grouse from key stressors.

Recommendations:

Refer to the recommendations for Recreation, Recreation Emphasis Areas, and Recommended Wilderness Areas in this document.

Various Errors

MON-VEGF-02 for fire refers to table 8, but fire is in table 10.

Table 28 lists relationship between at risk species and areas with low risk for ground disturbance. It has two different values for number of species within low risk areas

Conclusion

The Greater Yellowstone Ecosystem (GYE) is one of the most iconic and beloved natural areas on Earth. Home to the world's first national park and a remarkable diversity of fish and wildlife, the region is one of the last intact ecosystems in the planet's temperate zones. GYC works with people to protect the lands, waters and wildlife of the GYE now, and for future generations. Our vision is a healthy and intact GYE where critical lands and waters are adequately protected, wildlife is managed in a thoughtful, sustainable manner and a strong, diverse base of support is working to conserve and sustain this special place as part of a larger, connected Northern Rocky Mountain Region.

As we noted in the General Observations section, the Forest Service is facing several new challenges in drafting this revised forest plan. GYC would like to see the Forest Service acknowledge and include rising recreational demand as one of the major impacts on the western side of the forest. There is a noticeable lack of consideration of human-wildlife conflict. GYC would like to see a more proactive approach to understanding and managing the potential impacts of recreation on wildlife, vegetation and connectivity. We also want to see specific plan components addressing climate change. These two areas will require monitoring to ensure adaptive management decisions and strategies are well informed. Crafting an effective forest plan will certainly require creative solutions and adaptive management. In general, we see great potential in many of the ideas represented in the DEIS, such as the approach to manage for ecosystem resilience while acknowledging and attempting to work with natural landscape-shaping forces. The Forest Plan will require a monitoring plan with meaningful indicators to track progress and conditions to ensure a resilient ecosystem. Improved and expanded monitoring components are necessary to understand and respond to changing threats on the landscape and to manage adaptively, as required by the 2012 planning rule. GYC encourages the Forest Service to develop enforceable and actionable plan components. Desired conditions could be less general and more measurable with standards and objectives that build progress toward those conditions.

Thank you for considering our comments. The CGNF forest plan revision process is critical to support the overall health of the GYE. Greater Yellowstone Coalition is grateful to the Forest Service to be able to participate in forest plan revision. We look forward to helping plan for climate change, water, wildlife and wilderness. The issues the forest must address are not easy but with a robust planning process the outcome will be a well-managed, healthy and resilient forest.

GYC staff Ryan Cruz, Darcie Warden, Bob Zimmer, Charles Drimal, Joe Josephson, Shana Drimal and Brooke Shifrin contributed to this document. A big thanks to this group for your energy, thought and time to help the Forest Service create a plan that supports a resilient and sustainable forest for the future.

Literature Cited

Ballantyne, M., O. Gudes, and C.M. Pickering. 2014. Recreational trails are an important cause of fragmentation in endangered urban forests: a case-study from Australia. *Landscape and Urban Planning,* 130: 112-124.

Barros, A., J. Gonnet, and C. Pickering. 2013. Impacts of informal trails on vegetation and soils in the highest protected area in the Southern Hemisphere. *Journal of Environmental Management*, 127: 50-60.

Beartooth Mountains Oil & Gas Leasing, Final Environmental Impact Statement. April 1993. *Dept of Agriculture, Custer National Forest*.

Blanchard, B. M. and R. R. Knight. 1991. Movements of Yellowstone grizzly bears, 1975–87. *Biological Conservation*, 58:41–67.

Boulanger, J. and G. B. Stenhouse. 2014. The Impact of Roads on the Demography of Grizzly Bears in Alberta. *PloS ONE* 9(12): e115535. Dot:10.1371/journal.pone.0115535

Bureau of Land Management. 2006. Record of Decision and Approved Dillon Resource Management Plan. *Dillon, Montana, USA*.

Carroll, C., R.F. Noss, and P.C. Paquet. 2001. Carnivores as focal species for conservation planning in the Rocky Mountain region. *Ecological Applications*, 11(4): 961-980.

Carson National Forest. 2019. Draft Land Management Plan. *U.S. Department of Agriculture, U.S. Forest Service Southwestern Region*.

Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem. 2016. *Interagency Grizzly Bear Committee*.

Courtemanch, A.B. 2014. Seasonal habitat selection and impacts of backcountry recreation on a formerly migratory Bighorn Sheep Population in Northwest Wyoming, USA. *University of Wyoming Master's Thesis.*

Craighead, A.C., E.A. Roberts, and F.L. Craighead. 2001. Bozeman Pass wildlife linkage and highway safety study. Progress Report. *Craighead Environmental Research Institute. Bozeman, MT*.

Craighead, F.L., and E. Vyse. 1996. Brown/grizzly bear metapopulations. *In*: D. McCullough (Ed.) Metapopulations and Wildlife Conservation Management. *Island Press, Washington DC and Covelo CA*. Chapter 14: pp. 325-351.

Crow Indian Tribe et al., Plaintiffs vs. United States of America et al., Federal Defendants and State of Wyoming et al., Defendant-Intervenors. 2018. *United States District Court for the District of Montana Missoula Division, Case 9:17-cv-00089-DLC.*

Dood, A., S. J. Atkinson and V. J. Boccadori. 2006. Grizzly bear management plan for western Montana: final programmatic environmental impact statement, 2006–2016. *Montana Department of Fish, Wildlife and Parks, Helena, Montana, USA*.

Haroldson, M. A., C. C. Schwartz, K. C. Kendall, K. A. Gunther, D. S. Moody, K. Frey, and D. Paetkau. 2010. Genetic analysis of individual origins supports isolation of grizzly bears in the Greater Yellowstone Ecosystem. *Ursus*, 21:1–13.

Heinemeyer, K., J. Squires, M. Hebblewhite, J.J. O'Keefe, J.D. Holbrook, and J. Copeland. 2019. Wolverines in winter: indirect habitat loss and functional responses to backcountry recreation. *Ecosphere* 10(2): e02611. 10.1002/ecs2.2611.

[IGBC] Interagency Grizzly Bear Committee. 2018. 5 Year (2018-2022) Plan: Goals, Objectives, and 2018 Planned Actions. *Missoula, Montana, USA*.

[IGBC] Interagency Grizzly Bear Committee. 1994. Interagency grizzly bear committee task force report: grizzly bear/motorized access management. *Missoula, Montana, USA*.

[IGBST] Interagency Grizzly Bear Study Team. 2019. Yellowstone Ecosystem Subcommittee Spring Meeting presentation on grizzly mortalities 1975-2018 (F. van Manen). *April 3&4, Bozeman, Montana, USA*.

Inman, R. 2013. Wolverine Ecology and Conservation in the Western United States. *Doctoral Thesis No. 2013:4. Faculty of Natural Resources and Agricultural Sciences. Swedish University of Agricultural Sciences. Uppsala, Sweden.*

Inman, R. M., B. L. Brock, K. H. Inman, S. S. Sartorius, B. C. Aber, B. Giddings, S. L. Cain, M. L. Orme, J. A. Fredrick, B. J. Oakleaf, K. L. Alt, E. Odell, and G. Chapron. 2013. Developing priorities for metapopulation conservation at the landscape scale: Wolverines in the western United States. *Biological Conservation 166*:276-286.

Ladle A., R. Steenweg, B. Shepherd, and M.S. Boyce MS. 2018. The role of human outdoor recreation in shaping patterns of grizzly bear-black bear co-occurrence. *PLoS ONE* 13(2): e0191730. https://doi.org/10.1371/journal.pone.0191730

Larson, C.L., S.E. Reed, A.M. Merenlender, and K.R. crooks. 2016. Effects of recreation on animals revealed as widespread through a global systematic review. *PloS one, 11: e0167259*.

Mace, R. D, and T. L. Manley. 1993. South Fork Grizzly Study; Progress Report. *Montana Department of Fish, Wildlife and Parks, Kalispell, Montana*.

Mace, R. D., and J. S. Waller, T. L. Manley, L. J. Lyon, and H. Zuuring. 1996. Relationships among grizzly bears, roads and habitat in the Swan Mountains, Montana. *Journal of Applied Ecology,* 33:1395–1404.

Mattson, D. J., R. R. Knight, and B. M. Blanchard. 1987. The effects of developments and primary roads on grizzly bear habitat use in Yellowstone National Park, Wyoming. Pages 259-273 in Bears: their biology

and management. *Proceedings of the 7th International Conference on Bear Research and Management, Williamsburg, Virginia, USA*.

McLellan, B.N. and F.W. Hovey. 2001. Natal dispersal of grizzly bears. *Canadian Journal of Zoology*, 79:838–844.

Merriam, C.H. 1922. Distribution of grizzly bears in U.S. *Outdoor Life*, 50: 405-406.

Montana. 2013. Joint Draft Environmental Assessment: Year-Round Habitat for Yellowstone Bison. *Montana Fish, Wildlife and Parks, 1420 East Sixth Avenue, Helena, MT 59620*.

[MFWP] Monta Department of Fish, Wildlife and Parks. 2019. 2018 Grizzly bear conflict report presented at the spring Yellowstone Ecosystem Subcommittee meeting (K. Frey). *April 3&4, Bozeman, Montana, USA*.

Montana Department of Fish, Wildlife and Parks. 2013. Grizzly bear management plan for southwestern Montana: final programmatic environmental impact statement. *Montana Department of Fish, Wildlife and Parks, Helena, Montana, USA*.

Monz, C.A., D.N. Cole, Y. Leung, and J.L. Marion. 2010. Sustaining visitor use in protected areas: future opportunities in recreation ecology research based on the USA experience. *Environmental Management*, 45: 551-562.

Olimb, S. and E. Williamson. 2006. Regional habitat connectivity analysis: crown of the continent ecosystem. *American Wildlands, Bozeman, MT. 29 pp. www.wildlands.org*

Peck, C. P., F.T. van Manen, C.M. Costello, M.A. Haroldson, L.A. Landenburger, L.L. Roberts, D.D. Bjornlie and R.D. Mace. 2017. Potential paths for male-mediated gene flow to and from an isolated grizzly bear population. *Ecosphere*, 8(10) article e01969.

Pickering, C. M., J.G. Castley, and K. Richardt. 2012. Informal trails fragmenting endangered remnant vegetation in Australia. *In Sixth international conference on monitoring and management of visitors in recreational and protected areas, Stockholm, Sweden*, 362-363.

Picton, H. D. 1986. A possible link between Yellowstone and Glacier grizzly bear populations. *Int. Conf. Bear Res. and Mgmt*, 6:7-10.

Plumb, G.E., P.J. White, M.B. Coughenour and R.L. Wallen. 2009. Carrying capacity, migration, and dispersal in Yellowstone bison. *Biological Conservation* 2377-2387.

Primm, S. and S.M. Wilson. 2004. Re-connecting grizzly bear populations: Prospects for participatory projects. *Ursus*, 15:104-114.

Proctor, M. F., B. N. McLellan, C. Strobeck, and R. M. R. Barclay. 2004. Gender-specific dispersal distances of grizzly bears estimated by genetic analysis. *Canadian Journal of Zoology*, 82:1108–1118.

Proctor M., B. McLellan, D. Paetkau, C. Servheen, W. Kasworm, K. Kendall, G. Stenhouse, M. Boyce, and C. Strobeck. 2005. Delineation of sub-population boundaries due to anthropogenic fragmentation of grizzly bears in southwest Canada and northwest USA using genetic analysis. *Oral presentation, International Bear Association 16th annual conference, Trentino, Italy.*

Proctor, M. F., B. N. McLellan, G. B. Stenhouse, G. Mowat, C. T. Lamb, and M. Boyce. 2018. Resource Roads and Grizzly Bears in British Columbia, and Alberta. Canadian Grizzly Bear Management Series, Resource Road Management. *Trans-border Grizzly Bear Project. Kaslo, BC, Canada*. *Available at:* http://transbordergrizzlybearproject.ca/research/publications.html.

Regan, B. 2018. Inventory of Outdoor Recreation in the Greater Yellowstone Ecosystem. *Greater Yellowstone Coalition Report, Bozeman, MT, USA. Available at:* http://greateryellowstone.org/blog/2018/6/28/gyc-finalizes-inventory-on-future-of-recreation-in-greater-yellowstone

Schwartz, C. C., M. A. Haroldson, G.C. White. 2010. Hazards Affecting Grizzly Bear Survival in the Greater Yellowstone Ecosystem. *Journal of Wildlife Management,* 74(4):654-667.

Servheen, C., J.S. Waller, and P. Sandstrom. 2003. Identification and management of linkage zones for wildlife between the large blocks of public lands in the northern Rocky Mountains. Updated July 8, 2003. *USDI, Fish and Wildlife Service, Missoula, MT. Available at:* www.cfc.umt.edu/research/MFCES/programs/GrizzlyBearRecovery/Linkages_Report_20 03.pdf

Summerfield, B., W. Johnson, and D. Roberts. 2004. Trends in road development and access management in the Cabinet–Yaak and Selkirk grizzly bear Recovery Zones. *Ursus,* 15:115–122.

U.S. Department of Agriculture, U.S. Forest Service. 2017. Final Assessment Report of Ecological of Ecological, Social and Economic Considerations on the Custer Gallatin National Forest. 136 pp.

United States Government Accountability Office, Report to the Chairman, Committee on Natural Resources, House of Representatives, "Hardrock Mining. BLM and Forest Service Have Taken Actions to Expedite the Mine Plan Review Process but Could Do More." January 2016. GAO-16-165

Wakkinen, W. L. and W. F. Kasworm. 1997. Report: Grizzly bear and road density relationships in the Selkirk and Cabinet-Yaak Recovery Zones.

Walker, R. and L. Craighead. 1997. Analyzing wildlife movement corridors in Montana using GIS. R*eport No. 11, American Wildlands. http://www.wildlands.org*

Wells, S.L., L.B. McNew, D.B. Tyers, F.T. van Manen, and D.J. Thompson. 2019. Grizzly bear depredation on grazing allotments in the Yellowstone Ecosystem. *The Journal of Wildlife Management*, 83(3): 556-566.

Appendices

Appendix A: Region 1 Recommended Wilderness Guidance

Appendix B: GYC Wild and Scenic Eligibility Report

Appendix C: GYC Assessment Letter

Appendix D: Proposed Action Joint Bison Letter

Appendix E: NCDE FPA for grizzly bear management direction Join Letter

Appendix F: GYC Objection to the NCDE FPA for grizzly bear management direction

Appendix G: GYC comments on the HLC NF DEIS

Appendix H: GYC Recreation Literature Review

Appendix I: Outdoor Alliance Montana – Mapping and Recommendations

Appendix A:

Region 1 Recommended Wilderness Guidance

USDA **United States Department of Agriculture** **Forest Service** **Region One** **Northern Region 200 East Broadway Missoula, MT 59802**

File Code: 1950/2320
Date: OCT 0 4 2007

Sandra Mitchell
Public Lands Director
Idaho Snowmobile Association
P.O. Box 70001
Boise, ID 83707

Dear Ms. Mitchell:

Thank you for taking time to meet with us in Missoula last month. I appreciate having the opportunity to share my thoughts on management of recommended wilderness and hear your concerns on how snowmobilers would be affected.

In our meeting you asked to see, in writing, the guidance that has been provided to the field on management of recommended wilderness. Enclosed is a paper that has been developed to provide consistency across the Region. I also am enclosing an explanation of the methodology and process that the forests and grasslands are using to determine which of the roadless areas should be considered for recommendation for inclusion in the National Wilderness Preservation System. I hope you will see that the process is very rigorous and intended to eliminate from consideration those areas that are really best suited for uses that are not compatible with wilderness designation. The final decision on which areas to recommend is done through a thorough and open public involvement process.

My hope is that you and your constituents are active players in these discussions.

Sincerely,

Thomas L. Tidwell

THOMAS L. TIDWELL
Regional Forester

Enclosure

Consistency in Land and Resource Management Plans

Topic: Management of recommended wilderness

Purpose: During plan revision, the national forests and grasslands will be evaluating the areas that were recommended for wilderness designation in the first round of planning to determine if they should still be recommended. They also will be evaluating all other inventoried roadless areas to determine if they should also be recommended. For all of these areas, the forest needs to determine, through public involvement and the wilderness evaluation process, the best use of each area.

Guidance: If it is determined that the area is best suited to motorized or mechanized recreation, the area should not be recommended for wilderness. If it is determined that the best future use is inclusion in the National Wilderness Preservation System, the desired condition (dc) should reflect that. If there are established uses that are incompatible with that dc, such as motorized or mechanized recreation, forests should choose to implement one of the following actions:

1. Pursue a non-motorized/non-mechanized approach to management of the area through travel planning
2. Adjust management area boundary to eliminate the area with established uses,
3. Not recommend the area for wilderness designation.

Administrative use of motorized equipment for maintenance (chain saws, rock drills, limited use of helicopters) will continue to be allowed.

Background: Through the first round of planning, approximately 1.3 million acres of inventoried roadless was recommended for wilderness designation. The plan standards for most of those areas allowed for existing uses to continue as long as they did not degrade wilderness character. These standards are vague and have resulted in problems:

- **Lack of understanding of wilderness characteristics**. There has been some confusion over how wilderness characteristics are defined and what activities or what level of use would result in degradation of wilderness characteristics. In some areas, uses have changed or certain types of use have increased significantly, possibly degrading wilderness characteristics. In most cases, use has not been monitored closely enough, if at all, to make a call on how use has changed over the years.
- **Inconsistent management of recommended wilderness across the region.** Some areas are managed by more than one unit and the units have different management approaches, particularly for motorized recreation. This results in public confusion and can result in encroachments of illegal activities on to the adjacent forest.

Wilderness Characteristics

National Wilderness Monitoring Committee

Untrammeled—Lack of evidence of human control or manipulation.

- Prescribed fire
- Fire suppression
- Rehab with non-native species
- Mechanical fuel reduction

Undeveloped or "Does not Occupy"—Lack of evidence of modern human presence, occupation, modification.

- Signs
- Structures
- Road and trails
- Special provisions; livestock grazing, electronic sites, etc.

Natural—Ecological systems are substantially free from effects of modern civilization.

- Exotic species
- Changes to air quality
- Changes to water quality
- Effects of past timber harvest

Opportunities for solitude or primitive and unconfined recreation—Remoteness, solitude, freedom, risk, challenge.

- Human noise
- Sights of human civilization
- Number of people/parties
- Types of use; motorized, mechanized

KIPZ FOREST PLAN REVISION
IRA EVALUATION FOR WILDERNESS
EVALUATION METHODOLOGY AND PROCESS
Version **7/26/05**

METHODOLOGY

The 85 Inventoried Roadless Areas (IRA)[1] on the Kootenai and Idaho Panhandle National Forests revision zone (KIPZ) will be evaluated for suitability for wilderness recommendation. The three tests of capability, availability, and need will be used to determine suitability as set forth in Forest Service Handbook (FSH) 1909.12, Chapter 72.[2] In addition to the inherent wilderness quality an IRA might possess, the area must provide opportunities and experiences that are dependent upon and enhanced by a wilderness environment. The area and boundaries must allow the area to be managed as wilderness.

Capability is defined in FSH 1909.12, Chapter 72 as the degree to which the area contains the basic characteristics that make it suitable for wilderness designation without regard to its availability for or need as wilderness. **Availability** determination is conditioned on the value of and need for the wilderness resource compared to the value of and need of the area for other resources. **Need** is the determination that the area should be designated as wilderness through an analysis of the degree that the area contributes to the local and national distribution of wilderness.

Capability

There are five basic characteristics identified to evaluate the capability of an IRA: environment, challenge, outdoor recreation opportunities, special features, and manageability.

The environment provides the person the opportunity to feel or experience solitude and serenity, a spirit of adventure and awareness, and a sense of self-reliance. The area needs to appear natural and free from disturbance and where the normal activities and life cycles of biotic species take place. A range of geological, biological, and ecological variability exists and is identified. Any scientific, educational, or historical values are identified and considered. Social and economic factors must blend with the environment and natural features to make the area desirable and manageable as wilderness.

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1. There are 48 IRAs on the Idaho Panhandle NF and 43 IRAs on the Kootenai NF. Six of the IRAs are located on both forests. They are counted separate for each forest but only once for the planning zone.

2. This chapter of FSH 1909.12 was reissued in March 2005. Changes in the new issue included using new chapter numbers and the use of some new terminology. It did not alter the direction for analysis or the evaluation process. The methodology and process used to evaluate the IRAs in KIPZ meet the March 2005 handbook direction. Chapter numbers used in this document reference the March 2005 handbook.

Challenge considers the degree that the area offers people the opportunity to experience adventure, excitement, challenge, initiative, or self-reliance.

Outdoor recreation opportunities that are primitive and unconfined include hiking, backpacking, stock riding, hunting, fishing, skiing, snowshoeing, and rafting. These may or may not currently exist within an individual area. Other outdoor recreational activities may currently exist but are not compatible with a wilderness setting or other wilderness characteristics.

Special features recognize scientific, educational, historical, and scenic values found in the area. The abundance and variety of wildlife and fish, including threaten and endangered species, will be considered. Other special features that are unique or are outstanding will be identified.

Manageability considers the ability to manage the area as wilderness as required by the 1964 Wilderness Act. Such factors as size, shape, and juxtaposition to external situations are considered. Boundary location and the ability to easily identify the boundary on the ground are critical in meeting this characteristic.

The combinations of basic natural characteristics are of infinite variety. No two areas possess any of theses characteristics in the same measure. The process, then, is to analyze the quality and quantity of these characteristics and determine if they can be provided by establishing management, protective, mitigation, or enhancement measures.

In order to evaluate the five basic characteristics, they will be broken down into elements, activities, or features that describe the basic characteristics and provide a basis for rating. At least two criteria will be established for each element, activity, or feature with three criteria considered optimal. While there is no limit on the number of criteria that can be established, the number of criteria must be kept to a number that can reasonably provide for evaluation of the characteristics. Since criteria will probably not be of equal importance, criterion will be listed in order of priority for each element, activity, or feature. Criteria will be established to consider existing as well as future conditions both inside and adjacent to the IRA.

Forest and district resource specialists and managers will rate the criterion as high, medium, or low depending on how well the criterion is or can be met in the IRA. For IRAs that crossed forest boundaries, the criteria will be evaluated only for the portion that lies within the Kootenai or Idaho Panhandle Forest boundary. Final evaluation of these IRAs will not be completed until reconciliation with the adjoining forest can be made.

Three specialists from each of the two forests in the zone will then evaluate the elements, activities, or features based on the criteria rating given in the first evaluation. The IRA will then be given a summary rating of high, moderate, or low in capability. Methodology will use three Forest Service specialists who are familiar with the IRA along with three that generally do not know the IRA and will be limited to the criteria ratings and comments provided by the districts during the first evaluation.

Availability
Availability of an IRA for wilderness management must be evaluated against other resource needs, demands, and uses of the area. To be available for wilderness, the wilderness value, both tangible and intangible, should offset the value of the other resources. The predominant value does not necessarily reflect the use or combination of uses that would yield the greatest dollar return or the greatest unit output. In evaluating other resources, current uses, trends, and potential future uses and outputs need to be considered.

Wilderness designation and management of an area can have an effect on the management of adjacent lands. Therefore, evaluation of other resource needs may need to be considered in the area adjacent to an IRA. FSH 1909.12, Chapter 72.21 provides some examples and guidance in evaluating the development and management for sustained yield production of resources other than the wilderness resource.

Other resources to be evaluated will be determined from resource specialists' knowledge of the areas and public comments. Once the resources have been identified, criteria will be established for evaluation. Forest and District resource specialists will rate the criteria as high, medium, or low. Two to six forest program mangers will then evaluate each IRA's availability for wilderness designation.

Need
The need for an area to be designated as wilderness will be through an analysis to determine the degree the area can contribute to the local and national distribution of wilderness. There should be clear evidence of current or future public need for additional designated wilderness in the general vicinity of the area being considered. This evidence will include public involvement. Need analysis will use such factors as the geographic distribution of areas, representations of landforms and ecosystems, and the presence of wildlife expected to be visible in a wilderness environment.

To best analyze the need for additional wilderness in the Northern Region, the Regional Forester decided the needs assessment would be completed at the Regional level. Once that assessment is completed, two to six program managers will use the assessment to rate the IRAs for need of additional wilderness designations. A rating of high, moderate, or low will be assigned to each IRA.

Suitability of an IRA for potential wilderness designation will be based on the inherent wilderness quality determined in the capability, availability and needs assessment. In addition to the inherent quality, the area must provide opportunities and experiences that are dependent upon and enhanced by a wilderness environment. The size and shape of the area must allow the area to be managed as wilderness. Forest Land Managers will review the evaluation and determine which IRAs are suitable for wilderness designation.

Proposed wilderness boundaries and mapping will be completed following the guidelines in FSH 1909.12, Chapter 72.5 for each IRA determined to be suitable. Boundaries must

be easy to define, locatable on the ground, and must be manageable. Priority of boundary in descending order of desirability is:

1. Use natural features locatable on both a map and on the ground, such as a ridge top, mountain peak, or lake shore.

2. Use semipermanent human-made features such as roads and powerlines. The boundary may be set back a given distance from these features.

3. Use previously surveyed lines or legally determined lines such as section and township lines, property lines, or State boundaries.

4. Use a straight line from one locatable, visible point to another, such as between two mountain peaks.

5. Use a series of bearings and distances between locatable points that are not visible.

PROCESS

Evaluation of the 85 IRAs for wilderness suitability and recommendation was based on the methodology established above. IRAs that crossed the Kootenai and Idaho Panhandle National Forests boundaries but remained totally within the KIPZ revision boundary were rated first for the respective forest, then given a consolidated rating for the zone. IRAs that crossed the KIPZ boundary on to the Flathead, Lolo, Clearwater, or Colville National Forests were not given an overall rating until the adjacent forest had provided evaluation comments. Coordination of IRA evaluation with adjacent forests was completed in December 2004.

The results of each step or test established in FSH 1909.12, Chapter 72 are provided below.

Capability

Methodology required identifying elements, activities, or features that described the basic characteristics and provided a base for rating. This was completed by the two Forest Recreation Program Managers and assisted by a NEPA Specialist and the Forest Planners. The format was adapted from the White River National Forest in Colorado. Work began in September 2002 and was completed in early June 2003.

The five basic characteristics were broken down into 19 elements, activities, or features. A total of 47 criteria were established and used to rate each of the 85 IRAs. Generally each criterion listed first for an element, activity, or feature received a heavier weighting in evaluation than the following criteria. Criteria were established to consider existing as well as future conditions both inside and adjacent to the IRA.

Evaluation of the criteria was performed by District Recreation Managers, Forest Fishery and Wildlife Biologists, and Forest Hydrologists. Each criterion was rated as high, medium, or low. For IRA's that crossed forest boundaries, the evaluation was only for the portion that lies within the Kootenai or Idaho Panhandle Forest boundary. This evaluation was completed in June 2003.

In December 2003, three specialists from each of the two forests in the zone rated the 19 elements, activities, or features as high, medium, or low based on the rating given in the first step. The IRA was then rated as high, moderate/high, moderate, moderate/low, or low in capability. The moderate/high and moderate/low ratings were used only when an IRA did not clearly fit in one of the ratings established in methodology and was consider in a transition area between two established ratings. Specialists for each forest consisted of the Forest Recreation and Wilderness Program Manager and two District Resource Managers.

Table IRA-1 shows the 19 elements, activities and features and the 47 criteria used to rate the 85 IRAs.

Table IRA-1: AREA CAPABILITY ASSESSMENT ELEMENT AND CRITERIA

ENVIRONMENTAL ELEMENTS		
Opportunity for Solitude		
High	**Medium**	**Low**
Feeling of being alone or remote from civilization.	Feeling of being alone is possible but signs of civilization are likely.	Little opportunity of feeling alone.
The possibility of meeting another party is remote.	The possibility of meeting or not meeting another party is about equal.	It would be rare to not meet another party.
Recreation use is light.	Recreation use is moderate.	Recreation use is high.
Natural and Free from Disturbance		
High	**Medium**	**Low**
IRA appears free of human disturbance. Any disturbance appears to be natural, such as a small wildfire.	IRA appears mostly free of human disturbance. Natural disturbance evident, but does not dominate the landscape.	IRA shows signs of human disturbance. Natural disturbance dominates the landscape, such as a stand replacing wildfire.
Area visible in surrounding foreground (outside the IRA) may show some human disturbance but does not dominate the view.	Area visible in surrounding foreground has signs of human activity such as a road or farmhouse.	Area visible in surrounding foreground shows obvious human activity such as clearcuts or a town.
Has only a minor improvement, such as a trail.	Has several minor improvements.	Has a major improvement such as a power line, dam, or road.
Noxious weeds not evident.	Noxious weeds evident in isolated spots.	Noxious weeds common or scattered throughout the area.
High water quality. Fully supports beneficial uses.	Good water quality. Partially supports beneficial uses.	Poor water quality. Does not support beneficial uses.
Provides Challenge and Adventure		
High	**Medium**	**Low**
Terrain generally rugged.	Terrain typical for general forest area.	Terrain more gentle and rolling.
Requires above average physical ability, knowledge,	Requires similar physical ability, knowledge, or skill	Area easily accessible; requires average physical

or skill to safely recreate in the area.	as the general forested area.	ability, limited knowledge and skill as compared to the abilities required in the general forest area.
Nonhunting outfitting permitted within area.	Nonhunting outfitting permitted but rarely used.	Nonhunting outfitting not permitted within area.
Manageable		
High	**Medium**	**Low**
Size and shape of area allows for effective management.	Size or shape will affect manageability but can be mitigated by boundary changes.	Size is small or has irregular shape that makes management difficult.
Minimum activity in surrounding area that effects manageability	Activity is evident and ongoing in surrounding area but will not keep the area from being managed	Activity in surrounding area will effect the manageability of the IRA
Located adjacent to existing Wilderness or other IRAs	Located near existing Wilderness or other IRAs. May be difficult to access.	Isolated, small parcel of land
SPECIAL FEATURES		
Scientific, Educational, or Historical Values		
High	**Medium**	**Low**
Several significant scientific, educational, or historical values have been identified in the IRA	At least one significant or several minor scientific, educational, or historical values have been identified in the IRA	No scientific, educational, or historical value has been identified in the IRA
Identified values are unique to the northern Rockies.	Identified values are common in northwestern US but is uncommon on KIPZ	Any identified values are common through out KIPZ and northwest US.
Scenic Features		
High	**Medium**	**Low**
Area has peaks or rocky formations considered spectacular from the rest of the Forest and/or special vegetative features that are considered very scenic.	Area has a peak or formation that stands out from surrounding terrain and/or vegetative features considered scenic.	Terrain is typical of the forest or surrounding area and the vegetation is common to the surrounding area.
Area has alpine lakes, creeks in alpine meadows, or waterfalls.	Area may have bodies of water but are typical for the Forest.	Area has no permanent lakes but may have perennial creeks or ponds.

Variety and Abundance of Wildlife		
High	**Medium**	**Low**
There is a diverse community of native mammals, birds, and fish.	There is a moderate variety of native mammals, birds, and fish.	The community of native mammals, birds, and fish is not diverse.
There is a known high variety of TE&S Species within the IRA.	There is a known moderate variety of TE&S Species within the IRA.	There is a known low variety of TE&S Species within the IRA.
Overall wildlife habitat integrity rating of high	Overall wildlife habitat integrity rating of moderate	Overall wildlife habitat integrity rating of low
Provides critical linkage between wildlife areas or habitats	Provides linkage between wildlife areas or habitats	Does not provide linkage between wildlife areas or habitats
Other Special Features		
High	**Medium**	**Low**
Area has at least one major other special feature, such as a grove of western red cedars, high mountain meadow, bog, etc.	Area has several minor other special features, such as old growth stand, flat creek bottom, or small water falls.	Area has no major or very few minor other special features
Contains a designated special area such as a W+S River or SIA, etc.	Contains a candidate or eligible special area.	Does not contain an established, candidate, or eligible special area.
PRIMITIVE AND UNCONFINED RECREATION		
Hiking Opportunities		
High	**Medium**	**Low**
Two or more trails, class 3 or higher, that are routinely maintained	At least one trail, class 2 or higher, that is routinely maintained	No system trails that are maintained
Terrain is gentle and vegetation open to allow easy cross-country travel	Terrain is moderate or vegetation brushy that impedes cross-country travel	Terrain is steep or vegetation too dense (including down material) that cross-country travel is difficult
Backpacking Opportunities		
High	**Medium**	**Low**
Two or more trails, class 3 or higher, that are routinely maintained	At least one trail, class 2 or higher, that is routinely maintained	No system trails that are maintained
Area has several dispersed camping sites that are routinely used	Area has at least one dispersed camping site that is occasionally used	Area does not have dispersed camping sites that are used but progressive

		camping may occur
Saddle Stock Opportunities		
High	**Medium**	**Low**
At least one trail, class 3 or higher, designed for saddle stock and routinely maintained	At least one trail, class 2 or higher, that is suitable for saddle stock and routinely maintained	No system trails that are maintained
Trailhead has stock facilities, such as unloading ramp	Trailhead has room to turn around stock truck or stock trailer	Trailhead does not support use of stock
Hunting Opportunities		
High	**Medium**	**Low**
Good populations of the big game animals or fair population of permitted animals, such as sheep or goats	Has fair populations of game animals	Has scattered small herds of big game animals
Terrain is gentle and vegetation open to allow easy hunting access off trails and ridges	Terrain is moderately steep or vegetation brushy that limits hunting on much of the area	Terrain is steep or vegetation too dense that hunting is limited to trails or ridges
Fishing Opportunities		
High	**Medium**	**Low**
Good populations of native game fish	Has fair populations of native game fish	Has low populations of native game fish
Stream bottoms are generally gentle with minor brush allowing access to water	Stream channel has enough brush to limit access; channel bottom or side slopes not overly steep	Stream channel steep, or steep rocky side slopes, or brush along channel makes access difficult
Skiing and Snowshoeing Opportunities		
High	**Medium**	**Low**
Terrain is gentle and vegetation open to allow easy cross-country travel	Terrain is moderate or vegetation brushy that impedes cross-country travel	Terrain is steep or vegetation too dense that cross-country travel is difficult
Area is easily accessible in winter by motorized wheel vehicles	Snow keeps wheeled vehicles several miles from area but access is possible by snowmobile	Area is difficult or rarely accessed by snowmobile

Snowmobiling Opportunities		
High	**Medium**	**Low**
Terrain is steep or vegetation too dense that cross-country travel is difficult	Terrain is moderate or vegetation brushy that impedes cross-country travel	Terrain is gentle and vegetation open to allow easy cross-country travel
Snowmobile use prohibited, or if allowed, rarely used	Snowmobile use restricted to two months or less, or on half or less of the area	Snowmobile use permitted.
MANAGEABILITY – THE EXTENT THAT		
Area Boundaries are Recognizable		
High	**Medium**	**Low**
The vast majority of the boundary follows features that can be easily found and identified on the ground, such as a dominate ridge, creek, road, or trail	More than half of the boundary follows a feature that can be easily found and identified on the ground	Boundary generally lies across the hill side and can rarely be located without equipment, such as a gps unit
Boundary can be easily adjusted to follow locatable and identifiable features without significantly modifying the area boundaries	Boundary can be adjusted to follow locatable and identifiable features but will modify the general size and shape of the IRA. Boundary may be identified with minimal signing.	Boundary can not be adjusted to follow locatable and identifiable features, or requires extensive signing.
Area Boundaries promote Remoteness		
High	**Medium**	**Low**
Area accessed by trail or closed and revegetated road; adjacent area has natural setting	May be accessed by narrow or two track open road that is lightly traveled; minimal human presence evident	Boundary adjacent to heavily used road or along area showing high human presence, such as a number of farm houses with outbuildings, pasture land, etc.
No active disturbance near boundary	May have disturbance near boundary but is short term such as a logging operation.	Boundary adjacent to long term disturbance like farmland or mining operations
Natural processes take place undisturbed and unmanipulated.	Minimal disturbance of natural processes.	Natural processes cannot occur without human intervention.

Area Boundaries are Manageable		
High	**Medium**	**Low**
Boundary total on National Forest and not adjacent to private property	Boundary follows property line forming irregular shape.	Boundary crosses private property so there are in-holdings along the boundary.
No inholdings.	Few small inholdings may be present.	Several small or a large inholding.
Area Boundaries Constitute Barrier to Prohibited Use		
High	**Medium**	**Low**
Topographic feature provides a natural barrier, such as major stream or steep hill side	Topography generally makes it difficult to participate in prohibited use	Topography not a deterrent to prohibited use
Human improvement is significant to physically provide a barrier, such as a road cut slope	Human improvement places user on notice of prohibited use, such as a sign.	Human improvement not a deterrent; may provide point of access of prohibited use

Table IRA-2 shows the rating for each criteria and element and the overall rating for each IRA.

Add the table.

Availability

While Capability evaluated the wilderness characteristics of an IRA, Availability considered other resources needs. FSH 1909.12, Chapter 72.2 and internal and external comments were used to identify other resources for evaluation and establish the criteria. Eight criteria were established by the two Forest Recreation and Wilderness Program Managers in August 2004. The two managers selected resource specialists from each forest to rate the criteria using a high, medium, or low rating system. Specialists included recreation managers, wildlife and fishery biologists, hydrologists, ecologists, geologists, fuels and wildfire specialists, land specialists (special use permits), and Silviculturists. These ratings were completed by October 2004.

Individual district and forest specialists rating and resource needs were summarized for each IRA. An overall availability rating was then established by the two forest program managers. This was completed in December 2004.

Table IRA-3 lists the eight resources and criteria. The availability for an area for proposed wilderness designation will be the opposite of the rating for other resource requirements. For example, a rating of high mineral value will mean a low rating for wilderness designation.

Table IRA-3: AREA AVAILABILITY RESOURCE ASSESSMENT AND CRITERIA

RESOURCES
1. Areas that are of high value for water yield or on-site storage where installation and maintenance of improvements may be required.
2. Areas needing management for wildlife or aquatic animals that MIGHT conflict with Wilderness management.
3. Area needing active aquatic restoration activates.
4. Area needing active vegetative restoration activity due to specific species survival, or identifiable fuel reduction activity to reduce the risk of catastrophic wildfire, or known areas of severe insect infestation that will lead to heavy tree mortality.
5. Areas of high value mineral deposits of economic or strategic importance.
6. Areas having such unique characteristics or natural phenomena that general public access should be developed to facilitate public use and enjoyment including winter sports sites.
7. Lands committed through contracts, permits, or agreements that would be in conflict with Wilderness management (some minor permitted uses may still be allowed.)
8. Forest Service does not have sufficient control to prevent development or irresolvable, incompatible uses that would lessen wilderness character and potential.
RATING
HIGH = Areas having an evidence and high priority need for treatment in the category addressed in the question. Availability would equate to Low.
MEDIUM = Areas having a need for treatment in the category addressed in the question. Availability would equate to Moderate.

LOW = Areas have no to little need of treatments or management addressed in the question. Availability would equate to High.

Table IRA-4 shows the ratings determined for each resource and the overall rating for each IRA.

Add table.

Need

After evaluating an area's capability for providing wilderness characteristics and availability for wilderness designation, the last step of the evaluation process is to determine if the area is needed as part of the National Wilderness Preservation System. A Wilderness Needs Assessment was completed in 2003 by an interdisciplinary team at the regional level. This allowed the assessment to cover Montana, northern Idaho, and parts of the Dakotas – a much larger area than the KIPZ. The assessment focused on social and ecological factors. The social factors included current levels of use in designated wilderness in the Northern Region, national and local trends in outdoor activities, and population statistics. Ecological factors included representative-ness of vegetative cover types and ecological sections, fisheries, and wildlife. A copy of the Northern Region Wilderness Needs Assessment is attached as Appendix A.

Since the regional needs assessment covers a large and diverse area, it could not address individual IRA's. The two Forest Recreation and Wilderness Program Managers met in December 2004 to apply the regional needs assessment to the 85 IRAs in the KIPZ. The assessment was broken down into six questions and each IRA rated high, moderate, or low. Maps created for the regional assessment were available and used to determine the significance of the resource being addressed by each question to every individual IRA. Table IRA-5 shows the six questions and the rating criteria used to determine need.

Diversity within KIPZ and application of the broad regional needs assessment required that ratings be established for individual IRA's, for individual forests, for portions of a forest, or for the zone. Ratings for questions 1 and 2 were determined for each IRA based on the presence or absence of the species being addressed. Question 3 was split based on whether the IRA was located adjacent to an existing wilderness boundary or located near another IRA. A rating was determined for either 3a or 3b, but not both. A rating for Question 4 was determined for the entire forest or section of forest. It was split for the Idaho Panhandle between the north and south halves but only one rating was used for the Kootenai Forest. A single population center was selected for each forest from the list in the regional needs assessment for question 5. Couer d'Alene, Idaho was selected for the population center for the Idaho Panhandle Forest. Kalispell, Montana was selected as the population center for the Kootenai. For Question 6, each forest produced a map that showed the four selected under-represented plant communities that are typically available in the KIPZ. The four selected were Vegetation Response Units (VRU) 2 (ponderosa pine), 5 (western red cedar and western hemlock), and 8 (western red cedar and western hemlock – wet) and Aquatic Response Unit (ARU) types representing forest-dominated riparian areas. Other under-represented communities were not considered because they do not exist or are only found in small quantities within the IRAs.

An overall rating was then applied for the IRA based on the following parameters:

The overall rating would be high if:

- Three or more questions were rated high, or
- Two questions were rated high and at least two of the remaining four questions were rated moderate.

The overall rating would be moderate if:

- Two questions were rated high and not more than one of the remaining four questions was rated moderate, or
- One question was rated high and at least one of the remaining five was rated moderate, or
- No question was rated high but two or more were rated moderate.

The overall rating would be low if:

- Five of the questions rated low, or
- No question was rated high and no more than two were rated moderate.

Table IRA-5: AREA NEEDS ASSESSMENT AND CRITERIA

Questions	High	Moderate	Low
1. Areas having the presence of Westslope cutthroat, Yellowstone cutthroat, or bull trout.	Presence of 2 fish	Presence of 1 fish	None of the species present
2. Presence of sensitive plant species.	Sensitive plant(s) identified in IRA are globally rare	Sensitive plants identified in IRA would benefit from wilderness designation = **moderate/high** Sensitive plants present in IRA = **moderate/low**	No sensitive plants identified in IRA.
3a. Areas adjacent to existing Wilderness (larger reserved size beneficial for wildlife conservation.)	IRA is adjacent to existing Wilderness boundary	IRA adjacent but separated by corridor	Not applicable
3b. IRAs could be combined to form large habitat patches.	Two or more IRAs adjacent and separated only by a narrow corridor, such as a road.	Two or more IRAs could be connected by a wildlife travel corridor.	IRA not adjacent or close to another IRA
4. Ecological Sections represented in Wilderness.	Ecological Section represented by not more than 10,000 acres.	Ecological Section represented by 10,001 to 100,000 acres.	Ecological Section represented by more than 100,000 acres.
5. Number of	Wilderness acres of	Wilderness acres of	Wilderness acres of

Wilderness acres within 100 miles of Kalispell or Couer d'Alene.	approximately 100,000 acres.	approximately 500,000 acres.	approximately 1,000,000 acres.
6. Under-represented plant communities.	VRU 2, 5, or 8 and ARU forest-dominated riparian covers more than 2/3 of the IRA.	VRU 2, 5, or 8 and ARU forest-dominated riparian covers 1/3 to 2/3 of the IRA.	VRU 2, 5, or 8 and ARU forest-dominated riparian covers less than 1/3 of the IRA.

Table IRA-6 shows the ratings and overall ratings for the IRAs.

Add the table.

DETERMINATION OF SUITABILITY AND PROPOSAL

Each individual IRA received a rating from the three tests of capability, availability, and need as described above. To be determined suitable for wilderness designation, the three ratings must indicate the IRA has an inherent wilderness quality. In addition to the three ratings, the area must provide opportunities and experiences that are dependent upon and enhanced by a wilderness environment. The size and shape of the area and the area boundaries must allow the area to be managed as wilderness. Suitability must also consider adjacent land, whether public or private, so that the entire national forest can be managed in accordance to public laws, including the protection and management of a variety of resources, both inside and outside the IRA.

The evaluation process described in FSH 1909.12, Chapter 72 is to determine the mix of land and resource uses that best meet public needs. This process may recommend management of an IRA through a theme different than proposed wilderness designation. Some management themes provide protection of existing wilderness characteristics while providing for resource management that is not compatible with a wilderness management theme. IRAs determined not to be suitable for wilderness designation will be evaluated for management under one of the other themes.

The three ratings of capability, availability, and needs provided the beginning determination of suitability. Other considerations such as size and shape, wilderness opportunities, and the ability to manage the area as wilderness were then applied. For areas determined to be suitable, proposed wilderness boundaries were mapped that supported wilderness management of the included land while providing protection of other resources and public safety.

An IRA's inherent wilderness quality could be demonstrated if the capability rating was high or moderate/high. Availability and need for wilderness designation could be demonstrated if at least one of these ratings was high and the other moderate or high. A rating of low for any of the three tests indicated the IRA did not meet the suitability determination. Appling the other considerations either confirmed or modified the beginning determination and completed the suitability determination for each IRA.

Determination of suitability included the Forest Supervisor, District Rangers, Forest Staff Officer, and Forest Wilderness Program Manager.

Parameters for mapping proposed wilderness for those IRAs determine to be suitable are, in order of priority:

1. Boundaries must be identifiable on the ground. Major ridges and roads provide the best topography or human development feature that can identify a boundary. Minor or broad ridges are often hard to identify on the ground and should not be used. Major creeks or rivers are suitable for boundaries but small creeks should not be used. Contour lines are difficult to locate even with the proper equipment

and generally will not be used except for short distances. Meandering lines are impossible to locate and may not be used.

Points and connecting straight lines using the Global Position System (GPS) may provide adequate boundary identification in the near future. Small handheld GPS units can locate boundaries to within a few feet. This system was allowed when other, better boundary locations did not exist.

2. Boundaries must allow for wildfire protection by providing a wildland fire interface zone near private property, along state and federal highways and county roads and along major utility corridors. The boundary was to be at least ½ mile from these features. Shorter distances were allowed in cases where management of private property was not conducive for human occupancy, such as high elevation corporation timber lands, where existing proclaimed wilderness boundary abuts against private land, or where remoteness of the area allowed for a shorter interface zone. These boundaries may not correlate to the Wildland Urban Interface (WUI) boundaries developed under the Healthy Forests Restoration Act of 2003. It is possible to have proposed wilderness boundaries inside a WUI boundary.

3. Boundaries must allow for maintenance of existing roads. The boundary was set 300 feet (horizontal distance) on either side of the road centerline to provide adequate area to maintain clearing limits, provide fuel breaks, handle slumps and slides, maintain water drainage structures, and allow for improvements necessary for safe travel. Along major arterial roads where traffic is normally heavy and the road provides the main access to the national forest, the distance was increased to ¼ mile.

4. Boundaries could allow motorized travel corridors through the proposed wilderness area. When two or more IRAs were separated by an open road, the IRAs could be proposed as a single wilderness but a 600 foot (300 foot either side of the road) motorized travel corridor could be maintained.

5. Old harvest units and the access roads could be included within the proposed wilderness boundary provided the evaluation process indicated wilderness management was the highest resource value for the treated lands, adequate mitigating measures had been taken to reduce erosion and other watershed issues on the access roads, and the inclusion of the treated lands eliminated intrusion corridors within the proposed wilderness.

Boundary mapping was completed in April 2005.

IRAs proposed for wilderness designation and the recommended boundaries are shown in the Forest Plan Revision documents and on the accompanying maps.

Appendix B:

GYC Wild and Scenic Eligibility Report

GREATER YELLOWSTONE COALITION

REPORT ON RECOMMENDED WILD AND SCENIC RIVERS

ON THE CUSTER GALLATIN NATIONAL FOREST

IN MONTANA

NOVEMBER 2017

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Cover photo by Charles Wolf Drimal: West Fork of Rock Creek of the Clarks Fork of the Yellowstone River

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Background

Founded in 1983, the Greater Yellowstone Coalition (GYC) has a mission to protect the lands, waters and wildlife of the Greater Yellowstone Ecosystem for future generations. Covering roughly 20 million acres, the Greater Yellowstone Ecosystem represents one of the largest, nearly intact temperate ecosystems in the world. For decades, the Greater Yellowstone Coalition has led highly successful conservation campaigns in southwest Montana, northwest Wyoming, and eastern Idaho to safeguard terrestrial and aquatic species, protect core wildlife and fish habitat, and reduce impacts from extractive industrial resource projects. Through extensive grassroots organizing and the use of best available science, the Greater Yellowstone Coalition has engaged in campaigns to protect iconic watersheds such as the Snake Headwaters and Clarks Fork River in Wyoming, winning historic protections under the Wild and Scenic Rivers Act. GYC has also engaged in Forest Service and Bureau of Land Management planning processes to secure administrative protections for eligible Wild and Scenic Rivers across the ecosystem. The Greater Yellowstone Coalition operates with the principle that comprehensive analysis and meticulous attention to detail within National Forest plan revision processes pays dividends to establishing long term, conservation-oriented land management practices.

Introduction

The Custer Gallatin National Forest covers over 3 million acres from southwest Montana to northwest South Dakota. These public lands harbor a tapestry of native fish populations, sensitive terrestrial species such as grizzly bear and wolverine, biologically rich montane forests, remote alpine mountain ranges, wild rivers, and thousands of miles of cold, clean water. The National Forest is currently undergoing a forest plan revision in which the Forest Service must review all streams for their potential eligibility for designation in the National Wild and Scenic Rivers System (NWSRS) as directed under section 5(d)(1) of the National Wild and Scenic Rivers Act of 1968 (PL 90-542:16 USC 1271-1287, as amended).

The Custer Gallatin National Forest has 940 named streams across seven ranger districts. 761 of these streams (covering 2,945 miles) are in the five ranger districts (Beartooth, Bozeman, Gardiner, Hebgen Lake and Yellowstone) that make up part of the Greater Yellowstone Ecosystem. The Greater Yellowstone Coalition reviewed all 761 streams and chose to conduct a thorough analysis of 119 streams during an internal Wild and Scenic Rivers eligibility analysis in 2017. GYC recommends 58 of the 761 streams in the Greater Yellowstone Ecosystem part of the Forest as eligible Wild and Scenic Rivers. This accounts for 645 river miles.

The following report contains recommendations by the Greater Yellowstone Coalition for eligible Wild and Scenic Rivers on the Custer Gallatin National Forest in southwest and southcentral Montana. The report was generated through independent analysis using field data collection by GYC waters staff and GYC interns, peer reviewed literature, scientific papers from federal agencies and non-governmental organizations (NGO's), interviews with biologists and recreation specialists, Geographical Information System (GIS) analysis, and ecologic and climatic models generated from best available science.

The purpose for generating this report is to provide an in depth, on-the-ground, detailed examination of stream conditions in the part of the Custer Gallatin National Forest that lies within the Greater Yellowstone Ecosystem. The Greater Yellowstone Coalition acknowledges that the Custer Gallatin Forest Plan Revision will use an interdisciplinary process including involvement of local governments, tribal governments, other agencies and members of the public for the determination of eligible Wild and Scenic Rivers. The Greater Yellowstone Coalition believes eligibility of Wild and Scenic Rivers on the Custer Gallatin National Forest needs to be determined by a coupling of actual on-the-ground field observations with an examination of recent literature, modeling and reports on various natural resource conditions. A simple abstract analysis from remote computer screens in the forest supervisor's office will not suffice. Conditions change from year to year, and from decade to decade. This is noted in changes in the region's economy shifting strongly toward a recreation focus, changes in demographics and increasing populations that influence use of the forest, changes in occupied habitat of both terrestrial and aquatic species, and changes in the climate.

What's more, it's been the experience of GYC staff and interns that field visits teach us that the Custer Gallatin National Forest is filled with unexpected gems off the beaten path and under the radar of mainstream popular attention. Ecologically vibrant riparian habitat, aesthetic rugged mountain scenery, and clean cold water have proven to be trademarks of the Custer Gallatin National Forest within the Greater Yellowstone Ecosystem. Their regional and national significance should not be underestimated.

Streams Recommended as Eligible Wild and Scenic Rivers by the Greater Yellowstone Coalition

The Custer Gallatin National Forest has 940 named streams across seven ranger districts. 761 of these streams (covering 2,945 miles) are in the five ranger districts (Beartooth, Bozeman, Gardiner, Hebgen Lake and Yellowstone) that make up part of the Greater Yellowstone Ecosystem. The Greater Yellowstone Coalition reviewed all 761 streams and chose to conduct a thorough analysis of 119 streams during an internal Wild and Scenic Rivers eligibility analysis in 2017. GYC recommends 58 of the 761 streams in the Greater Yellowstone Ecosystem part of the Custer Gallatin National Forest as eligible Wild and Scenic Rivers. This accounts for 645 river miles. Names of the GYC recommended eligible Wild and Scenic Rivers are listed in the table below in alphabetical order by watershed.

NAME	WATERSHED
Broadwater River	Clarks Fork Yellowstone
Clarks Fork Yellowstone	Clarks Fork Yellowstone
Lake Fork	Clarks Fork Yellowstone
Rock Creek	Clarks Fork Yellowstone
Sky Top Creek	Clarks Fork Yellowstone
West Fork Rock Creek	Clarks Fork Yellowstone
Alp Creek	Gallatin
Buffalo Horn Creek	Gallatin
Gallatin River	Gallatin
Hyalite Creek	Gallatin
Lightning Creek	Gallatin
Maid of the Mist Creek	Gallatin
North Fork Spanish Cr.	Gallatin
Porcupine Creek	Gallatin
Shower Creek	Gallatin
South Fork Spanish Cr.	Gallatin
Taylor Creek	Gallatin
Wapiti Creek	Gallatin
Beaver Creek	Madison
Cabin Creek	Madison
Cub Creek	Madison
Madison River	Madison
Middle Fork Cabin Cr.	Madison
Sentinel Creek	Madison
Sheep Creek	Madison
South Fork Madison R.	Madison
West Fork Beaver Creek	Madison
Cottonwood Creek	Shields
Shields River	Shields

NAME	WATERSHED
East Rosebud Creek	Stillwater
Glacier Creek	Stillwater
Goose Creek	Stillwater
Stillwater River	Stillwater
West Fork Stillwater R.	Stillwater
West Rosebud Creek	Stillwater
Bark Cabin Creek	Upper Yellowstone
Big Creek	Upper Yellowstone
Big Timber Creek	Upper Yellowstone
Boulder River	Upper Yellowstone
Cedar Creek	Upper Yellowstone
Davis Creek	Upper Yellowstone
East Boulder River	Upper Yellowstone
East Fork Boulder River	Upper Yellowstone
Lower Deer Creek	Upper Yellowstone
Mill Creek	Upper Yellowstone
Pine Creek	Upper Yellowstone
South Fork Pine Creek	Upper Yellowstone
West Boulder River	Upper Yellowstone
Bear Creek	Yellowstone Headwaters
Buffalo Creek	Yellowstone Headwaters
Grizzly Creek	Yellowstone Headwaters
Hellroaring Creek	Yellowstone Headwaters
Horse Creek	Yellowstone Headwaters
Lake Abundance Creek	Yellowstone Headwaters
Middle Fk. Hellroaring Cr	Yellowstone Headwaters
Slough Creek	Yellowstone Headwaters
Wounded Man Creek	Yellowstone Headwaters
Yellowstone River	Yellowstone Headwaters

Broadwater River				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
81	**Gardiner**	**Clarks Fork Yellowstone**	**5.8**	**W**

Wildlife: The Broadwater River contains high value core grizzly bear habitat near the confluence of Sky Top Creek and in the mid reach of the Broadwater River, according to Craighead Institute models. There is a watershed integrity value to connect Sky Top Creek, Broadwater River and the Clarks Fork River with consistent management of eligible Wild and Scenic from the headwaters to the Forest Service boundary at Clarks Fork Canyon on the Shoshone National Forest.

Segment: From the confluence with Sky Top Creek to Clarks Fork of the Yellowstone River

Classification: Wild

Clarks Fork Yellowstone River				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
137	**Gardiner**	**Clarks Fork Yellowstone**	**2.5**	**S, F**

Scenery: The Clarks Fork Yellowstone River presents spectacular open views of the Absaroka Mountains and connects with a designated Wild and Scenic River downstream that forms a deep canyon.

Fish: According to Montana Fish, Wildlife and Parks, the river hosts a population of pure Yellowstone cutthroat trout.

Segment: From the confluence with the Broadwater River to the Montana-Wyoming state line where it continues on the Shoshone National Forest as an eligible Wild and Scenic River.

Classification: Wild – 2 miles in length, from Chief Joseph Interpretive Site to state line; Recreational – ½ mile in length, from confluence with Broadwater River to Chief Joseph Interpretive Site

Lake Fork of Rock Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
421	**Beartooth**	**Clarks Fork Yellowstone**	**13.3**	**R, S**

Recreation: The Lake Fork offers popular backpacking and hiking opportunities into the Absaroka Beartooth Wilderness.

Scenery: The Lake Fork includes spectacular alpine scenery, sections of a steep and fast flowing creek, waterfalls, and high elevation plateaus that stretch across the horizon.

Public Support: The Lake Fork was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012; Lake Fork is supported in the Montanans for Healthy Rivers Citizen Proposal for New Wild and Scenic Rivers legislation.

Segment: From the headwaters at Sky Pilot Lake to the confluence with Rock Creek.

Classification: Wild – from the headwaters to the trailhead; Recreational – from the trailhead to Rock Creek

Rock Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
668	**Beartooth**	**Clarks Fork Yellowstone**	**14.2**	**S, R, H**

Scenery: Rock Creek provides jaw-dropping views of a gorgeous U-shaped glacially carved valley along the Beartooth Highway.

Recreation: Rock Creek offers a recreational mecca for the Red Lodge community that includes campgrounds, trailheads, and fishing and swimming opportunities.

Heritage: The Crow Aboriginal Trail presents sites marking the Red Lodge battle between the Shoshone and Crow Tribes and provides a glimpse into the lives of the people who originally called this land home.

Public Support: Rock Creek was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012; Rock Creek is supported in the Montanans for Healthy Rivers Citizen Proposal for New Wild and Scenic Rivers legislation.

Segment: Headwaters to Forest Service boundary.

Classification: Recreational

Sky Top Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
732	**Gardiner**	**Clarks Fork Yellowstone**	**7.5**	**S, R**

Scenery: Sky Top Creek allows visitors to experience some of the most aesthetic scenery in the region with alpine tundra, alpine rock, alpine lakes, views to the south of the Absaroka Range in Wyoming, and views to the north of Granite Peak - Montana's tallest summit.

Recreation: Sky Top is a major access point for mountaineers to approach the south side of Granite Peak.

Segment: Headwaters to Forest Service boundary.

Classification: Wild

West Fork Rock Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
908	**Beartooth**	**Clarks Fork Yellowstone**	**19.9**	**S, R, H**

Scenery: The West Fork starts as a gorgeous creek meandering through subalpine meadows and then presenting views of stunning high alpine rock walls and peaks.

Recreation: The West Fork allows access to some very popular hiking trails and backpacking routes.

Heritage: Historic camps and ranger stations can be found along the stream.

Public Support: The West Fork was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012; West Fork is supported in the Montanans for Healthy Rivers Citizen Proposal for New Wild and Scenic Rivers legislation.

Segment: Headwaters to Forest Service boundary.

Classification: Wild – from headwaters to trailhead; Recreational – trailhead to Forest Service boundary

Alp Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
4	**Hebgen Lake**	**Gallatin**	**3.9**	**S, F, W, CR**

Scenery: Stunning alpine scenery in the heart of the southern Madison Range is experienced in the upper three miles of the stream.

Fish: Natural habitat of native westslope cutthroat trout.

Wildlife: Alp Creek has a high rating for grizzly bear core habitat based on Craighead Institute models. It also has occupied wolverine habitat according to the Wildlife Conservation Society.

Climate Refugia: Based on NorWeST climate models, Alp Creek will serve as a cold water refuge in 2040 for temperature sensitive species such as the westslope cutthroat trout.

Segment: Headwaters to Forest Service boundary.

Classification: Wild

Buffalo Horn Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
90	**Bozeman**	**Gallatin**	**8.2**	**F, W, S, CR**

Fish: Buffalo Horn Creek is characterized in sections by large meandering channels that host excellent gravel for trout.

Wildlife: The creek supplies excellent willows for potential moose habitat. Montana FWP stewards a Wildlife Management Area in the watershed.

Scenery: Scenic views of Ramshorn Peak and Fortress Mountain can be seen from the creek.

Climate Refugia: Based on NorWeST climate models, Buffalo Horn Creek will serve as a cold water refuge in 2040 for temperature sensitive species.

Public Support: Buffalo Horn was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012.

Segment: Headwaters to Forest Service boundary.

Classification: Wild

Gallatin River				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
323	**Hebgen Lake**	**Gallatin**	**39.6**	**R, S, W, H**

Recreation: The Gallatin is a designated blue ribbon trout stream with high quality recreational fishing. It is an angling paradise as well as a mecca for whitewater paddling. There are many developed campsites spread throughout the corridor.

Scenery: The lower section of the river has carved out a magnificent and stunning canyon while the upper river, near Yellowstone National Park, can be characterized by open meandering wetlands.

Wildlife: The area provides winter range for both elk and bighorn sheep. Moose can be found in the wetlands and meadows of the upper reaches.

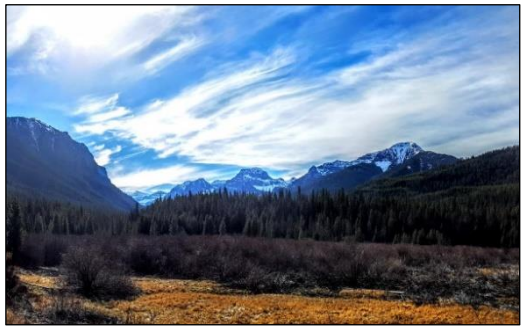
Heritage: The corridor provided a gateway to Yellowstone National Park at the turn of the 20th Century.

Public Support: The Gallatin was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012; it is supported in the MHR Citizen Proposal for New Wild and Scenic Rivers legislation.

Segment: Headwaters to Forest Service boundary.

Classification: Recreational

Hyalite Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
395	**Bozeman**	**Gallatin**	**12.7**	**R, S**



Recreation: Hyalite provides a recreational haven for the greater Bozeman community. A myriad of recreational opportunities can be found ranging from hiking, camping, backpacking, fishing, backcountry skiing, and Hyalite's world-class ice climbing.

Scenery: Hyalite offers panoramic views of rugged alpine peaks and rolling montane forests. The upper sections contain countless waterfalls.

Public Support: Hyalite was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012; Hyalite is supported in the Montanans for Healthy Rivers Citizen Proposal for New Wild and Scenic Rivers legislation.

Segment: Headwaters to Hyalite trailhead; reservoir to Forest Service boundary

Classification: Wild - headwaters to Hyalite trailhead (4.7 miles); Recreation - reservoir to Forest Service boundary (8 miles)

Lightning Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
432	**Hebgen**	**Gallatin**	**4.6**	**F, W, CR**

Fish: Lightning Creek is a stronghold for native westslope cutthroat trout.

Wildlife: Lightning Creek has a high rating for core grizzly bear habitat according the Craighead Institute models. Moose tracks and scat were observed along the corridor when surveyed. The area contains confirmed occupied wolverine habitat, according to Wildlife Conservation Society reports.

Climate Refugia: Based on NorWeST climate models, Lightning Creek will serve as a cold water refuge in 2040 for temperature sensitive species.

Segment: From the headwaters to Taylor Creek.

Classification: Wild

Maid of the Mist Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
477	**Bozeman**	**Gallatin**	**1.4**	**R, S**

Recreation: Maid of the Mist is a very popular access point for backcountry skiing, mountaineering, and hosts one expert world class ice climb.

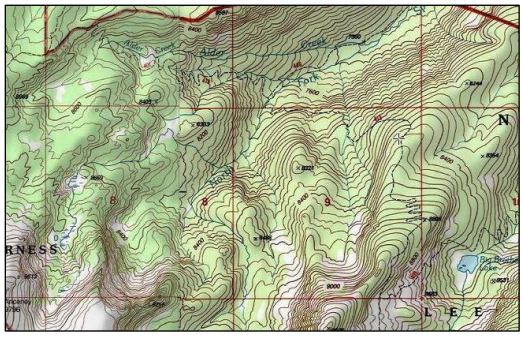
Scenery: The upper basin hosts absolutely stunning alpine terrain surrounded by large peaks and buttes.

Segment: Headwaters to confluence with Hyalite Creek.

Classification: Wild

North Fork Spanish Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
592	**Bozeman**	**Gallatin**	**6.4**	**W, S, F, CR**

Wildlife: The North Fork Spanish Creek has a high rating for grizzly bear core habitat based on the Craighead Institute models. The area has confirmed occupied wolverine habitat, according to the Wildlife Conservation Society data.



Scenery: The stream winds its way through gorgeous meadows with the impressively rugged Spanish Peaks serving as a constant backdrop.

Fish: A cutthroat trout restoration project has been proposed by FWP and CGNF for the headwaters of the creek.

Climate Refugia: Based on NorWeST climate models, the North Fork Spanish Creek will serve as a cold water refuge in 2040 for temperature sensitive species.

Public Support: The North Fork was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012.

Segment: Headwaters to Forest Service boundary.

Classification: Wild - headwaters to trailhead; Scenic - trailhead to Forest Service boundary

Porcupine Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
641	**Bozeman**	**Gallatin**	**9.1**	**R, S, W**

Recreation: Porcupine Creek is a popular trail amongst cyclists, motorbikes, hikers, and horseback riders. All were observed while the stream was being surveyed.

Scenery: The area provides fantastic views of sagebrush meadows with views of the Gallatin Peaks towering in the back drop.

Wildlife: Lower Creek contains a FWP wildlife management area to protect elk winter range.

Public Support: Porcupine Creek was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012; Porcupine Creek is supported in the Montanans for Healthy Rivers Citizen Proposal for New Wild and Scenic Rivers legislation.

Segment: Headwaters to confluence with Gallatin River

Classification: Wild – headwaters to trailhead; Scenic - trailhead to confluence with Gallatin River

Shower Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
719	**Bozeman**	**Gallatin**	**1.3**	**R, W**

Recreation: Shower Creek is a hotspot for backcountry skiing and hiking. It is colloquially known as "Triple Divide Peak" by the recreation community.

Wildlife: The area has high value core grizzly bear habitat.

Segment: Headwaters to Hyalite Creek

Classification: Wild

South Fork Spanish Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
719	**Bozeman**	**Gallatin**	**8.9**	**R, S, W**

Recreation: The watershed is very popular amongst hikers/backpackers and horseback riders.

Scenery: It offers breathtaking views of the higher and more rugged summits of the Spanish Peaks.

Wildlife: The area has high value core grizzly bear habitat, according to Craighead Institute models, and is confirmed occupied wolverine habitat, according to Wildlife Conservation Society data.

Public Support: The South Fork Spanish Creek was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012.

Segment: Headwaters to Forest Service boundary.

Classification: Wild

Taylor Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
836	**Hebgen Lake**	**Gallatin**	**18.4**	**S, R, W, CR**

Scenery: Taylor Creek offers a unique and undeveloped low elevation open sagebrush valley with excellent views of the Madison Range as a scenic backdrop.

Recreation: The area is home to excellent opportunities for human powered recreation, dispersed camping, fishing, and pack-rafting during high flows.

Wildlife: The valley is a wildlife haven for elk, moose, grizzly bear, raptors, and is an identified bison restoration habitat area. Many ungulates use the area as a migration corridor. The valley has confirmed occupied wolverine habitat.

Climate Refugia: Based on NorWeST climate models, the Taylor Creek will serve as a cold water refuge in 2040 for temperature sensitive species.

Public Support: Taylor Creek was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012; it is supported in the MHR Citizen Proposal for New Wild and Scenic Rivers.

Segment: from the headwaters to the Gallatin River.

Classification: Wild – headwaters to Taylor Cr. trailhead, Recreational – trailhead to Gallatin River.

Wapiti Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
885	**Hebgen Lake**	**Gallatin**	**9.9**	**W, F, S, R**

Wildlife: The valley provides a path for an elk migration route. The surrounding area has a high rating for core grizzly bear habitat based on Craighead Institute models.

Fish: The stream is a home to native westslope cutthroat trout.

Scenery: Beautiful views of Pika Point are easily visible from the stream.

Recreation: The trail is popular amongst equestrians. Several horse riders were seen on the trail at inventory.

Segment: from the headwaters to Taylor Creek.

Classification: Wild - from headwaters to 4wd road on private land; Scenic - from 4wd road on public land to Forest Service road; Recreational - from Forest Service road to confluence with Taylor Creek.

Beaver Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
39	**Hebgen Lake**	**Madison**	**11.03**	**R, W, S**

Recreation: Beaver Creek serves as a corridor for the Southern Madison Range with numerous dispersed campsites and two very popular trailheads: West Boulder and Sentinel.

Wildlife: Beaver Creek supports a plethora of wildlife. It contains high value grizzly bear core habitat and supports moose habitat, elk migration routes, and occupied wolverine habitat.

Scenery: The stream is characterized by a meandering river with flat gravel bars with magnificent views of the towering peaks of the southern Madison Range.

Public Support: Beaver Creek was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012.

Segment: Headwaters to Forest Service boundary.

Classification: Recreational

Cabin Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
100	**Hebgen Lake**	**Madison**	**7.8**	**F**

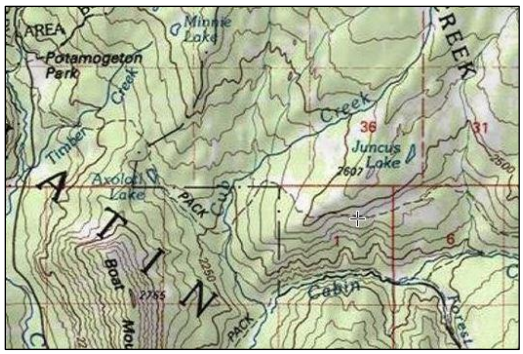
Fish: Cabin Creek supports a pure population of westslope cutthroat trout through restoration efforts of Montana Fish, Wildlife and Parks, the U.S. Forest Service, Madison River Foundation, NorthWestern Energy and the National Fish and Wildlife Foundation. The work includes a human-made fish barrier .3 miles upstream from the Cabin Creek Campground.

Segment: Headwaters to Forest Service boundary.

Classification: Wild

Cub Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
186	**Hebgen Lake**	**Madison**	**4.4**	**F, W**

Fish: Cabin Creek supports a pure population of westslope cutthroat trout through restoration efforts of Montana Fish, Wildlife and Parks, the U.S. Forest Service, Madison River Foundation, NorthWestern Energy and the National Fish and Wildlife Foundation. The work includes a human-made fish barrier .3 miles upstream from the Cabin Creek Campground. Cub Creek contributes to this habitat.



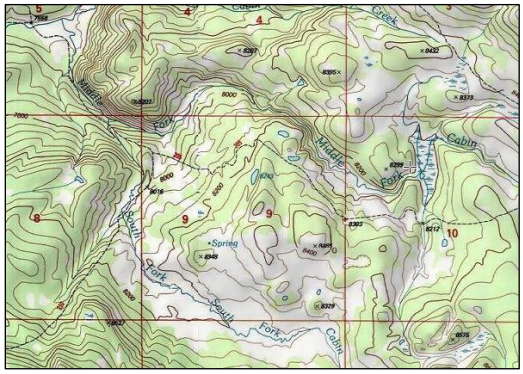
Wildlife: The area is high value core grizzly bear habitat.

Segment: Headwaters to Forest Service boundary.

Classification: Wild

Middle Fork Cabin Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
502	**Hebgen Lake**	**Madison**	**5.1**	**F, W**

Fish: Cabin Creek supports a pure population of westslope cutthroat trout through restoration efforts of Montana Fish, Wildlife and Parks, the U.S. Forest Service, Madison River Foundation, NorthWestern Energy and the National Fish and Wildlife Foundation. The work includes a human-made fish barrier .3 miles upstream from the Cabin Creek Campground. The Middle Fork of Cabin Creek contributes to this habitat.



Wildlife: The Middle Fork of Cabin Creek contains high value core grizzly bear habitat, according to the Craighead Institute models.

Segment: From the headwaters to Cabin Creek.

Classification: Wild

Madison River				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
457	**Hebgen Lake**	**Madison**	**8**	**R, W, G, S, H**

Recreation: The Madison River is popular for fly fishing and paddling. It hosts a Blue Ribbon Fishery.

Wildlife: The Madison Valley is a wildlife haven. The river serves as a major elk migration route from Yellowstone Park to the Madison Valley as well as moose wintering range. The river corridor contains high value core grizzly habitat on the north side of Earthquake Lake, occupied wolverine habitat, and trumpeter swan wintering grounds.

Geology: The river was part of the 1959 earthquake that caused "Quake Lake."

Scenery: The Madison starts as a steep mountain river surrounded by high peaks and eventually opens up into a broad river valley of short-grass prairie and sweeping vistas of several mountain ranges.

Heritage: The area was used historically by the Shoshone-Bannock as part of the Bannock Trail and was also part of the Nez Perce Trail.

Public Support: The Madison was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012; The Madison is supported in the Montanans for Healthy Rivers Citizen Proposal for New Wild and Scenic Rivers legislation.

Segment: from the Hebgen Dam to the Forest Service boundary.

Classification: Recreational

Sentinel Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
700	**Hebgen Lake**	**Madison**	**6**	**R, W, S**

Recreation: In recent years, Sentinel Creek has become a recreational hotspot and is now considered a key entry way to the aesthetic Hilgard Basin.

Wildlife: Sentinel Creek contains high value grizzly bear core habitat according to Craighead Institute models. Sentinel Creek also contains confirmed occupied wolverine habitat, according to the Wildlife Conservation Society.

Scenery: Stunning alpine peaks surround the headwaters of Sentinel Creek.

Segment: From the headwaters to Beaver Creek.

Classification: Wild

Sheep Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
709	**Hebgen Lake**	**Madison**	**5.4**	**S, W, CR**

Scenery: Sheep Creek offers gorgeous views of the higher Madison Range and Henry's Lake Mountains. Scenic Sheep Lake is located near the alpine in its headwaters.

Wildlife: Sheep Creek contains confirmed occupied wolverine habitat, according to the Wildlife Conservation Society.

Climate Refugia: Sheep Creek is a predicted cold water refugia in 2040, according to NorWeST models.

Segment: From the headwaters to the Forest Service boundary.

Classification: Wild

South Fork Madison River				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
776	**Hebgen Lake**	**Madison**	**23.5**	**F, W, CR**

Fish: The South Fork of the Madison River hosts a westslope cutthroat trout population, according to Montana Fish, Wildlife and Parks. The river is braided in places, with deep pools in outer meandering bends; it contains small and medium sized gravel, off channel ponds, healthy banks with no signs of incision. The lower reach below Highway 20 makes large meandering curves.

Wildlife: The South Fork of the Madison River contains high value core grizzly bear habitat above Highway 20, according to Craighead Institute models. The habitat includes thick willow, wetlands, beaver dams, and has green healthy conifers above riparian zone with little sign of beetle infestation and no sign of recent wildfire. Moose tracks were observed throughout the riparian zone and in the creek during a field visit.

Climate Refugia: South Fork Madison River is a predicted cold water source in 2040, according to NorWeST models.

Public Support: The South Fork of the Madison River was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012; the South Fork of the Madison River is supported in the Montanans for Healthy Rivers Citizen Proposal for New Wild and Scenic Rivers legislation.

Segment: From the headwaters to the South Arm of Hebgen Reservoir.

Classification: Recreational

West Fork Beaver Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
896	**Hebgen Lake**	**Madison**	**5**	**R, S, W**

Recreation: The West Fork Beaver Creek contains one of the most popular trails in the Hebgen Ranger District.

Scenery: The West Fork of Beaver Creek offers beautiful views into the high alpine country of the Madison Range.

Wildlife: The West Fork of Beaver Creek flows through high value core grizzly bear habitat, according to Craighead Institute models. An elk migration from Skyline Ridge to Madison Valley has been documented by the Wildlife Conservation Society. WCS has also confirmed occupied wolverine habitat in the West Fork of Beaver Creek.

Segment: From the headwaters to Beaver Creek.

Classification: Wild

Cottonwood Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
167	**Yellowstone**	**Shields**	**8.6**	**H, S, R, G, CR**

Heritage: The Crazy Mountains are an important range for the Crow tribe of Native Americans. The Crow people used many of the peaks for vision quests and would have likely used Cottonwood Creek to approach the Crazy Mountains from the west.

Scenery: Cottonwood Creek offers beautiful, high alpine scenery on the upper reach of the creek.

Recreation: Cottonwood Creek is one of the most popular recreation access points on the west side of the Crazy Mountains. The drainage experiences substantial snowmobile use, as well as backcountry skiing, hiking and hunting.

Geology: Grasshopper Glacier can be seen above Cottonwood Lake. The creek has carved out a couple of short canyon sections.

Climate Refugia: Cottonwood Creek is predicted to maintain cold water well into 2040, according to NorWeST climate models.

Segment: From the headwaters to Forest Service boundary.

Classification: Wild – from the headwaters to the trailhead covering 5 miles; Recreational – from the trailhead to the Forest Service boundary covering 3.6 miles.

Shields River				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
716	**Yellowstone**	**Shields**	**6.8**	**S, F**

Scenery: The Shields River starts in the shadows of the Crazy Mountains and then flows south to the Yellowstone River. From the Shields River one witnesses breathtaking views of the Crazy, Bridger, and Absaroka Mountain Ranges.

Fish: The Shields River supports healthy trout populations. Yellowstone cutthroat trout can be found in upper section and exclusively above a fish barrier. Brown trout move up the river from the Yellowstone to spawn in the fall.

Segment: From the headwaters to Forest Service boundary.

Classification: Recreational

East Rosebud Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
265	**Beartooth**	**Stillwater**	**20**	**R, S, G**

Recreation: East Rosebud Creek is a mecca for Red Lodge, Billings, and the Beartooth Front; it attracts thousands of summer visitors for hiking, backpacking, fishing, and some Class V Whitewater kayaking.

Scenery: The East Rosebud valley is often talked about as a "Little Switzerland" with stunning Alp-like scenery.

Geology: The East Rosebud watershed contains a classic U-shaped glacially carved valley with granite walls on either side.

Public Support: East Rosebud Creek was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012; East Rosebud Creek is supported in the Montanans for Healthy Rivers Citizen Proposal for New Wild and Scenic Rivers legislation. A legislative bill for Wild and Scenic River protection of 20 miles of East Rosebud Creek currently awaits passage in the U.S. Congress.

Segment: From the headwaters to Forest Service boundary.

Classification: Wild – from the headwaters to East Rosebud Lake; Recreational – from the outlet of East Rosebud Creek to the Forest Service boundary.

Glacier Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
332	**Beartooth**	**Stillwater**	**5.7**	**R, S, CR**

Recreation: Glacier Creek is a backcountry skiing and mountaineering gem.

Scenery: Glacier Creek is surrounded by some of the most aesthetic alpine mountains in the Greater Yellowstone Ecosystem, including Sawtooth Mountain and Wolf Mountain.

Climate Refugia: Glacier Creek is predicted to maintain cold water well into 2040, according to NorWeST climate models.

Segment: From the headwaters to the Stillwater River.

Classification: Wild

Goose Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
341	**Beartooth**	**Stillwater**	**7**	**R, S, F, W, CR**

Fish: Goose Creek is now a pure, native Yellowstone cutthroat trout stream, as a result of work completed by Montana Fish, Wildlife and Parks and the U.S. Forest Service in 2007 to maintain native trout purity.

Wildlife: The Goose Creek watershed contains high value core grizzly bear habitat, according to Craighead Institute models.

Scenery: Goose Creek is surrounded by some of the most aesthetic alpine mountains in the Greater Yellowstone Ecosystem, including Sawtooth Mountain, Mount Fox and Mount Zimmer.

Recreation: The upper Goose Creek watershed is hands down one of the best backcountry skiing and mountaineering playgrounds in the Greater Yellowstone Ecosystem.

Climate Refugia: Goose Creek is predicted to maintain cold water well into 2040, according to NorWeST climate models.

Segment: From the headwaters to the Stillwater River.

Classification: Wild

Stillwater River				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
818	**Beartooth**	**Stillwater**	**29**	**R, S, G, W**

Recreation: The Stillwater River is a popular destination for fishing, technical whitewater kayaking, hiking, backpacking, and hunting.

Scenery: The Stillwater River provides a mix of steep granite rock walls in a lower gorge, a wide meandering river at mid-reach, and alpine walls up high with thundering waterfalls.

Geology: The Stillwater River contains a unique geologic gorge above Woodbine.

Wildlife: The Stillwater River watershed contains high value core grizzly bear habitat, based on Craighead Institute models, as well as winter range for moose, according to Montana Fish, Wildlife and Parks.

Public Support: The Stillwater River was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012; the Stillwater River is supported in the Montanans for Healthy Rivers Citizen Proposal for New Wild and Scenic Rivers legislation.

Segment: From the headwaters to Flume Creek, just upstream from the Sibanye-Stillwater mine.

Classification: Wild – from the headwaters to the Woodbine trailhead; Recreational – from the Woodbine trailhead to Flume Creek.

West Fork Stillwater River				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
909	**Beartooth**	**Stillwater**	**17**	**S, W**

Scenery: The West Fork Stillwater River hosts a diversity of wetlands, open meadows, steep cliffs and dense forests.

Wildlife: The West Fork of the Stillwater River contains high value core grizzly bear habitat according to Craighead Institute models. The watershed contains elk and moose winter range, confirmed by Montana Fish, Wildlife and Parks mapping.

Public Support: The West Fork Stillwater River was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012; West Fork Stillwater River is supported in the MHR Citizen Proposal for New Wild and Scenic Rivers legislation.

Segment: From the headwaters to the Forest Service boundary.

Classification: Wild – headwaters to the trailhead; Recreational – trailhead to Forest Service boundary.

West Rosebud Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
916	**Beartooth**	**Stillwater**	**8**	**S, R, G**

Scenery: West Rosebud Creek hosts dramatic alpine scenery with granite cliffs, deciduous forests and whitewater.

Recreation: West Rosebud Creek is a popular access into the Absaroka-Beartooth Wilderness.

Geology: West Rosebud Creek contains glacially scoured walls throughout the drainage.

Public Support: West Rosebud Creek was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012.

Segment: From the headwaters to Mystic Lake.

Classification: Wild

Bark Cabin Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
19	**Yellowstone**	**Upper Yellowstone**	**3.7**	**F, W**

Fish: Bark Cabin Creek supports a native pure Yellowstone cutthroat trout population connected to Big Creek

Wildlife: Bark Cabin Creek contains an elk migration route that has been verified by Wildlife Conservation Society data.

Segment: From the headwaters to the confluence with Big Creek.

Classification: Wild

Big Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
46	**Yellowstone**	**Upper Yellowstone**	**13.5**	**F, R, G**

Fish: Big Creek hosts a pure native Yellowstone cutthroat trout population as a result of a natural barrier.

Recreation: Big Creek receives extensive usage by horseback riders and hunters. It is one of the best access points into the Gallatin Range for Park County residents and visiting tourists in Paradise Valley.

Geology: Big Creek contains a unique deep canyon with rocky outcrop geologic formations.

Public Support: Big Creek was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012.

Segment: From the headwaters to the Forest Service boundary.

Classification: Wild – from the headwaters to the trailhead; Recreational from the trailhead to the Forest Service boundary.

Big Timber Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
50	**Yellowstone**	**Upper Yellowstone**	**9**	**H, R, S**

Heritage: Historical records indicate the Crow Chief Plenty Coups used Crazy Peak for an important vision quest in which he foresaw the coming changes to his people. Other Crow tribal members would have likely used Big Timber Creek for access to the high peaks of the Crazy Mountains.

Recreation: Big Timber Creek Falls is an expert kayaking run. Other parts of the creek contain pools for fishing and smaller falls.

Scenery: The stunning scenery of the Crazy Mountain range looms overhead through the entire drainage.

Public Support: Big Timber Creek was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012.

Segment: Headwaters to the Forest Service boundary.

Classification: Wild – headwaters to the trailhead; Recreational – trailhead to the Forest Service boundary.

Boulder River				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
68	**Yellowstone**	**Upper Yellowstone**	**33.5**	**R, S, G, H, CR**

Recreation: The Boulder River offers a lifetime of recreation opportunities for the hiker or backpacker. Access to the Absaroka-Beartooth Wilderness is ubiquitous along the river corridor. Whitewater kayaking, fishing, camping, and ATV/OHV use are also common.

Scenery: The Boulder River corridor presents stunning scenery of the Beartooth Mountains and a diversity of river channel types from steep and tumbling whitewater to meandering bends with riffles.

Geology: The Boulder River contains unique geologic features associated with a waterfall around a collapsed natural bridge.

Heritage: The Boulder River corridor includes an historic Forest Service station and an historic mining district at Independence.

Climate Refugia: The Boulder River is expected to protect native trout in upper reaches and tributaries in 2040 according to NorWeST models.

Public Support: The Boulder River was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012; the Boulder River is supported in the Montanans for Healthy Rivers Citizen Proposal for New Wild and Scenic Rivers legislation.

Segment: From the headwaters to the Forest Service boundary.

Classification: Wild – 2 miles from the headwaters to the 4wd road that leads to Independence; Recreational – from 4wd road to the main Boulder road at the Forest Service boundary.

Cedar Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
126	**Gardiner**	**Upper Yellowstone**	**8**	**H, F, W**

Heritage: Located on lower Cedar Creek, the OTO Homestead and Dude Ranch was the first dude ranch in Montana. It was started by James Norris (Dick) Randall and his wife Dora after they purchased squatters rights on a small cabin along Cedar Creek. Notable guests included Theodore Roosevelt and Marcellus Hartley Dodge, Jr. The 3,265 acre property was eventually acquired by the Rocky Mountain Elk Foundation, who donated it in 1991 to the Forest Service. In 2004 the site was listed on the National Register of Historic Places.

Fish: Cedar Creek is an important spawning creek for native Yellowstone cutthroat trout.

Wildlife: Cedar Creek contains a mule deer migration, according to the Wildlife Conservation Society.

Segment: Headwaters to the confluence with the Forest Service boundary.

Classification: Wild – headwaters to OTO Ranch; Recreational – OTO Ranch to Forest Service boundary.

Davis Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
194	**Yellowstone**	**Upper Yellowstone**	**9.7**	**W, CR**

Wildlife: Davis Creek contains high value grizzly bear core habitat, according to Craighead Institute models. The ranch manager of the neighboring Burnt Leather Ranch warned GYC staff about the heavy grizzly bear use of the drainage. A black bear sow and cub were observed during the field check in 2017. The drainage hosts excellent forest cover with open meadows in places. All of it was spared from the 2006 West Boulder fire.

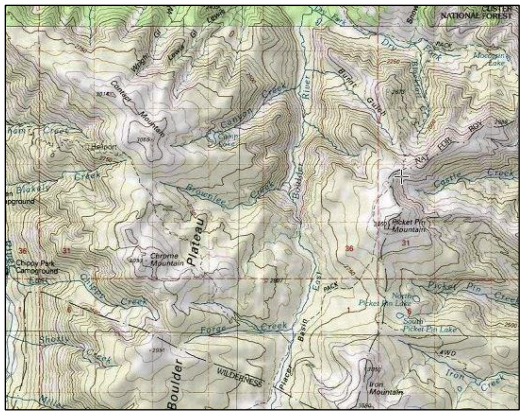
Climate Refugia: Davis Creek is a long, north and northeast aspect flowing stream. It contained lots of water in the stream at end of August 2017. NorWeST models indicate it will maintain its cold water refugia in 2040.

Segment: From the headwaters to the confluence with the West Boulder River.

Classification: Wild

East Boulder River				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
235	**Yellowstone**	**Upper Yellowstone**	**9**	**W, F**

Wildlife: The East Boulder River hosts a mule deer migration route, according to the Wildlife Conservation Society data. It also contains high value core grizzly bear habitat according to Craighead Institute models.



Fish: The East Boulder River hosts a pure Yellowstone cutthroat trout population above the Dry Fork Creek confluence, according to Montana Fish, Wildlife and Parks.

Public Support: The East Boulder River was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012.

Segment: From the headwaters to the Dry Fork Creek confluence.

Classification: Wild

East Fork Boulder River				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
242	**Yellowstone**	**Upper Yellowstone**	**12.25**	**W, R, CR**

Wildlife: The East Fork Boulder River contains important elk, bighorn sheep, and moose habitat, according to Montana Fish, Wildlife and Parks. It also contains high value core grizzly bear habitat, according to the Craighead Institute models.

Recreation: The trail along the East Fork Boulder River appears as a wide, well-manicured highway. There are a lot of signs of recreation use by foot and horse.

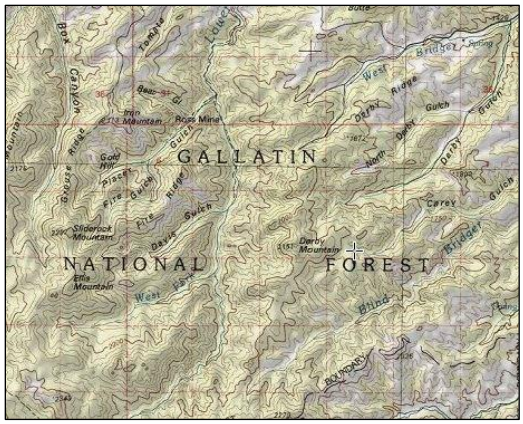
Climate Refugia: Climate models such as NorWeST indicate that the East Fork Boulder River's long northwest flow will continue to produce cold water in 2040. During a field visit in late August 2017, the creek was producing good flows, with many nice pools; trout were observed during field check.

Segment: From the headwaters to the confluence with the Boulder River.

Classification: Wild

Lower Deer Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
472	**Yellowstone**	**Upper Yellowstone**	**13.5**	**F, W**

Fish: Lower Deer Creek contains a pure native Yellowstone cutthroat trout population that is protected by a barrier.



Wildlife: Lower Deer Creek contains important moose habitat, according to Montana Fish, Wildlife and Parks mapping.

Segment: From the headwaters to the Forest Service boundary.

Classification: Wild

Mill Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
522	**Yellowstone**	**Upper Yellowstone**	**14.9**	**F, S, R**

Fish: Mill Creek hosts **a** pure Yellowstone cutthroat trout population above a barrier at the Forest Service boundary. "The barrier at the FS boundary was placed in the 1990s and appears to be keeping rainbows out of the system," according to Scott Optiz, Montana Fish, Wildlife and Parks fish biologist.

Scenery: The upper reaches of Mill Creek contain spectacular views of Absaroka Range high country.

Recreation: Mill Creek receives extensive usage by fisherman, horseback riders, hikers, and ATV users.

Public Support: Mill Creek was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012.

Segment: From the headwaters to the Forest Service boundary.

Classification: Wild – from the headwaters to ½ mile east of the confluence with Anderson Creek; Recreational – from ½ mile east of Anderson Creek to Forest Service boundary.

Pine Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
626	**Yellowstone**	**Upper Yellowstone**	**4.9**	**R, S**

Recreation: The Pine Creek watershed is a very popular area for hiking, ice climbing, and peak bagging of Black Mountain. Pine Creek Falls attracts hundreds of visitors per day during the summer months.

Scenery: High within the headwaters of Pine Creek is the sight of a rare, large alpine lake in the Absaroka Mountains.

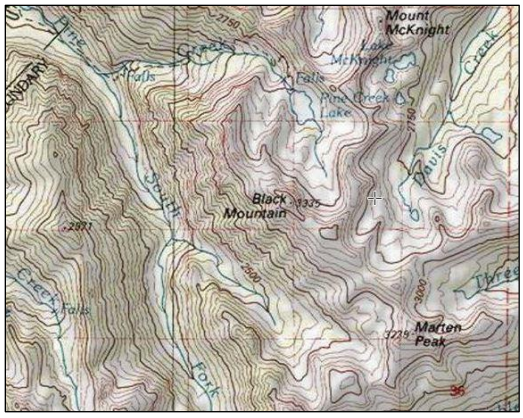
Public Support: Pine Creek was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012.

Segment: From the headwaters to the Forest Service boundary.

Classification: Wild

South Fork Pine Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
781	**Yellowstone**	**Upper Yellowstone**	**5.9**	**W, CR**

Wildlife: The South Fork of Pine Creek contains high value core grizzly bear habitat, according to the Craighead Institute models.



Climate Refugia: The South Fork of Pine Creek is predicted to be a cold water source in 2040, according to NorWeST models.

Segment: From the headwaters to the confluence with Pine Creek.

Classification: Wild

West Boulder River				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
889	**Yellowstone**	**Upper Yellowstone**	**14**	**W, F, R, CR**

Wildlife: The West Boulder River contains high value core grizzly bear habitat, according to the Craighead Institute models.

Fish: The West Boulder River hosts a population of native Yellowstone Cutthroat Trout, according to Montana Fish, Wildlife and Parks mapping.

Recreation: The West Boulder River is a popular backpacking, day hiking and fishing destination.

Climate Refugia: The West Boulder River is predicted to be a cold water refuge and host a native trout population in 2040 according to NorWeST models.

Public Support: The West Boulder River was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012; The West Boulder River is supported in the Montanans for Healthy Rivers Citizen Proposal for New Wild and Scenic Rivers legislation.

Segment: From the headwaters to the Forest Service boundary.

Classification: Wild

Bear Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
27	**Gardiner**	**Yellowstone Headwaters**	**11**	**W, S, H**

Wildlife: Bear Creek contains mule deer and elk migration routes, and occupied wolverine habitat according to Wildlife Conservation Society data; it hosts high value core grizzly bear habitat, based on Craighead Institute models.

Scenery: Bear Creek is a beautiful little valley running up into the Absaroka Mountains.

Heritage: Jardine is an old mining community with old mining equipment bordering the creek.

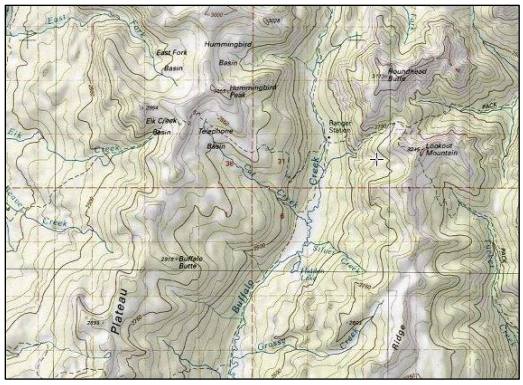
Public Support: Bear Creek is supported in the Montanans for Healthy Rivers Citizen Proposal for New Wild and Scenic Rivers legislation.

Segment: From the headwaters to the Yellowstone River.

Classification: Wild – headwaters to the Bear Creek trailhead; Recreational – from the Bear Creek trailhead through the community of Jardine; Scenic – from Jardine to the Yellowstone River.

Buffalo Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
89	**Gardiner**	**Yellowstone Headwaters**	**13.6**	**W**

Wildlife: Buffalo Creek contains high value core grizzly bear habitat according to Craighead Institute models. Buffalo Creek also supports a mule deer migration route, noted from Wildlife Conservation Society data and moose winter range and moose general range, as documented by the Montana Fish, Wildlife and Parks.



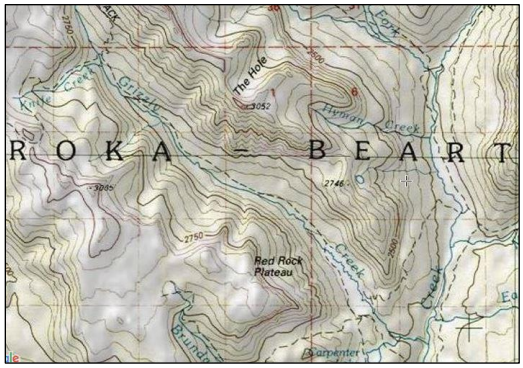
Public Support: Buffalo Creek was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012.

Segment: From the headwaters to the Forest Service-Yellowstone National Park boundary.

Classification: Wild

Grizzly Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
354	**Gardiner**	**Yellowstone Headwaters**	**7.6**	**F, W**

Fish: Grizzly Creek contains native Yellowstone cutthroat trout in the lower section according to mapping produced by Montana Fish, Wildlife and Parks.



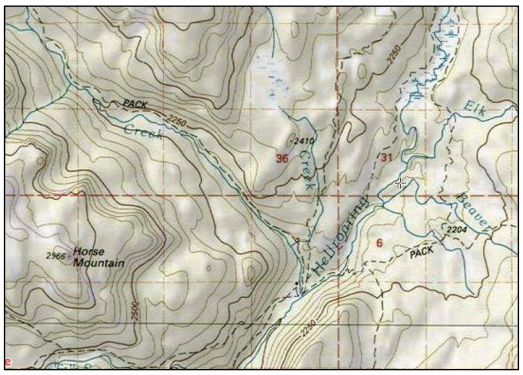
Wildlife: Grizzly Creek contains high value core grizzly bear habitat in high reaches according to Craighead Institute models. Grizzly Creek also hosts occupied wolverine habitat, based on data and mapping completed by the Wildlife Conservation Society. Grizzly Creek should be included with Hellroaring Creek as eligible Wild and Scenic to protect the watershed values.

Segment: From the headwaters to Hellroaring Creek.

Classification: Wild

Hellroaring Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
370	**Gardiner**	**Yellowstone Headwaters**	**18.9**	**F, W, S**

Fish: Hellroaring Creek contains a pure native Yellowstone cutthroat trout population according to past data and mapping from Montana Fish, Wildlife and Parks



Wildlife: Hellroaring Creek hosts two mule deer migratory routes, according to the Wildlife Conservation Society data. It also contains high value core grizzly bear habitat, according to Craighead Institute models. The eastern edge of occupied wolverine habitat, mapped by the Wildlife Conservation Society, extends in to Hellroaring Creek.

Scenery: Hellroaring Creek carves a rugged canyon down low with fast moving, turbulent waters. Up high, the watershed opens up to a broad valley and views of the high alpine Absaroka Range.

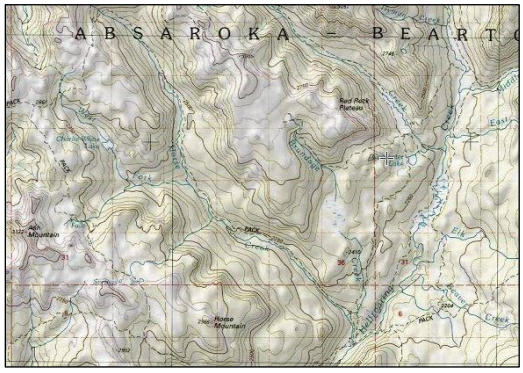
Public Support: Hellroaring Creek was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012.

Segment: From the headwaters to the Forest Service boundary.

Classification: Wild

Horse Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
389	**Gardiner**	**Yellowstone Headwaters**	**10**	**F, W**

Fish: Horse Creek contains native Yellowstone cutthroat trout in the lower section according to mapping produced by Montana Fish, Wildlife and Parks.



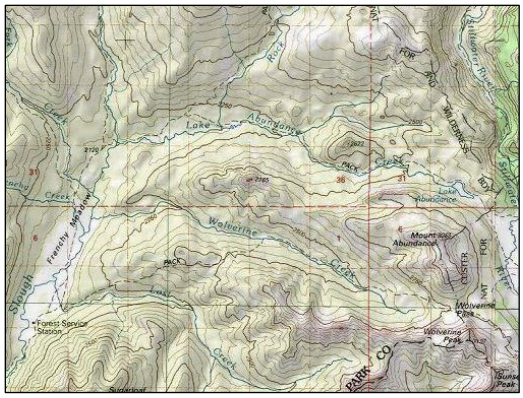
Wildlife: Horse Creek contains high value core grizzly bear habitat in high reaches according to Craighead Institute models. Horse Creek also hosts occupied wolverine habitat, based on tracking and mapping completed by the Wildlife Conservation Society. Horse Creek should be included with Hellroaring Creek as eligible Wild and Scenic to protect the watershed values.

Segment: From the headwaters to Hellroaring Creek.

Classification: Wild

Lake Abundance Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
419	**Gardiner**	**Yellowstone Headwaters**	**7.5**	**F**

Fish: Lake Abundance Creek contains a pure native Yellowstone cutthroat trout population due to a barrier on Slough Creek. Efforts have been made by the Forest Service and Montana Fish, Wildlife and Parks to purify the native Yellowstone cutthroat trout population in the Slough Creek watershed.

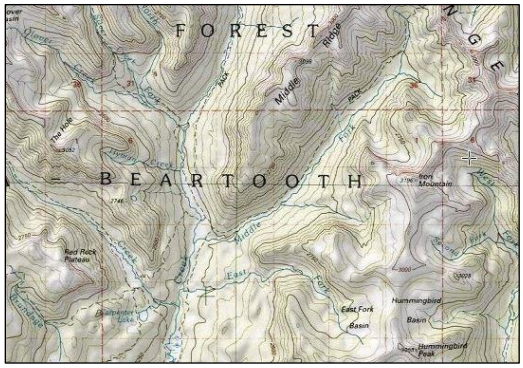


Segment: Headwaters to Slough Creek.

Classification: Wild

Middle Fork Hellroaring Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
506	**Gardiner**	**Yellowstone Headwaters**	**6.7**	**W**

Wildlife: The Middle Fork of Hellroaring Creek contains high value core grizzly bear habitat according to Craighead Institute models. An important mule deer migration route begins at the bottom of the Middle Fork of Hellroaring Creek, according to Wildlife Conservation Society data.



Segment: Headwaters to Hellroaring Creek.

Classification: Wild

Slough Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
737	**Gardiner**	**Yellowstone Headwaters**	**18.4**	**F, W**

Fish: Slough Creek contains a pure Yellowstone cutthroat trout population above a barrier.

Wildlife: Slough Creek hosts high value core grizzly bear habitat according to Craighead Institute models in the lower and upper reaches. Important elk and mule deer herds migrate in and out of Yellowstone National Park and into the Stillwater watershed, according to Wildlife Conservation Society data.

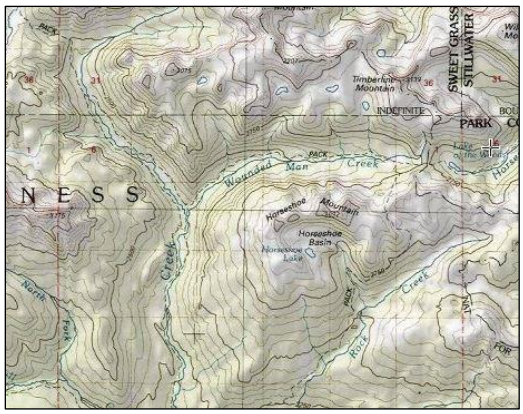
Public Support: Slough Creek was included in the Montanans for Healthy Rivers Wild and Scenic River Eligibility Report 2012.

Segment: Headwaters to the Forest Service boundary.

Classification: Wild – headwaters to the Slough Creek Ranger Station; Scenic – Slough Creek Ranger Station to the Forest Service boundary.

Wounded Man Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
933	**Gardiner**	**Yellowstone Headwaters**	**4.5**	**F**

Fish: Wounded Man Creek contains a pure Yellowstone cutthroat trout population. Efforts have been made by the Forest Service and Montana Fish, Wildlife and Parks to purify the native Yellowstone cutthroat trout population in the Slough Creek watershed. Therefore, Wounded Man Creek, Lake Abundance Creek and unnamed tributaries should be included with Slough Creek as eligible Wild and Scenic.

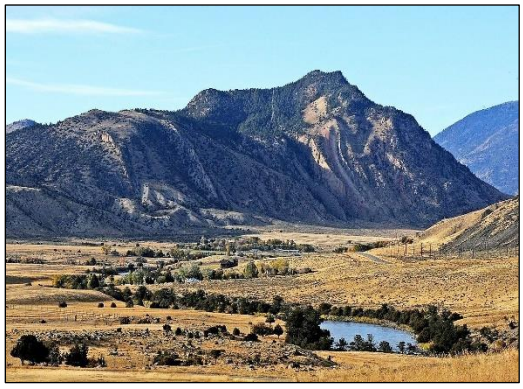


Segment: From the headwaters to Slough Creek.

Classification: Wild

Yellowstone River				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
940	**Gardiner**	**Yellowstone Headwaters**	**17**	**R, S, W, H**

Recreation: The Yellowstone River is a recreation mecca in Park County for rafting, fishing, camping, and hunting.



Scenery: The Yellowstone River carves a unique, broad meandering valley with alpine peaks of the Absaroka and Gallatin mountain ranges within view and sage brush flats down low.

Wildlife: The riparian corridor and the flats above the river offer essential grizzly bear, bison, elk, pronghorn, and bighorn sheep habitat.

Heritage: The Gardiner Basin and Yellowstone River corridor is the original gateway to Yellowstone National Park via railway. The first Dude Ranch in Montana was located in the Yellowstone River corridor at OTO Ranch on Cedar Creek. The OTO Ranch property is now administered by the Forest Service.

Public Support: The Yellowstone River is supported in the Montanans for Healthy Rivers Citizen Proposal for New Wild and Scenic Rivers legislation.

Segment: From the Yellowstone National Park boundary in Gardiner through Yankee Jim Canyon.

Classification: Recreational

Additional Recommendations in the Pryor Mountains

Although the Greater Yellowstone Coalition does not typically engage in conservation issues in the Pryor Mountains because this range is considered outside the geographic purview of the Greater Yellowstone Ecosystem, we recognize that the Pryor Mountains are not a forgotten landscape. This range hosts many important wildlife, cultural, and geologic values. Therefore, GYC has chosen to provide recommendations on eligible Wild and Scenic Rivers in the Pryor Mountains with some commentary. GYC did not use the same methodology to conduct a thorough analysis on these streams as was done on streams within the Greater Yellowstone Ecosystem part of the Custer Gallatin National Forest.

Bear Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
32	**Beartooth**	**Shoshone**	**6.2**	**W**

Wildlife: The Greater Yellowstone Coalition supports Bear Creek in the Pryor Mountains as eligible for its important contribution to migratory and resident bird populations. The intact riparian vegetation of Bear Creek, along with the security it provides for wildlife, warrants administrative protection as an eligible Wild and Scenic River. The Forest Service should extend the eligible Wild and Scenic Rivers boundary to the headwaters of Bear Creek.

Cave Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
123	**Beartooth**	**Bighorn Lake**	**7.2**	**G**

Geology: The Greater Yellowstone Coalition supports Cave Creek as eligible Wild and Scenic for its geologic ORV associated with a karst limestone canyon connected to Crooked Creek.

Crooked Creek				
FOREST SERVICE #	**RANGER DISTRICT**	**WATERSHED**	**MILEAGE**	**ORV**
182	**Beartooth**	**Bighorn Lake**	**7.9**	**G, S, H, F**

All: The Greater Yellowstone Coalition recommends Crooked Creek as an eligible Wild and Scenic River for its geologic, scenic, heritage and fish ORV's. This creek hosts many important scenic, wildlife, cultural, geologic and fish values, including a pure native Yellowstone cutthroat trout population protected by a barrier to keep out non-native species.

About Wild and Scenic Rivers

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. The law defines a river as a flowing body of water or estuary, or a section, portion, or tributary thereof, including rivers, streams, creeks, runs, kills, rills, and small lakes.

> *It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Congress declares that the established national policy of dams and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes.*
>
> *(Wild and Scenic Rivers Act, October 2, 1968)*

The Wild and Scenic River Act dictates that each river in the National Wild and Scenic Rivers System be administered in a manner to protect and enhance a river's outstandingly remarkable values. The Act allows existing uses of a river to continue and future uses to be considered, so long as existing or proposed use does not conflict with protecting river values. The Act also directs building partnerships among landowners, river users, tribal nations, and all levels of government.

The Act is best known for protecting the free-flowing character of a river or creek. To this end, the Federal Energy Regulatory Commission (FERC), which licenses non-federal hydropower projects, is not allowed to license construction of dams, water conduits, reservoirs, powerhouses, transmission lines, or other project works on or directly affecting Wild and Scenic Rivers.

Although streams may only be *designated* as Wild and Scenic Rivers through acts of Congress, all eligible segments must be *managed* in the interim to preserve the free-flowing nature and protect the Outstandingly Remarkable Values that have been determined.

To be considered *Eligible*, a stream must be free-flowing and possesses one or more outstandingly remarkable value. If found eligible, a river is analyzed as to its current level of development and a preliminary *classification* determination is made as to whether it should be placed into one of three classes:

- *Wild Rivers* – Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.
- *Scenic Rivers* – Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

- *Recreational Rivers* – Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some limited impoundment or diversion in the past.

The 2012 National Forest Planning Rule, provides directions and instructions to National Forests undergoing a revision of their existing Forest Plans. (36 CFR part 219) Chapter 80 of the Forest Service Handbook (FSH 1909.12) provides additional guidance specifically on how to conduct the Wild and Scenic Rivers eligibility study. The Custer Gallatin National Forest has summarized this process into the following steps:

Step 1: Identify All Named Streams on the 7.5 Minute USGS Quad Maps

Step 2: Identify Free-flowing Streams

The Wild and Scenic Rivers Act defines "free-flowing" as existing or flowing in a natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway. The existence of low dams, diversion works, or other minor structures at the time any river is proposed for inclusion in the National Wild and Scenic Rivers System does not automatically disqualify it for designation, but future construction of such structures is not allowed.

Step 3: Identify Regions of Comparison for Each Resource

The Greater Yellowstone Coalition supports the Custer Gallatin National Forest review team in using the Greater Yellowstone Ecosystem as a region of comparison for considering each Outstandingly Remarkable Value (ORV).

Step 4: Develop Evaluation Criteria to Identify Outstandingly Remarkable Values (ORVs)

Based on ORV categories established in the Wild and Scenic Rivers Act, the Greater Yellowstone Coalition has used those categories as well as criteria established in Forest Service Handbook (FSH) 82.14a to recommend eligibility. Further details are described in the *methodology* section of this report.

Step 5: Evaluate named Streams and Determine if they possess Outstandingly Remarkable Values (ORVs)

All ORV's must be river-related and:

- Be located in the river or on its immediate shore lands (generally within ¼ mile on either side of the river),
- Contribute substantially to the functioning of the river ecosystem, and/or
- Owe their location or existence to the presence of the river

This evaluation considers the area within one-quarter mile of the high water mark on both sides of a river, and other features outside this corridor such as tributaries supporting rearing and spawning habitat, if their inclusion is essential for the protection of the river's ORVs.

Outstandingly Remarkable Values include: “scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values” (WSRA, sec.1(b)).

Step 6: Review the Level of Development along Eligible Streams and Determine their Classification

After a stream has been determined eligible the level of development needs to be reviewed to determine one of the three classifications the stream falls within (Wild, Scenic, Recreation). A classification should be based on existing level of development at the time of the evaluation, not anticipated development in the future.

Methodology

Field data collection is the bedrock of this *Report on Recommended Eligible Wild And Scenic Rivers on the Custer Gallatin National Forest*. Over the course of three months in the summer of 2017, the Greater Yellowstone Coalition employed a waters conservation staff member and two trained interns to inventory streams on the Custer Gallatin National Forest for Wild and Scenic Rivers eligibility. Some additional field inventories took place before and after the summer of 2017 by the GYC waters conservation associate. Preceding field data collection, the Greater Yellowstone Coalition provided a training to two interns on: the Wild and Scenic Rivers Act; Chapter 80 of the Forest Service Handbook on Wild and Scenic eligibility analysis; a primer on approaches to field data collection; a backcountry safety protocol; a primer on backcountry travel and camping – particularly relevant to traveling in grizzly bear country. The GYC staff and interns primarily inventoried streams by foot. They hiked, walked, ran and backpacked backcountry stream sections. Where germane, they used automobiles to access and inventory major rivers accessible by road. In addition to field data collection, this report is complemented by analysis of peer reviewed literature, scientific papers from federal agencies and non-governmental organizations (NGO's), interviews with biologists and recreation specialists, Geographical Information System (GIS) analysis, and ecologic and climatic models generated from best available science.

Scoping of Streams – Region, Size, and Reputation

The Custer Gallatin National Forest has 940 named streams across seven ranger districts. 761 of these streams (covering 2,945 miles) are in the five ranger districts (Beartooth, Bozeman, Gardiner, Hebgen Lake and Yellowstone) that make up part of the Greater Yellowstone Ecosystem. The Greater Yellowstone Coalition has reviewed a subset of these streams during the Wild and Scenic Rivers eligibility analysis in 2017.

To establish some semblance of priority streams to conduct field inventories, the Greater Yellowstone Coalition looked at streams that were at least five miles in length within the Greater Yellowstone Ecosystem of the Custer Gallatin National Forest. While five miles may be a subjective number, it represented to GYC a length that likely begins to measure opportunities for "outstandingly remarkable values" on the national forest. However, given the fact that a stream's length should not dictate eligibility for Wild and Scenic Rivers, GYC staff also kept an open mind to a field inventory of small creeks that have a local or regional reputation for containing specific values related to heritage, wildlife, fish, recreation and scenery. Such examples include Maid of the Mist Creek in the Hyalite Creek watershed, the West Fork of Beaver Creek in the Madison watershed, and Pine Creek of the Upper Yellowstone River – all of which have a recreation outstandingly remarkable value associated with them. Other creeks smaller than five miles contain a fish ORV, as presented in more detail in this report. All total, GYC staff and interns conducted field inventories and/or Geographical Information System (GIS) analysis on 119 streams within the Greater Yellowstone Ecosystem portion of the Custer Gallatin National Forest.

Data Table Creation – Greater Yellowstone Coalition

For field data collection and Geographical Information System (GIS) analysis, Greater Yellowstone Coalition staff created a 28 point data spreadsheet (see appendix) to assess different conditions and

attributes of each creek on the Custer Gallatin National Forest. The data spread sheet takes its framework from the Forest Service Handbook 1909.12 Chapter 80, which describes a protocol for evaluating eligible Wild and Scenic Rivers on a National Forest. GYC staff then added four points of analysis on climate modeling for cold water streams and projected native fish habitat based on modeling conducted by NorWeST and Climate Shield. During field data collection, GYC staff and interns took photography with GPS coordinates using an application called Gaia GPS. In some cases, staff and interns conducted video along creeks as well.

The “ORV Description” column within the 28 point data spreadsheet includes: analysis of high value core grizzly bear habitat based on Craighead Institute models; major ungulate migratory paths based on Wildlife Conservation Society research; documented occupied wolverine habitat based on Wildlife Conservation Society research; general and winter range for moose based on Montana Fish, Wildlife and Parks mapping; pure native cutthroat trout populations based on Montana Fish, Wildlife and Parks mapping; places with heritage values based on research of Native American history and early white American settlement; and, recreation meccas based on Forest Service data, conversations with Forest Service employees, conversations with people directly involved in the outdoor recreation economy, and anecdotal knowledge from GYC staff who hike, climb, paddle, fish, and backcountry ski on the Custer Gallatin National Forest.

The 28 point data spreadsheet on eligible Wild and Scenic River analysis includes:

1. River Name – ex: Taylor Creek
2. FS Number - # River
3. District Name – ex: Beartooth Ranger District
4. Watershed Basin Name – ex: Clarks Fork Yellowstone
5. Field Check - Date mm/dd/yyyy, Duration (hours)
6. Segment checked - Begin/end point; Hydrographic features; ownership status; development
7. Segment Length – Linear Distance (Miles)
8. Free-Flowing - Status Condition "existing or flowing in a natural condition without impoundment, diversion, straightening, riprapping, or other modifications" "existence of low dams, diversion works or other minor structures shall not bar consideration" FSH 82.71
9. Potential ORV – ex: Fish, Wildlife, Recreation
10. ORV Description - located in river or corridor; contribute substantially to ecosystem function; river dependent; owes existence to river presence; if recreation - describe FSH 82.73
11. Climate Refuge 1 – Field: Aspect, Gradient, topographical relief in channel/riparian
12. Climate Refuge 2 – NorWeST Source water 5-10C in 2040
13. Climate Refuge 3 – NorWeST Optimal native trout habitat Temp 10-15C in 2040
14. Climate Refuge 4 – Climate Shield Cold Water Refuge Streams for Native Trout (probability of occurrence 2040 80-100%)
15. Digital Imagery – Photos, Video, Date, time, GPS Coordinate
16. Region of Comparison – ex: Greater Yellowstone Ecosystem
17. Classification – Wild, Scenic, Recreation FSH 82.8
18. Water Resource Development – Impoundment, diversion, modification 82.8
19. Shoreline Development - Primitive, undeveloped, small dispersed dwellings (ag.), grazing, timber harvest FSH 82.8
20. Accessibility – Level of roads, bridges, railroads FSH 82.8

21. Water Quality – Any known baseline testing or reporting FSH 82.8 (USGS, DEQ)
22. Tribal Consultation – Blackfeet, Crow, CKST, Shoshone, Nez Perce FSH 81.1
23. NRI – Nationwide Rivers Inventory FSH 82.2
24. USGS 7.5 Minute Quad – Name of Quad FSH 82.2
25. Changed Circumstances – Wildlife & Fish Species (Y/N) FSH 82.4; Recreation changes
26. GYC Recommended Eligibility – Y/N
27. Recommended Segment – ex: all; or from named confluence to headwaters
28. Explanation – Further justification for recommendation for eligible Wild and Scenic Rivers

Climate Models – NorWeST Rocky Mountain Research Station

The Greater Yellowstone Coalition used the NorWeST (Rocky Mountain Research Station, Department of Agriculture) summer stream temperature model and scenarios for the western U.S. to address different scenarios for climate change modeling on the Custer Gallatin National Forest. The NorWeST temperature database was compiled from hundreds of biologists and hydrologists working for more than 100 resource agencies. The database contains more than 200,000,000 hourly temperature recordings at over 20,000 unique stream sites. Those temperature data were used with spatial statistical network models to develop 36 historical and future climate scenarios at 1-kilometer resolution, covering more than 1,000,000 kilometers of streams.

To determine whether a stream might serve as a cold water "Climate Refugia" in the future, GYC used GIS shapefiles from modeled stream temperature scenarios to analyze streams that were predicted to flow at temperatures ranging from 5 – 10C in 2040 and from 10 – 15C in 2040. GYC used best available science to determine that the 5 - 10C range was a minimum temperature range to support native cutthroat trout growth and reproduction while the optimal growth temperature for native cutthroat trout is 13 - 15C. Isolating these two temperature ranges during GYC's analysis provided an understanding of where cold water refugia is predicted to exist in 2040 to: 1) simply support native trout populations as a minimum temperature requirement, and 2) to protect thriving native trout populations in 2040. Since the NorWeST models only deal with temperature, GYC analyzed literature on native fish research to justify the two temperature scenarios.

In a 2007 paper entitled *Cold Summer Temperature Limits Recruitment of Age-0 Cutthroat Trout in High Elevation Colorado Streams*, published in Transactions of the American Fisheries Society by Mark Coleman and Kurt Fausch, the authors write:

> *We defined the start of the growing season as the beginning of the first week that average stream temperatures exceeded and remained above 5C for the season; the end of the growing season was defined as the last day of the first week that average stream temperature dropped below 4C. These criteria were based on previous work indicating that adult native cutthroat trout in Colorado spawn when stream temperatures reach 5 – 8C (USFWS 1998), and that growth typically occurs in trout at water temperatures of approximately 4C and above (Piper et al. 1982)*

The National Park Service *Yellowstone Trout Facts,* recently updated in 2017*,* also confirms that cutthroat trout require a minimum temperature of 5C for adequate spawning.

In another 2007 publication in Transactions of the American Fisheries Society entitled *Comparative Thermal Requirements of Westslope Cutthroat Trout and Rainbow Trout: Implications for Species Interactions and Development of Thermal Protection Standards,* Elizabeth Bear, Thomas McMahon and Alexander Zale concluded that "maximum temperatures near an upper limit of 13 – 15C would delineate suitable thermal habitat for long term persistence of west slope cutthroat trout." Bear et al. further argued that "westslope cutthroat trout may have greater tolerance than rainbow trout to the recruitment failures that are common to higher elevation sites because of their cold summer temperatures and short growing season."

Multiple literature sources make clear that Yellowstone cutthroat trout (*Oncorhynchus clarkia bouvieri*) and westslope cutthroat trout (*Oncorhynchus clarkia lewisi*), two species native to the Custer Gallatin National Forest, are restricted to high elevation, higher gradient streams where the water temperatures are consistently cold. Conversely, mid to lower elevation reaches of streams are commonly occupied by non-native rainbow trout, brook trout, brown trout and rainbow-cutthroat hybrids, known as cutbows.

Recommendation: To protect the longevity of the two native cutthroat trout species on the Custer Gallatin National Forest, the Greater Yellowstone Coalition encourages the Forest Service to recognize the modeled cold water streams as containing an outstandingly remarkable value known for their "Climate Refugia."

Cutthroat Trout – Climate Shield Cold Water Refuge Streams

The Greater Yellowstone Coalition used the GIS shapefile on *Climate Shield Cold Water Refuge Streams for Cutthroat Trout* (Isaak et al.) to better understand where scientists concluded cold water streams within the interior range of cutthroat trout are too cold to be invaded by brown trout and rainbow trout during different climate scenarios. In this analysis, the GYC staff focused on refuge streams for native trout where the probability of occurrence is predicted at 80 - 100 percent in 2040. The analysis of this work indicates significant overlap with modeling on cold water stream temperatures from the NorWeST (above) shapefiles. However, the overlap is not perfect. There are some creeks that are cold (5 – 10C) that are not modeled to support native trout in 2040 according to the Climate Shield models. GYC concludes that, in some cases, native trout survival is based on habitat requirements, not merely cold water temperatures. This does not, however, devalue the importance of cold water of 10C or less because this cold water in high elevation streams supports native trout at lower elevations where the stream gradient may also be more conducive to native trout survival.

Cutthroat Trout – Pure Native Populations & Habitat – Montana Fish, Wildlife & Parks

The Greater Yellowstone Coalition used the GIS shapefile on fish populations, produced by Montana Fish, Wildlife and Parks and housed in the Montana State Library geographic information clearinghouse. GYC staff selected native Yellowstone cutthroat trout (*Oncorhynchus clarkia bouvieri*) and native westslope cutthroat trout (*Oncorhynchus clarkia lewisi*) in the GIS shapefile to examine currently mapped pure populations on the Custer Gallatin National Forest.

While conducting field data collection on optimal stream habitat for native trout, the Greater Yellowstone Coalition staff used components of the Stream Visual Assessment Protocol (SVAP) developed by the Natural Resource Conservation Service. Rather than score each stream habitat component, GYC staff and interns made visual observations on the following characteristics of stream health: channel condition (natural, levels of alteration, down cutting); riparian zone (natural vegetation extends relative width to channel); bank stability; water appearance (clear, slightly cloudy, cloudy, turbid); barriers to fish movement; pools (type and abundance); and, riffle ebeddedness (gravel, cobble, fine sediment).

Recommendation: Observations from this analysis influenced GYC staff to support a "Fish" outstandingly remarkable value" for streams on the Custer Gallatin National Forest where pure native trout have a stronghold or are protected from non-native introgression or non-native competition by natural or human-made stream barriers. GYC asks the Forest Service to follow this recommendation.

Grizzly Bear – Craighead Institute

The grizzly bear (*Ursus arctos*) has long been considered an iconic species of the Greater Yellowstone Ecosystem. Due to habitat destruction, hunting, poaching and human conflict, the grizzly bear population in the Greater Yellowstone Ecosystem sunk to an all-time low of 136 bears in 1975. Since then, the population increased to an estimated 757 in 2014, and then declined to 690 grizzly bears in 2016. According to the Interagency Grizzly Bear Study Team, grizzly bears have gradually expanded their occupied habitat by more than 50% since 1975.

The Custer Gallatin National Forest provides invaluable habitat for sustaining a healthy grizzly bear population. Riparian zones often create some of the best secure habitat for grizzly bears. Although the U.S. Fish & Wildlife Service recently determined that the population of the Greater Yellowstone grizzly bear is recovered from an Endangered Species Act listing as a result of estimated population size, distribution of females with cubs, and mortality rates, the Greater Yellowstone Coalition finds it imperative that all federal agencies continue to work together to identify and protect critical grizzly bear habitat.

While most of the Custer Gallatin National Forest within the Greater Yellowstone Ecosystem provides grizzly bear habitat, the Greater Yellowstone Coalition chose to parse out the highest level of core grizzly bear habitat to identify it as worthy of an outstandingly remarkable wildlife value. GYC examined Craighead Institute GIS spatial modeling that focused on: grizzly bear connectivity (rated from high to low movement costs); grizzly bear corridors (rated from high to low probability of connectivity); and, grizzly bear predicted living/core habitat (rated from low to high value). GYC staff ended up focusing our attention on the High Value Predicted Core Habitat geodatabase raster dataset overlaid across creeks and rivers (shapefile) on the Custer Gallatin National Forest to make recommendations for a wildlife ORV pertinent to grizzly bear survival.

Recommendation: The Greater Yellowstone Coalition believes that it is important to analyze grizzly bear secure habitat as a "Wildlife" outstandingly remarkable value to be reviewed for Wild and Scenic eligibility on relevant streams on the Custer Gallatin National Forest. GYC asks the Forest Service to follow this recommendation.

Wolverine – Wildlife Conservation Society

Wolverines (*Gulo gulo*) within the lower 48 states are currently confined to small, remnant populations of fewer than 300 in Idaho, Washington, Wyoming and Montana. A recent study estimates that their "effective" population size – the portion of the population that successfully breeds- may be as low as 35 individuals in the Rocky Mountains. According to Celgeski et al., "The size and trend of each of these populations and connectivity to adjacent populations in the contiguous United States and Canada are poorly understood." Warming winters and dwindling snowpack, a result of climate change, have created an increased pressure on the longevity of wolverine populations in the lower 48 states, even threatening extinction. In 2010, the U.S. Fish and Wildlife Service determined that wolverines warrant protection under the Endangered Species Act but that those protections were withheld indefinitely due to the backlog of other species awaiting an official listing.

Research and publications by the Wildlife Conservation Society (WCS) in the past decade have led to increased understanding of habitat use and home range by wolverines on, and adjacent to, the Custer Gallatin National Forest in Montana. The Greater Yellowstone Coalition used Wolverine Progress Reports published by the Wildlife Conservation Society in 2007, 2008 and 2009 to evaluate occupied wolverine habitat on the Custer Gallatin National Forest. Most of the consistently used habitat lies along the Lion's Head and Madison Range, as well as the southwest corner of the Absaroka Range in Montana.

Recommendation: The GYC staff used mapping produced by WCS that represents occupied wolverine habitat with polygons and then overlaid those home range polygons over creeks and rivers on the Custer Gallatin National Forest to make a recommendation for a "Wildlife" outstandingly remarkable value associated with wolverine habitat. GYC asks the Forest Service to follow this recommendation.

Ungulate Migration & Habitat – Wildlife Conservation Society, Montana Fish, Wildlife & Parks

The Greater Yellowstone Coalition used the Wildlife Conservation Society Ungulate Migration data set to determine riparian corridors of high wildlife value on the Custer Gallatin National Forest

The Wildlife Conservation Society Ungulate Migration data set contains large mammal migration routes for five ungulate species (elk, mule deer, bighorn sheep, moose, and pronghorn) in the Greater Yellowstone Ecosystem, as compiled from GIS data on migration route locations for Wyoming, Montana, and Idaho. Each route is assigned a confidence ranking, a threat score and mean threat value based on the likelihood of adverse impacts from human land use along the length of the route. This dataset was obtained from Data Basin and is available at:
http://app.databasin.org/app/pages/datasetPage.jsp?id=1a82b70322fe439dae3747d5ba3699cf

The Greater Yellowstone Coalition also evaluated general range and winter range for moose and elk based on habitat mapping compiled by the Montana Fish, Wildlife and Parks. The elk distribution dataset can be found at:
https://mslservices.mt.gov/geographic_information/data/datalist/datalist_Details.aspx?did={F699A592-C81D-4AC9-BC81-DEE1E9A9FC87}

The moose distribution dataset can be found at: https://mslservices.mt.gov/geographic_information/data/datalist/datalist_Details.aspx?did={b2222c20-5b0b-11e5-a837-0800200c9a66}

Recommendation: In watersheds on the Custer Gallatin National Forest where a significant portion of an ungulate migration path parallels a riparian corridor, the Greater Yellowstone Coalition recommends the corresponding stream for a "Wildlife" outstandingly remarkable value for Wild and Scenic Rivers eligibility. GYC asks the Forest Service to follow this recommendation.

Heritage – Apsáalooke (Crow Nation), U.S. Forest Service

To pay respects to the Native American cultural heritage of the region within the Greater Yellowstone Ecosystem that is now administered by the Custer Gallatin National Forest, the Greater Yellowstone Coalition included recommendations for a "Heritage" outstandingly remarkable value associated with eligible Wild and Scenic Rivers. Much of the GYC's analysis of Native American connections to this landscape drew from the Forest Service's *Assessment Forest Plan Revision Final Areas of Tribal Importance Report* as well as scholarly research accessible online.

The Custer Gallatin National Forest contains many culturally important sites held sacred by Native American tribes. LaPoint and Bergstrom write:

> Native American tribes have lived on, or traversed through, lands within the Custer Gallatin for thousands of years where they hunted, fished, gathered plant foods, buried their dead, and conducted religious ceremonies. Their cultural practices were still in use when they were removed from their homelands onto reservations, and many of these ties to their aboriginal territories and practices remain in place today through stories, songs, language, place names and spiritual world view. These places provide guidance and spiritual assistance to individuals and tribes in general, and when these sites are destroyed so is a portion of tribal heritage, a loss experienced by the whole tribe.

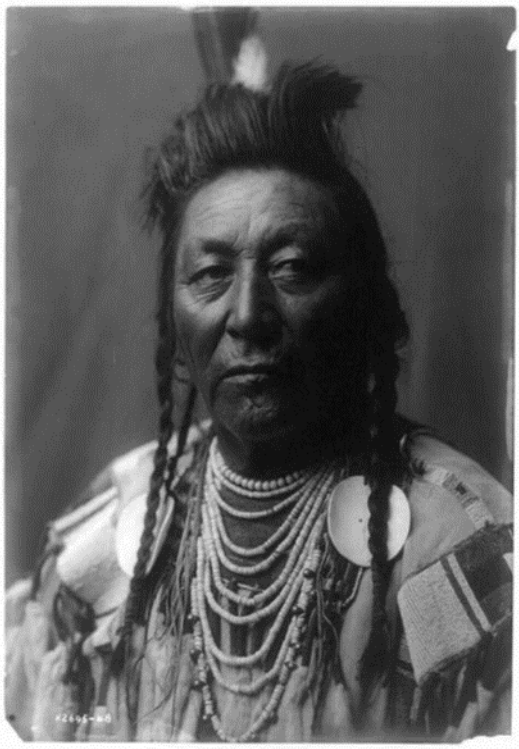
Indian Claim's Commission maps depict the Custer Gallatin National Forest overlapping within three tribal claims – Dahcotah (Sioux); the Arikara, Mandan, Hidatsa Nation; and Apsaalooké (Crow). Most of the Custer Gallatin National Forest that lies within the Greater Yellowstone Ecosystem was historically Crow territory, however other tribes used the Madison, Gallatin and Yellowstone Valley as routes to access hunting grounds. The Hebgen Lake and Bozeman Districts of the Custer Gallatin fall within the original "open hunting grounds," or unceded lands, identified in the 1851 Fort Laramie Treaty and no Indian Claim's Commission claims have been made on these areas. According to the Gallatin County Montana Genealogy Trails "There was an early tradition among the Indians of Montana that Gallatin Valley, called by them the "Valley of Flowers" was neutral ground."

Landscape	Tribe	Association/Concerns
Madison, Henry's Lake, Gallatin, Absaroka and Beartooth Mountains	Nex Perce Shoshoni-Bannock Eastern Shoshone	Nez Perce Natinal Historic Trail; Bannock Trail; Hunting, Gathering, Fasting; Maintain and increase access for mineral resource gathering, such as soapstone and paint pigment; Respectful treatment of TCPs especially Sun Dance Grounds, fasting sites, rock art sites and medicine wheels; Respectful treatment of hunting, fishing and root gathering sites
Bridger, Bangtail, Crazy Mountains	Blackfeet Confederated Salish Kootenai Crow	Flathead Pass; Crazy Mountain Traditinal Cultural Landscape Crazy Mountains – motorized travel above timber line or alpine areas
Pryor Mountains	Crow Shoshone Northern Cheyenne	Traditional Cultural Landscape; Hunting and Gathering; Plants; Motorized travel at Dryhead Overlook; Maintain access for plant collecting (including tipi poles) particularly in the Pryor Mountains and especially Pryor foothills

Table. General known tribal associations and concerns (Excerpted from Table 4 in the Custer Gallatin National Forest's *Assessment Forest Plan Revision Final Areas of Tribal Importance Report.*)

One of the more revered mountain ranges in the region, used by Native Americans for generations for sacred rituals such as rites of passage and vision quests is the Crazy Mountains.

> *The picturesque Crazy Mountains were known to the Apsáalooke people as Awaxaawapìa Pìa, roughly translated as "Ominous Mountains." An even rougher translation of "Pia" could be the English term "crazy," because it infers an extreme and unpredictable nature. Awaxaawapìa Pìa were well known for their unique qualities that included their stark physical stature, their ability to draw storm clouds upon them at any time, and their metaphysical power which was always abundant and potent for those who sought it in the mountains.* (Inglebret and Wood)



In 1804, as the Lewis and Clark expedition traveled by canoe up the Missouri River, a famous Apsáalooke chief named Alapooish (Sore Belly) fasted on top of the highest peak in the Crazy Mountains, now called Crazy Peak, and received a powerful dream that helped to propel him into history as a leader on the northern Plains. Another famous Apsáalooke chief, Alaxchíia Ahú (Plenty Coups), also received a vision while fasting in the Crazy Mountains as an adolescent in 1861. Alaxchíia Ahú foresaw the Virginia City Gold Rush and the opening of the Bozeman Trail, which informed his Tribe's diplomatic decisions to form an alliance with the U.S. government when the invasion of the Crow homeland began in 1864. Drainages such as Big Timber Creek on the east side and Cottonwood Creek on the west side of the Crazy Mountains were key passage ways into the interior high peaks of the range.

Recommendation: The Greater Yellowstone Coalition supports Big Timber Creek and Cottonwood Creek for

their "heritage" outstandingly remarkable value for inclusion as eligible Wild and Scenic Rivers. GYC asks the Forest Service to follow this recommendation.

Photo: Alaxchíia Ahú (Plenty Coups) by Edward S. Curtis (Library of Congress)

Recreation Reports – U.S. Forest Service; Montana fish, Wildlife & Parks

In the past decade, recreation has become a booming economic force for communities such as Billings, Bozeman, Livingston, Gardner, Red Lodge and West Yellowstone, Montana – all adjacent to the Custer Gallatin National Forest. The booming recreation economy has led to a significant increase in year-round recreation in both front country, backcountry and river settings on the Forest.

The *Assessment Forest Plan Revision Final Recreation Settings, Opportunities, and Access Report* (2017) explains that recreation on the Custer Gallatin National Forest in 2012 contributed $51,712,000 to the regional market area. The report also identifies recreation as the primary reason visitors come to the Forest. National Visitor Use Monitoring from 2014 accounts for nearly 2.6 million dispersed area visitors. Dispersed recreation consists of activities that take place outside developed recreation areas, such as camping, hiking, fishing, hunting, gathering forest products, river use, skiing, recreational shooting, climbing, and snowmobiling.

The Custer Gallatin National Forest is also experiencing high demands for commercial recreation special use permits. Across the Greater Yellowstone Ecosystem of the Custer Gallatin National Forest, which includes the Madison, Henry's, Gallatin, Absaroka, Beartooth, Bridger, Bangtail and Crazy Mountain Ranges, 169 outfitter guides operate on an annual basis. In 2015, horseback trail rides accounted for 32,500 user days, rafting and boating accounted for 28,000 user days, snowmobiling accounted for 11,000 user days, climbing (rock and ice) 6,475 user days, environmental education accounted for 6,000 user days, hunting 5,600, fishing 4,250, hiking 3,100, and backpacking 2,500 user days. (Oswald)

According to Montana Fish Wildlife and Parks, as of 2009, angling on just the five most-fished Custer Gallatin waterbodies (Madison, Gallatin, and Yellowstone Rivers; Hebgen and Hyalite Reservoirs) was over 146,000 angler days, with 45 percent of these angler days representing nonresident fishermen. The segment of the Madison River downstream of the Custer Gallatin supports an additional 121,000 angler days a year. The Yellowstone River, likewise has over 71,000 angler days. (Brandt et al.)

Beyond rivers with national notoriety that are expected to attract significant recreational focus, the Custer Gallatin National Forest also administers places like Hyalite Canyon that supports significant winter recreation from local and regional interests. A 2013 Hyalite Canyon Winter Use Study found that approximately 18,765 cars passed by the lowest counter along the Hyalite Road between January and March with 12,742 passing by the counter just below the reservoir access. Over 87% of users were residents of Gallatin County; 105 respondents identified Hyalite as a winter destination recreation area that they are traveling overnight to access. (Gray and Haywood)

Clearly, recreation plays a huge role on the Custer Gallatin National Forest. Fortunately, part of the eligibility review for Wild & Scenic Rivers on a National Forest includes recognition of creeks and rivers that significantly contribute to recreation opportunities – both aquatic and terrestrial. In analyzing

potential “recreation” outstandingly remarkable values on the Custer Gallatin National Forest, the Greater Yellowstone Coalition used aforementioned reports, as well as valuable recreation data produced by the Beartooth Ranger District that is specific to user days at major trailheads, such as East Rosebud Creek, Lake Fork, West Fork Rock Creek, the Stillwater River, etc. (Wood). However, to our understanding, this type of recreation user data does not exist across all ranger districts or on all creeks and trails. Therefore, the Greater Yellowstone Coalition used local knowledge, conversations with agency employees and feedback from the general public to justify a “recreation” outstandingly remarkable value for recommended eligible Wild and Scenic Rivers on the Custer Gallatin National Forest.

Montanans for Healthy Rivers Wild & Scenic Rivers Eligibility Report 2012

In 2011, a coalition of businesses, sportsmen, watershed groups, private landowners, and conservation groups came together to form Montanans for Healthy Rivers. Since its genesis, Montanans for Healthy Rivers has served as a unified group of diverse stakeholders who share a common interest to address river conservationist opportunities across Montana on both public and private lands. With multiple national forests pursuing forest plan revisions in the past eight years, one of the first tasks of Montanans for Healthy Rivers was to explore and inventory creeks and rivers across Montana for their potential Wild and Scenic Rivers eligibility status. By 2012, Montanans for Healthy Rivers published an independent, Wild and Scenic Rivers Eligibility Report covering streams on nine national forests across Montana, including the Custer Gallatin National Forest. At the time, the Custer Gallatin was reviewed as two separate national forests because the merger of the Custer Gallatin was not finalized until 2013.

The report was generated by a team of experts in fisheries and wildlife biology, river ecology, hydrology and recreation. The report was based on close examination of the Montana Fisheries Information System, current and draft forest plans, the Nationwide Rivers Inventory (NRI), the National Whitewater Inventory, Google Earth and other geospatial resources, and field observations. All total, the report recommended 43 streams as eligible Wild & Scenic on the Custer Gallatin National Forest. Two of these streams are outside of the Greater Yellowstone Ecosystem and located in the Pryor Mountains.

The Greater Yellowstone Coalition is proud to be a part of the 2012 Montanans for Healthy Rivers (MHR) Wild and Scenic River Eligibility Report. The GYC 2017 field data collection sheet for this report documents streams that were recommended as eligible Wild and Scenic in the 2012 MHR report. This is noted in the explanation column. The Greater Yellowstone Coalition continues to be an active member of the Montanans for Healthy Rivers coalition. GYC also continues to support most of the creeks contained in the 2012 report as eligible Wild and Scenic Rivers. However, GYC has continued to learn more about the condition of creeks and rivers across the Greater Yellowstone Ecosystem. As a result, we believe this current 2017 report produced by the Greater Yellowstone Coalition represents the most thorough analysis of recommended eligible Wild and Scenic Rivers on the Custer Gallatin National Forest.

Montanans for Healthy Rivers Wild & Scenic Rivers Legislative Citizens Proposal

The Greater Yellowstone Coalition's report on recommended eligible Wild and Scenic Rivers on the Custer Gallatin National Forest includes streams that were also included in a citizen's legislative proposal for new designated Wild and Scenic Rivers, compiled by Montanans for Healthy Rivers. The legislative proposal is composed of streams in the Greater Yellowstone and Crown of the Continent ecosystems, as well as the Smith River and Rock Creek of the Clark Fork River. All streams were nominated by Montanans who want to protect clean water and healthy rivers. The full list includes 46 stream segments totaling 673 stream miles, less than 0.25% of Montana's 177,000 miles of streams. GYC acknowledges streams supported in the legislative proposal in two places in this analysis and report: in the "Explanation" column of the field data spread sheet (see appendix), as well as in the narrative of recommended eligible Wild and Scenic Rivers below.

Over the past six years, Montanans for Healthy Rivers (MHR) compiled a list of proposed Wild and Scenic Rivers submitted by a broad cross section of Montanans. MHR hosted nearly 20 public meetings and events across Montana in Big Sky, Billings, Bozeman, Condon, Ennis, Kalispell, Livingston, Missoula, Ovando, Red Lodge, Rock Creek, Seeley Lake, and Whitefish. To date, the proposal has garnered the support of over 1300 official endorsements, including more than 300 businesses, four chambers of commerce, the Montana Fish, Wildlife & Parks Commission, the Rocky Mountain Tribal Leaders Council (representing 12 tribes), Montana Backcountry Horseman (representing 17 chapters), and business organizations such as Fishing Outfitters Association of Montana (representing 700 outfitters and guides) and Business for Montana Outdoors (representing 120 businesses).

Montanans for Healthy Rivers (MHR) is led by a steering committee of sportsmen and conservation organizations invested in river protection through community and business outreach in western Montana. The MHR steering committee currently consists of American Rivers (200,000 members and supporters), American Whitewater (5800 members and 80,000 affiliates), Backcountry Hunters and Anglers (1800 Montana members), Greater Yellowstone Coalition (over 95,000 members and supporters), and Pacific Rivers (500 members).

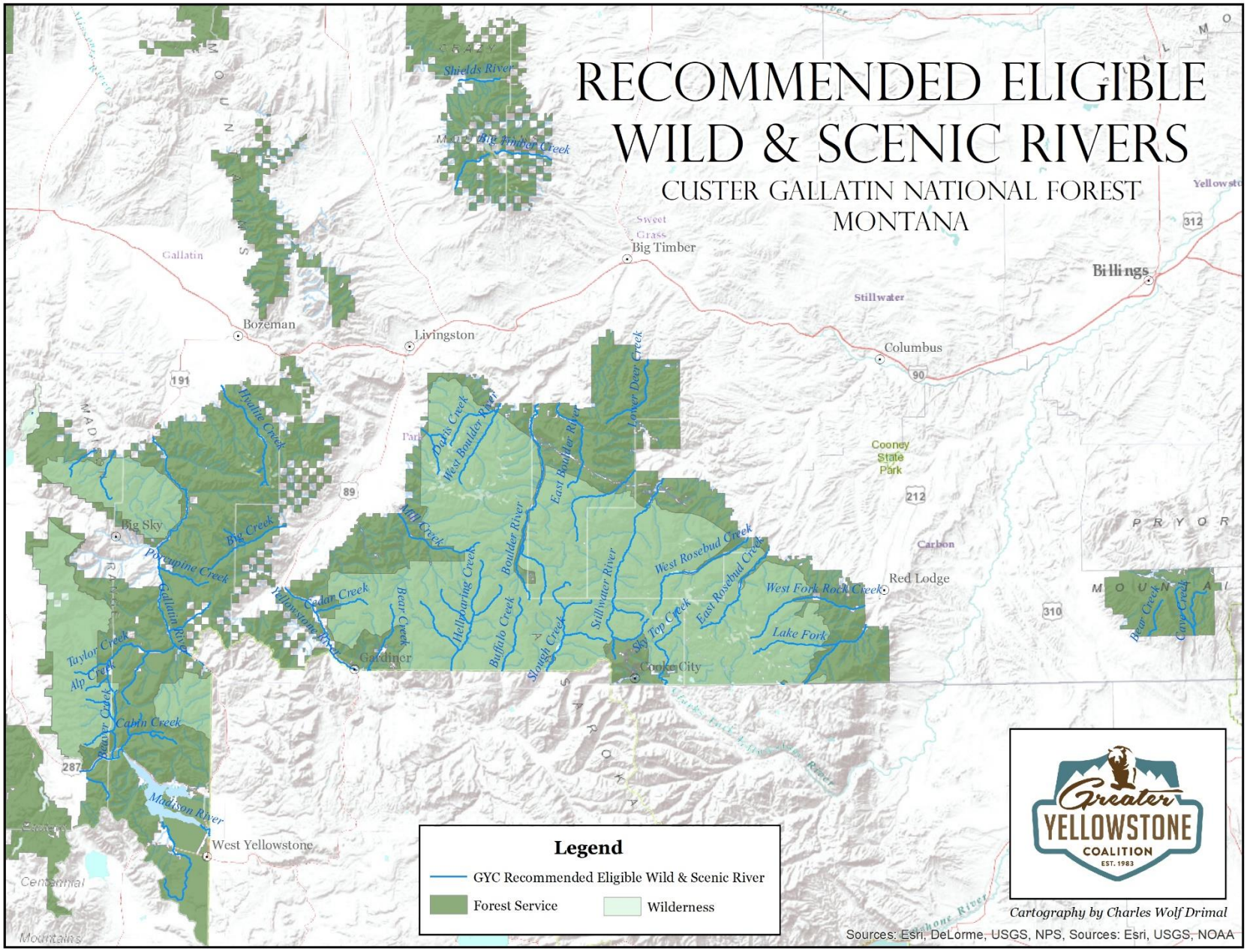
The Greater Yellowstone Coalition provides this information to the Forest Service to demonstrate the significant public support that exists for Wild and Scenic River protections on specific streams. While we respect the fact that forest planning's role in determining Wild and Scenic eligibility is separate from legislative protections that occur through an act of Congress, the Greater Yellowstone Coalition believes it is important for the Forest Service to recognize that many of the creeks and rivers we recommend as eligible Wild and Scenic have also been vetted through numerous public forums and presented as a citizens proposal for new Wild and Scenic Rivers by the Montanans for Healthy Rivers coalition.

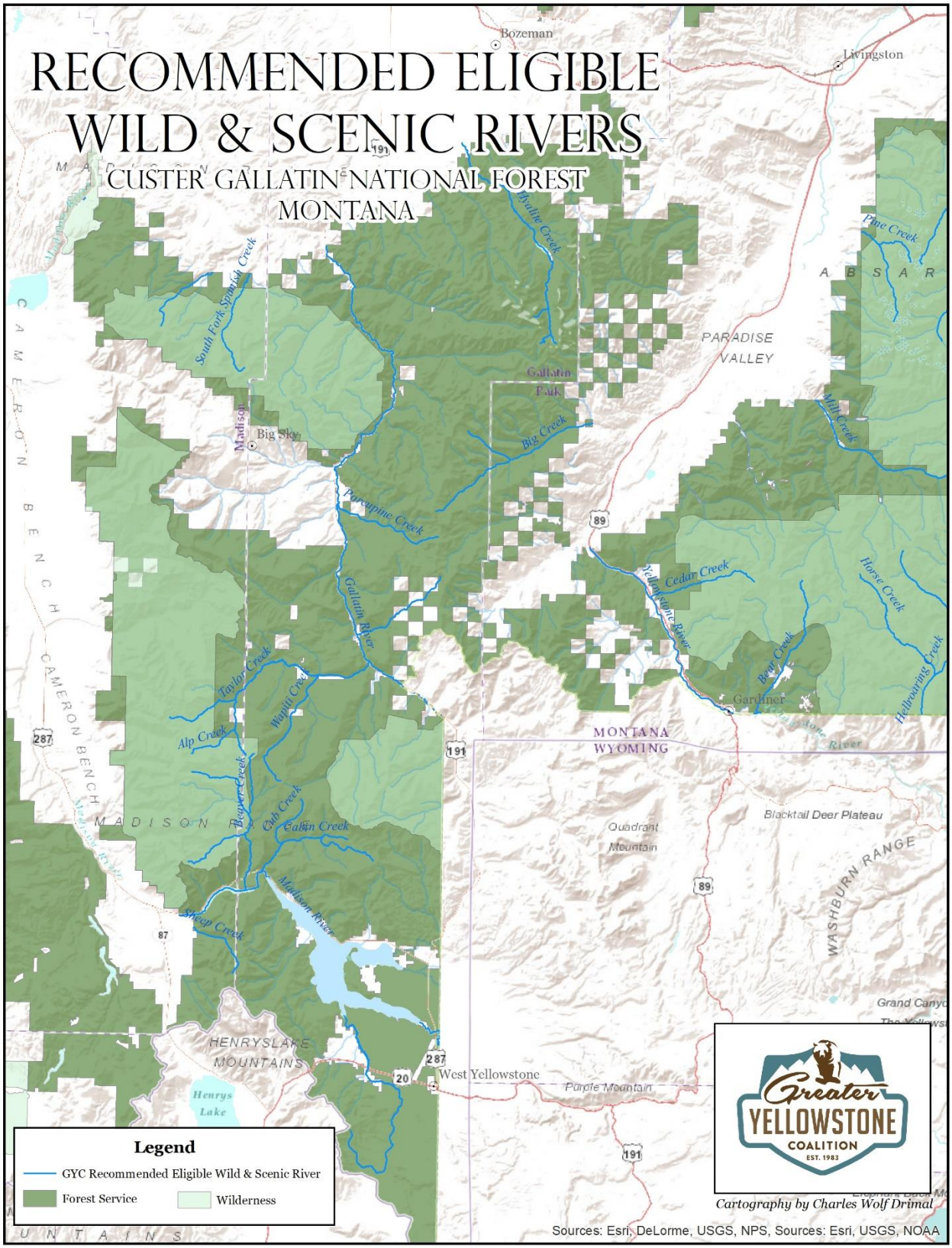
Climate Refugia is an Outstandingly Remarkable Value

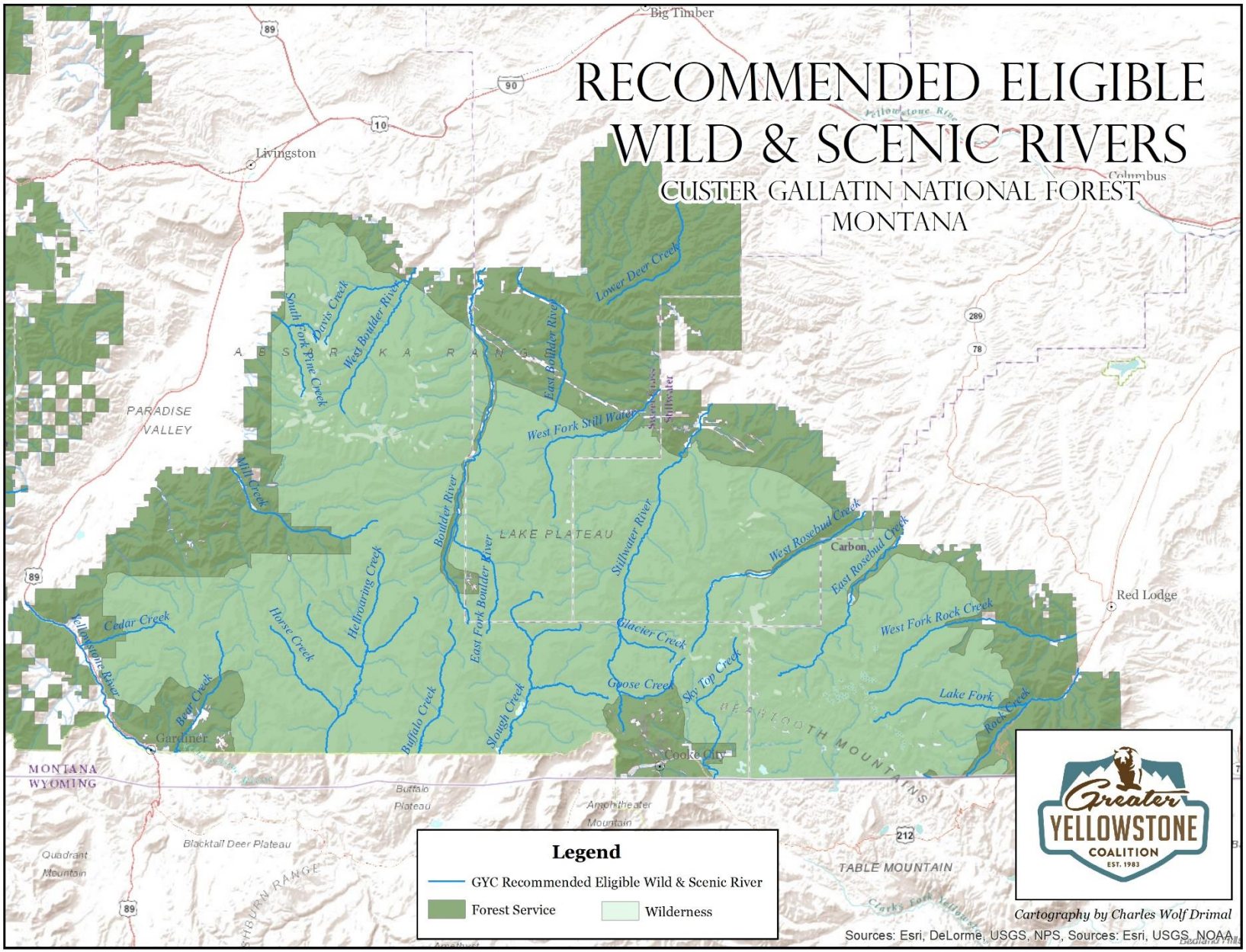
As part of the Greater Yellowstone Ecosystem, many headwater streams on the Custer Gallatin National Forest have been identified by fisheries and climate scientist as hosting important climate refugia due to elevation and aspect. As the Forest Service writes a forest plan for the next 25 years, climate change needs to be taken into account. This plan is not written for 2020, but rather for the next couple decades when all climate modeling points to the importance of protecting riparian habitat, particularly in

drainages that hold snowpack later into the summer, originate in high elevation, and are usually, though not always, north aspect with moderate to steep gradients. As described in the section of this report on recommendations for eligible Wild and Scenic Rivers, the Greater Yellowstone Coalition chose to use best available science, data and modeling to make an outstandingly remarkable value recommendation based on streams likely to serve as climate refugia in the future.

Recommendation: The Greater Yellowstone Coalition strongly encourages the Forest Service to consider "climate refugia" as an "other" outstandingly remarkable value.


RECOMMENDED ELIGIBLE WILD & SCENIC RIVERS
CUSTER GALLATIN NATIONAL FOREST
MONTANA
Shields River
Big Timber Creek
Sweet Grass
Big Timber
Billings
Stillwater
Gallatin
Bozeman
Livingston
Columbus
Cooney State Park
Carbon
Red Lodge
Big Sky
Gardiner
Cooke City
West Yellowstone
Hyalite Creek
Big Creek
Porcupine Creek
Gallatin River
Taylor Creek
Alp Creek
Beaver Creek
Cabin Creek
Madison River
Cedar Creek
Yellowstone River
Bear Creek
Mill Creek
Hellroaring Creek
Buffalo Creek
Slough Creek
Boulder River
Davis Creek
West Boulder River
East Boulder River
Lower Deer Creek
Stillwater River
Sky Top Creek
West Rosebud Creek
East Rosebud Creek
West Fork Rock Creek
Lake Fork
Bear Creek
Coyote Creek
PRYOR MOUNTAINS
Legend
GYC Recommended Eligible Wild & Scenic River
Forest Service
Wilderness
Greater YELLOWSTONE COALITION EST. 1983
Cartography by Charles Wolf Drimal
Sources: Esri, DeLorme, USGS, NPS, Sources: Esri, USGS, NOAA


RECOMMENDED ELIGIBLE
WILD & SCENIC RIVERS
CUSTER GALLATIN NATIONAL FOREST
MONTANA
Bozeman
Livingston
Big Sky
Madison
Gardiner
West Yellowstone
PARADISE VALLEY
CAMERON BENCH
MADISON
ABSAR
MONTANA
WYOMING
HENRYS LAKE MOUNTAINS
WASHBURN RANGE
Blacktail Deer Plateau
Quadrant Mountain
Purple Mountain
Gallatin Peak
Fine Creek
Mill Creek
Big Creek
Porcupine Creek
Cedar Creek
Horse Creek
Hellroaring Creek
Beef Creek
Gallatin River
Yellowstone River
Taylor Creek
Wapiti Creek
Alp Creek
Beaver Creek
Cub Creek
Cabin Creek
Madison River
Sheep Creek
Henrys Lake
South Fork Spanish Creek
Hyalite Creek
Legend
GYC Recommended Eligible Wild & Scenic River
Forest Service
Wilderness
Greater YELLOWSTONE COALITION EST. 1983
Cartography by Charles Wolf Drimal
Sources: Esri, DeLorme, USGS, NPS, Sources: Esri, USGS, NOAA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WILD & SCENIC RIVERS
CUSTER GALLATIN NATIONAL FOREST
MONTANA
Big Timber
Livingston
Columbus
Red Lodge
Carbon
Gardiner
Cooke City
PARADISE VALLEY
LAKE PLATEAU
BEARTOOTH MOUNTAINS
TABLE MOUNTAIN
Buffalo Plateau
Amphitheater Mountain
Blacktail Deer Plateau
Quadrant Mountain
MONTANA
WYOMING
Lower Deer Creek
South Fork Pine Creek
Davis Creek
West Boulder River
East Boulder River
West Fork Still Water
Stillwater
Mill Creek
Boulder River
Stillwater River
West Rosebud Creek
East Rosebud Creek
Cedar Creek
Yellowstone River
Horse Creek
Hellroaring Creek
East Fork Boulder River
Glacier Creek
Goose Creek
Sky Top Creek
West Fork Rock Creek
Lake Fork
Rock Creek
Bear Creek
Buffalo Creek
Slough Creek
Legend
GYC Recommended Eligible Wild & Scenic River
Forest Service
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Cartography by Charles Wolf Drimal
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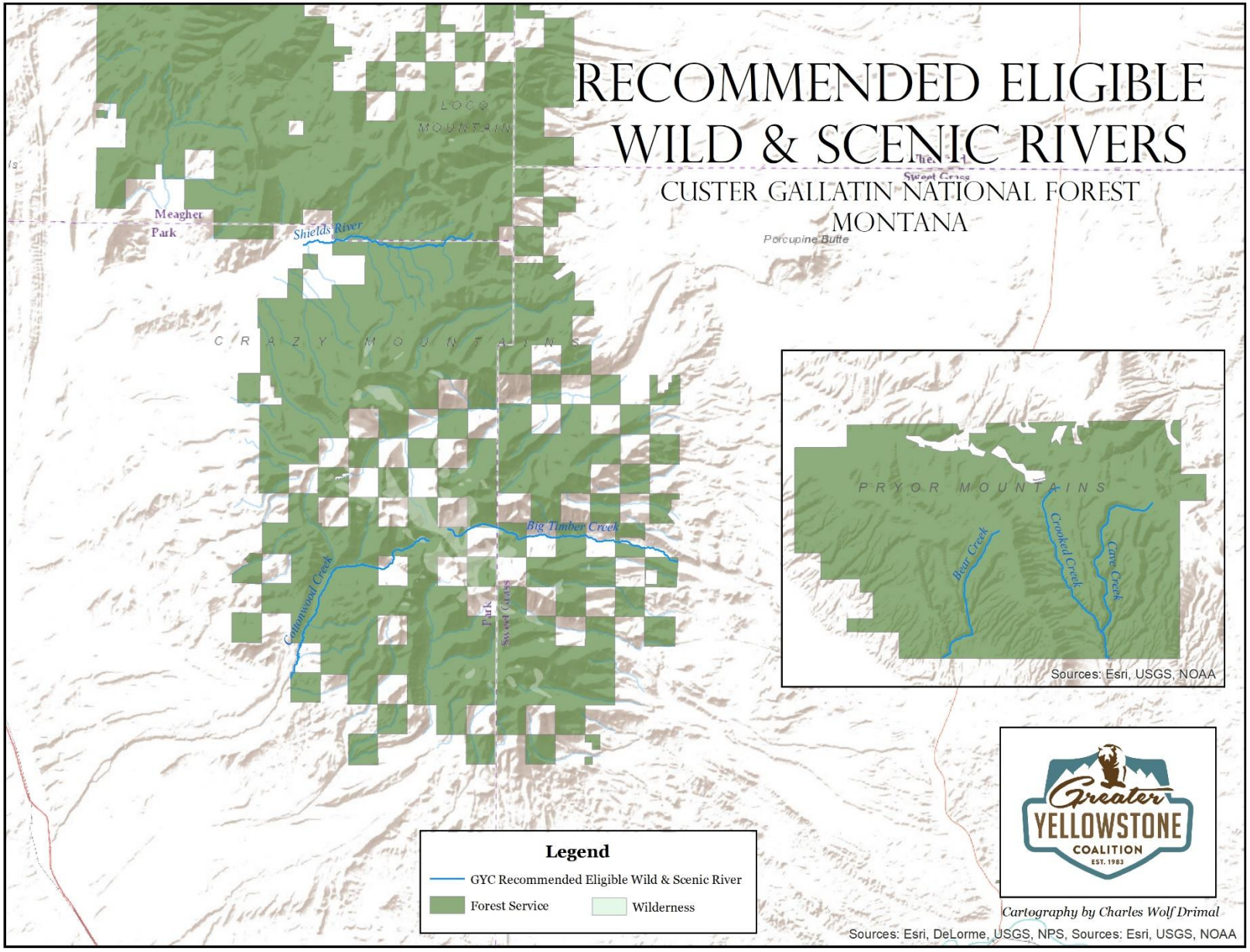
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WILD & SCENIC RIVERS
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MONTANA
LOCO MOUNTAIN
Meagher Park
Shields River
Porcupine Butte
CRAZY MOUNTAINS
Big Timber Creek
Cottonwood Creek
Sweet Grass
PRYOR MOUNTAINS
Bear Creek
Crooked Creek
Cove Creek
Sources: Esri, USGS, NOAA
Legend
GYC Recommended Eligible Wild & Scenic River
Forest Service
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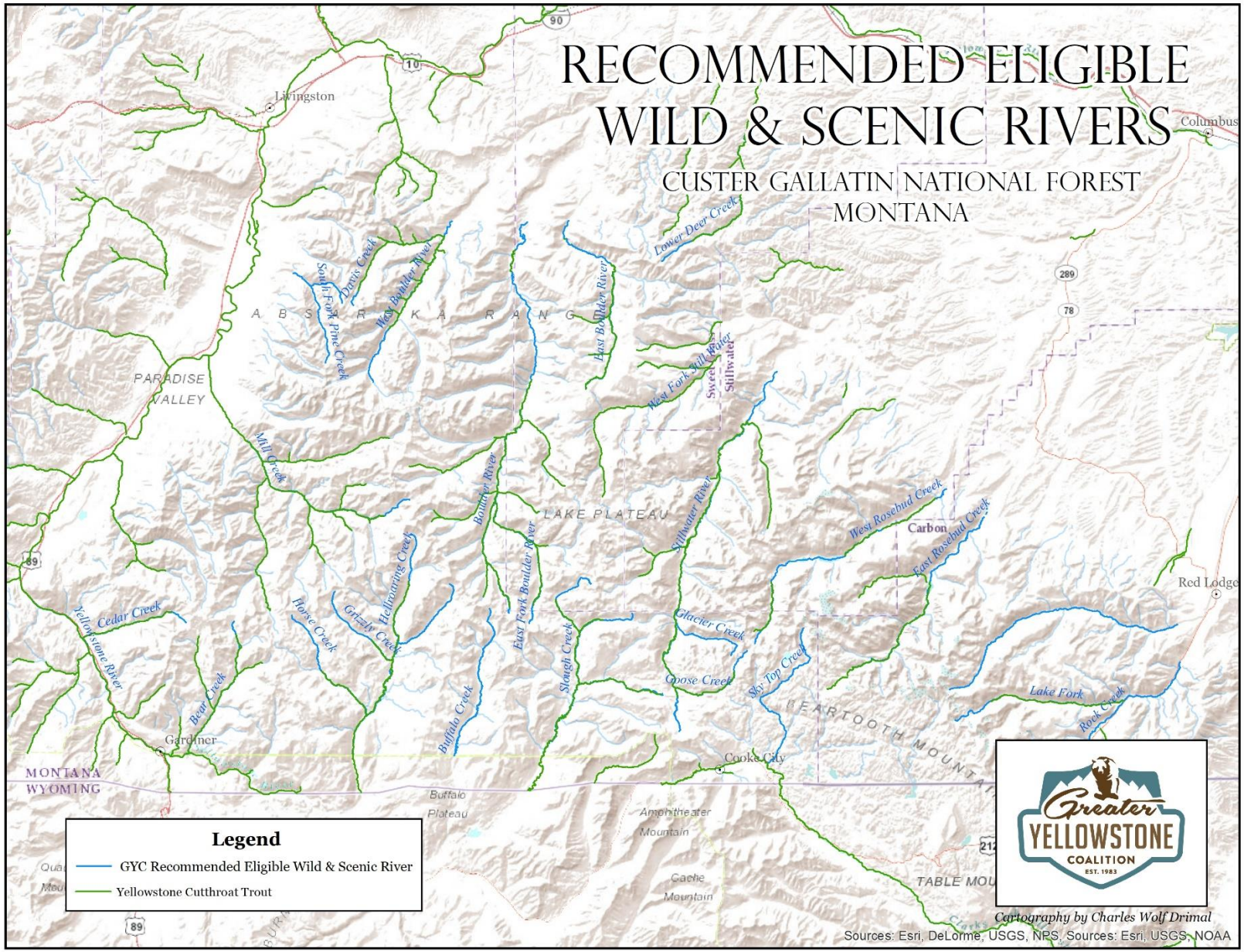
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Columbus
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MONTANA
WYOMING
ABSAROKA RANGE
PARADISE VALLEY
LAKE PLATEAU
BEARTOOTH MOUNTAINS
Buffalo Plateau
Amphitheater Mountain
Cache Mountain
Lower Deer Creek
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Davis Creek
West Boulder River
East Boulder River
Sweet Water
Stillwater
West Fork Stillwater
Mill Creek
Boulder River
East Fork Boulder River
Stillwater River
West Rosebud Creek
East Rosebud Creek
Cedar Creek
Yellowstone River
Bear Creek
Horse Creek
Grizzly Creek
Hellroaring Creek
Buffalo Creek
Slough Creek
Glacier Creek
Goose Creek
Sky Top Creek
Lake Fork
Rock Creek
Legend
GYC Recommended Eligible Wild & Scenic River
Yellowstone Cutthroat Trout
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Cartography by Charles Wolf Drimal
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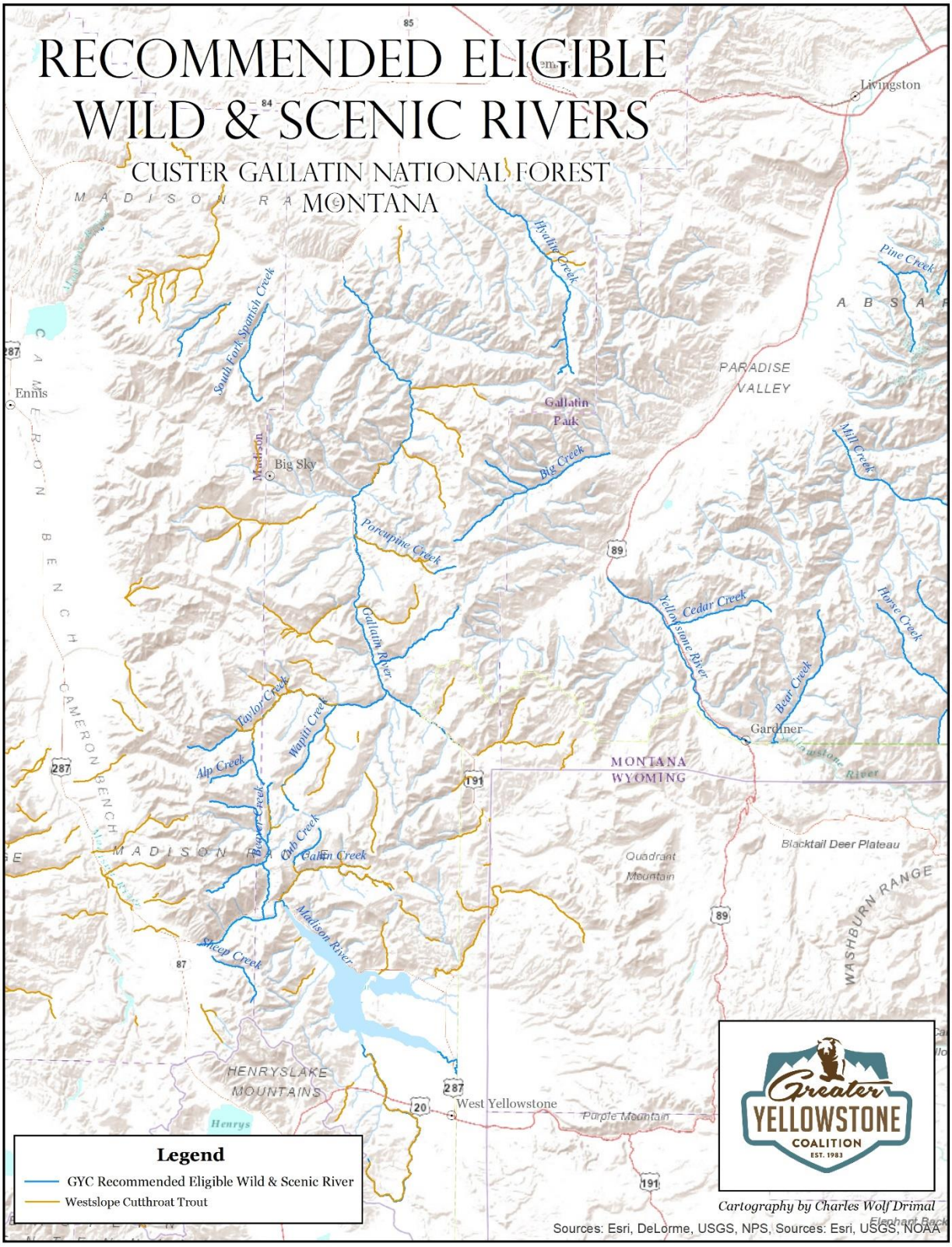
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MONTANA
Livingston
Ennis
Big Sky
Gardiner
West Yellowstone
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Gallatin Park
MONTANA
WYOMING
Blacktail Deer Plateau
Quadrant Mountain
Purple Mountain
WASHBURN RANGE
HENRYSLAKE MOUNTAINS
CAMERON BENCH
MADISON RANGE
South Fork Spanish Creek
Hyalite Creek
Pine Creek
Mill Creek
Porcupine Creek
Big Creek
Gallatin River
Cedar Creek
Yellowstone River
Horse Creek
Bear Creek
Taylor Creek
Wapiti Creek
Alp Creek
Beaver Creek
Cub Creek
Galatin Creek
Madison River
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Legend
GYC Recommended Eligible Wild & Scenic River
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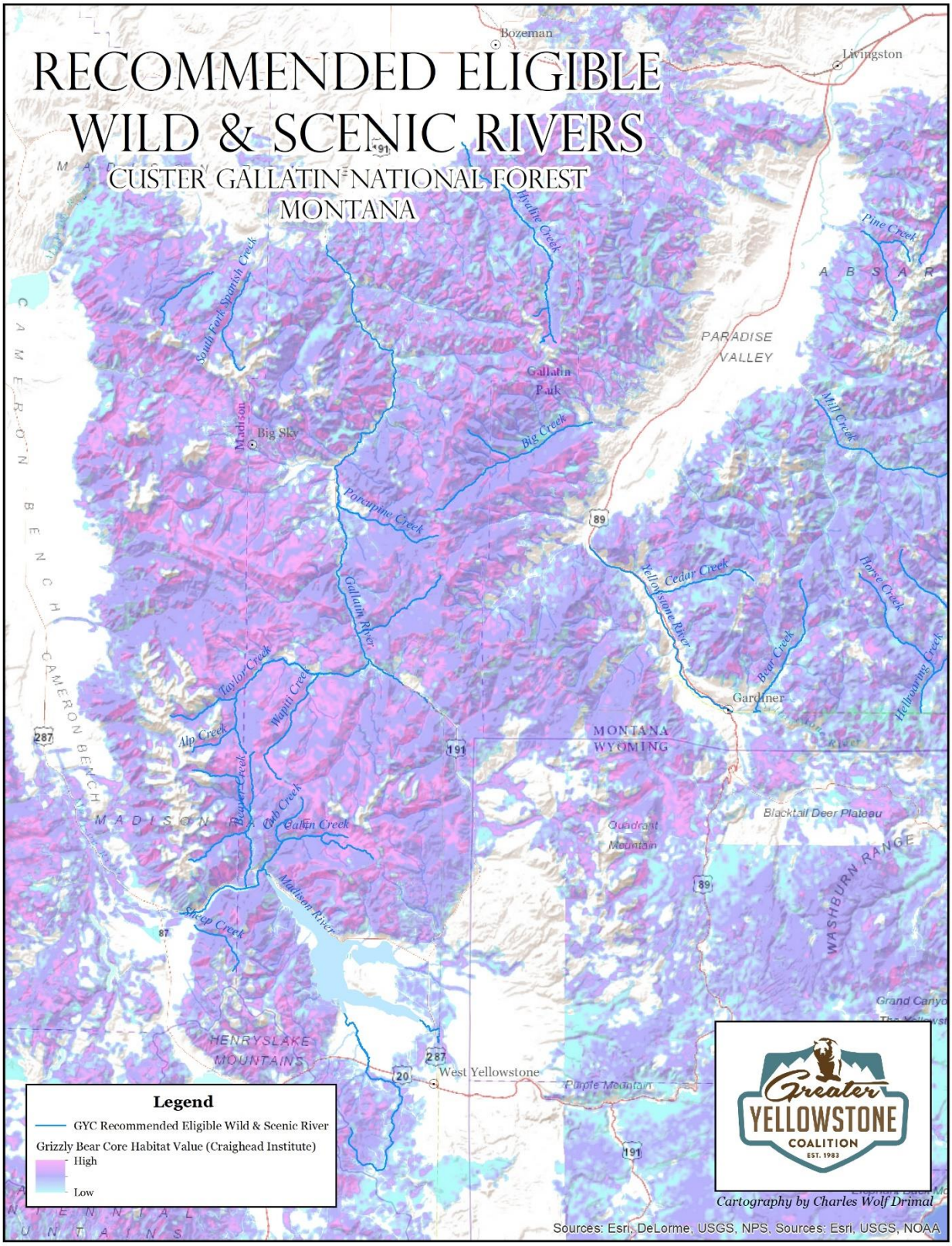
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West Yellowstone
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WASHBURN RANGE
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Quadrant Mountain
Porcupine Creek
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Horse Creek
Hellroaring Creek
South Fork Spanish Creek
Taylor Creek
Wapiti Creek
Alp Creek
Beaver Creek
Cab Creek
Gallin Creek
Madison River
Sheep Creek
Legend
GYC Recommended Eligible Wild & Scenic River
Grizzly Bear Core Habitat Value (Craighead Institute)
High
Low
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Cartography by Charles Wolf Drimal
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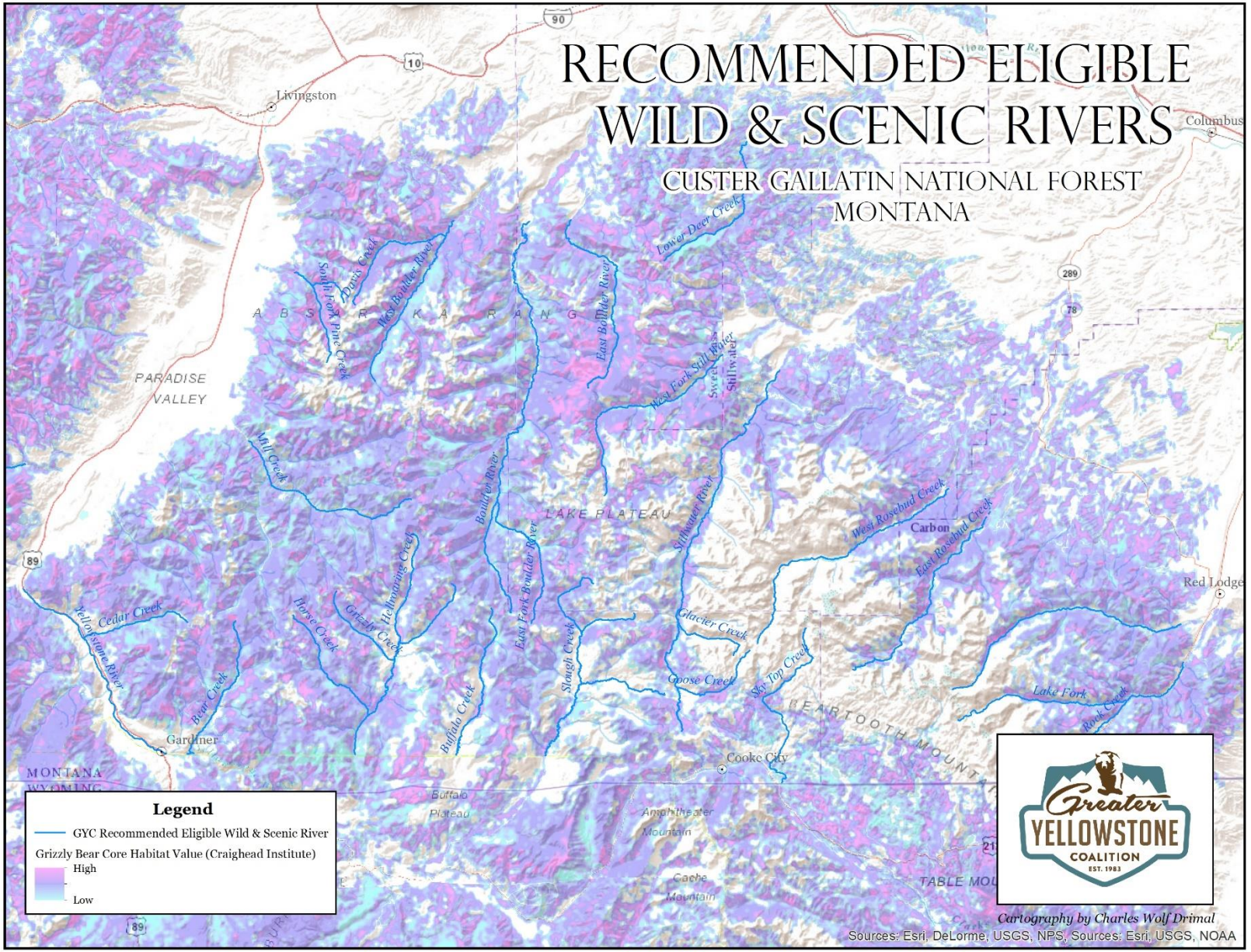
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Cooke City
PARADISE VALLEY
ABSAROKA RANGE
LAKE PLATEAU
BEARTOOTH MOUNTAINS
MONTANA
WYOMING
Buffalo Plateau
Amphitheater Mountain
Cache Mountain
TABLE MOUNTAIN
Lower Deer Creek
South Fork Pine Creek
Davis Creek
West Boulder River
East Boulder River
West Fork Stillwater
Sweet Water
Stillwater
Mill Creek
Boulder River
East Fork Boulder River
Stillwater River
West Rosebud Creek
East Rosebud Creek
Yellowstone River
Cedar Creek
Bear Creek
Horse Creek
Grizzly Creek
Hellroaring Creek
Buffalo Creek
Slough Creek
Glacier Creek
Goose Creek
Sky Top Creek
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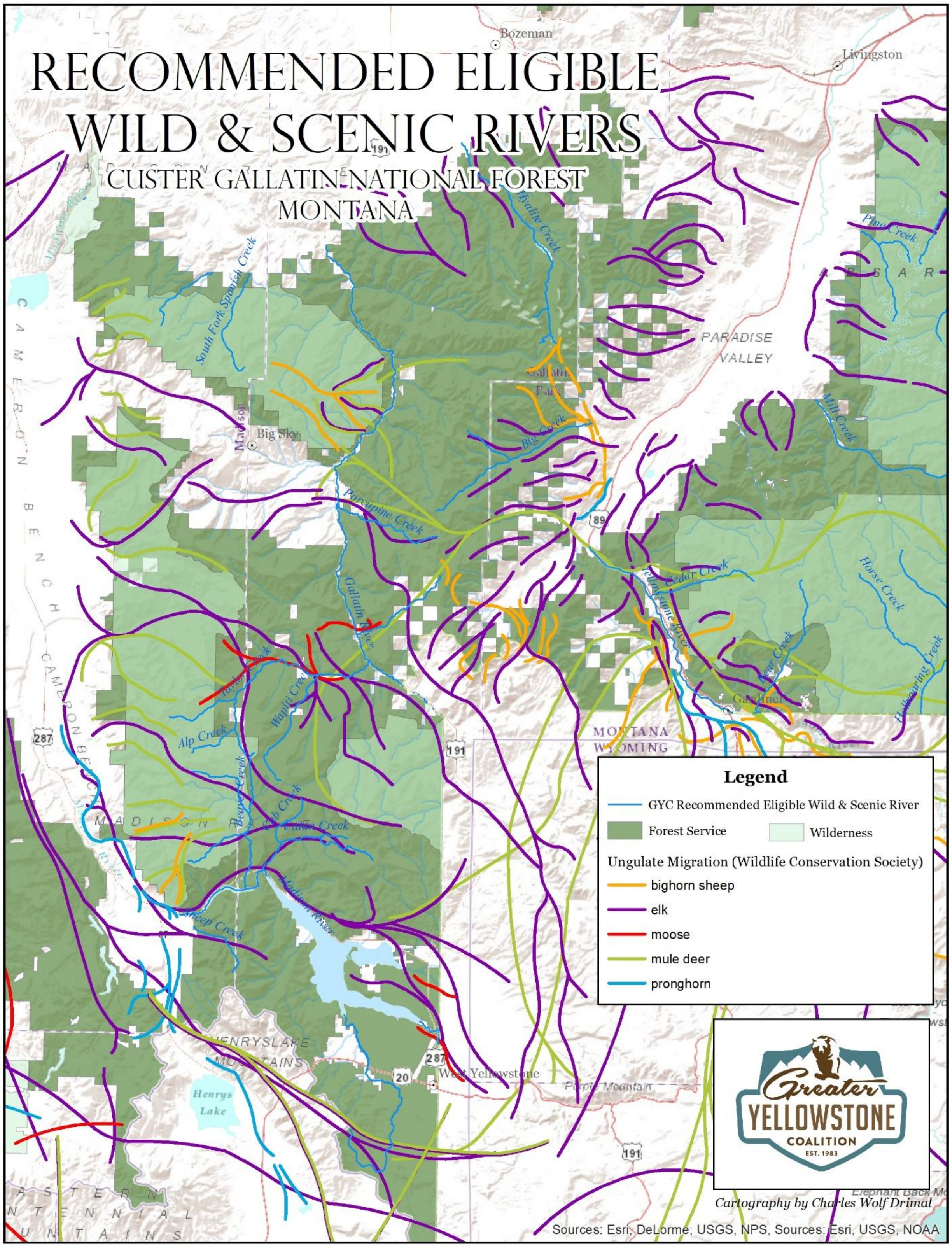
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Forest Service
Wilderness
Ungulate Migration (Wildlife Conservation Society)
bighorn sheep
elk
moose
mule deer
pronghorn
Bozeman
Livingston
Big Sky
Paradise Valley
Gardiner
West Yellowstone
Henrys Lake
Montana
Wyoming
Cartography by Charles Wolf Drimal
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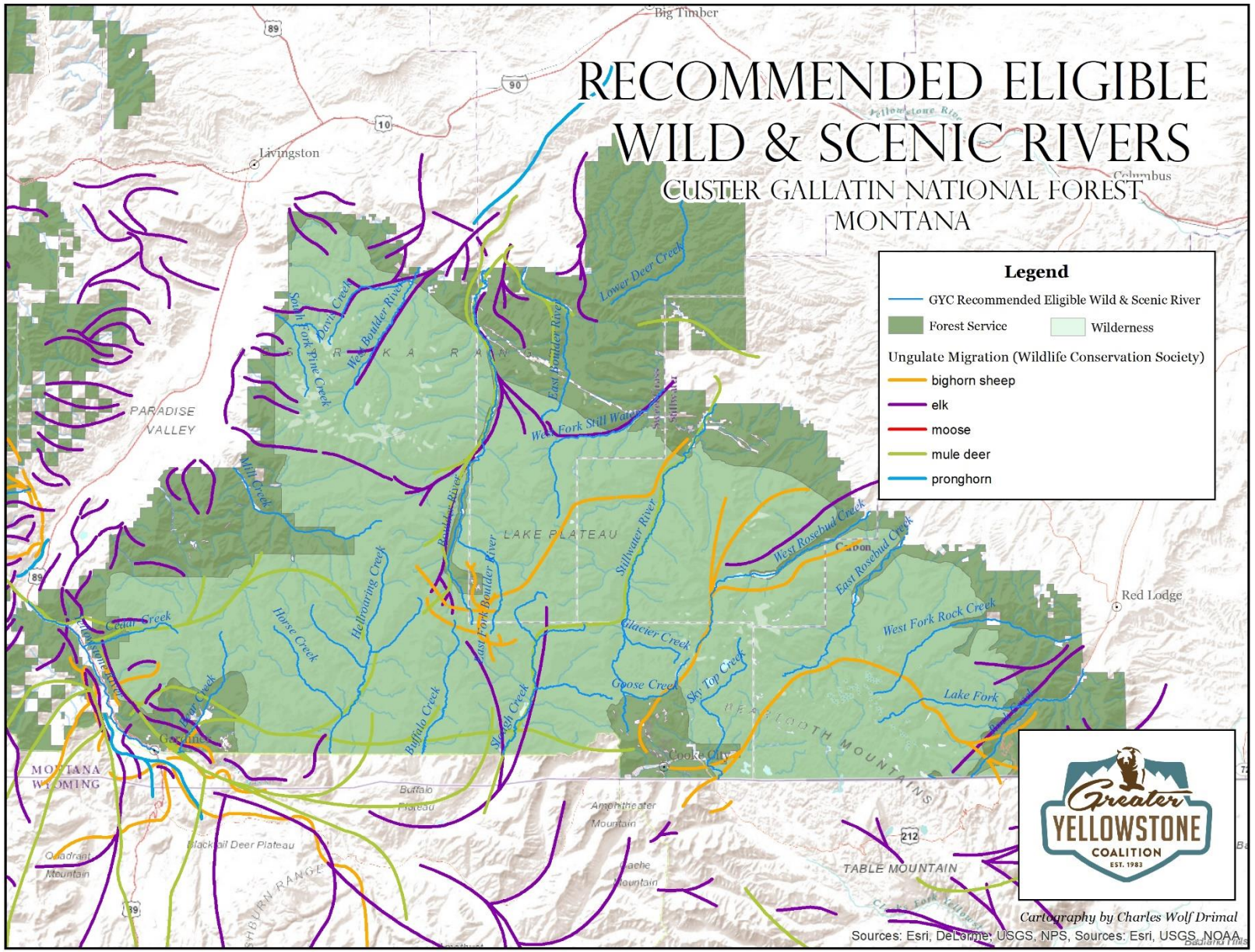
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Forest Service
Wilderness
Ungulate Migration (Wildlife Conservation Society)
bighorn sheep
elk
moose
mule deer
pronghorn
Big Timber
Livingston
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WYOMING
Lower Deer Creek
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Quadrant Mountain
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References

Online Sources

DRAFT Bonneville Cutthroat Trout (Oncorhynchus clarkii utah) and Yellowstone Cutthroat Trout (Oncorhynchus clarkii bouvieri) Thermal Tolerance Analyses – Juvenile and Adult, Summer. April 2016. Nevada Department of Environmental protection. https://ndep.nv.gov/uploads/water-wqs-docs/BonnevilleLCTTTA.pdf

Gallatin County Montana Genealogy Trails http://genealogytrails.com/mon/gallatin/earlyhistory.html

Krisweb Stream Temperature Sensitivity by Life Stage. http://www.krisweb.com/stream/temperature.htm

Montana Fish, Wildlife and Parks. Elk Distribution Dataset. Acquired July 2017. https://mslservices.mt.gov/geographic_information/data/datalist/datalist_Details.aspx?did={F699A592-C81D-4AC9-BC81-DEE1E9A9FC87}

Montana Fish, Wildlife and Parks. Fish Distribution - Streams. Acquired July 2017. https://mslservices.mt.gov/geographic_information/data/datalist/datalist_Details.aspx?did={E7C08A8A-1713-4975-BBAD-59CF14E1D7B1}

Montana Fish, Wildlife and Parks. Moose Distribution Dataset. Acquired July 2017. https://mslservices.mt.gov/geographic_information/data/datalist/datalist_Details.aspx?did={b2222c20-5b0b-11e5-a837-0800200c9a66}

Recommended EPA Temperature Thresholds for Use in Establishing Thermal Potential and Species Life Stage Numeric Criteria. http://www.fsl.orst.edu/~johnsons/AppdxA.pdf

Printed Sources

Brandt, S., K. Reid, J. Chaffin. 2017. Assessment Forest Plan Revision - Final Aquatic and Riparian Ecosystems Report. Custer Gallatin National Forest.

Bear, E., T. McMahon, A. Zale. 2007. Comparative Thermal Requirements of Westslope Cutthroat Trout and Rainbow Trout: Implications for Species Interactions and Development of Thermal Protection Standards. Transactions of the American Fisheries Society.

Cegelski, C.C., L.P. Waits, N.J. Anderson, O. Flagstad, C. Strobeck & C.J. Kyle. 2006. Genetic diversity and population structure of wolverine (*Gulo gulo*) populations at the southern edge of their current distribution in North America with implications for genetic viability. Conservation Genetics.

Coleman, M., K. Fausch. 2007. Cold Summer temperature Limits Recruitment of Age-0 Cutthroat Trout in High-Elevation Colorado Streams. Transactions of the American Fisheries Society.

Christensen, S., Z. Brown. 2011. Native Trout Conservation and Watershed Restoration: A Response to Climate Change in the Greater Yellowstone Ecosystem. Greater Yellowstone Coalition.

Craighead Institute. Grizzly Bear Connectivity Model. Grizzly Bear Corridor Model. Grizzly Bear Predicted Living Core habitat. Unpublished Geographical Information System (GIS) data. Acquired 2016.

Gray, L., B. Haywood. 2013. Hyalite Canyon Winter Use Study: Findings and Summary.

Greater Yellowstone Wolverine Program Cumulative Report May 2007. Wildlife Conservation Society North America Program.

Inglebret E., S. Wood. 2014. Honoring Tribal Legacies: An Epic Journey of Healing. CHiXapkaid Tuwaduq Cultural & Research Institute

Inman, R., M. L. Packila, K. Inman, R. Spence, & D. McCauley, DVM. Greater Yellowstone Wolverine Program Practical, Science-based Solutions for Wolverine Conservation Progress Report – November 2008. Wildlife Conservation Society North America Program.

Inman, R., M. Packila, K. Inman, B. Aber, R. Spence, D. McCauley. Greater Yellowstone Wolverine Program Practical, Science-based Solutions for Wolverine Conservation Progress Report – December 2009. Wildlife Conservation Society North America Program.

Isaak, D., M. Young, D. Nogel, D. Horan, M. Groce. 2015. Climate Shield Cold-Water Refuge Streasm for Cutthroat Trout. Poster.

Isaak, D., S. Wenger, E. Peterson, J. Ver Hoef, D. Nagel, C. Luce, S. Hostetler, J. Dunham, B. Roper, S. Wollrab, G. Chandler, D. Horan, S. Parkes-Payne. 2017. The NorWeST summer stream temperature model and scenarios for the western U.S.: A crowd-sourced database and new geospatial tools foster a user community and predict broad climate warming of rivers and streams. Water Resources Research. DOI: 10.1002/2017WR020969.

LaPoint H., M. Bergstrom. 2017. Assessment Forest Plan Revision Final Areas of Tribal Importance Report. Custer Gallatin National Forest.

Natural Resources Conservation Service. Cutthroat Trout (*Oncorhychus clarki*). Fish and Wildlife Habitat Management Leaflet. January 2007. Number 47.

National Park Service. Yellowstone Trout Facts. Updated February 2017.

Olenicki, T., Haroldson, M.A., and Craighead, L. 2005. Evaluation and application of grizzly bear habitat modes for the Greater Yellowstone Ecosystem. In 8th Biennial Scientific Conference on the Greater Yellowstone Ecosystem, Yellowstone National Park, WY October 17-19 2005.

Oswald, L. Assessment Forest Plan Revision Final Recreation Settings, Opportunities, and Access Report. 2017. Custer Gallatin National Forest.

Wood, A. 2016. Compare Sites of the Beartooth Ranger District. Data from 2016-04-24 to 2016-09-08. Custer Gallatin National Forest.

Appendix C:

GYC Assessment Letter

GREATERYELLOWSTONE.ORG
LOCATIONS IN MONTANA, IDAHO & WYOMING

HEADQUARTERS
215 South Wallace Avenue
Bozeman, Montana 59715
406.586.1593

January 6, 2017

Virginia Kelly
Forest Plan Revision Team Leader
Custer Gallatin National Forest
10 E Babcock, P.O. Box 130
Bozeman, MT 59771

Re: Custer Gallatin National Forest Assessment letter

Dear Virginia:

Thank you for the opportunity to comment and contribute to the Assessment of current conditions for the Custer Gallatin National Forest Plan Revision. The Greater Yellowstone Coalition (GYC) is uniquely positioned to provide relevant and existing information about land, water, wildlife and trends across the broader ecosystem landscape.

Background
The Greater Yellowstone Coalition (GYC) is a regional conservation organization based in Bozeman, MT with offices in Idaho and Wyoming and over 95,000 supporters from across the country. Our mission is to work with people to protect the lands, waters, and wildlife of the Greater Yellowstone Ecosystem, now and for future generations. Our members include residents living in communities across southwest Montana and visitors enjoying the Greater Yellowstone Ecosystem and Custer Gallatin National Forest from across the nation. The Greater Yellowstone Coalition works with diverse stakeholders to ensure lands are managed to function in harmony with the natural world. This includes forest planning processes within the Greater Yellowstone Ecosystem that set management direction for the next 15-20 years.
We look forward to working with the Forest Service in the revision process to help inform, craft and update the forest plan. This is a once-in-a-generation opportunity to create a plan that manages the forest with a longer view into the future. We recognize the Custer Gallatin National Forest is responsible for managing many uses in a very diverse landscape. There are numerous pieces and parts to evaluate and make decisions about but we trust the Forest Service will thoughtfully and completely incorporate public comment to create a plan that will manage for a connected landscape, core habitats, protect water resources and reduce and manage user conflict among local or visiting users of the forests resources. The Greater Yellowstone Ecosystem (GYE) is a place where people can experience the unparalleled wonders of one of the world's most vibrant ecosystems. There is no place on Earth like the Greater Yellowstone Ecosystem. The GYE is fire and ice. It is jagged mountain peaks and verdant valleys. It is acres of lush forests bathing mountainsides in vivid greens and stark sagebrush plains stretching to the horizon. It is the hissing and spewing of geysers and the serenity of meadows carpeted in wildflowers. The Custer Gallatin National Forest (CGNF) is an important and integral part of the Greater Yellowstone Ecosystem. The CGNF is the doorstep to connectivity to other northern rocky ecosystems to the north and west. This area is key to connecting some of Greater Yellowstone's most iconic wildlife, such as the grizzly bear and wolverine, with other large protected areas. It is our responsibility to be good stewards of one of the last few intact ecosystems in the Lower 48.

The framework of the GYC Assessment letter is grounded in our program work and areas of expertise- land, water, wildlife and people on a landscape level. For the purposes GYC's Assessment letter, we will provide information and resources based on the Forest Service's areas of interest outlined in the 2012 Planning Rule Assessment list of topics. We will also consider current policy regarding land, water and wildlife as well as system drivers and stressors. We are mindful of your time and resources in this process and trust we can help provide a more informed snapshot of the forest.

Existing Relevant Credible Information

Greater Yellowstone Coalition (GYC) takes an ecosystem approach to protect terrestrial and riparian habitat, climate refugia and corridors, and iconic species by preserving and protecting the integrity of the Greater Yellowstone Ecosystem. This approach to conservation is regarded as a premier example of landscape-level management, a strategy federal land managers are integrating into their planning. As the Custer Gallatin Forest Plan Revision Team embarks upon the multi-year forest pan revision process, GYC recommends taking the landscape view in order to fully consider the management of this forest, especially in the context of how it impacts the integrity of the entire ecosystem. GYC has put some time and thinking into a strategy to assess and evaluate ecosystem integrity on a landscape level. In 2011 GYC collected and mapped landscape level data which could be helpful to the Forest Service as a resource to evaluate and assess the current conditions of the forest.

In 2011, GYC identified ecosystem integrity targets and outcomes for the GYE based on what we know now and future projections based on modeling[1]. For GYC's purposes, integrity of a landscape is determined by incorporating a wide range of land uses and potential threats to biodiversity. Based on the identified threats and uses an integrity scale was developed from 0-100, 100 being ideal habitat integrity. As various uses and threats are introduced into a landscape, the habitat integrity degrades.

Specific integrity targets are defined as:

Integrity targets are the percentage of habitat that sustains a great fraction of the biodiversity in the original habitat.

Integrity Target Ranges:

Minimum integrity targets: Minimum integrity targets are often set at 15-35% depending upon the habitat. These estimates are supported by island biodiversity studies.

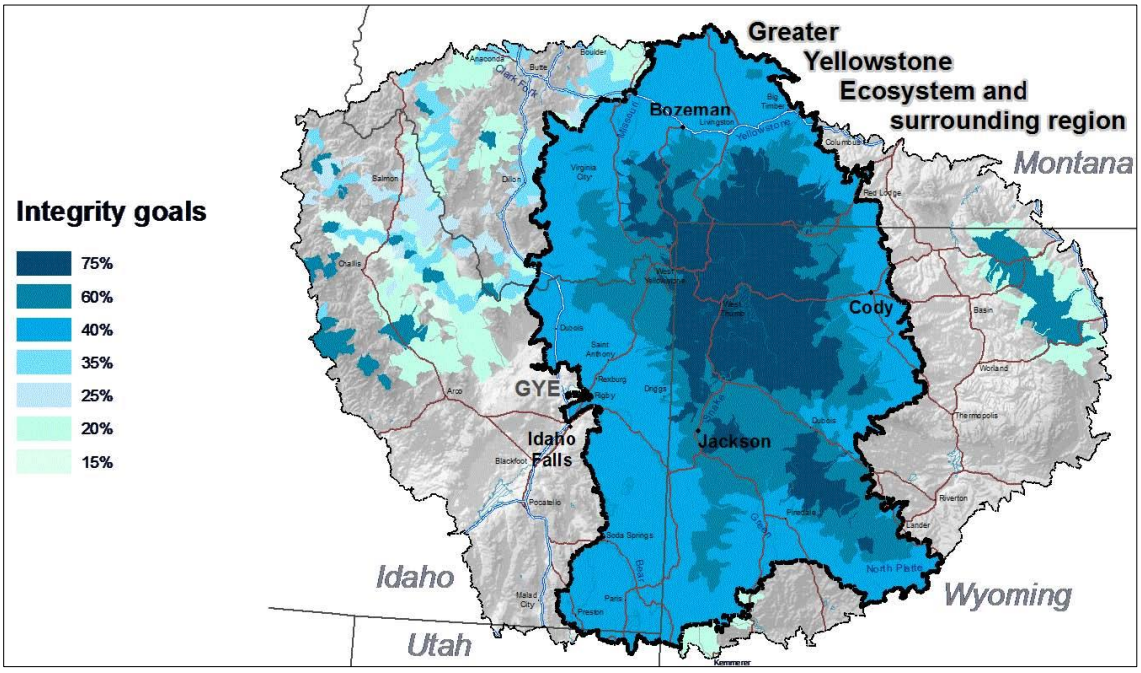
Higher integrity targets: However, certain species have higher needs. For example, grizzly habitat minimum integrity targets are commonly higher (60-80%).

Area-weighted integrity: The model uses area-weighted integrity so that a large number of acres at a moderate integrity are equivalent to a smaller number at a high integrity.

GYC's integrity goals: Generally, the integrity goals for GYC are grouped into categories of 20, 25, 35, 40, and 60, with an exception for grizzly bears at 75 and an exception for a few highly threatened watersheds at 15 (where achieving 20 was not feasible).

[1] Technical Document for Assessing GYC's Strategic Alternatives, Modeling details and Appendices. Prepared by Redstone Strategy Group in collaboration with Greater Yellowstone Coalition. October 2011.

Figure 1: Integrity Goals



Land

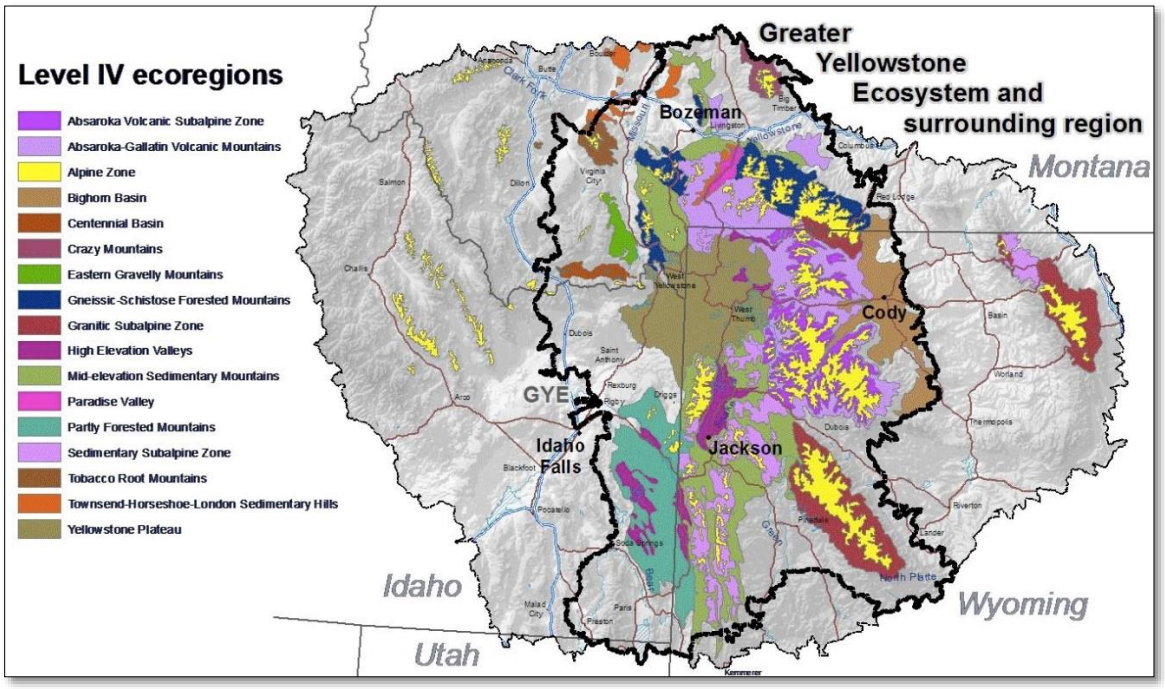
Ecosystem Integrity Goals

Based on GYC's definition and parameters for a thriving GYE, standards were set for terrestrial and riparian habitats to ensure the health of the ecosystem. As Figure 1 illustrates, the high integrity lands exist in Yellowstone National Park. The Custer Gallatin National Forest (CGNF) also contains high integrity lands critical for secure and connected wildlife habitat. The CGNF is an important habitat and migration corridor forest for wildlife. It is also an important forest for recreation and a multitude of outdoor activities for residents and visitors alike. There are many contributing factors impacting landscape integrity, factors based on population growth, recreational technology advancements and the ability for the Forest Service to manage based on capacity including personnel, time, and money. Site specific decisions are appropriate for project level work but if we think about the entire forest and the surrounding landscape, a guide for ecosystem health and management on the landscape level is the best strategy of forest management. Below is a summary of standards GYC developed as a guide to measure ecosystem health.

- ensure the long-term terrestrial habitat integrity of the GYE overall at or above 40%
- Ensure the long-term habitat integrity of riparian zones in the GYE at or above 25%
- For the habitat of 16 Level IV ecoregions[2], ensure the long-term habitat integrity at or above 20% integrity
- For the habitat of the Bighorn Basin Level IV ecoregion (with 40-50% of its habitat within the GYE), ensure the long-term habitat integrity of lands within the GYE at or above 20% integrity

[2] The ecoregions were developed by the Environmental Protection Agency. See Figure 2 with >50% of the habitat within the Middle Rockies Level IV ecoregion within the GYE.

Figure 2: Level IV Ecoregions



GYC recognizes all of the ecosystem integrity standards may not directly apply to the CGNF. However, it is important to understand the current and desired conditions of the surrounding landscapes to make informed landscape level management decisions for this forest. It is also important to understand the logic behind identifying, categorizing, weighting and addressing threats across the landscape. Table 1 below details the specific threats incorporated into the modeling utilized to determine GYC's integrity standards.

Threats

This model assessed long-term habitat integrity of a landscape by incorporating a wide range of land uses and potential threats to biodiversity. An ideal, natural landscape would have a habitat integrity of 100. As various other uses and threats are introduced into a landscape, the habitat integrity degrades. Table 1 details the specific threats incorporated into the modeling. The major driver of habitat integrity is land ownership and land management. Additional known threats include current oil and gas, grazing, future dams and climate change among others. All of these increasingly lower the habitat integrity. Threats can affect terrestrial or riparian habitat integrity differently. The modeling uses different weights of threats in the integrity calculations, as shown in Table 1. Both the inclusion of the threat and the weight of the threat can vary, though most have similar weights. As an example, non-native fish do not affect terrestrial integrity, while phosphate mining has a greater effect on riparian integrity than terrestrial integrity.

Table 1

Threat	Maximum threat	Terrestrial integrity weight	Riparian integrity weight
1. Land ownership and management			
Wilderness Areas , National Parks	10	1	1
Wilderness Study Areas, Recommended Wilderness	15		
National Wildlife Refuges, ACECs, Wildlife management, State parks	25		
Private conservation areas	35		
National Forests, BLM, Recreational Areas	50		
BIA, state lands, private natural, DOE, BOR	75		
Private ranches	85		
Agricultural lands	90		
Urban and other federal (DOD)	95		
2. Climate change	14	1	1
3. Current oil and gas development	10	1	1
4. Future oil and gas development	20	1	1
5. Phosphate and other mining	15	1	2
6. Roads	10	1	1
7. Grazing	10	1	1
8. Logging	10	1	2
9. Elk winter feeding (National Elk Refuge)	10	1	n/a (0)
10. Dams and canals	10	0.5	1
11. Future dams	10	n/a (0)	1
12. Non-native fish	10	n/a (0)	1

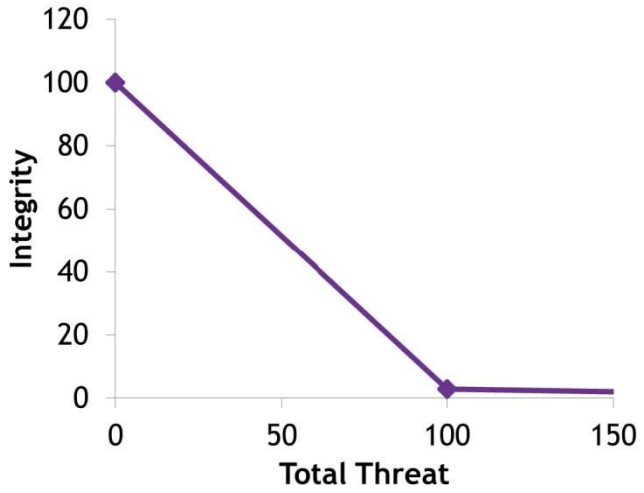
For the modeling, 36 different types of land ownership were grouped into nine categories (See Table 2). At the lower end of the threat table, wilderness areas score 10 and an equivalent integrity score of approximately 90 (100 as ideal) if no other threats are present. National forests have a threat and an integrity of approximately 50 if no other threats are present. The land ownership threat represents the total potential threat that could occur on the lands into the future given their current management, though the current integrity may be higher in some cases. Working ranch lands are a good example of land ownership indicating a higher threat score than may actually be the case on the ground. Grazing practices have improved over the years protecting the integrity of land, water and providing habitat for wildlife. Many working ranch lands provide wildlife migration corridors, contributing to connectivity between major landscapes like the Greater Yellowstone Ecosystem and the Crown of the Continent.

Table 2

Threat to integrity	Ownership class	Specific land ownership/management
10	Wilderness Areas , National Parks	Wilderness Areas (BLM, FS, FWS) National Parks National Monuments (Craters)
15	Wilderness Study Areas, Recommended Wilderness	Wilderness Study Areas Recommended wilderness areas (in Beaverhead Deerlodge NF, Bighorn NF, Bitterroot NF) Wind River Reservation Roadless Area
25	National Wildlife Refuges, ACECs, Wildlife management, State parks	National Wildlife Refuges Area of Critical Environmental Concern Wildlife management area State parks Wildlife habitat protection area Scenic areas Waterfowl production area Geothermal area National Historic Park Primitive area
35	Private conservation areas	Land trusts or NGOs with fee title ownership Private and land trust conservation and wildlife easements
50	National Forests, BLM, Recreational Areas	National Forests and experimental forests BLM mixed use areas National recreational areas National historic and recreational trails Natural area Research and experimental natural area DOE (Idaho National Engineering Lab)
75	BIA, state lands, private natural, DOE, BOR	BIA lands without roads or agriculture State lands Private natural lands (no agriculture, not developed) BOR Experimental research areas and historic area
85	Private ranches	Private ranches NRCS lands
90	Agricultural lands	Private agriculture Indian land agriculture
95	Urban and other federal (DOD)	Private urban lands Other federal (DOD) and access areas

The integrity calculation uses a non-linear curve based on total threat to determine the integrity (see Figure 3). This curve reflects the concept that once threats have totaled over 95 or 100, the lands effectively provide no value for biodiversity, so a total threat of 140 has a similarly low integrity value to a threat of 100.

Figure 3: Integrity/Threat Calculation Curve



Current land ownership based on a 2011 data (Figure 4) helps provide a picture of possible threats to landscape integrity (Figure 5). Figure 6 and Figure 7 project long-term habitat integrity of the landscape without intervention and with intervention up to the year 2090.

Figure 4: Current Land Ownership (2011)

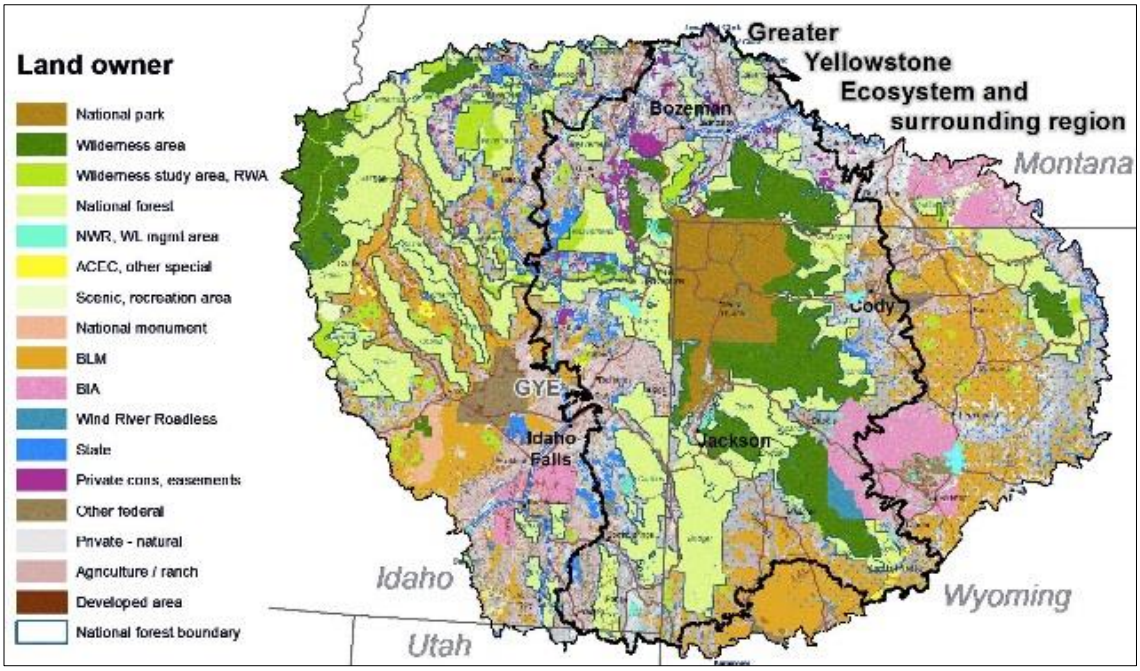


Figure 5: Current Habitat Integrity

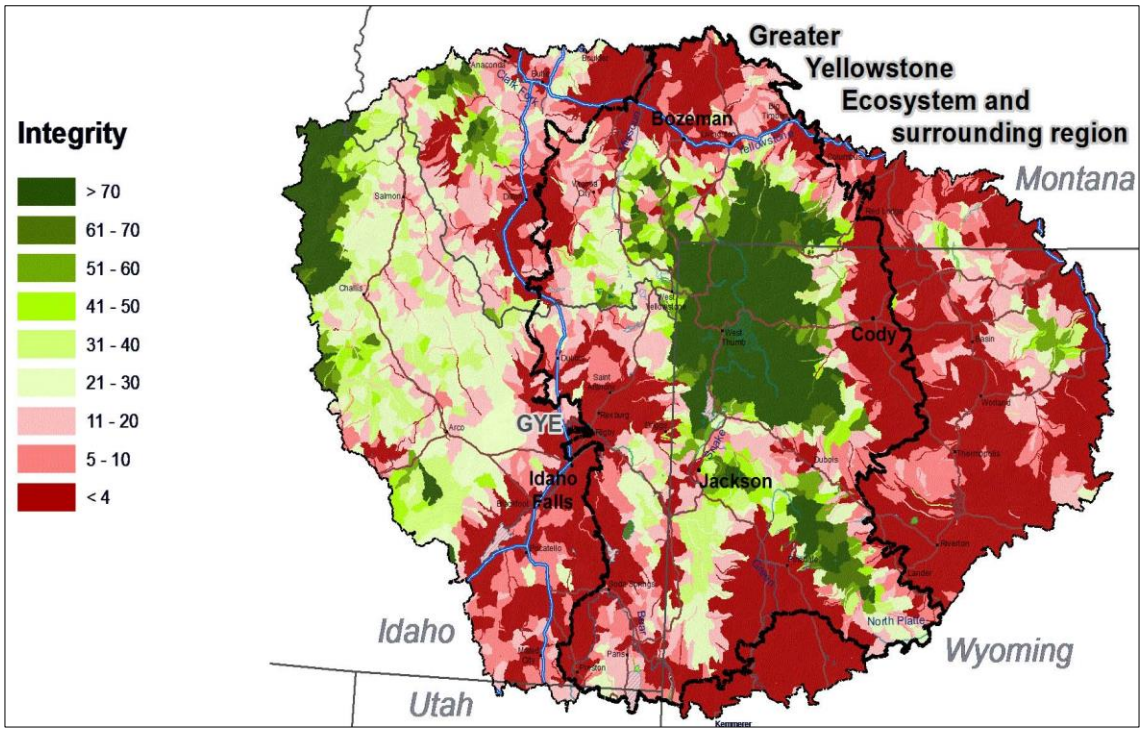


Figure 6: Projected Land Threat to Habitat Integrity without Intervention through 2090

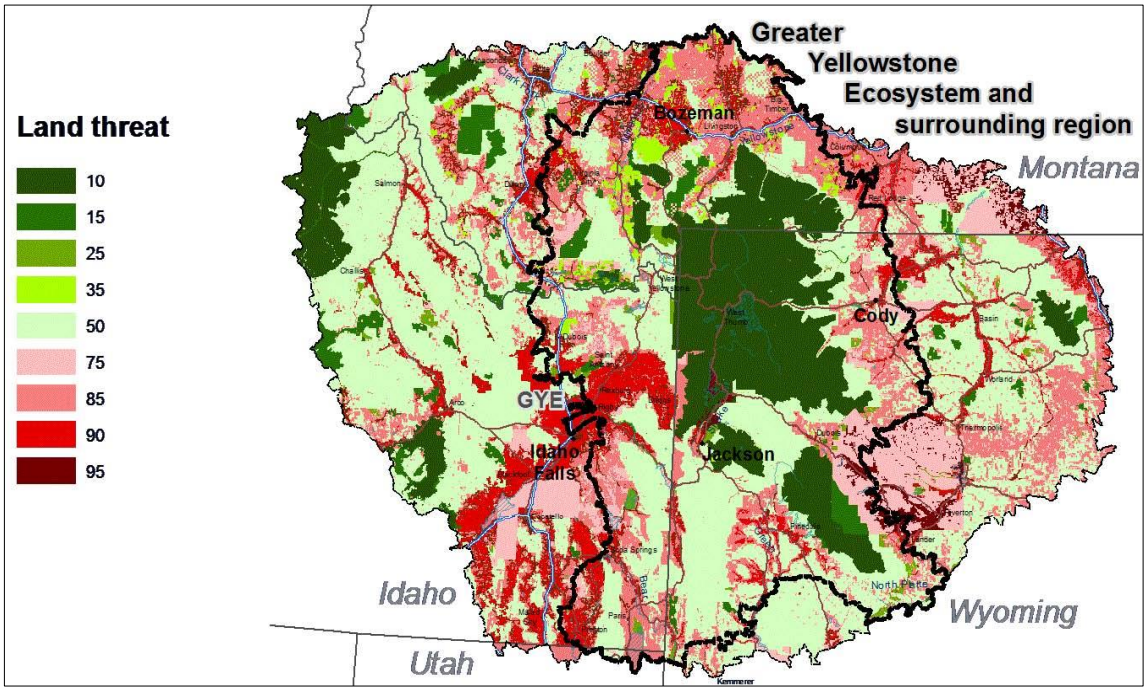
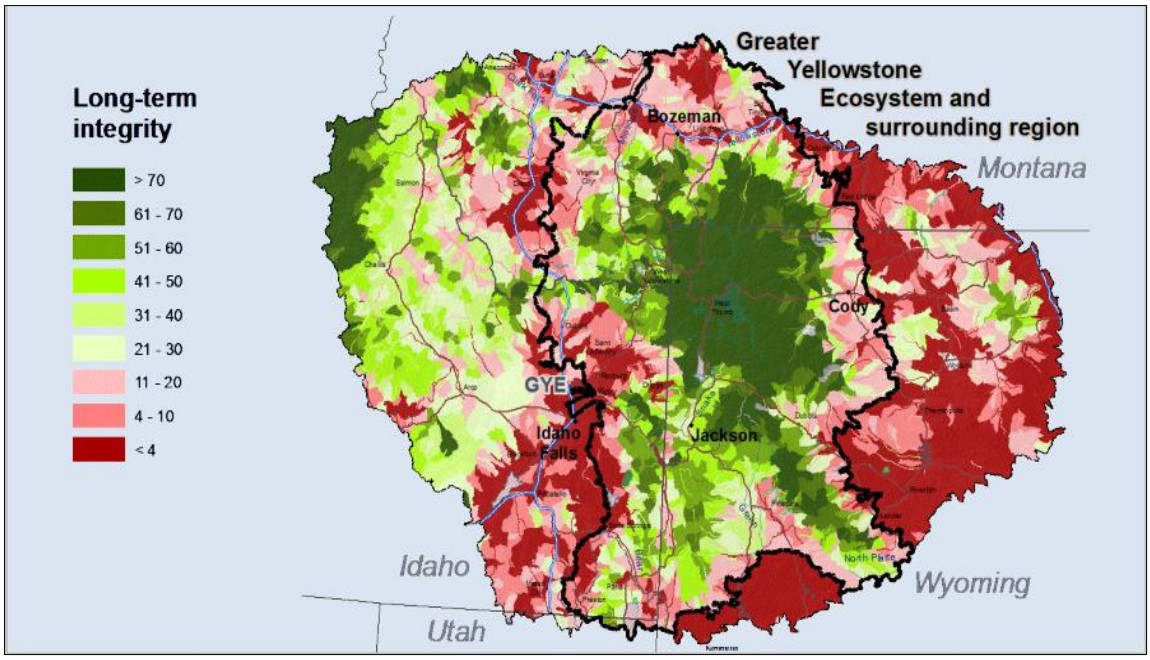


Figure 7: Projected Terrestrial Habitat Integrity with Intervention through 2090



The power behind the integrity scale is the ability to set landscape level goals for habitat. Forest Plan Revision is the time when the Forest Service uses the landscape level perspective and describes the plan area's distinctive roles and contributions in the broader landscape (36 CFR 219.7(f)(1)(ii), sec. 22.32 Land Management Planning Handbook). Determining the future of the forest requires critical thinking about the desired conditions. If the Forest Service were to use this integrity scale, or something similar, it would provide a vision, monitoring goals and the framework for future management to maintain and improve habitat conditions in the context of the broader landscape. Forest plans are intended to be revised and updated every 15 years. Due to any number of circumstances, the time between updated plans are often much longer than 15 years as demonstrated by both the Custer and Gallatin National Forest plans. Looking into the future we need to think about the vision for the forest, clean water, wildlife, public access, recreation, working lands and connected landscapes. We may be looking at another 30 years before the next forest plan revision process. During that time, we need clear goals for the forest and monitoring activity throughout the life of the plan to determine if those goals are achieved and maintained or if they are missed. Based on the monitoring data the Forest Service determines a change in management to move towards achieving the set goals. GYC believes the ecosystem integrity scale is one strategy to set goals and establish a monitoring program allowing for adaptive management practices to reach ecosystem integrity goals.

Ecosystems Services

Ecosystems services provide many services that don't have a monetary measurement. These services include wildlife habitat diversity, healthy riparian areas, carbon storage and clean water

to name only a few. Unfortunately, these resources historically haven't been considered in a meaningful or protective way because they don't make money or cost us anything up front. Luckily the United States Department of Agriculture (USDA) acknowledges this as does the Center for Environmental Quality. The USDA states on their website that they will be exploring national opportunities to advance markets and payments for ecosystem services. The website also speaks to working with partners and others to encourage broader thinking and collaboration that stimulates market-based conservation and stewardship. GYC recognizes the need to stimulate market-based conservation and stewardship and encourages the Forest Service to work with the conservation community to develop those tools. We also hope the Forest Service will think creatively and long into the future about the benefits ecosystems services provide.

The CGNF document, The Preliminary Need for Change, only briefly mentions ecosystem services in the context of the 2012 Planning Rule stating ecosystem services must be taken into consideration. The Draft Assessment of Current Conditions does not provide any information regarding the current ecosystems services. However, the a few of the reports included as additional information do acknowledge and list many of the services the CGNF provides including: nutrient cycling; provisioning services such as fresh water, forage and habitat for wildlife; regulating services such as carbon storage, water and flood regulation, water quality, erosion control; and cultural services such as recreation, scientific discovery and education, cultural, intellectual and spiritual inspiration. GYC recommends including in the Final Assessment of Current Conditions an outline for the public that walks us through how the Forest Service will identify and manage all the ecosystem services the CGNF provides. The Federal government has provided some resources and tools to help Federal agencies move forward in this direction.

On October 7, 2015 a Memorandum for Executive Departments and Agencies was release (M-16-01) with a directive to incorporate ecosystem services into Federal decision making. The memorandum sets out to "implement guidance to better integrate into Federal decision making due consideration for the full range of benefits and trade offs among ecosystem services associated with potential Federal actions, including benefits and costs that may not be recognized in private markets because of the public-good nature of some ecosystem services." The directives of the memorandum include:

1. Policies should describe approaches for conducting decision-relevant and scale-specific ecosystem-services assessments, as well as plans for effective monitoring and evaluation.
2. These policies do not need to be standalone documents and may be most useful when incorporated into existing decision-making frameworks and analyses. Agencies are encouraged to carry out the provisions of this guidance through existing planning and strategic processes such as: Agency and Departmental Strategic Plans, Strategic Sustainability Performance Plans, and Annual Performance Reports.
3. To support agencies in this process, a forthcoming appendix will provide implementation guidance for this memorandum to suggest best practices for ecosystem-services assessment. The implementation guidance will outline an assessment framework for integrating consideration of ecosystem services into existing agency decision process and will describe the elements and approaches for sound integration of ecosystem-services concepts, such as: (1) describing the Federal action; (2) identifying and classifying key ecosystem services in the location of interest; (3) assessing the impact of the Federal action on ecosystem services relative to baseline; (4) assessing the effect of

the changes in ecosystem services associated with the Federal action; and (5) integrating ecosystem services analyses into decision making.

Ecosystems services assessment, evaluation and future direction are still a work in progress but there is good guidance to get started with including the The Federal Resource Management and Ecosystem Services Guidebook produced by The National Ecosystem Services Partnership.

Further reading:
Executive Office of the President of the United States. Memorandum for Executive Departments of Agencies, M-16-01. Incorporating Ecosystem Services into Federal Decision Making. https://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m-16-01.pdf

Federal Resource Management and Ecosystem Services Guidebook. National Ecosystem Services Partnership. https://nespguidebook.com/

Integrating Ecosystem Services into U.S. Forest Service Programs and Operations. Federal Resource Management and Ecosystem Services Guidebook. Federal Agency Exploration and Applications: Case10 (U.S. Forest Service). https://nespguidebook.com/cms/wp-content/uploads/2014/11/FRMES-CE-10-FULL-PDF.pdf

Wilderness and Special Designations
The Custer Gallatin National Forest has several Wilderness and Special Designation areas. The Lee Metcalf and Absaroka-Beartooth Wilderness areas are the 7 Recommended Wilderness Areas (RWA) total from the Gallatin 1987 Plan and the Custer 1986 Plan: Lionhead Mountain, Republic Mountain, Mystic, Burnt Mountain, Red Lodge Creek Hell Roaring, Line Creek Plateau and Lost Water Canyon areas. The Lionhead is a rugged area popular among Montana and Idaho outdoor enthusiasts. Once Congress acts, the WSA and RWAs will either be included into the National Wilderness Preservation System (with all or a portion of the areas included in the final decision) or they will be released. If the HPBH WSA and the Lionhead RWA were to be designated as Wilderness motorized and mechanized user groups would no longer be able to recreate in those areas. This potential future reality is extremely controversial and has created significant tension between wilderness advocates and the motorized non-mechanized recreational users and mechanized recreational user groups.

Recommended Wilderness Areas (RWA) and Wilderness Study Areas (WSA) are intended to manage the existing and recommended wilderness resource to maintain its wilderness character and to provide for its use and protection[3]. The Forest Service has allowed activities in RWAs and WSAs that are not allowed in Wilderness areas. It is understood that the Forest Service has management discretion by allowing motorized and mechanized uses in these areas but allowing these uses sets up a situation that may not actually maintain the character and therefore those areas won't be included in the National Wilderness Preservation System. If an area is designated by Congress into the National Wilderness Preservation System that had continued use by the mountain biking and motorized communities, a significant conflict is inevitable. This is avoidable by managing the WSA and RWA to maintain wilderness character and to not allow activities in these areas that are not allowed in Wilderness areas. The Forest Service in Region 1 addressed this challenge by providing guidance (See Appendix A).

[3] Recommended Wilderness, Gallatin National Forest Plan, 1987. Wilderness Study Area, will be managed, subject to existing rights and uses, to maintain its existing wilderness character and potential for inclusion in the National Wilderness Preservation System, Gallatin National Forest Plan, 1987.

1. Eliminate those uses that threaten the capability and availability either through a standard in the forest plan or a subsequent record of decision.
2. Adjust the management area boundary to eliminate the area with established uses.
3. Not recommend the area for wilderness designation.

This guidance was developed to help resolve the ongoing problem of inconsistent management of RWAs, the lack of understanding of wilderness characteristics and the eventual loss of opportunity to consider areas for wilderness recommendation.

GYC recommends the Forest Service review and follow the guidance produced for Region 1.

Minerals

Greater Yellowstone Coalition has a 30-year history of deep involvement in mining issues throughout the Greater Yellowstone Ecosystem (GYE). This includes explorations and mines at every level including major projects such as the New World District near Cooke City, the phosphate patch of eastern Idaho, oil and gas leasing on the Beartooth front in Wyoming and the Stillwater Mine. Specific to the current forest plan revision, our emphasis at GYC resides in the GYE portions of the Custer Gallatin National Forest (Hebgen, Bozeman, Yellowstone and Beartooth Ranger Districts), but our interests extend forest wide.

The Greater Yellowstone Coalition does not approach this work from an anti-mining position. Rather, we consider every project on a holistic basis with particular attention to the specific nature of the ore-bodies, unique threats posed to the surrounding water, land and wildlife, potential for realistic mitigation of those threats, impacts to surrounding economies and property rights as well as the credibility/capacity of the mining proponents. Little space needs to be given to the vast record throughout Montana and the west of mining-related failures or false promises made by mining companies. Nor is this a forum to discuss how the 1872 General Mining Law and other regulations create challenges for both the Agencies and the public to adequately address the role of mining within their communities. That said, based on the high level of public interest in two recent gold mining proposals in Park County and the diverse number of threats these projects pose, one thing is clear, facilitating the extraction of minerals is no longer guaranteed to be the “highest and best use” of national forest lands in the Greater Yellowstone Ecosystem.

Forest Planning provides a rare opportunity for the US Forest Service to clearly address how the agency will fulfill *all* of its commitments to both the public and to statutes such as the 1872 General Mining Law.

Mineral Resource Appraisals

The Custer Gallatin National Forest is quite large, sitting at 3.1 million acres[4]. The forest is divided into 13 blocks across southern Montana stretching all the way into western South Dakota. In order to gather information about the potential for undiscovered mineral resources over such a large area, the USFS divided the Forests (Custer and Gallatin) into five study units: western and northern Gallatin, Absaroka-Beartooth, Pryor Mountains, Ashland Division, and eastern Custer. From 1990 to 1994 the USGS conducted a mineral and energy resource assessment in each of the five units. [5]

[4] The Gallatin and Custer National Forests merged into one “Custer Gallatin National Forest” in 2014.

[5] Historically, both the U.S. Geological Survey (USGS) and the U.S. Bureau of Mines (USBM) provided the USFS with minerals information from different perspectives. The USBM considered identified resource issues and the USGS focused on geology and the potential for new resource. USBM merged with USGS in 1996.

These reports and others provide considerable information on the nature of locatable minerals across the forest. Assessments conclude that, "all of the metallic mineral production and most of the recent exploration activity in the Forests are concentrated in the Absaroka-Beartooth study area." [6] Indeed, the 1.4 million acres of the Absaroka-Beartooth (A-B) study area alone has 71 pages of bibliography to geologic references.[7] A majority of these focus on geology and the extent of the minerals.

The collection of Open-File reports and professional papers from the 1990-94 assessment create a critical body of literature to consider closely throughout Forest Plan revision process. During this review, it will be important to distinguish the appraisal of current resources and undiscovered potential from additional engineering analysis, economic and socio-economic impacts of each resource. These latter factors are far more variable to change over time and in general, are incomplete, or at best outdated. The last engineering analysis and economic/socioeconomic study for the areas (ongoing operations like Stillwater excluded) most likely to be explored or developed was in 1993.[8] Updated economic and socio-economic analysis, engineering analysis and feasibility of resource development of all identified minerals and energy endowments should be completed.

In 1993, Hammarstrom summarized "mineral exploration and development within the Gallatin National Forest is unlikely in the foreseeable future."[9] Although this reference applies only to the western and northern areas of the Gallatin, outside of the A-B study area, the cited fact that "the entire area lies within the Greater Yellowstone Area Ecosystem, which is currently being managed with a focus on preservation than resource development" applies to the entire A-B study area. Furthermore, the "Summary and Outlook" statement (page J1) declares, "recent uncertainty about the future of mining on Federal land in the New World district, and on Federal land proximal to Yellowstone National Park in general, has affected mining industry interest in the area and may continue to dissuade exploration in the foreseeable future."

Today, the emphasis on preservation, conservation and alternative resource values (like recreation) in the GYE remains a priority over development and extraction, particularly due to new threats to habitat and water posed by climate change. However, as seen by the recent "junior miner" explorations in Emigrant Gulch and Crevice Mountain, as well as oil and gas interest on the Beartooth front, it is clear the summary and outlook conclusions, written in 1993, require a reexamination when addressing potential management directions in the Forest Plan. That is, future management direction should *assume* there will be interest to develop mineral (including phosphate) and energy resources and assess how to address the potential threats to

[6] Mineral and Energy Resource Assessment of the Gallatin National Forest (exclusive of the Absaroka-Beartooth Study Area), in Gallatin, Madison, Meagher, Park and Sweet Grass Counties, South-Central Montana. U.S. Geological Survey Professional Paper 1654. Edited by Anna B. Wilson, Jane M. Hammarstrom and Bradley S Van Gosen. 2005.

[7] Van Gosen, B.S. 1993, Bibliography of geologic references (1872-1992) to the Absaroka-Beartooth study area in the Custer and Gallatin National Forests south-central Montana; U.S. Geological Survey Open-File Report 93-285-A (text), 71 p., 93-285-B (digital text files diskette).

[8] Johnson, F., Boleneus, D., Cather, E., Graham, D., Hughes, C., McHugh, E. and Winters, D., 1993, Mineral Resource Appraisal of the Gallatin National Forest, Montana. U.S. Bureau of Mines Open-File Report MLA 19-93, 183 pages.

[9] Hammerstrom, J.M. Executive Summary (pave VII) in Mineral and Energy Resource Assessment of the Gallatin National Forest (exclusive of the Absaroka-Beartooth Study Area), in Gallatin, Madison, Meagher, Park and Sweet Grass Counties, South-Central Montana. U.S. Geological Survey Professional Paper 1654. Edited by Anna B. Wilson, Jane M. Hammarstrom and Bradley S Van Gosen. 2005.

land, water, wildlife (habitat integrity), recreation, local economies and property rights according to current and reasonably forseeable “highest and best” uses of National Forest System lands.

Energy Reserves

Unlike hard rock minerals which are (mostly) located in the A-B study area, energy reserves are more widely distributed across the Custer Gallatin Forest. On the western portions of the forest including the A-B Study area, oil and gas are the primary resources but coal and related products are also present. This includes largely-forgotten potential reserves like the Electric Coal Field on the border of Yellowstone National Park. Although current economic circumstances and private land ownership combined limit the development of energy reserves in sensitive areas like the Gardiner Basin, the multi-decade view taken in a Forest Planning process must analyze these resource assessments for reasonably foreseeable changes in commodity markets, extraction technologies, land designations, private land ownership and social-economic factors.

The 9th Circuit Court of Appeal upheld a district court decision in 1985 (Conner v Burford) under which the Bureau of Land Management (BLM) “set aside” any leases on the then Gallatin and Flathead National Forests, under the provisions of 5 U.S.C. § 706, pending site-specific analysis of the environmental effects under the National Environmental Policy Act and Endangered Species Act.[10] In situations where oil and gas exploration, development and production create unacceptable effects to soil, water, timber, range, scenic, wildlife, cultural, recreational and other remarkable values, the Federal government can decide which resource will be the dominant use. The Forest Service makes recommendations on these matters; the final decisions are made by the BLM.

The Draft Renewable and Nonrenewable Energy and Minerals Resource Report written for the Forest Plan Revision Assessment (Pierson, Nov 29, 2016) cites, “the Custer Gallatin National Forest has 88 authorized leases totaling 118,601.8 acres.” Approximately 100,531 acres of these leased acres are suspended from further activities, as a result of the Conner v Buford legal challenges. Only 2,007 of the remaining acres are on the Beartooth District with 18,070 acres in the eastern Souix District.

The Greater Yellowstone Ecosystem has unique and important resources at stake including but not limited to expanding occupied grizzly bear habitat, Wild and Scenic River eligibility and legislation, impacts to recreation with rapidly growing tourism and high tech based communities. Combine this unique nature with the long-standing suspension of leases on the Gallatin (and relatively few leasable energy resources to begin with) and the small number of acres remaining in the Beartooth front, it is recommended that Forest Plan Revision consider No Surface Occupancy for leasable minerals on all Custer Gallatin Forest Service lands in the GYE portions of the Forest.

In the eastern districts, where grazing is critically important, the impacts of ongoing drought, widespread fire-regime and climate change must be considered against the socio-economic impacts and value of potential energy development. Management directions need to have a latitude that provide for adequate consideration of non-mineral resources and values such as grazing and agriculture as the “highest and best use” of the limited public land and water.

Collaboration

[10] Conner v. Burford. Citation: 15 ELR 20608. No. No. CV-82-42 BU, 605F. Supp. 107/22 ERC 1606 (D. Montana, 03/12/1985).

The 2012 Planning Rule is explicit in requiring collaboration in development of the new Forest Plan. In general Forest Plans have long required a certain level of cooperation between agencies and other entities. For example, the 1986 Custer National Forest Plan specifically calls for "cooperative relations" in regards to Minerals and Geology management:

1) The Forest will coordinate and cooperate with local, state, and other federal agencies, as needed, to facilitate the development of mineral resources occurring beneath lands administered by the Forest Service and to minimize the environmental and socio-economic impacts associated with the extraction and marketing of those resources.[11]

Minerals management on National Forest System lands requires interagency coordination and cooperation. Although the Forest Service is responsible for management of the surface resources, the BLM in the Department of Interior is primarily responsible for the management of Federal minerals. The Montana Department of Environmental Quality (MT DEQ) is responsible for water, air quality, waste rock and other concerns while the United States Fish and Wildlife Service (USFWS) may require consultation in regards to impacts on threatened and endangered species. Montana Fish Wildlife and Parks play a critical role in determining the impacts of mining activities on habitat, migrations and other critical wildlife concerns. County governments most often need to be involved through the intersection with County roads and other infrastructure required for the exploitation of minerals.

The 1986 Custer Forest Plan goes on to specify interest groups to "contact and coordinate" with:

2) Contact and coordination will be made with mining and oil and gas interest groups, such as the American Mining Congress, Montana Mining Association, Northwest Mining Association, Rocky Mountain Oil and Gas Association (RMOGA), Independent Petroleum Association of Mountain States (IPAMS) and International Association of Geophysical Contractors (IAGC) to investigate procedures and processes which will facilitate the exploration and development of energy and non-energy mineral resources, occurring beneath the lands administered by the Forest Service.[12]

During Forest Plan revision under the 2012 Forest Planning Rule, the forest must identify and actively reach out to additional interest groups like: Non-Governmental Organizations, tribal and local governments, interested citizens, business leaders and others. The full spectrum of input and consultation with more than just the industry stakeholders will help identify the current values, threats and solutions to minimize the "environmental and socio-economic impacts" of mining and energy projects.

Research on Mining Impacts

As the forest weighs management directions for sensitive areas like the lands around Yellowstone National Park, we strongly recommend the forest incorporate and consider literature and resources that address the impacts of mining and the ongoing challenges to long-term solutions.

Additional literature should include but not be limited to the following reports:

Kuipers, J.R., Maest A.S., MacHardy, K.A., and Lawson, G. 2006. Comparisons of Predicted and Actual Water Quality at Hardrock Mines, the reliability of predictions in Environmental Impact Statements. Earthworks, Washington DC.

[11] Custer National Forest, Management Plan, October 1986. Chapter II, Section 8 (page 27).

[12] Ibid.

Maest, A.S., Kuipers, J.R., Travers, C.L., and Atkins, D.A. 2005. Predicting Water Quality at Hardrock Mines: Methods and Models, Uncertainties and State-of-the-Art. Earthworks, Washington, DC.

Gestring, B. 2012. U.S. Copper Porphyry Mines: The track record of water quality impacts resulting from pipeline spills, tailings failures and water collection and treatment failures. Earthworks, Washington, DC.

Good Neighbor Agreements

Stillwater Mining Company[13], operating between the Stillwater River (operations beginning in 1986) and the East Boulder River (operations beginning in 2002) remains one of the largest hard rock operations in the state of Montana and is home to the only known reserve of strategic metals platinum, palladium, rhodium (PGE) in the United States and over 75% of the known chromium reserves. The Stillwater Mine operation is an example of industry working with community.

In 2000, concerned citizens and organizations and the Stillwater Mine negotiated a Good Neighbor Agreement (GNA) to extend protections beyond state requirements for property, water and area communities, while allowing mining to proceed. This legally binding contract allows citizens to regularly meet with company representatives to address and prevent problems related to mining impacts, reclamation, wildlife and other issues while developing "new strategies to diminish the effects a long-term mine can have on water quality and rural communities." [14]

Although mineral resource management requires the Forest Service to conform to Congressional mandates (including 1872 General Mining Law) to make minerals from National Forest System land available while carrying the responsibility to minimize the adverse impacts of mining activities. These impacts including but not limited to wildlife habitat, ground and surface water, roads, recreational access, air quality, sound, private property rights, economic and socio-economic impacts to surrounding communities. Using the success of the Stillwater GNA as a model, GYC strongly encourages the forest to consider formal collaboration with local stakeholders as a requirement for operators and communities prior to permitting any mining activities larger than the Small Miners Exemption (SMES) as defined by MCA 82-4-301, et seq. and managed by the Montana Department of Environmental Quality.[15]

Current Hard Rock Mining Exploration

In determining management direction for locatable minerals across the forest, it is important to have a complete survey of current and active explorations and claims, an understanding of reasonably foreseeable future actions and considerations for the cumulative impacts of these activities including economic and socio-economic consequences.

Throughout 2015 and 2016, there have been two active proposals before the state of Montana to explore for gold on private lands in Park County in both the Emigrant Gulch[16] and Crevasse Mining Districts[17]. In the plans of operations for both proposals, the proponents make clear an

[13] http://stillwatermining.com/

[14] https://www.northernplains.org/issues/good-neighbor-agreement/

[15] https://deq.mt.gov/Portals/112/Land/hardrock/documents/pdfs/Packets/SmallMinerExclusion_June2013.pdf

[16] http://luckyminerals.com/content/The%20Emigrant%20Mining%20District%20Project%20updated%20final.pdf

[17]http://deq.mt.gov/Portals/112/Land/Hardrock/Documents/Crevice/Crevice%20Mining%202016%20Exploration%20Permit%20_s.pdf

interest in future expansion onto public lands. Considering the proximity of these two proposals to each other, proximity to Yellowstone National Park and their potential cumulative impacts on water, wildlife, property rights and local communities, these projects provide a poignant example of how future management direction for minerals in the Custer Gallatin National Forest must pay particular attention on how they manage these historic mining districts. A current and comprehensive view of all resource values in these areas must be considered including the potential for recommended mineral withdrawal on public lands.

Existing Mineral Withdrawals and No Surface Occupancy Limits
Federal statute (FLPMA Section 204) permits withdrawal of areas from appropriation, entry, or use for mining in order to protect certain surface resource values. On the Custer Gallatin National Forest, the Absaroka-Beartooth Wilderness, Cabin Creek Wildlife Management Area, Lee Metcalf Wilderness and other government improvements such as campgrounds and administrative sites are currently withdrawn. Many recreation areas and trails on the forest currently have a recommended direction of "No Surface Occupancy" (NSO) within ¼ mile of sites (including seasonal stipulations) and Mineral Withdrawal for all developed recreation sites – if not already completed. In addition, approximately 26,223 acres of federally owned lands and interests in the New World Mining District near Cooke City have been withdrawn from all forms of entry, appropriation, and disposal under the public land laws, and from location, entry and patent under the mining laws, and from disposition under all mineral and geothermal leasing laws.

In short, mineral withdrawals and no surface occupancy are a proven, long term tool to protect natural resources for their "highest and best use".

Climate change, recreational growth and other factors are changing the visitor use patterns of recreation sites and trails as well as wildlife patterns across the forest. Previous withdrawal recommendations, NSO distances and seasonal stipulations should be re-evaluated and reconsidered using current data and potential impacts to ensure mineral and energy activities will not substantially impact the time of access, regularity, and experience for all users and wildlife.

Water

Current Water Resources Management
Management of water resources is an integral piece to connectivity, species diversity, wildlife corridors, and long term economic health. The USDA Forest Service Programs and Policies, the United States Forest Service (USFS) has prioritized watershed health as a fundamental element in measuring its performance. "Ultimately, our success at the Forest Service will be measured in terms of watershed health on those 193 million acres of national forests and grasslands." Tom Tidwell Chief, Forest Service April 29, 2010. Even prior to 2010 the USDA acknowledged the importance water with the following statement: "Public concern about adequate supplies of clean water led to the establishment in 1891 of federally protected forest reserves. The Forest Service Natural Resources Agenda is refocusing the agency on its original purpose." (United States Department of Agriculture Forest Service FS-660, January 2000). The Greater Yellowstone Coalition would like to see the CGNF provide an evaluation of: 1) watershed condition; 2) water resource integrity and; 3) conformance to the current forest plan(s) water resource objectives.

There are a variety of acts, programs and plans that support and direct the Department of Agriculture in forest plan revision. The challenge is to balance the directives and the uses in the forest while using the landscape level perspective. The USFS stated that "The challenge for the Forest Service will be to simultaneously perform the following:

- Systematically restore damaged watersheds on the National Forests.
- Mitigate additional watershed damage from land uses and the inevitable major wildfires.
- Foster partnership efforts to meet the most pressing watershed restoration needs when they fall outside of national forest boundaries."

Watershed Condition Classification and Forest Planning Assessment

Watershed Condition Classification (WCC) and the associated Watershed Condition Framework give CGNF a method to develop priority watersheds. As a guide for assessment, GYC suggests using conservation of aquatic species through preservation and improving conditions. This framework also provides the tools to address aquatic and terrestrial invasive species with potential to negatively impact water resources. GYC encourages the CGNF forest plan revision team to address the current Watershed Condition Classification (*United States Department of Agriculture Forest Service FS-977 & FS-978, 2011*). We recommend further developing priority watersheds based on the WCC. This classification will help inform land uses in the forest.

Water resource health is a direct result of land management efforts and land uses. Naturally, National Forest activities impact water quality and productivity of the land for better or for worse. On both sides of the spectrum, there are noticeable examples of improved and degraded condition on the CGNF through forest projects and enforcement. Watershed health is not always easy to identify in a large landscape. For example, problem watersheds and processes are often masked by the size of the landscape, or noticeable only when flooding or other disturbances occur. Most watersheds on national forests may appear healthy on a large scale, however extensive localized rehabilitation needs still exist on these lands.

Through the CGNF's analysis utilizing the Watershed Classification Framework we see that 268 stream systems were evaluated and listed in the 2011 Watershed condition classification for National Forest System lands. *http://www.fs.fed.us/biology/watershed/condition_framework.html.* The assessment identified 70 watersheds "functioning at risk" and 4 streams identified as priority watersheds (Upper Beaver Creek, Upper Hyalite Creek, Lower West Rosebud Creek and Bozeman Creek). A significantly large number of stream systems were classified as having poor aquatic biota, aquatic habitat, water quantity, forest cover and road/trail conditions. The Watershed Classification Framework is a foundation to use in order for the forest to incorporate current Watershed Restoration Action Plans and priorities based on the 2011 classifications. This additional action orientated information made available to the public will provide the transparency needed to continue to build trust between the public and the Forest Service as well as hold the Forest Service accountable for management of the water resources. It also allows for the public to offer restoration or management ideas and to work collaboratively with local officials, scientists, water experts and the Forest Service staff. A great example of the public engaging with the Forest Service for healthy water is the West Fork Gallatin River. CGNF is one of 36 cooperative stakeholder entities in the Big Sky Sustainable Water Solutions Forum (others include GYC, Gallatin River Task Force, Big Sky Water and Sewer District and others) working to develop community values based water resource plan. This group is working to improve conditions as a result of cooperative actions. Forest plan revision provides the opportunity to bring the base line information onto the table to develop watershed restoration action plans, bring in additional resources to protect priority watersheds and bring "functioning at risk" watersheds to functioning properly.

GYC is concerned about watershed health. We have observed an array of conditions in and around the forest including soil degradation, lack of vegetative cover, eroding stream channels, gullies, landslides, abandoned roads, grazing practices/management and compacted rangeland. In many cases forest management projects and unregulated/unenforced policies have led to significant watershed degradation. GYC recommends the CGNF evaluate and discuss the adherence to the current forest management plans. This will help inform improve Forest Service management and identify capacity issues. Further, an assessment of capacity is an opportunity to bring the outside resources to protect the resource. Some watersheds can be restored by emphasizing land management requirements and practices, other watersheds may respond to intensive investment adaptive management and the implementation of Best Management Practices (BMPs).

Monitoring

The forest plan revision process provides the opportunity to determine the extent and effectiveness of current monitoring and maintenance of the forest's resources. Different areas of the forest require different levels of work. For example, work needed to restore a water resource may be intensive, structural, and expensive for a relatively small site with ongoing monitoring and maintenance. However, based on location and value of the resource, significant investment in the project provides a large benefit to the forest. Further, monitoring and maintenance will help identify forest health stressors, how those stressors may be changing and impacting the quality and quantity of water resources. Currently, monitoring and maintenance (assessed and based on the monitoring) guide management decisions to improve forest conditions. If this practice continues and is improved upon it will continue to be beneficial to health of the forest. For the benefit of the public, GYC recommends the Forest Service develop a comprehensive list of forest stressors. That list should be available in the revised Forest Plan with the proposed approaches to managing them.

Forest Road Infrastructure

GYC recommends providing a current snapshot and an evaluation of road management and CGNF transportation plan(s) in the forest plan revision assessment to determine if they are contributing to the improved condition of water resources. We make this recommendation because road infrastructure and access is a significant forest stressor. Roads often times elevate erosion rates and increase the likelihood of landslides in steep or unstable terrain. Erosion and landslides can be especially pronounced where roads cross or run near streams, resulting in sediment discharge to surface waters. Roads are also likely sites for chemical spills associated with traffic accidents, with the highest risk of water contamination where roads cross streams.

Aquatic Species – Species of Special Concern

Continued watershed health regarding refugia is especially important. In conserving and recovering at-risk species and maintaining biodiversity, a strong consensus among conservation biologists supports the need for refugia or designated areas capable of providing high-quality habitat. For aquatic species, watersheds are the basic unit for such a conservation strategy. Refugia exists in watersheds that have maintained hydrologic functions and processes, support healthy populations of the species of interest or their specific habitats have been identified. GYC would like to see the results and achievements of the forest service's work in reaching the agreed upon goals and objectives set with Montana Fish Wildlife and Parks. At this early phase of forest plan revision we also recommend other members of the range wide management teams be consulted as it applies to an inventory of past and present habitat refugia. This identified conservation status will allow an evaluation of effectiveness of the CGNF water

resources management. GYC recommends the Forest Service consider and evaluate how effective the CGNF has been in using land management, special land-use standards and priority watershed designations to institute restoration efforts and achieve recovery of sensitive species like westslope and Yellowstone cutthroat trout.

Water Quantity

Water quantity is a cornerstone of watershed condition. Because water quantity is so important, GYC recommends the Forest Service provide an evaluation of water rights and water use on the CGNF. Water rights under forest control and those that are diverted within forest boundaries are of specific interest to this reviewer. The CGNF is the source for several municipal and urban water systems. In the case of the Big Sky Water and Sewer District (BSWSD), an evaluation of the interplay of surface and groundwater sources in use and the effect of the forest policies is necessary. Additionally, a review of the BSWSD wastewater disposal practices and the impact of those practices on forest resources and downstream water users is a high priority in this phase of forest planning. The interplay of surface and groundwater sources are highly relevant to understanding the current condition and effectiveness of CGNF's management of water resources. Please answer these questions related to privately and USFS held water rights (including their associated points of diversion and use):

- How do water rights held by the USFS and adjoining private parties affect forest managed water resources?
- Are current special use permit diversion structures being managed to provide passage for and protection for sensitive aquatic species? What maintenance or upgrade potential exists to improve conditions?
- Are stream flows appropriately sustaining aquatic and riparian resources?
- Have CGNF policies and practices regarding water rights improved the water quantity available to sensitive species and priority watersheds?

Additional questions to ask include:

- Are the current/in process acquisitions going to be enough?
- Should structures be upgraded or moved below critical reaches?
- Do current policies and action plans require modification to meet both current and future desired conditions?

Water Quality

GYC recommends providing an update and assessment of the status of CGNF's Clean Water Action Planning efforts. The Clean Water Action Plan under Unified Federal Policy objectives directs the Departments of Agriculture and the Interior to consult with other Federal agencies, States, tribes, and other stakeholders to develop a Unified Federal Policy to enhance watershed management for protecting water quality and the health of aquatic ecosystems on Federal lands. The purpose of the Unified Federal Policy is to ensure a consistent approach to managing Federal lands on a watershed basis, to protect, maintain, and improve watershed conditions and water quality.

GYC requests an update and assessment of the status of CGNF success in implementing the National BMP Program (http://www.fs.fed.us/biology/watershed/BMP.html) with regard to watershed improvement. GYC would like CGNF to state that what didn't get achieved and why. Please include the types of BMPs and protocols in use on the CGNF. As the CGNF is aware, the National BMP Program is part of the National Directives System. These directives are needed to meet the requirements of the new planning rule (36 CFR 219.8(a)(4)) which mandated implementation of the National BMP Program.

GYC requests an evaluation of the forest's coordination with Montana DEQ on state water management and integrated water report actions including 303d list, TMDL planning & implementation, changes in impaired stream status and listing over the course of existing forest plans. This evaluation should include forest tributary streams to listed waterbodies and how forest actions have aided in recovering listed waterbodies. This discussion can include active and abandoned mine lands as well as hazardous material site identified on CGNF lands as they may be contributing to water quality impairments to CGNF managed waterbodies. For your reference we included the state of Montana's FINAL 2014 water quality Integrated Report as submitted to the U.S. EPA:
http://deq.mt.gov/Portals/112/Water/wqpb/cwaic/Reports/IRs/2014/2014FinalIR.pdf

Recreation Impacts to Water Resources
GYC recommends the Forest Service provide an assessment of past and current recreation uses and impacts. This forest plan revision must include and consider land and trail recreation impacts to water resources to ensure a comprehensive evaluation is conducted. Please include assessment of use and impacts of current river access locations. An additional request is to include the influence of recreation use and management on adjacent and inholding parcels. GYC acknowledges that "while on water recreation" may be conceptually consistent over the life of the current forest plan(s), continued technological advancement of recreation gear changes and new assessments of recreation impacts are required. Due to these advancements GYC has questions regarding recreation in the rivers and water bodies. For example, how does angler foot ware impact invasive species management and sensitive aquatic species conservation? How have new floating and paddling innovations affected water resources? In these examples for instance, a question to answer could be: have felt soled wadding shoes had an adverse impact on fisheries? Have light weight packrafts added to management concerns and user conflicts with policies and programs? We would like to see these questions addressed through Forest Plan Revision.

Wild and Scenic Rivers Act Management and Cooperation
In 1968, a significant change occurred within forest management policy and management which included Wild and Scenic Rivers Act (WSRA) eligibility. While past Custer and Gallatin forest plans met the appropriate WSR management policy, additional streams and rivers should have received consideration for eligibility. Montanans for Healthy Rivers has conducted a preliminary Wild and Scenic Rivers Act eligibility assessment which includes many more streams in the CGNF. Please provide an explanation of how CGNF streams and rivers that warrant management under the Wild and Scenic Rivers Act will be determined. GYC recommends the following streams be reviewed for eligibility and protective management under the WSRA in forest plan revision (see Tables 3-6).

Tables 3-6 include four columns pertaining to support for Wild & Scenic Rivers on the Custer Gallatin National Forest. Reading from left to right, the third column denotes river segments formerly deemed eligible by the Custer and Gallatin National Forests through independent reviews of Wild and Scenic River eligibility screening. The fourth column notes river segments included by the Montanans for Healthy Rivers (MHR) draft citizen's proposal, which is currently gaining support for an introduction of a legislative bill in Congress. The fifth column points to additional river segments that the Greater Yellowstone Coalition and Montanans for Healthy Rivers agree should be recognized as eligible for Wild & Scenic protection. The sixth column refers to additional river segments that the Greater Yellowstone Coalition recommends new Forest Service eligibility management status. The GYC recommends these carry forward to the upcoming Forest Planning process. The seventh column refers to Outstandingly Remarkable Values that the GYC recommends add significance to river segments that make them eligible

for inclusion under the Wild & Scenic River Act. (W= Wildlife, F= Fisheries, R= Recreation, S= Scenery, G= Geology, H= History)

Please report on how the current forest plan(s) have protected the free flowing character of surface waters in the CGNF. Please provide an evaluation of the process and plan for determining eligibility of and inclusion of waterbodies for management under provisions of the Wild and Scenic Rivers Act.

Table 3

River Name	River Miles	Current FS Eligible	MHR Draft Citizens Proposal for Designation	MHR/GYC Support for Eligible	Needing Additional Analysis	Presumed ORV's
Gallatin River						
Gallatin River NPS To FS	39	yes	yes	yes		F, G, R, S, W
Bacon Rind	TBD	no			yes	W
Sage	TBD	no			yes	W
Wapati	TBD	no			yes	W
Portal	TBD	no			yes	W, R
Swan	TBD	no			yes	W, R
Storm Castle	TBD	no			yes	W, R, S
Mud	TBD	no			yes	W
Big Bear	TBD	no			yes	W
South Cottonwood	TBD	no			yes	W, R
Bozeman Cr.	TBD	no			yes	W, R
Rocky Cr. (E. Gallatin)	TBD	no			yes	W
Bridger Cr	TBD	no			yes	W
Reese Cr	TBD	no			yes	W
16 Mile	TBD	no			yes	W, F
Bear Cr.	TBD	no			yes	W
Taylor Cr.	17	no	yes	yes		F, R, S, W
Buck Cr.	10	no		yes		W, R
Porcupine Cr.	9	no	yes	yes		W, R
Hellroaring Cr.	11	no		yes		W, S
SF Spanish Cr.	TBD	no		yes		W, S, R
NF Spanish Cr.	16	no		yes		S, W
Cherry Cr.	5	no		yes		W
Hyalite Cr.	7	no	yes	yes		R, S

Table 4

Clarks Fork Yellowstone						
WF Rock Cr.	22	yes	yes	yes		G, S, R
Lake Fork Rock Cr.	9	yes	yes	yes		G, S, R
Main Rock Cr.	13	yes	yes	yes		R, W
Broadwater River	TBD	no			yes	G, S
Sky Top Cr.	TBD	no			yes	G, S, R

Table 5

Madison River						
Main Madison NPS To Hebgen	7	no		yes		W, F
SF Madison	21	no		yes		W, F,
Tepee Cr.	10	no		yes		W, F, R
Grayling Cr.	4	no		yes		W, F
Madison River Hebgen To FS	8	yes	yes	yes		F, R, S
Cabin Cr.	8	no		yes		F, G, H, S
Beaver Cr.	10	no		yes		R, S, W
Sentinel Cr.	15	no		yes		F

Table 6

River Name	River Miles	Current FS Eligible	MHR Draft Citizens Proposal for Designation	MHR/GYC Support for Eligible	Needing Additional Analysis	Presumed ORV's
Yellowstone River						
Brackett	TBD	no			yes	W, R
Cottonwood	TBD	no			yes	W
Shields River	TBD	no			yes	W, F
Rock Cr. of Shields River	TBD	no			yes	W, S
Rock Cr. of Upper Yellowstone	TBD	no			yes	W, F
Bear Cr. of Upper Yellowstone	TBD	no	yes	yes		W, F, R, S
Slough Cr.	22	no		yes		W,F, R, S
Buffalo Cr.	16	no		yes		W, F, R, S

Hellroaring Cr.	22	no		yes		W, F, R, S
Yellowstone R. NPS to BLM	15	yes	yes	yes		W, F, R, S, G
Tom Miner Cr.	5	no	yes		yes	W
Wallace Cr.	TBD	no			yes	W, S
Monitor Cr.	TBD	no			yes	W, S
NF Sixmile Cr.	TBD	no			yes	W, S
Sixmile Cr.	10	no		yes		W, S
Big Cr.	12	no	yes	yes		W, F, R, G
WF Mill Cr.	8	no		yes		W, R
EF Mill Cr.	12	no		yes		W, R, S
Arrastra Cr.	TBD	no			yes	R
S Fork Pine Cr.	3	no		yes		W, S, G
SF Sheilds River	6	no		yes		W, F
W Boulder River	17	no	yes	yes		W, F, R, S
Boulder River	27	yes	yes	yes		W, F, R, S, G
E Boulder River	5	no		yes		W, F, R, S, G
Falls Cr	TBD	no			yes	W, R, S
Speculator Cr	TBD	no			yes	W, R, S
Davis Cr.	TBD	no			yes	W, R, S
MeatRack	TBD	no			yes	W, R, S
Lower Deer Cr.	11	no		yes		W, F
WF Stillwater River	15	no		yes		W, F, R, S, G
Woodbine Cr.	TBD	no			yes	W, F
Fishtail Cr.	TBD	no			yes	W, F
West Redlodge Cr	TBD	no			yes	W, R
Goose Cr.	TBD	no			yes	W, R, S, G
Glacier Cr.	TBD	no			yes	W, R, S, G
Stillwater River	27	yes	yes			W, F, R, S, G
W Rosebud Cr.	20	yes		yes		W, F, R, S, G
E Rosebud Cr.	20	yes	yes			W, F, R, S, G
Custer Gallatin GYE Totals						
75 River Segments						

Watershed Resilience and Climate Change
Future Water Resources Management
Climate change response management includes managing forests, woodlands, and grasslands in the face of uncertainty. The Forest Service must continue to deliver public access to natural resources and recreational experiences with the additional layer of uncertainty that affect forest resources. The forest must therefore evaluate methods to adapt forest management in changing climate and landscape.

United States Department of Agriculture Forest Service Programs and Policies
In February 2002, President George W. Bush announced the formation of a new management structure, the Climate Change Science Program (CCSP), to coordinate and direct the United States' research efforts in the areas of climate and global change. These research efforts include the U.S. Global Change Research Program (USGCRP), authorized by the Global Change Research Act of 1990.

In keeping with the research goals of the U.S. Global Change Research Program, the climate change strategy of the U.S. Department of Agriculture (USDA), and the climate change framework of the Forest Service, the United States Forest Service has developed the Forest Service Global Change Research Strategy, 2009-2019 Implementation Plan. This will likely provide a framework from which the CGNF can develop applicable climate change mitigation policies and actions to protect its water resources and the associated species of concern. CGNF should provide an evaluation of probable affects to watershed condition, water resource integrity based upon the forest's vulnerability to climate change.

Determining Adaptation Capacity and Vulnerability
Climate Change will be a significant aspect leading to future change in and management of water resources. The CGNF should establish a method to monitor the effects of climate change on water resources. This monitoring effort should be scaled directly to watersheds, water resources and species that exhibit high vulnerability and low capacity to adapt to the effects associated with climate change.

CGNF staff have participated in several relevant assessments of climate change and it is expected that many of these will be updated to reflect current science and practices in research as discussed in the USDA's Pacific Northwest Research Station General Technical Report PNW-GTR-870 *Effects of Climatic Variability and Change on Forest Ecosystems: A Comprehensive Science Synthesis for the U.S. Forest Sector* December 2012. The Northern Rockies Adaptation Partnership (NRAP) provided additional climate assessment research. With a stated goal of **establishing "an effective long-term science-management partnership** involving multiple agencies and stakeholders to continually assess climate change science and its implications for biophysical and social resources" NRAP has issued the *Climate Change Vulnerability and Adaptation in the Northern Rocky Mountains – Final Draft* document. http://adaptationpartners.org/nrap/docs/NRAPFinalDraft_2016.07.25.pdf. This document reinforces the well-established anticipated effects to the region's hydroclimate and the associated hydrology. The forest should include and describe how climate vulnerability will be factored in to water resource protection, restoration and recovery elements of the CGNF forest plan. Additionally, the Forest Service should examine how current management programs can be best utilized to provide preemptive protection for water resources and their supporting watersheds. Wild and Scenic eligibility and designations for instance will ensure free flowing streams and secure habitat for native westslope and Yellowstone cutthroat trout. These protections should be prioritized for climate vulnerable trout habitat. Additionally, forest cover and fuels management project schedules should be evaluated against recovery and outcomes

modified by climate change. For example, fuels management in a watershed could result in a climate secure forest area to minimize excessive sediment by avoiding a high intensity fire.

Adaptive Management Requires Monitoring
In order to apply adaptive management practices and protect the most vulnerable watersheds must implement a thorough, detailed, local monitoring program. GYC recommends the Forest Service establish a prioritization criteria and monitoring plan for the vulnerable and highly vulnerable streams and watersheds. This monitoring network should be coordinated with the Rocky Mountain Research Station's Climate Shield project to assist in calibrating the Climate Shield modeling and to assess high value climate refugia for cold water aquatic species. Adaptive management policies informed by climate change potential should also be established to protect water quality and quantity for both forest users and downstream communities.

WILDLIFE

The 20-million acre Greater Yellowstone Ecosystem is the realm of grizzly bears, bison, wolves, and the largest elk herds on the planet and is well known as one of the last remaining intact temperate ecosystems in the world. As wild as it is rare in today's rapidly changing world, Greater Yellowstone still represents one of the best examples of unspoiled nature once found across the American West.

A significant portion of the Custer Gallatin National Forest is part of the Greater Yellowstone Ecosystem (GYE). Given its proximity to Yellowstone National Park and its wild, roadless character, it is home to some of our most rare and iconic wildlife species and is *the* doorstep for Yellowstone in terms of wildlife connectivity to other northern Rockies ecosystems to the north and west of the GYE. The forest and its variety of habitats provides an important travel corridor for wildlife coming from the park, winter range for foraging ungulates, and secure cover for bears, elk and bison. We look forward to working closely with you over the coming months/years to help identify and secure important habitat and connectivity/migration corridors for our nation's most iconic and rare wildlife species.

Big Game and Migration Pathways in the Custer Gallatin National Forest

Each year, thousands of elk migrate back and forth between distant winter ranges in Wyoming, Montana, and Idaho to high-elevation summer ranges near the core of Yellowstone National Park. Their abundance sustains diverse carnivores and scavengers, attracts tens of millions of dollars to gateway communities, and inspires national and global interest in America's premier national park. These migrations define and unify Greater Yellowstone, both ecologically and culturally, and are considered by scientists to be the "engine of the ecosystem." The Custer Gallatin is home to and used by many of these elk, including the Madison herd (see Figures 8 and 9 below) and provides access to critical big game winter range for many GYE species (see Figure 10).

However, The Greater Yellowstone Ecosystem, of which the Custer Gallatin is an integral and essential part, is not immune to a growing number of ecological changes and conservation challenges. Subdivision of critical winter range, human and energy development, increased recreation, and roads have reduced and fragmented the corridors and habitats needed to sustain seasonal wildlife movements. In addition, some populations are being impacted by hotter and drier summers, invasive species, and introduced diseases. A combination of these factors has led to declines in several elk herds across the region (see Wyoming Migration

Initiative – www.migrationinitiative.org and Greater Yellowstone Migrations – www.greateryellowstonemigrations.com).

Additionally, as elk migrate from Yellowstone's core to winter ranges each fall, they cross an incredibly complex terrain of land ownership and management regimes. Moving from the national park, to Forest Service, Bureau of Land Management, state, and private lands, wildlife are forced to navigate roads, subdivisions, fences, pump-jacks, livestock operations, and many other challenging features that stem from a diversity of land ownership and increasing development. Even within federal agencies, land management provisions can change radically at jurisdictional borders. The incremental loss of critical seasonal habitat outside park boundaries threatens Yellowstone's migratory wildlife. Simply put, if migration corridors are severed, there will no longer be elk, pronghorn, mule deer, bighorn sheep, or moose in Yellowstone National Park or beyond (see Figure 10 showing migration pathways for these species).

The Greater Yellowstone Coalition is currently proposing an administrative action asking federal land management agencies within the Departments of Interior and Agriculture to amend existing and future land management plans for lands within the Greater Yellowstone Ecosystem to designate major wildlife migration corridors and include a standard that all projects, activities, and infrastructure authorized in designated wildlife migration corridors be designed, timed, and/or located to allow continued successful migration between identified summer and winter ranges.

The Custer Gallatin National Forest is an integral and essential part of this ecosystem and all its processes. Through this Forest Planning process, we ask that the Custer Gallatin National Forest:
1. Identify and designate critical big game habitat and migration pathways,
2. Develop forest plan components that will protect and preserve these areas and processes, and
3. Develop coordinated administrative actions that result in cross-boundary recognition and protections for migration routes to ensure Yellowstone National Park's iconic wildlife survive in a time of climate change and increasing human pressure.

The Gallatin County is one of the fastest growing counties in the nation and with this we can expect to see a continued increase in recreational pressures and impacts. An important and effective way to protect big game species, including their critical habitat and migration pathways, is through winter range closures. Winter closure areas can be essential to the survival of certain wildlife species when they are especially vulnerable (i.e. their energy reserves are low, pregnant females are in their final trimester, deep snow limits movement and access to forage, and plants have not yet begun to green-up). Similar to what the Bridger-Teton and Caribou-Targhee National Forests in Wyoming have instituted (See the "Don't Poach the Powder" program - https://jhalliance.org/campaigns/dont-poach-the-powder/; Figure 11), we recommend that the CGNF consider big game winter closures that prohibit all human presence/activities during critical time periods to mitigate the potential for significant recreational impacts to big game.

Figure 8: From - http://www.nationalgeographic.com/magazine/2016/05/yellowstone-national-parks-elk-migration-map and Greater Yellowstone Migrations – www.greateryellowstonemigrations.com.

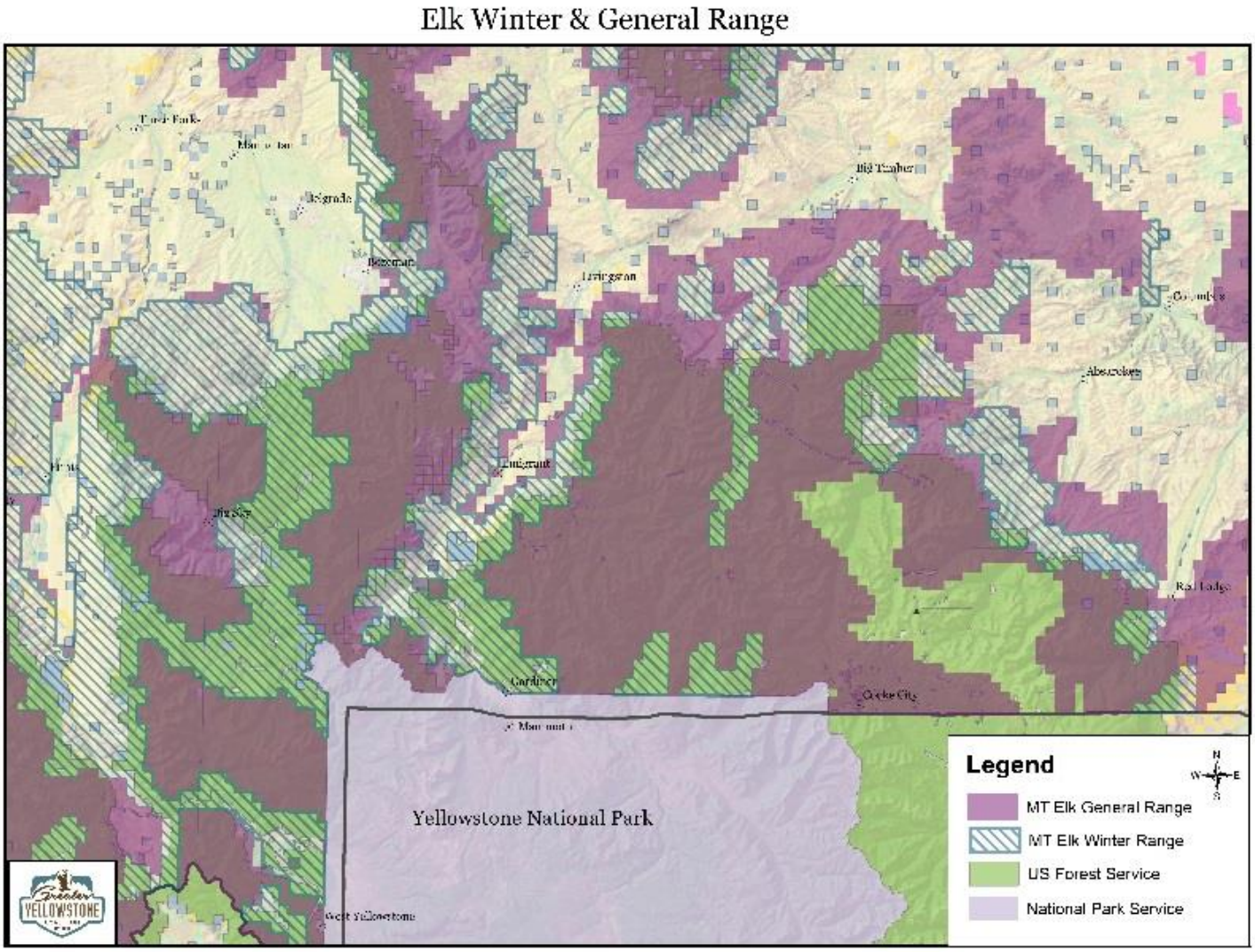


Figure 9: Elk winter and general range distribution in Montana. From - http://fieldguide.mt.gov/speciesDetail.aspx?elcode=AMALC01010

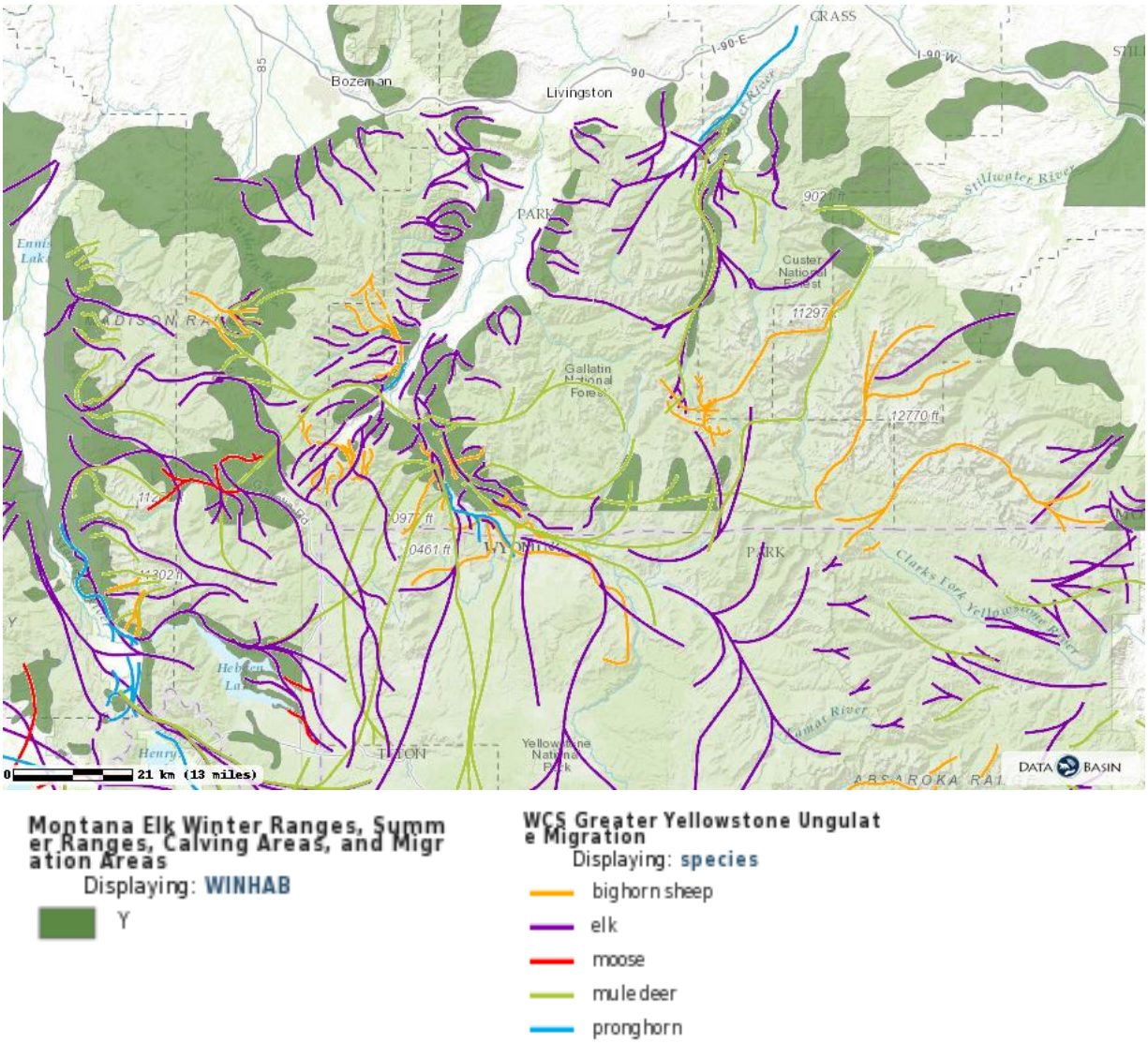


Figure 10: From Databasin – Elk winter ranges, summer ranges, calving areas and migration areas for the state of Montana (Montana Fish Wildlife and Parks), as well as migration routes for bighorn sheep, elk, moose, mule deer, and pronghorn (Wildlife Conservation Society).

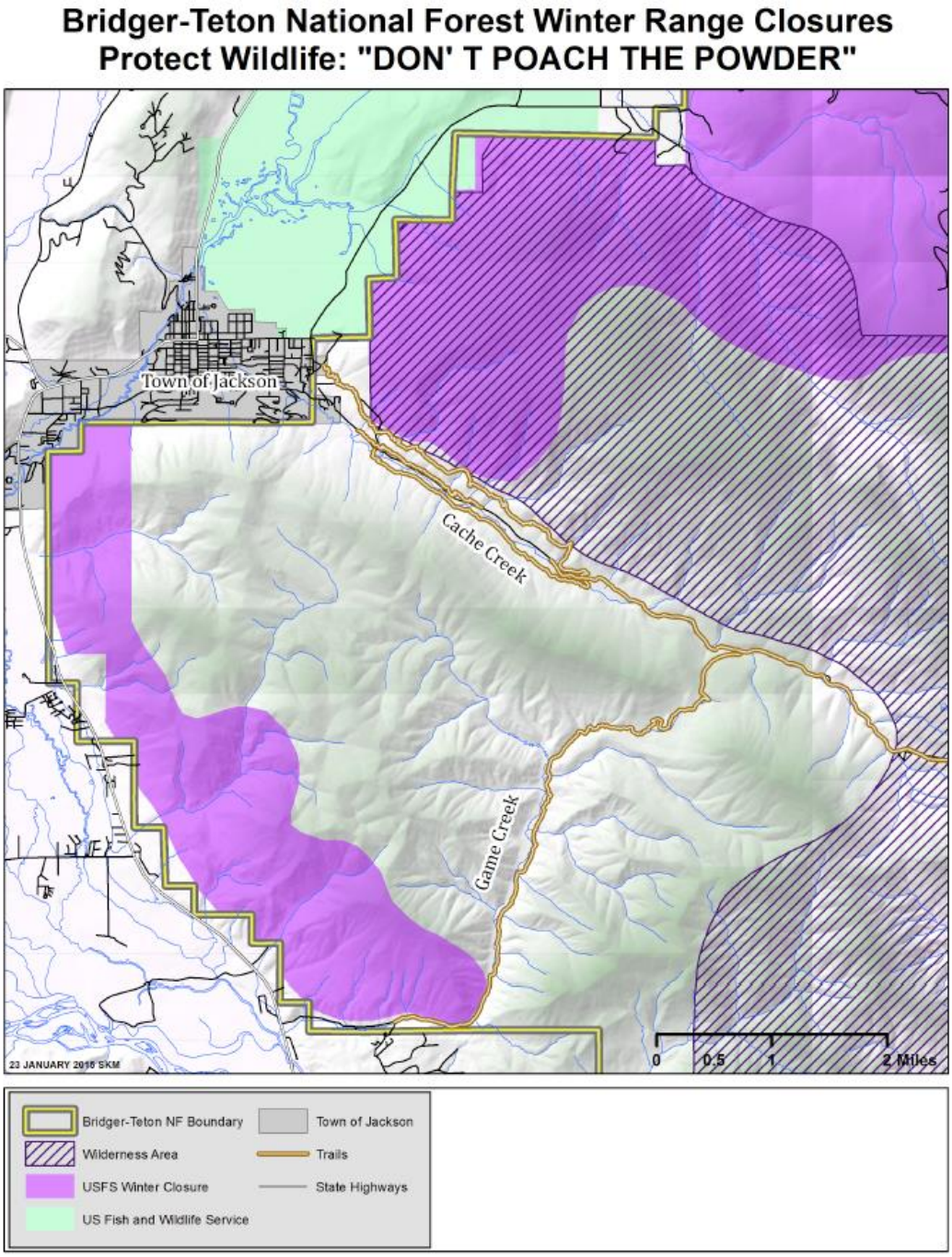


Figure 11: Example of existing Big Game Winter Range Closure – JH CONSERVATION ALLIANCE / COURTESY MAP. Parts of the Bridger-Teton National Forest shown on this map are closed to people from Dec. 1 to May 1.

Grizzly Bears

For more than 30 years, the Greater Yellowstone Coalition has advocated for a thriving population of grizzly bears throughout the GYE by protecting core habitat, working to achieve functional connectivity for bears between the GYE and Crown of the Continent, and helping local communities coexist with bears by building awareness and providing proactive conflict mitigation tools. Regardless of their legal status, it is our goal to ensure that the GYE grizzly bear population remains robust and eventually connects to the Northern Continental Divide Ecosystem (NCDE) and other populations as a large interconnected Northern Rockies grizzly bear metapopulation.

The Yellowstone grizzly population has grown from a couple hundred bears in Yellowstone National Park four decades ago to more than 700 grizzlies throughout the region today. We now have grizzly bears in places they haven't been in more than 80 years and their range continues to expand. In March 2016, the U.S. Fish and Wildlife Service (USFWS) proposed "delisting" Yellowstone grizzlies, publishing a proposed delisting rule and Draft 2016 Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem detailing regulatory mechanisms and strategies for ensuring successful long-term conservation of grizzlies. Prior to delisting, the U.S. Fish and Wildlife Service (FWS) must demonstrate that this species (or any population proposed for delisting) is no longer threatened by the five factors outlined in 16 U.S.C. § 1533(a)(1). These five factors include the present or threatened destruction, modification, or curtailment of the grizzly bear's habitat or range; the inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting the species' continued existence. Pursuant to the above five-factor analysis, the FWS must consider how the currently isolated GYE grizzly bear population can qualify as recovered without regulatory mechanisms to provide for connectivity between this population and others, including the NCDE. The Forest Planning process now underway offers the federal government an unparalleled opportunity to commit to and provide for such connectivity.

Connectivity is a guiding principle under the National Forest Management Act (NFMA) as well. NFMA requires that the Secretary of Agriculture promulgate land management planning regulations that "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives." 16 U.S.C. § 1604(3)(B). Section 219.9 of the 2012 Planning Rule implements this statutory mandate, and provides for a "complementary ecosystem and species-specific approach to maintaining the diversity of plant and animal communities and the persistence of native species in the plan area." 77 Fed. Reg. 21,162, 21,265 (Apr. 9, 2012), to be codified at 36 C.F.R. § 219.9. As part of this approach, plans must include, inter alia, "components to maintain or restore [ecosystem] structure, function, composition, and connectivity." 77 Fed. Reg. at 21,265, to be codified at 36 C.F.R. § 219.9(a)(1) (emphasis added). The components outlined in a plan must be sufficient to conserve threatened and endangered species and maintain viable populations of species of conservation concern; if the components are insufficient in this regard, additional, species-specific components must be included. 77 Fed. Reg. at 21,265, to be codified at 36 C.F.R. § 219.9(b).

Under NFMA's diversity requirement, and because the long-term goal for listed grizzly bears is to "achiev[e] connectivity and manag[e] grizzly bear populations in the northern Rockies as subpopulations of a metapopulation" (2011 Grizzly Bear 5-Year Review, p.14), the U.S. Forest Service (USFS) must consider the impacts of this plan revision and future plan components not only for the GYE grizzly bear population, but also for the NCDE (as well as other recovery areas) under Section 7 of the ESA (a)(1) http://www.fws.gov/endangered/laws-policies/section-7.html. The viability and recovery of still threatened populations may depend on the long-term

occupancy *throughout* connectivity areas. In other words, regardless of the legal status of the GYE population and where management zones are delineated by USFWS, the Forest Service *must* contribute to the recovery of still federally listed threatened and endangered species and provide for population viability under NFMA.

A significant portion of the Yellowstone grizzly bear distribution, suitable habitat, Primary Conservation Area (PCA), and Demographic Monitoring Area (DMA) (see Figure 12) falls within the Custer-Gallatin National Forest. To be exact, the Gallatin National Forest contains over 800,000 acres within the grizzly bear recovery zone and grizzly bears may occupy approximately 89% of the Gallatin National Forest (Gallatin N.F. Clean Up Amendment EA 2015, p. 80). Furthermore, their range is expanding within the CGNF, and CGNF lands serve as the doorstep for grizzly bear connectivity to other ecosystems to the north and west (see Figures 13, 14, and 15).

Regardless of grizzly bear legal status, the new Custer Gallatin Forest Plan must:

1. Incorporate habitat-related direction from the Final 2016 GYE Grizzly Bear Conservation Strategy (GBCS) and, at minimum, previous Forest Plan Amendments regarding grizzly bears.
2. Ensure protection of grizzly bear habitat both inside and outside the Primary Conservation Area (PCA). Specifically, habitat standards for the PCA should be applied throughout the Demographic Monitoring Area (DMA) to ensure a stable population of grizzly bears.
3. Ensure connectivity between the GYE and other populations to the North and West.

Regardless of their classification, the CGNF should focus on developing plan components that provide the ecological conditions necessary for recovery, population stability, and persistence of grizzly bears within the forest plan area and beyond.

Through the forest plan revision process grizzly bears will either be listed as threatened or should be designated a Sensitive Species or Species of Conservation Concern (SCC). Regardless of the legal status of bears, as part of the general assessment process the CGNF must identify and evaluate existing information relevant to the entire plan area for any “at risk species”, including threatened species and potential species of conservation concern (SCC) and therefore should be looking at:1) What are the “ecological conditions necessary to contribute to recovery of” federally listed species?; 2) Will Forest Planning efforts “maintain a viable population of species of conservation concern in the plan area?” In general, the CGNF should seek to minimize management activities that conflict with, or result in the incidental take of threatened and endangered, management indicator, SCCs or otherwise iconic species, especially in critical and suitable habitat or high potential connectivity areas.

Under the 2016 Conservation Strategy, it is suggested that the Forest Service consider “sensitive species” designation for grizzly bears following delisting. However, currently each of the GYE Forests are in various stages of forest planning and the “sensitive species” designation no longer exists under the current (2012) planning direction. If grizzly bears are delisted before the lengthy process of forest plan revision is complete they should be designated as a Regional Forester Sensitive Species (RFSS), in accordance with Forest Service Manual 2670. Then through the forest plan revision process, the CGNF should provide a clear, seamless, and consistent transition to Species of Conservation Concern designation following 2012 Planning Rule direction (SCC, 12.52d-2b 2012 Planning Handbook p.36).

As a likely future SCC across its range, the CGNF must consider the ecological conditions necessary to maintain and contribute to grizzly bear populations that will "persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments" (36 CFR 219.19). Thus, the forest must develop plan components that provide the ecological conditions necessary for the recovery, stability, and long-term persistence of grizzly bears within the Custer Gallatin National Forest plan area. The assessment phase should focus on evaluating the current status and trends of the necessary conditions *across the entire forest* as required under the 2012 Planning Rule. Conditions to be evaluated include existing habitat conditions and protections related to road density, secure habitat, site developments, recreational pressure and impacts, food storage orders, grazing allotments, bear safety and education, etc. Secure habitat is calculated from creating buffers around known motorized routes. Thus, as part of the assessment process, the forest should look at whether the motorized access route database is accurate and reflects current conditions on the ground. This includes work to improve the baseline understanding of motorized route densities and amount of secure habitat forest-wide – meaning both inside and outside the PCA.

The assessment must also evaluate CGNF's larger role in contributing to the persistence of grizzly bears within the species range. For wide-ranging at-risk species like grizzly bears, information about the contribution of the plan area to a "viable population of the species within its range" is relevant to the revised plan as required under NFMA's diversity requirement (36 CFR 219.9(b)(2)). Again, it is essential that the CGNF assessment considers the role of the plan area in providing connectivity to other populations of grizzly bears and evaluate existing information demonstrating the importance of connectivity between grizzly bear populations (i.e. Kamath et. al 2015; Miller and Waits 2003).

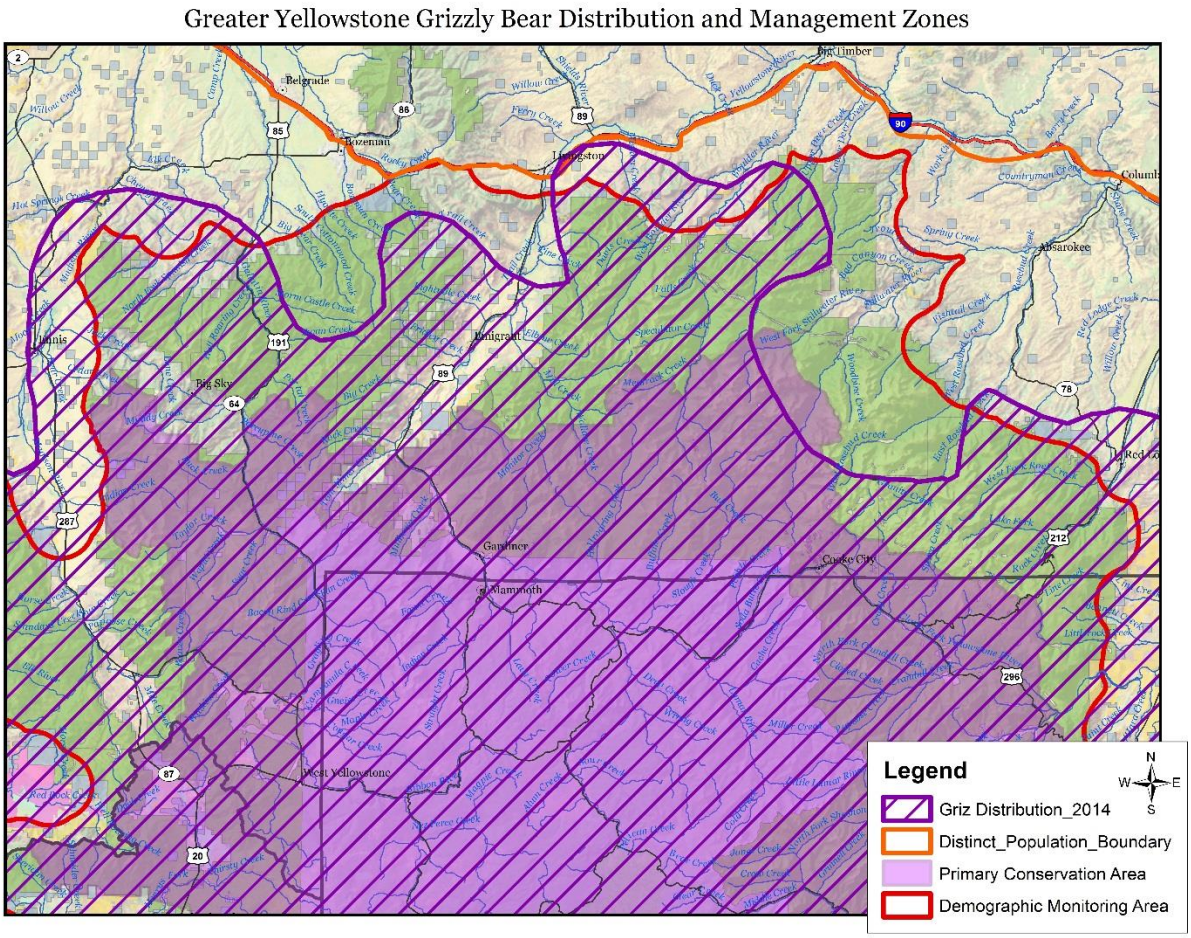


Figure 12: Yellowstone grizzly bear distribution, Primary Conservation Area (PCA), and Demographic Monitoring Area (DMA) in the Custer-Gallatin National Forest area of Southwest Montana – map created by Greater Yellowstone Coalition.

The CGNF must provide for adequate regulatory mechanisms as a prerequisite for delisting.
Though the current delisting process may be lengthy and uncertain, the CGNF must provide for adequate regulatory mechanisms as a prerequisite for delisting under current forest plan direction. The 2016 Conservation Strategy establishes management criteria required to be in place and carried into the future. At present, it is not clear how and when the CGNF plans to provide for this and how this will be incorporated in to the forest plan revision process.

The 2006 Forest Plan Amendments that were developed for Greater Yellowstone Area National Forests prior to the previous delisting attempt are outdated and inadequate for protecting the places where bears live today. They only impact habitat within the PCA, and are inconsistent with current federal actions and planning direction. Since the 2007 Grizzly Bear Conservation Strategy, the grizzly bear population has expanded its distribution far beyond the boundaries of the PCA where these habitat standards would apply. Grizzly bears now occupy approximately 44,624 sq. km (17,229 sq. mi), and the Primary Conservation Area (PCA), where habitat protections ensure continued secure habitat for grizzly bears, only comprises 23,853 sq. km (9,210 sq. mi), barely half of the currently occupied habitat. Furthermore, on December 14,

2016, the USFWS and members of the Yellowstone Ecosystem Subcommittee agreed to a final draft of the 2016 Conservation Strategy that included language to manage for a stable population of grizzly bears for the foreseeable future following delisting. Thus, we believe new or revised amendments should be developed through a formal public process, that contain adequate habitat standards and protections for federal lands that reflect the current distribution of grizzly bears and will ensure a stable population of bears into the foreseeable future. Then, through the Forest Plan Revision process, the CGNF should incorporate the habitat related direction from these new forest plan amendments, as well as the 2016 final conservation strategy, as part of the new forest plan (i.e. they should be formally adopted as part of the new forest plan, rather than amending it). In the very least, the CGNF should implement the 2006 Forest Plan Amendment and manage bears as a RFSS in the interim.

We provided comments on the proposed Forest Plan Amendment to integrate the Northern Continental Divide Ecosystem (NCDE) Grizzly Bear Conservation Strategy (GBCS) into the forest plans for the Helena, Kootenai, Lewis and Clark, and Lolo National Forests. Our comments here and going forward throughout this process are/will be consistent with these NCDE Forest Plan Amendment (NCDE FPA) comments and we ask that those be considered and incorporated here as well (these comments are included below in Appendix B). Please also see these NCDE FPA comments for additional science that may be missing or excluded from the body of current information the Custer Gallatin National Forest is using to conduct the assessment for current conditions of the forest. This document is relevant for the purposes and direction for forest planning under NFMA, even though it may not be included in the final Conservation Strategy.

Habitat Protections inside the Primary Conservation Area

The Forest Plan Revision must ensure that the 1998 baseline for road density, site developments, livestock allotments, secure habitat and motorized access route density are maintained or improved upon within the PCA. In fact, since 2007, there have been many positive modifications in grizzly bear habitat and changes that have occurred on some of these lands. We recommend that the USFS assess secure habitat within the PCA and beyond within the DMA.

Habitat Protections within the Demographic Monitoring Area (DMA) (outside the PCA)

The Forest Service is obligated to implement habitat protections that reflect the current distribution of grizzly bears in Forest Plan Amendments before delisting is finalized. Expanding the habitat standards, which were designed to protect grizzly bears, to the area that grizzly bears will be counted towards the population and therefore recovery goals, is logical and necessary to ensure a *stable* population in to the foreseeable future, and to help ensure the Forest Service meets connectivity and at risk species persistence requirements under the 2012 Planning Rule. As the Custer Gallatin National Forest looks into the future, GYC reminds the forest that standards outside of the PCA should, at a minimum, include forest-wide food storage orders, road density, secure habitat, and no surface occupancy stipulations that currently exist on Federal Lands. This is critical to both bears residing in core habitat and bears attempting to disperse to other populations. Proper food storage directly reduces human-bear conflicts and increases human safety. Roads (permanent or temporary, open or closed) and site development will increase human-bear conflicts and grizzly bear mortality and affect the potential for connectivity through important linkage areas. We cannot emphasize enough the importance of maintaining and promoting secure habitat throughout the DMA to maintain a stable population (any decreases in habitat quality or security within the DMA will not support a stable population).

CGNF must develop plan components to ensure that all grizzly bear populations are well-connected to promote the long-term viability and recovery of this at-risk species.

The Greater Yellowstone Coalition understands the assessment/current conditions phase of Forest Plan Revision is a snap shot of the forest based on the most current and best available information. However, with grizzly bear expansion, forest plan revision, and forthcoming delisting, we recommend the CGNF conducts a corridor assessment/analysis with modeling efforts already conducted to identify, map, and manage linkage habitats essential to grizzly bear movement between ecosystems. In particular, *special plan components* should be developed for "connectivity areas" that closely resemble those suggested for lands within the PCA, including road density and site development restrictions to support grizzly bear occupancy and eventual dispersal to the NCDE. Southwest Montana contains a patchwork of public and private lands, with rapid development of private lands predicted in the coming years. Private lands often create mortality sinks (Schwartz, et. al. 2012); thus, grizzly bears will likely rely heavily on the large blocks of contiguous public lands for security, requiring more rigorous habitat protections and placing ever-increasing importance on properly managed public lands to promote grizzly bear occupancy and connectivity.

Key areas within the CGNF (see Figures 13, 14, and 15, and FPA comments in Appendix A) serve as potential connectivity/linkage areas to other ecosystems to the west and north, and are recognized as areas of considerable importance to the long-term recovery of this species. Characteristics associated with effective linkage zone function for large carnivores and ungulates include low open road density, low concentrations of human occupancy and development, an abundance of productive foraging habitat, and a healthy mix of forested and non-forested lands (Craighead et al. 2001; Walker and Craighead 1997; Servheen et al. 2003; Olimb and Williamson 2006). Walker and Craighead (1997) identified three potential corridors linking the GYE grizzly population to the NCDE; through the (1) Big Belt–Bridger–Gallatin mountain ranges, (2) the Boulder–Tobacco Root–Gravelly–Taylor–Hilgard ranges (see Figure 13), and (3) the Selway–Bitterroot–Lemhi– Centennial–Madison ranges, and Krehbiel 2015 (see Figure 14), Cushman et al. (2009) (see Figure 15), and the WCS CircuitScape Models produced similar results.

We greatly appreciate the CGNF's acknowledgment of the importance of the northern portions of the Custer Gallatin NF in facilitating grizzly bear connectivity to the NCDE (page 36) and hope that forest plan direction and habitat protections in the new plan will support/reflect this. The Bridger and Big Belt Mountain Ranges on the CGNF have been identified as the most important corridor for connectivity to the north (Walker and Craighead 1997; Cushman et al. 2008 – see Figures 14 and 16 below). However, under current conditions, grizzly bears from the NCDE have still not connected to the Greater Yellowstone Ecosystem (or vice versa) via this or any other route (Haroldson et al. 2010). It seems unlikely then that bears will expand in to and/or move through this area in the future if they have not done so already without significant improvements in habitat protections. The CGNF should therefore consider improved habitat protections in these areas in the new plan to promote eventual connectivity to the NCDE. If CGNF chooses not to plan for grizzly bear connectivity, the Forest Service must provide justification for ignoring the best available science regarding connectivity.

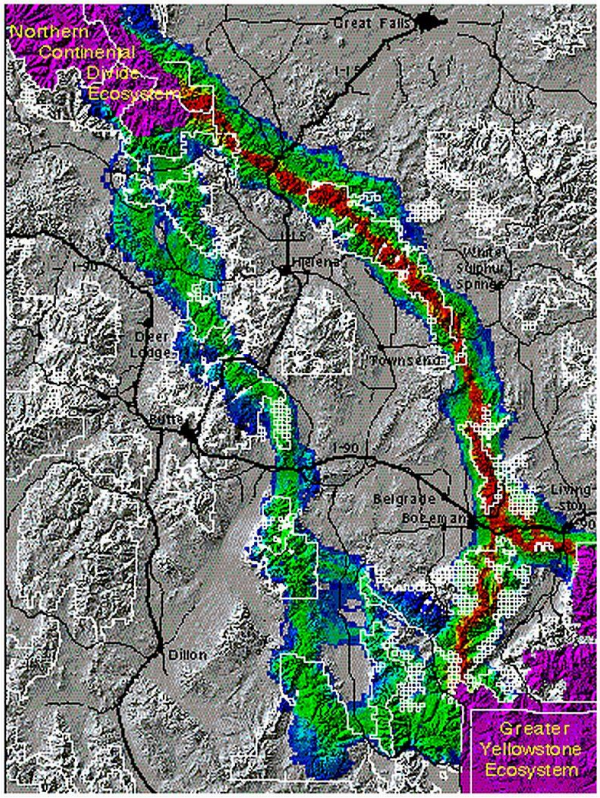


Figure 13. Corridors linking grizzly bear habitat in Montana. The first and second best corridors are shown, with warmer colors indicating better areas of habitat connectivity. One route is far superior to others: through the Gallatin, Bridger, and Big Belt mountain ranges. © 2010 Nature Education Courtesy of Richard Walker & Lance Craighead. All rights reserved. Source: Clark, W. (2010) Principles of Landscape Ecology. Nature Education

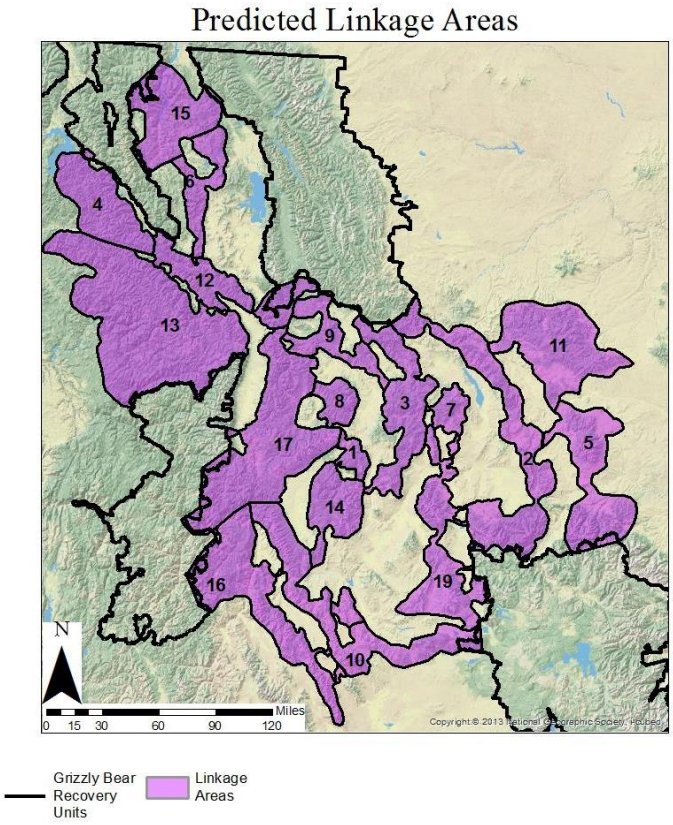


Figure 14. From Krehbiel 2015. Grizzly bear linkage areas identified using cumulative dispersal-cost matrix: 1. Anaconda, 2. Big Belts, 3. Boulders, 4. Couer d'Alene, 5. Crazy, 6. East Cabinets, 7. Elkhorn, 8. Flint Creek, 9. Garnett, 10. High Divide, 11. Little Belts, 12. Nine Mile, 13. North Bitterroots, 14. Pioneers, 15. Salmon, 16. Salish, 17. Sapphires, 18. Tendoy, 19. Tobacco Roots.

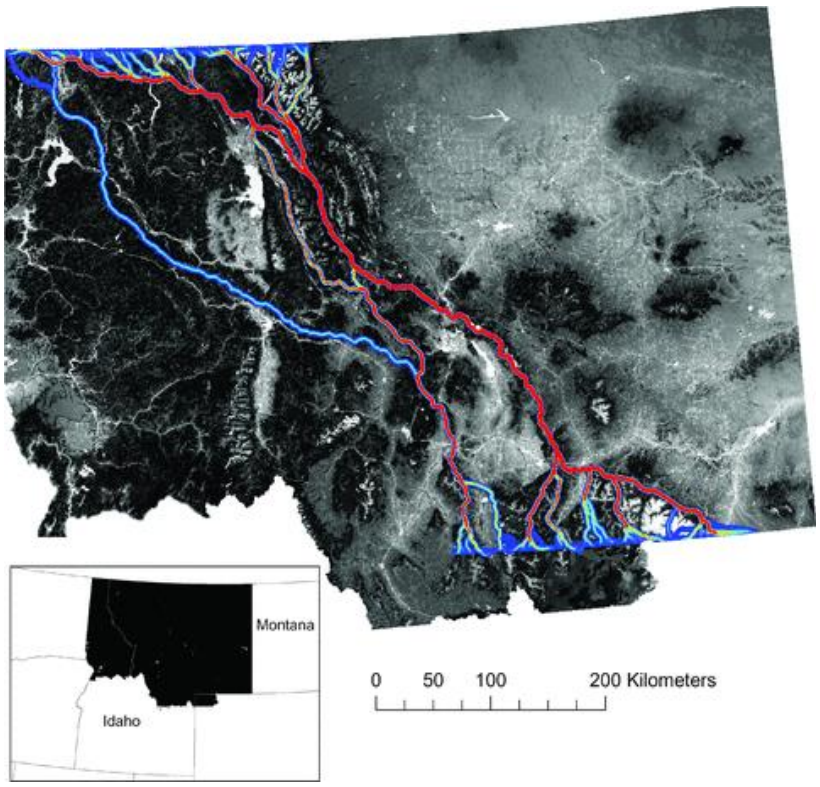


Figure 15. From Cushman et al. 2008: "The movement-resistance map and source and source-destination paths for least-cost path analysis. Resistance to movement is a function of elevation, forest cover, and human developments (Cushman et al. 2006) and is scaled from black at minimum to white at maximum. The number of source-destination paths in each corridor is reflected by the color scheme, ranging from blue (few paths) to red (many paths)."

The proposed GYE grizzly bear delisting rule and Conservation Strategy clearly state a commitment to allow grizzly bears to expand into biologically suitable and socially acceptable areas beyond the PCA. Ensuring habitat connectivity between the GYE and NCDE would benefit not only grizzly bears, but multiple wildlife species, and would be consistent with the NCDE Grizzly Bear Conservation Strategy (2013), USFWS Grizzly Bear Recovery Plan (USFWS 1993, pp. 24-25), the Grizzly Bear Management Plan for Western (Dood et al. 2006, pp. 54-56) and Southwestern Montana (MFWP 2013, p. 41), the Western Governors' Association Resolution 07-01 (2007), and the interagency statement of support for the concept of linkage zones signed by the state wildlife agencies in Montana, Washington, Idaho, and Wyoming and the USFS, USFWS, USGS, NPS, and BLM (IGBC 2001).

Providing for connectivity is also a requirement under the 2012 Planning Rule. The 2012 Planning Rule includes explicit requirements specific to managing for ecological connectivity on national forest lands and facilitating connectivity planning across land ownerships, including state managed and private lands relevant to populations of species of conservation concern (36 C.F.R. § 219.9(b)(2)(ii), as well as coordination with plans and land-use policies of other jurisdictions (36 C.F.R. § 219.4(b)) (see also Haber and Nelson 2015 and Haber et al. 2015). Specifically, this directs the Forest Service to identify and manage key ecosystem characteristics, including "Connectivity," for the purpose of sustaining ecosystems contributing to the recovery of listed species. The Rule defines "Connectivity" as the "Ecological conditions

that exist at several spatial and temporal scales that provide landscape linkages that permit…the dispersal and genetic interchange between populations; and long-distance range shifts of species, such as in response to climate change" (36 C.F.R. § § 219.19). The "functional" example of this includes the "measure of the ability of native species to move through the planning area and cross in to adjacent areas" (36 C.F.R. § § 219.19). As a key characteristic of ecosystems, connectivity should be addressed through either ecosystem-scale plan components in order to restore "ecological integrity", or it may need to be addressed at the species level (i.e. connectivity as an "ecological condition" needed to contribute to the recovery of a listed species). Upon revision if not before, the CGNF will need to develop plan components – including connectivity plan components – to contribute to the recovery and viability of the GYE and NCDE grizzly bear populations.

We suggest CGNF work or partner with Montana Fish, Wildlife and Parks (MTFWP), the Bureau of Land Management (BLM), and other FS jurisdictions that have objectives to manage for grizzly bear connectivity and have identified corridors that should be recognized and managed through the forest planning process. Montana has made protection of connectivity and linkage areas a priority for Associated Species of Greatest Conservation Need (Tier I Species including grizzly bears) in their Comprehensive Fish and Wildlife Conservation Strategy and identified as a conservation strategy to "Identify and prioritize key wildlife linkage areas, and work with other state and federal agencies, conservation groups, and landowners to restore wildlife connectivity." (Page 45). Similarly, the BLM Record of Decision and approved Dillon Resource Management Plan (2006) states a commitment to manage wildlife migration/dispersal corridors that provide connectivity for special status species including grizzly bears and to coordinate with others to identify critical barriers and potential passage locations (page 70). Under the 2012 Planning Rule the Forest Service is directed to consider lands and jurisdictions beyond their boundaries through a coordinated approach to ensure broader landscape connectivity. In the very least we hope that the CGNF will adequately consider activities that do NOT conflict with or inhibit the management objectives or priorities of other agencies in the region.

Conflict Reduction

In 2016 there were 55 known grizzly bear mortalities with the vast majority of those due to conflicts with humans (IGBST: https://www.usgs.gov/data-tools/2015-known-and-probable-grizzly-bear-mortalities-greater-yellowstone-ecosystem). The CGNF must consider past conflicts (see Figure 16) as well as the potential for future conflicts. The human population is increasing in the GYE, especially in Gallatin County. Conflict will inevitably increase between bears and humans as bear numbers grow and distribution expands as intended under recovery plans, the Conservation Strategy and proposed delisting rule. GYC recommends CGNF work towards improving the quality of grizzly bear habitat and proactively mitigate human and bear conflict in site specific areas of habitually high conflicts and human-caused bear mortality. We recommend tried and true strategies such as increased sanitation measures, seasonal road or trail closures, decommissioning of roads, and public education and outreach. In general, we recommend the *prevention* of conflicts through proactive measures, rather than simply *reacting to* conflicts which typically results in dead bears. Grizzly bears are less likely to come in conflict with people if they have both secure and suitable habitat with adequate bear foods available to them (Gunther et al. 2004).

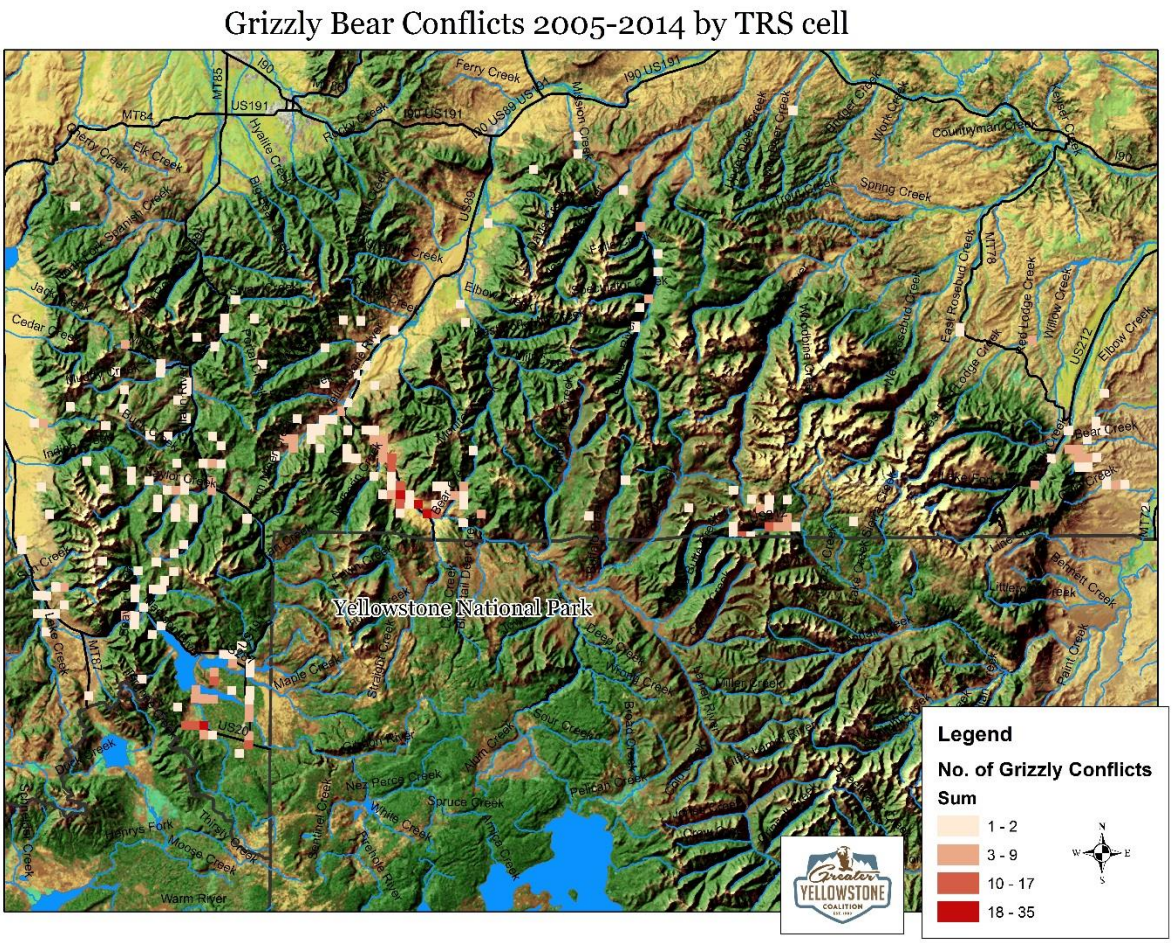


Figure 16: Map showing the number of grizzly bear conflicts from 2005-2014 by TRS cell. Data from Montana Fish Wildlife and Parks. Map created by the Greater Yellowstone Coalition.

Livestock Management in Grizzly Bear Habitat

The high potential for conflicts between grizzly bears and domestic sheep grazing is well supported (Knight et al. 1983) and livestock depredation is a leading cause of lethal removal of grizzly bears. In fact, between 2002 and 2014, one-third of removals by wildlife managers were due to conflicts with livestock (Proposed Rule, pp. 132-133). As outlined in the current proposed delisting rule (pp 42-44), active sheep grazing allotments can serve as a population sink as bears are often attracted to these flocks, and following repeat depredations (which is often the case), are killed or removed from the population (Knight et al. 1988). We strongly support the restriction of domestic sheep grazing within the PCA and this approach is consistent with the Conservation Strategy. Considerable effort and resources on the part of numerous organizations and agencies has gone in to retiring sheep grazing allotments on CGNF lands and we hope that these efforts will be effectively carried forward into the new forest plan. And while there are currently no domestic sheep allotments on the Custer Gallatin National Forest, bears also get in to trouble with cattle. Conservation measures should be added to any permitted grazing activities that may lead to increased conflicts with grizzly bears. We also encourage the CGNF to consider retiring any cattle grazing allotments with willing producers in areas with known conflict both inside and outside the PCA. Livestock grazing will likely need to be adjusted to accommodate other uses and resource needs, particularly sensitive watershed

and fish management, habitat diversity, and the reintroduction of fire into the ecosystem, utilizing grazing standards that accommodate these needs. Finally, previously retired grazing allotments that have occurred to mitigate threats to native wildlife through willing buyer/seller agreements should be formally closed under this Forest Planning effort.

Public Education, Sanitation and Defense

With the continued expansion of bear populations toward the northern end of the CGNF, public education should be a high priority for users of this part of the Forest unaccustomed to co-existing with grizzly bears in both backcountry as well as front-country settings. In short, the safety and well-being of both humans and grizzly bears should be a primary concern and this is an opportune time for the CGNF to take a proactive approach with public education as the bear's range expands. GYC recommends the CGNF emphasize public education at all campgrounds and trailheads regarding grizzly bear behavior and human opportunities for mitigating conflict. Appropriate food storage (e.g. hanging food or using bear safe garbage bins/storage containers, keeping food away from camp, etc.) should be mandated with adequate fines established for poor human conduct. Signage should strongly encourage the use of bear spray, large hiking party sizes and noise as effective non-lethal deterrents. Furthermore, there have been many high profile conflicts on the CGNF between hunters and bears (e.g. http://www.cbsnews.com/news/grizzly-bear-attack-todd-orr-montana-twice-bloody-facebook-video/?ftag=CNM-00-10aab6g&linkId=29468041), and hunter-bear conflicts represent approximately 1/3rd ofof bear mortalities on an annual basis within the ecosystem. CGNF should work with NGO'S and MFWP to promote, educate, and possibly require use of bear spray while hunting on Forest Service lands.

We are committed to ensuring that the GYE grizzly population remains robust and resilient through eventual linkage to the NCDE and other populations. We feel there is need for improvement to truly achieve the long term goal of a connected, sustainable and resilient Northern Rockies grizzly bear population. Through the forest plan revision and grizzly bear amendment process, we request that the CGNF commit to grizzly bear recovery based on a metapopulation structure by providing habitat protections and implementing proactive conflict mitigation measures to ensure grizzly bear connectivity between populations and based on the best available science.

Bison

GYC has a long history of involvement with issues of bison management surrounding Yellowstone National Park (YNP) and our members consider bison one of the most treasured and iconic species in the region. Ultimately, we are working to ensure wild bison are valued and managed like other wildlife in Greater Yellowstone. Specifically, we envision a day when Yellowstone bison are sustainably managed as healthy, free roaming wildlife throughout national parks, national forests and other suitable habitats within the GYE and across the West.

Across North America, wild plains bison are considered by many as ecologically extinct throughout most of their historic range and heading towards genetic extinction (Bailey 2013). This is further corroborated by the fact that there were recently two petitions out to list plains bison as threatened under the Federal Endangered Species Act. Bison are currently listed as "Near Threatened" by the International Union for Conservation of Nature (IUCN) (Gates and Aune 2008), NatureServe (2015) classifies bison as SH - Possibly Extirpated in Idaho, S1 (Critically Imperiled) in Wyoming and S2 (Imperiled) in Montana (NatureServe 2015), and they are considered a "Species of Greatest Conservation Need" (Montana SWAP 2015) and a "Species of Concern" in Montana "because they are considered to be 'at risk' due to historic

extirpation, limited populations, loss of genetic diversity, threats to their habitat, and/or restricted distribution" (DEIS Bison Conservation and Management in Montana – page 9).

Though bison are a native wildlife species and their historical distribution once covered much of the state of Montana, including many areas of the Custer Gallatin National Forest (CGNF) (see Figures 17 and 18), currently the only truly "wild" bison in the state are those essentially confined to the boundaries of Yellowstone National Park. Yellowstone bison have a significantly (and artificially) limited distribution (Figure 18) due to unsubstantiated fears around brucellosis transmission risk and an outdated and draconian management plan. Bison are not even mentioned in the current CGNF Plan, let alone managed for as a native wildlife species.

However, the landscape is changing. We have new science and information regarding the risk of brucellosis transmission and increased tolerance for bison that makes this current management regime outdated and unacceptable. As a result, in 2015 the National Park Service (NPS) and State of Montana began the process to write a new Yellowstone Area Bison Management Plan. The development of a new plan offers the opportunity to improve, update and shift the management of Yellowstone bison and reduce the annual cycle of controversy and conflict that has characterized the public debate regarding bison management for too long. Through this process, we see a tangible opportunity to shift from the current system of population management through slaughter to a management regime similar to other native wildlife due to efforts that have largely resolved conflicts between bison and livestock over the past 15 years.

The changing times are further demonstrated by the fact that bison are allowed to occupy CGNF lands as wildlife following Montana Governor Bullock's recent decision to allow Yellowstone bison year-round access to more than 250,000 acres along the western boundary of Yellowstone Park and year-round tolerance for bull bison in the Gardiner Basin (Figure 19). Approximately 88% of lands in the newly designated tolerance zone (~380,000 acres in total) outside of the Park are on CGNF lands (Montana 2013). In short, the Forest Service has an obligation to assist in the recovery of plains bison and is required to provide habitat conditions for native species. As an Interagency Bison Management Plan (IBMP) partner, the CGNF's principle role in implementing the IBMP is to provide habitat for bison on CGNF lands (USDI et al. 2000). Furthermore, restoring bison to public lands such as the CGNF will maximize public access to, as well as benefits from, bison on the landscape.

While plains bison are known to use a variety of habitats including forested areas, they are primarily grazers and therefore thrive in open grasslands and meadows complexes. And while much of the lower elevation forage sought by bison during the winter months occurs on private lands in the surrounding valleys, according to Montana (2013) there are still thousands of acres of predicted/suitable habitat that fall within CGNF lands (for example, see Figure 20 below). Furthermore, we believe the CGNF could do a lot more in terms of recognizing and prioritizing bison as a native wildlife species of significant conservation concern and in meeting their obligation to provide habitat for bison.

As stated, "the key role of Custer-Gallatin National Forest relative to bison is to provide and improve suitable habitat" (page 134, Draft Terrestrial Wildlife Report of the Forest Plan Revision Assessment). Thus, forest plan components must be developed to manage for bison habitat on CG Forest lands and encourage habitat restoration projects aimed towards improving habitat for bison in appropriate areas. For example, thinning, prescribed burns, meadow and aspen restoration, restoration of native grass species and fertilization can enhance forage production in lodgepole pine stands (Lindgren and Sullivan 2014) that predominate over much of the lower

elevation CGNF lands west of the Park. Such prescriptions could also likely address other key wildlife species needs, so long as such activities take careful consideration of the effects and potential impacts to other species.

Suitable (general and winter) habitat for bison exists in a patchwork of areas throughout the CGNF including in the new western tolerance area. However, as shown in Figure 18 from the Terrestrial Wildlife Report (see Figure 21 below), there is a lack of contiguous suitable habitat providing effective corridor areas for bison to migrate and disperse farther out on the landscape and in to places such as the Taylor Fork and Upper Gallatin. The CGNF should identify and manage for corridor/migration route areas for bison migrating from YNP on to CGNF lands to facilitate dispersal throughout new and existing tolerance areas. Specifically, routes in to the Taylor Fork and Upper Gallatin tolerance area should be identified and habitat improvement projects implemented to provide a contiguous pathway of suitable habitat to facilitate the restoration of native bison to this area.

The following statement is very concerning to us: “In light of social tolerance issues, the prevention of further dispersal and range expansion, hunting and culling operations would need to be used to manage populations” (page 127). Certainly range expansion within current tolerance zones is acceptable and should be encouraged. The recent expansion of the western tolerance area was made considering social tolerance issues and the low potential for conflict in this area. The CGNF should prioritize providing for significant suitable habitat for bison throughout current tolerance areas as a critical and essential piece to improving the future of bison management.

Lastly, we are disappointed that the CGNF is not considering adding bison to their list of Species of Conservation Concern as part of the Forest Plan revision process. Instead, the CGNF is proposing to categorize bison as a Species of Public Interest which is defined as those “species that are *commonly* enjoyed and used by the public for hunting, trapping, observing or sustenance, including cultural or tribal uses” (page 42, Draft Assessment Report; emphasis added). Arguably, bison are not a species that is “commonly” enjoyed and used by the public on CGNF lands for hunting, observing, or sustenance, including for tribal and cultural uses. More than 10,000 people applied for bison tags in Montana in 2015 and less than 80 tags were awarded. Many tribes that hold treaty rights would like to see significantly more hunting opportunities, including more bison and bison using more available habitat outside the Park.

As mentioned previously, wild plains bison are considered by many as ecologically extinct throughout most of their historic range and heading towards genetic extinction. Though bison are native to lands throughout the CGNF, wild bison are largely confined to the boundaries of Yellowstone National Park and have a significantly restricted habitat range. The few bison that are allowed outside the Park are currently only using a very small proportion of the land that is now available to them under the governor’s new plan as evidenced by comparing Figures 21 and 22 below.

Under the 2012 Planning Rule, Species of Conservation Concern (SCC) are the responsibility of the regional forester (36 CFR 219.7(c)(3)), and designated based on two criteria (219.9(c)): 1) A species must be known to occur in the plan area, and 2) Best available scientific information (BASI) indicates substantial concern about the species’ capability to persist over the long-term in the plan area. Furthermore, this designation applies to “native species that are not included in Federal categories but have declining populations, habitat threats, ***restricted habitat range*** or other factors of concern”... (emphasis added). Based on these criteria, bison clearly warrant such a designation on the Custer Gallatin. The CGNF should include bison as a SCC and do

everything possible to help bison expand further out in to these areas through habitat improvement projects, facilitating safe highway crossings for bison (and other wildlife), and pursuing volunteer allotment buyouts and acquisition of private lands/conservation easement opportunities as those opportunities arise.

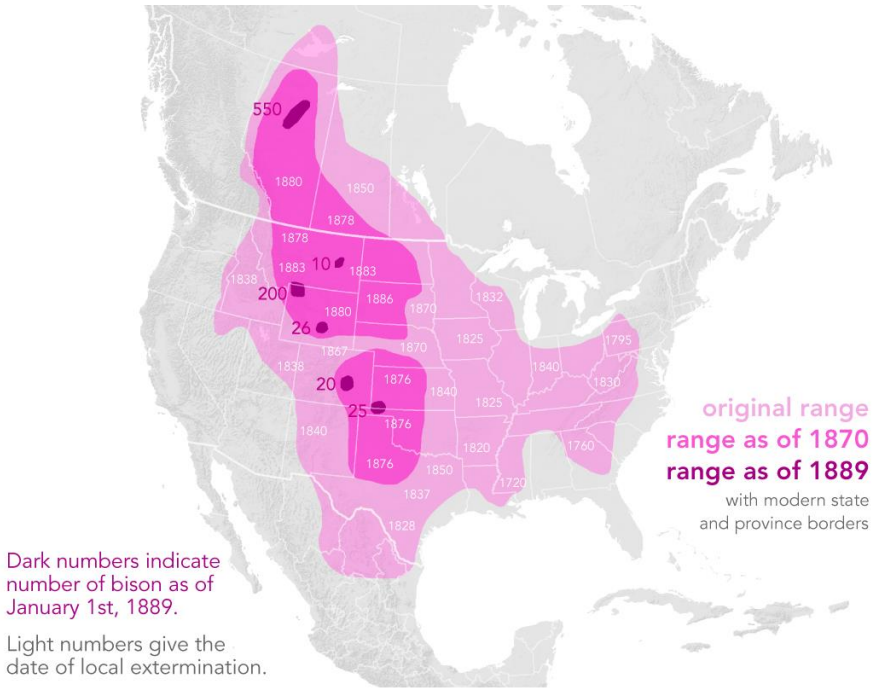


Figure 17: Historical distribution of the American Plains bison.

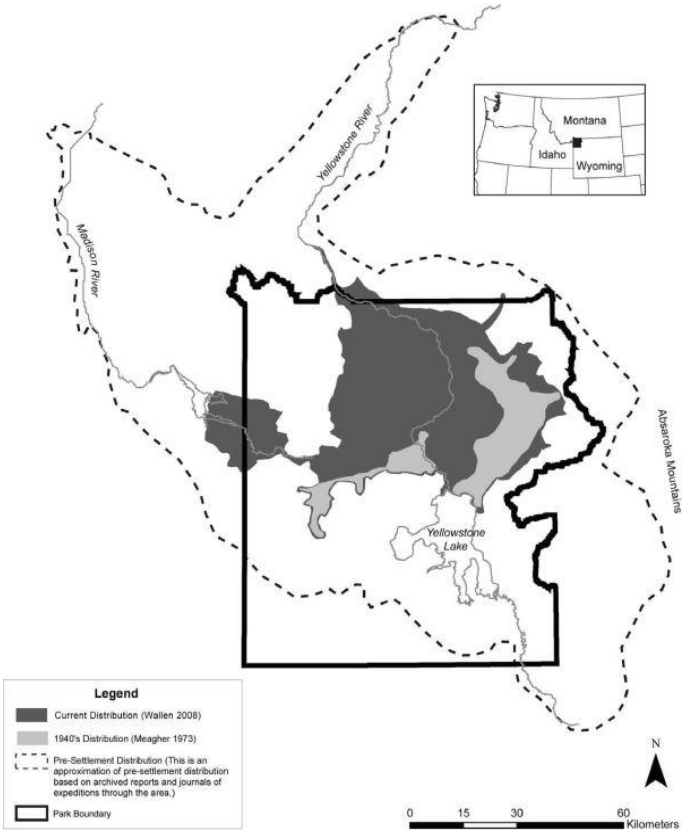


Figure 18: Current and predicted historical distribution of the Yellowstone bison herds. From: White et al. 2011.

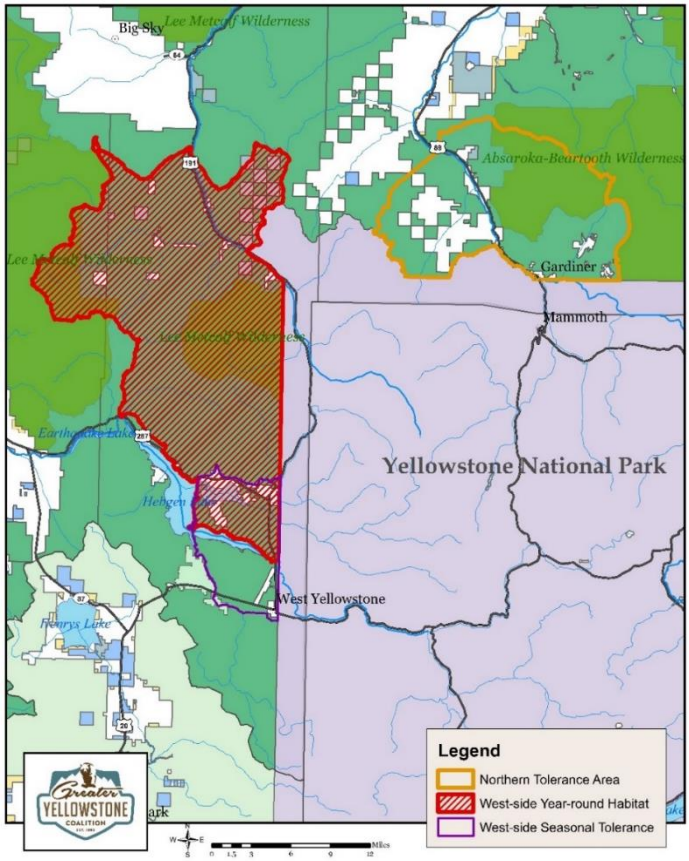


Figure 19: New year-round tolerance for Yellowstone bison as per Governor Bullock's December 2015 decision. Map created by the Greater Yellowstone Coalition.

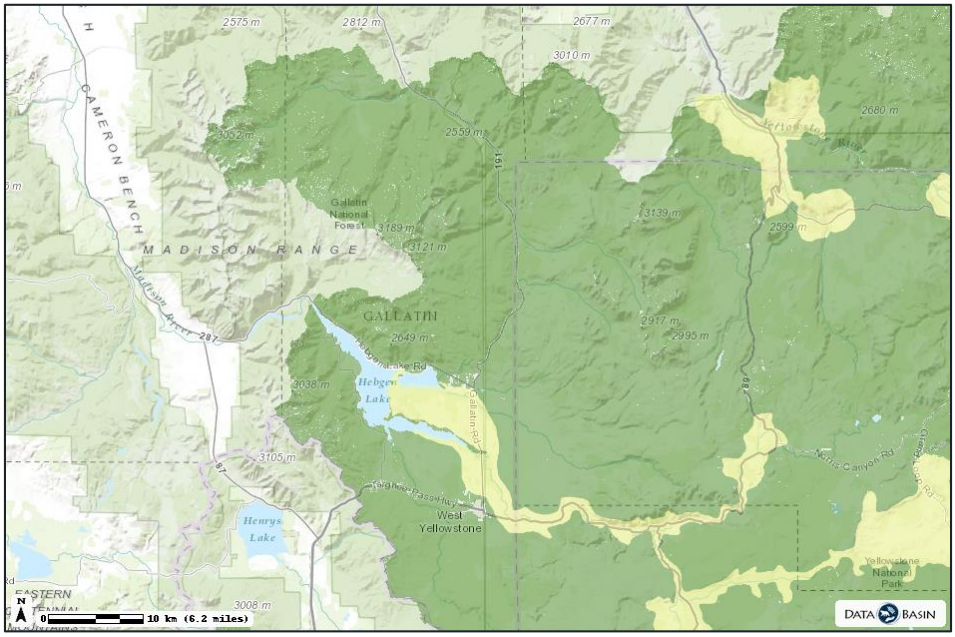


Figure 20: Current winter range and suitable bison habitat (data from Montana Fish Wildlife and Parks) – Databasin.

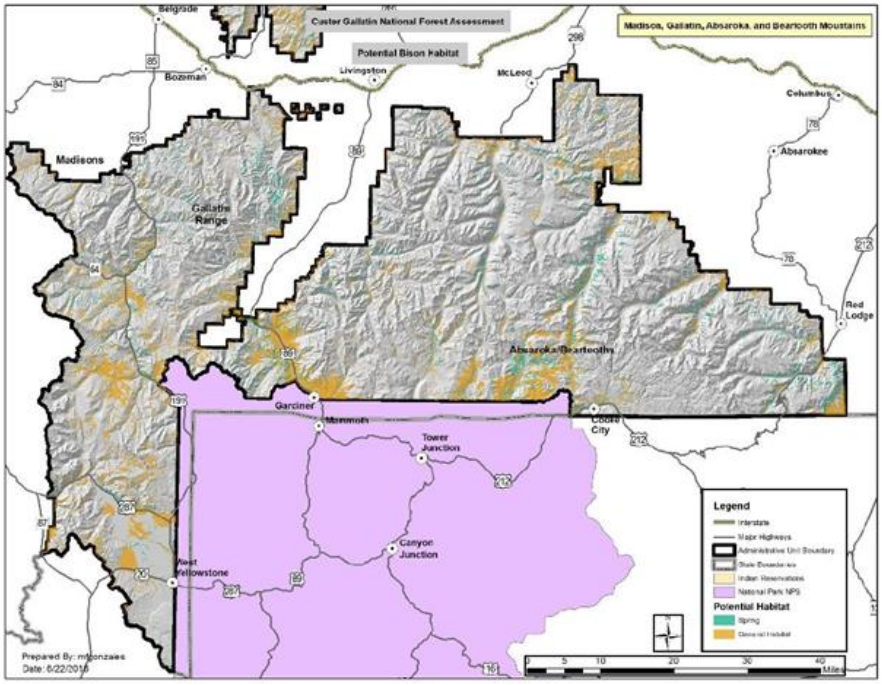


Figure 21: Figure 18 from the Terrestrial Wildlife Report showing potential bison habitat in the Madison, Gallatin, Absaroka, and Beartooth analysis area.

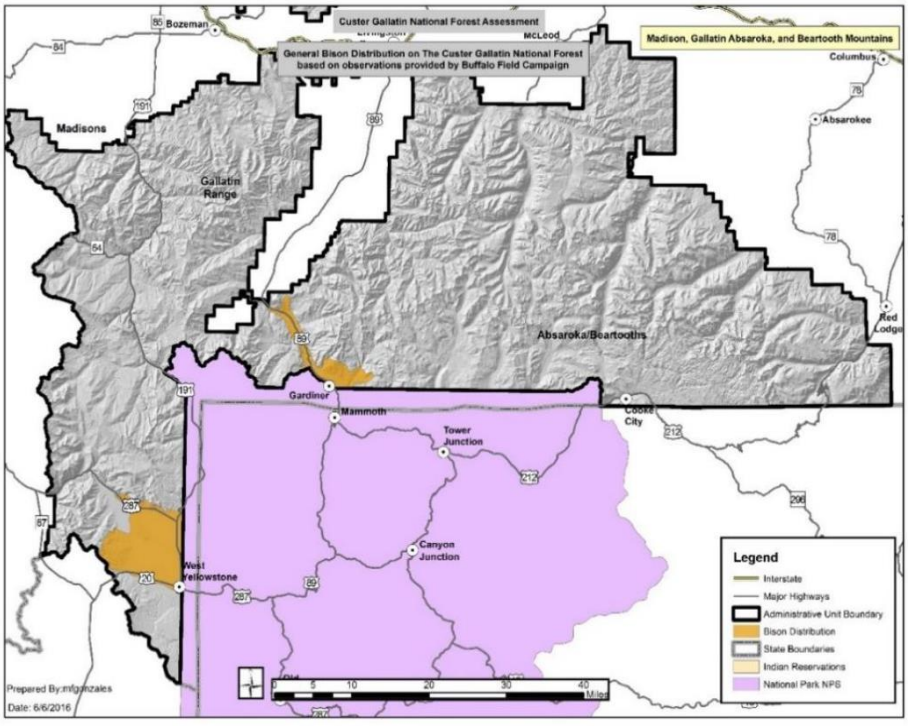


Figure 22: Figure 15 from the Draft Terrestrial Wildlife Report: Distribution of bison in winter-spring on the Custer Gallatin National Forest based on Buffalo Field Campaign

Wolverine

The best available science supports the conclusion that the wolverine (Gulo gulo) is an imperiled species that faces considerable threat from the cumulative impacts of climate change, small isolated populations, and recreational disturbance. First and foremost, the Greater Yellowstone Coalition requests that the CGNF add wolverine to their list of Species of Conservation Concern and develop plan components that ensure functional connectivity and long-term persistence of this species regardless of their legal status.

As stated earlier, under the 2012 Planning Rule, Species of Conservation Concern (SCC) are the responsibility of the regional forester (36 CFR 219.7(c)(3)), and designated based on the following two criteria (219.9(c)):

1) A species must be known to occur in the plan area, and
2) Best available scientific information (BASI) indicates substantial concern about the species' capability to persist over the long-term in the plan area.

The legal status of wolverines is in a state of flux. On August 13, 2014, the U.S. Fish and Wildlife Service withdrew a proposal to list the North American wolverine in the contiguous United States as a threatened species under the Endangered Species Act (ESA). However, conservation groups, including GYC, quickly filed suit against the U.S. Fish and Wildlife Service (Service) for summary judgment. Summary judgement was awarded to the plaintiffs on April 4, 2016 vacating the Service's August 13, 2014 withdrawal of its proposed rule to list the North American wolverine as threatened under the ESA. The Court agreed with the plaintiffs that: (1) the Service unlawfully ignored the best available science by dismissing the threat to the wolverine posed by climate change; (2) the Service unlawfully ignored the best available science by dismissing the threat to the wolverine posed by genetic isolation and small population size. See Defenders of Wildlife v. Sally Jewell, U.S. Department of the Interior; Daniel M. Ashe, Director, U.S. Fish and Wildlife Service.

Given the above ruling it is imperative that the CGNF consider the needs of this species during Forest Planning while the USFWS re-considers ESA protections for wolverines. Specifically, the CGNF must consider the cumulative impacts of climate change, small isolated populations, and recreation on wolverine persistence, and, through the assessment process, take a hard look at whether current plan components provide the necessary connectivity for wolverines (as required under the 2012 Planning Rule) regardless of their legal status going forward. As an existing Region 1 Sensitive Species, wolverines are already recognized by the USFS as being of viability (plan area) concern across Region 1, and the Montana Natural Heritage Program and Montana Fish, Wildlife and Parks Department also consider the wolverine a Species of Concern (MNHP 2006 http://mtnhp.org/docs/2010_Animal_SOC.pdf). We request that wolverine be added to your list of Species of Conservation Concern to ensure that new Forest Plan direction supports the long-term persistence of this species and to aide in the transition towards managing for an ESA listed species following any future changes in legal status.

Wolverines are known to occur on all units within Region 1 with the exception of the Dakota Prairie Grasslands (see USFS Region 1 Sensitive Species list, February 2011). The Custer Gallatin NF contains significant blocks of primary wolverine habitat (see Figure 23 below from Inman et al. 2013), and their presence has been well-documented throughout these areas (Inman 2013, Murphy et al. 2011, Gehman 2010). While much of the Forest contains small isolated "patches" of habitat, some known to be occupied by reproductive females, wolverines are rare (very few in number) and have a limited distribution in the GYE (Murphy et al. 2011) so it should not be assumed that habitat is saturated or populations stable.

Northern Rockies wolverines exist in small semi-isolated populations as part of a larger northern Rockies metapopulation that requires regular interchange of individuals for both genetic and population persistence (Aubry et al. 2007; Inman et al. 2013). The CGNF is the doorstep for wildlife connectivity between the major ecosystems of the northern Rockies, and a significant portion of the Gallatin forest falls within the Central Linkage Region which is considered of high importance for wolverine connectivity (Figure 24) (Inman et al. 2013; Inman 2013).

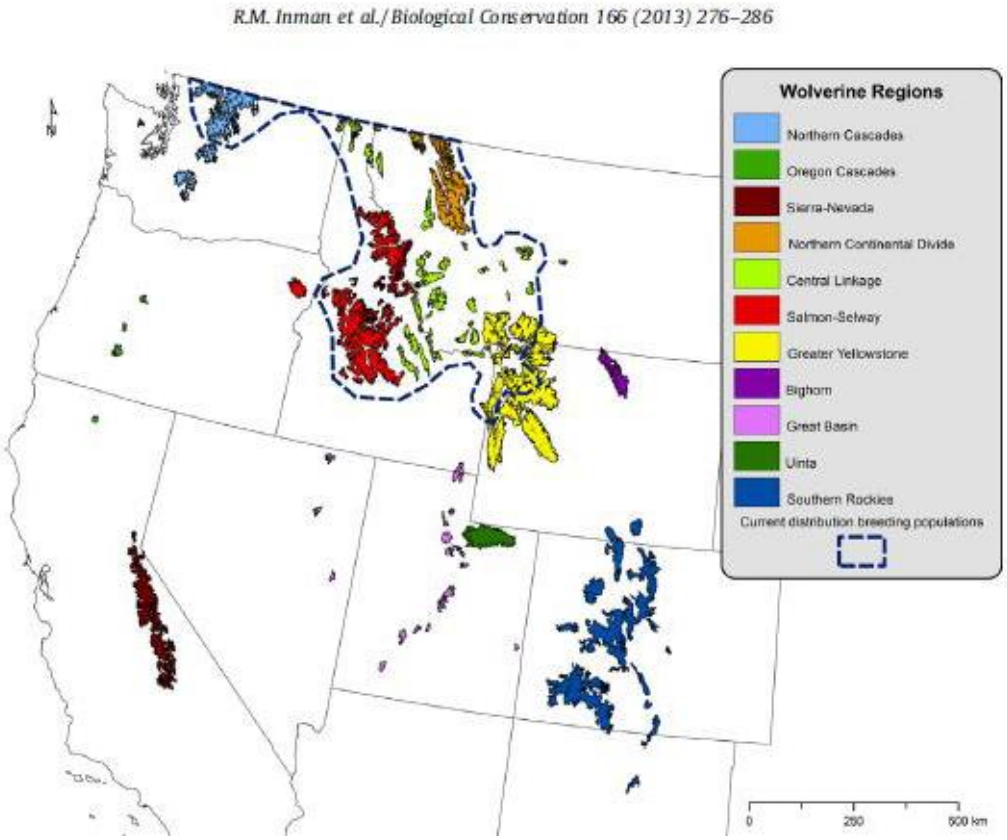


Figure 23: Major blocks (>100 km2) of primary wolverine habitat (suitable for use by resident adults) in the western United States, from Inman et al (2013).

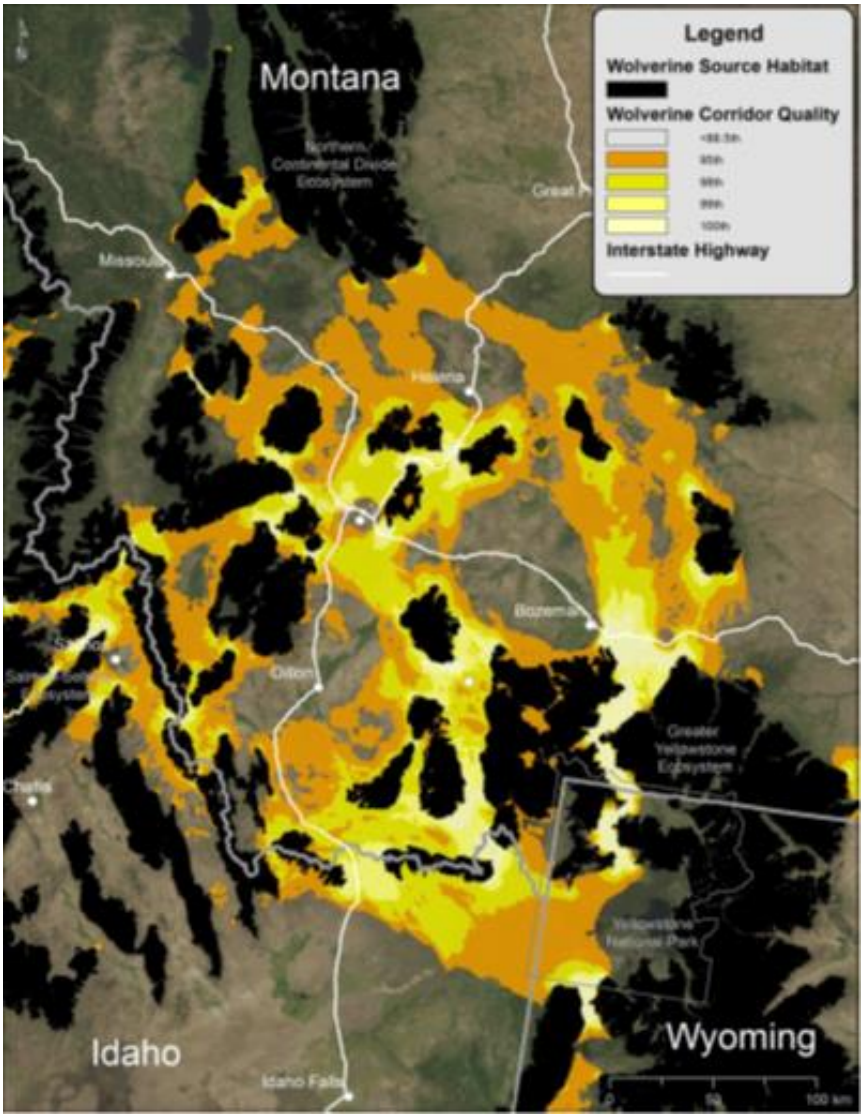


Figure 24: Wolverine source habitat and corridor modeling indicates importance of Custer-Gallatin National Forest. Colored areas depict corridor quality and highlight the 'Central Linkage Region', considered critically important for wolverine connectivity throughout the Northern Rockies. From Inman 2013.

There is considerable, science-based concern over the long-term persistence of wolverine throughout the Northern Rockies. We have included our comments (Appendix B) to the U.S. Fish and Wildlife Service regarding the proposed listing of wolverines on the Federal List of Endangered and Threatened Wildlife for a review of relevant science and policy related to wolverines and threats to their long-term persistence. We ask that those comments be considered here and throughout this Forest Planning process. In short, wolverines are adapted to cold temperatures and snow. The best available science clearly demonstrates the threat of climate change to wolverines through loss of snowpack in suitable habitat, loss of habitat critical to biological functions, and shrinking functional movement and connectivity corridors (McKelvey et al. 2011, Copeland at al. 2010). Furthermore, recreational use on the Forest has increased to a point that previously undisturbed areas are now supporting various types of extreme sports and other recreational pursuits and many of these areas overlap suitable and occupied

wolverine habitat (Heinemeyer and Squires 2012; IDFG 2014). Both dispersed and winter motorized recreational activities can potentially negatively impact wolverine and their use of natal denning areas (Carroll et al. 2001, Rowland et al. 2003, May et al. 2006, Copeland et al. 2007, Krebs et al. 2007) and this has been a concern of biologists and managers for decades (Copeland 2009). Furthermore, the Gallatin National Forest's Travel Plan FEIS (2006) analyzes and recognizes that wolverines are negatively impacted by winter recreation. Regulating snowmobile use in important denning areas and deterring wilderness trespassing by snowmobiles are important mitigation measures that the CGNF should consider in future plan components.

Bighorn Sheep

Currently, Bighorn sheep are in a state of peril across much of the Northern Rocky Mountains. Region 4 of the Forest Service added bighorn sheep to the Regional Forester's Sensitive Species list on all Region 4 national forests almost seven years ago. As a result, Bighorn sheep are now subject to agency management direction to ensure that Forest Service actions do not contribute/lead to bighorn declines and/or listing under the Endangered Species Act.

There exists decades of peer-reviewed, published science on the well-known and demonstrated risks of lethal disease transmission from domestic sheep to bighorns. GYC supports measures to close all domestic livestock allotments to domestic sheep grazing in core native bighorn sheep habitat. Considerable effort and resources on the part of numerous organizations and agencies has gone in to retiring sheep grazing allotments on CGNF lands. We hope that these efforts will be effectively carried forward into the new forest plan We also ask that the CGNF conduct a thorough review of the current science around disease transmission risk between domestic sheep and bighorn and through the forest plan process develop plan components, including Desired Future Conditions, that reduce disease transmission risk to bighorns and that ensure any future Forest Service actions do not contribute to the continued demise of bighorn populations and eventual listing under the ESA. The CGNF should also work towards resolving bighorn habitat and connectivity threats related to livestock grazing (i.e. fencing), human and highway development, highway collisions, and recreational impacts. For example, we recommend that CGNF coordinate with the MFWP to implement seasonal motorized access closures to crucial bighorn sheep winter range during critical time periods. Lastly, given the significant amount of bighorn range that exists on the CGNF (Figure 25), we ask that the CGNF follow suit and consider bighorn sheep as a Species of Conservation Concern.

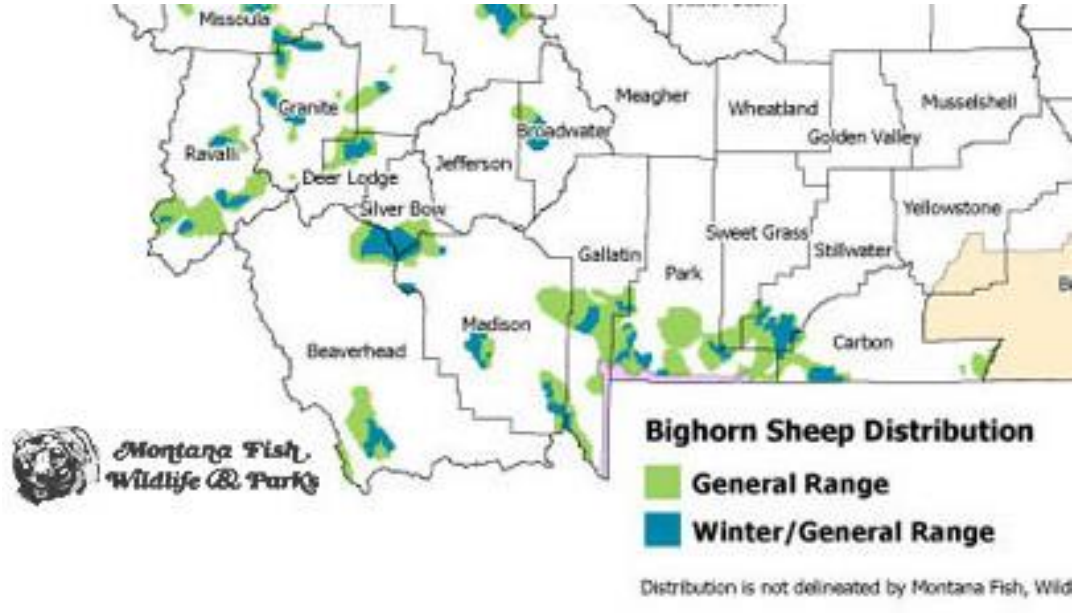


Figure 25: From Montana Fish Wildlife and Parks. Bighorn sheep distribution and winter ranges were reviewed and updated during 2002. Overall distribution polygons represent general or year round habitat. Winter range polygons represent areas occupied by the species from November 15 to March 1.

Lynx

This rare medium-sized carnivore was listed as a threatened species in 2000 under the Endangered Species Act. Canada lynx are now managed according to the *Northern Rockies Lynx Management Direction*, based on recommendations set forth in the *Canada Lynx Conservation Assessment and Strategy*. In 2014 the USFWS designated critical habitat for Canada Lynx including large portions of the CGNF (see Figure 26). The CGNF shares in the responsibility for the well-being of lynx and lynx habitat and should manage and develop plan components in revised forest plans that are consistent with the Northern Rockies Lynx Management Direction and incorporate designated Lynx Critical Habitat.

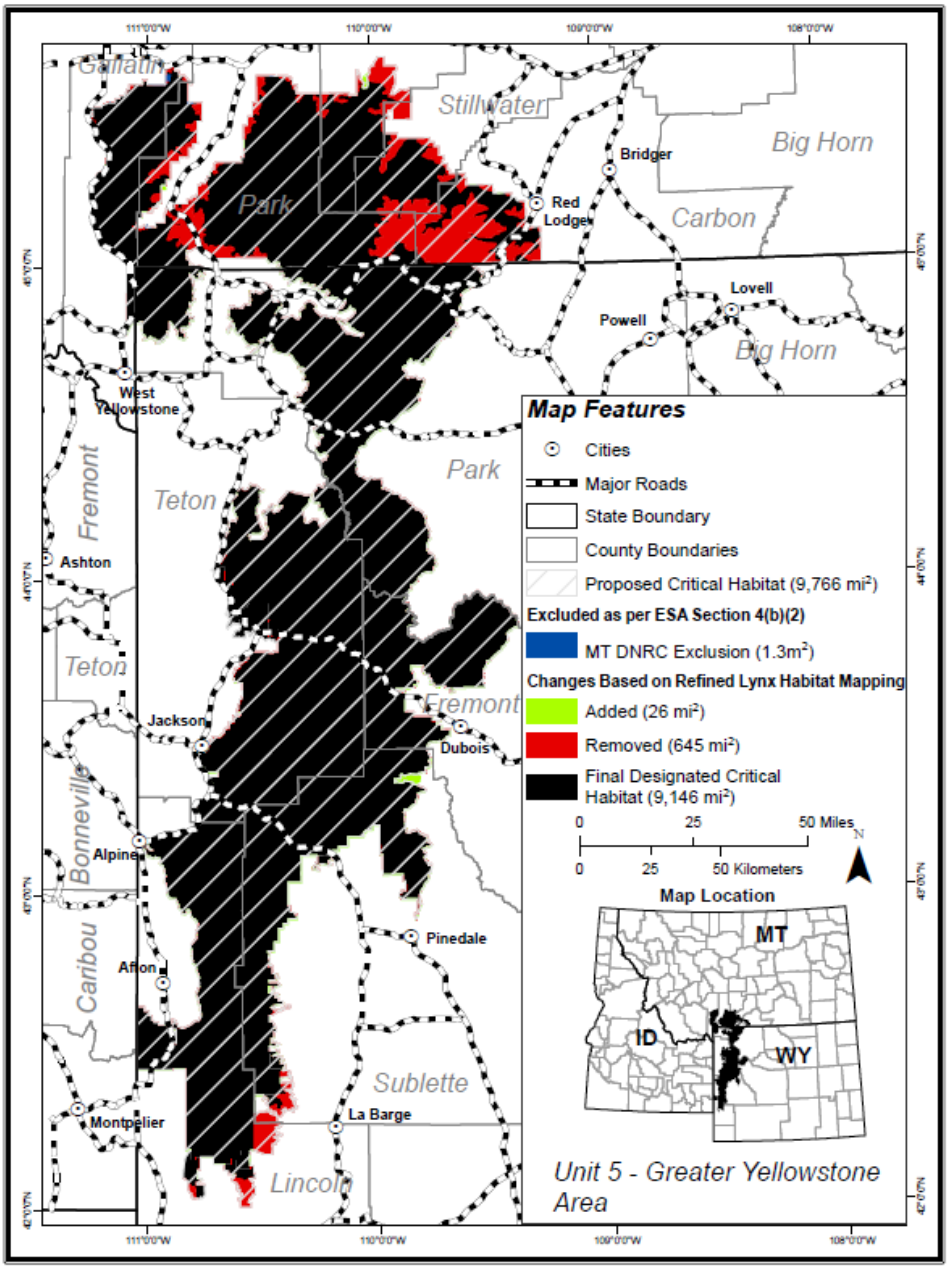


Figure 26: Greater Yellowstone Ecosystem Critical Habitat for Lynx. On September 12, 2014, the Service revised Endangered Species Act (ESA) protections for the contiguous United States distinct population segment (DPS) of Canada lynx (Lynx canadensis). The Service finalized both a revised critical habitat designation for the lynx DPS and a revised definition for what constitutes the range of the DPS – the portion of the species' North American range in which lynx are protected by the Act.

Species of Conservation Concern

Lastly, the Greater Yellowstone Coalition would like some clarification around the process to designate Species of Conservation Concern going forward. For example, what criteria will the Forest use in determining what species to list/manage as Species of Conservation Concern? Will currently listed Sensitive Species and/or Management Indicator Species be automatically

designated as Species of Conservation Concern, and what will that look like (as far as monitoring and management) for those species? The Greater Yellowstone Coalition asks that any currently listed Sensitive Species or Management Indicator Species be automatically designated as Species of Conservation Concern in revised forest plans and that continued monitoring and special plan components be carried over to ensure the long-term persistence of these species in the plan area and beyond.

Additional wildlife reports and research for the CGNF to consider:

Gehman, S. 2010 (Grizzly Bear section updated May 2012). Wildlife of the Gallatin Mountains, Southcentral Montana. http://www.wildthingsultd.org/wp-content/uploads/2012/08/Gallatin-Range_fullreport_with_photos.pdf

Craighead, F.L. 2015. Wilderness, Wildlife, and Ecological Values of the Hyalite-Porcupine-Buffalo Horn Wilderness Study Area http://www.craigheadresearch.org/wilderness-study-areas-and-wildlife.html

People

Neighboring Yellowstone National park, the Custer Gallatin National Forest is a widely used and loved forest. The CGNF received 3.1 million visitors based on the National Visitor Use Management inventory from 2013/2014. This is a significant increase from the 2 million visitors in the 2008/2009 visitation inventory. This visitation numbers are likely to increase in the years to come. Gallatin County is growing; it's one of the fastest growing counties in the country. The Gallatin Range, Absaroka-Beartooth Wilderness and Bridger Mountains are a short distance from Yellowstone County, Park County and Gallatin County. The Forest Service will need to address the many ways and number of people that recreate in the CGNF. Much of the recreation is hiking and walking along with motorized, mechanized and stock use taking place on the 3,162 miles of trail.

Access into the forest and the trail systems across the forest provide a huge service to hunters, fishers and recreational users among many others. Some trails receive a higher number of visitors than others depending on how easily accessible the trailhead is from the road system and how far someone travels along that trail. Some recreationalists may like to be with other people on the trail and others would rather not see anybody. But there is no data available to provide the picture of visitor satisfaction. In fact, we know very little about overall recreational user experience and satisfaction levels in the CGNF. Every five years the National Visitor Use Management inventory is conducted but that only provides the number of people who visit, nothing about the quality of their experience. GYC recommends the CGNF take the time to develop a monitoring strategy for recreational use in the forest. This will provide a base of information the Forest Service will be able to use when needing to make more site specific decisions later regarding recreation. There are many pressures a forest will endure. One of the increasing pressures are the growing numbers of visitors who seek a variety of different experiences. Forest plan revision is the foundational work needed to provide guidance for recreational users including motorized, mechanized, stock, hiking and skiing to name only a handful of activities.

Climate Change

The Custer Gallatin National Forest and the many mountain ranges within this forest, including the Gallatin Range, is a key component of the Greater Yellowstone Ecosystem and a key north-south wildlife linkage zone. The changing climate in North America is widely seen as a major challenge for continued management of the national forests and the CGNF is no exception. The

2012 Planning Rule requires the Forest Service to consider climate change as a major stressor that must be addressed and monitored. By understanding past and current conditions of the forest, the Forest Service can plan for a resilient forest in the future.

As noted in the Citizen's Guide to Forest Planning:

> *Forest protection and management represent an important opportunity to reduce the impacts of future climate change. The National Climate Assessment indicates 16 percent of the U.S. fossil fuel carbon emissions are removed and stored (known as "carbon sequestration") by forests in the United States. The report's long-term forecasts, however, suggest that in a few decades we could see dramatic reductions in the ability of America's forests to sequester carbon, so it is vital to create and sustain resilient and adaptable forests as a major carbon mitigation tool.* ***Besides all the historic and substantial benefits to society that forests provide, maintaining forest cover is probably one of the most cost-effective ways to mitigate climate change*** *(emphasis added)****.***

The Greater Yellowstone Ecosystem contains historical temperature and precipitation data dating back to 1895. Currently, there are 92 active SNOwpack TELemetry (SNOTEL) stations across the GYE[18]. Data collected from SNOTEL stations and documentation of disturbance events (ie: fire) has provided enough information to identify a trend of warming and landscape changes that have taken place. The GYE is experiencing warmer, dryer weather contributing to changes in stream flow and temperature. Stream discharge has declined during 1950-2010 in 89% of streams analyzed in the Central Rocky Mountains, including the GYE (Leppi et al. 2012). Reduced flows were most pronounced during the summer months, especially in the Yellowstone River[19]. Based on several studies, the GYE is experiencing major disturbances including increased mountain pine beetle attacks, major wildlife events and reduced annual snowpack (see resources at the end of this section).

Tony Chang's 2015 article, Historic & Projected Climate Change in the Greater Yellowstone Ecosystem, predicts a rise in mean annual temperature. By 2100, temperature is projected to increase 2-8 °F above the average for the reference period of 1900-2010. Mean annual precipitation is projected to vary between -2.0 to +8.9 inches by 2100. While temperature is projected to rise at similar rates across season, precipitation increases most rapidly in spring and decreases slightly in summer. Changes in aridity are projected to increase moderately to more substantially depending on the level of CO_2 concentration in the atmosphere. Chang states this data suggests the current climate changing pattern we have experienced for the last 30 years will likely continue and become more severe.

Planning, Management and Mitigation

On August 1, 2016, the Council on Environmental Quality (CEQ) provided Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews. CEQ sees climate change as a fundamental environmental issue, and its effects fall squarely within NEPA's

[18] Historic & Projected Climate Change in the Greater Yellowstone Ecosystem. Yellowstone Science. 2015. Tony Chang

[19] Historic & Projected Climate Change in the Greater Yellowstone Ecosystem. Yellowstone Science. 2015. Tony Chang

purview[20]. When addressing climate change, the guidance requires agencies to consider: 1) the potential effects of a proposed action on climate change as indicated by assessing Greenhouse Gas (GHG) emissions (e.g., to include, where applicable, carbon sequestration); and, 2) the effects of climate change on a proposed action and its environmental impacts. CEQ also recommends several GHG and climate change approaches including selection of the appropriate level of NEPA review to assess the broad-scale effects of GHG emissions and climate change, either to inform programmatic (e.g., landscape-scale) decisions, or at both the programmatic and tiered project- or site -specific level, and to set forth a reasoned explanation for the agency's approach[21]. A tool to assess GHG and climate change is available to the agency through CEQ's 2012 Guidance for Accounting and Reporting GHG Emission[22].

Once the CGNF determines the desired conditions for the forest, a forest management direction will be determined to reach and maintain those conditions. Desired conditions inform the NEPA process as to what should be considered in an action in the context of the future state of the environment. Further, climate change adaptation and resilience are important considerations for agencies contemplating and planning actions with effects that will occur both at the time of implementation and into the future. So in this case, the CGNF should be thinking within the 10-15 year time frame of implementation and consider 30-100 years beyond that as we look into the future of forest management in a changing climate. Additionally, forest management direction for GHG and climate change must include mitigation measures with a long-term monitoring plan. It is critical to include a monitoring program in the final decision in order to carefully evaluate the quality of the mitigation to ensure it is additional, verifiable, durable, enforceable, and will be implemented.

Forest plan revision provides the Forest Service the opportunity to conduct a programmatic review to assess the agencies efforts to adopt broad-scale sustainable practices for energy efficiency, GHG emissions avoidance and emissions reduction measures, petroleum product use reduction, and renewable energy use, as well as other sustainability practices. **GYC recommends the Forest Service identify carbon sequestration areas to use as mitigation measures for GHG emissions.**

Climate Change Resources:
USDA Forest Service, Climate Change Adaptation Plan 2014,
http://www.usda.gov/oce/climate_change/adaptation/Forest_Service.pdf

Climate Change Brief, Greater Yellowstone Ecosystem, Tony Chang and Andrew J. Hansen, Landscape Climate Change Vulnerability Project. February 2014.
http://www.montana.edu/lccvp/documents/LCCVP_GYE_ClimateBrief.pdf

[20] CEQ Memorandum for Heads of Federal Departments and Agencies: Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews. August 2016.
[21] CEQ Memorandum for Heads of Federal Departments and Agencies: Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews. August 2016.
[22] *See* https://www.whitehouse.gov/sites/default/files/microsites/ceq/revised_federal_greenhouse_gas_accounting_and_reporting_guidance_060412.pdf. Federal agencies' Strategic Sustainability Performance Plans reflecting their annual GHG inventories and reports under Executive Order 13514 are available at https://www.performance.gov/node/3406/view?view=public#supporting-info.

Executive Office of the President, Council on Environmental Quality. Memorandum for Heads of Federal Departments and Agencies. Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews. August 2016. https://www.whitehouse.gov/sites/whitehouse.gov/files/documents/nepa_final_ghg_guidance.pdf

Chang. Historic and Project Climate Change in the Greater Yellowstone Ecosystem. http://www.montana.edu/hansenlab/documents/ChangYS2015.pdf

Climate Change in Wildlands: Pioneering Approaches to Science and Management. Dr. Andrew James Hansen, William Monahan, Dr. David M. Theobal, Mr. S. Thomas Ollif. 2016.

Conservation Science Partnership. http://www.csp-inc.org/

Conclusion

The Greater Yellowstone Ecosystem (GYE) is one of the most iconic and beloved natural areas on Earth. Home to the world's first national park and a remarkable diversity of fish and wildlife, the region is one of the last intact ecosystems in the planet's temperate zones. GYC works with people to protect the lands, waters and wildlife of the GYE now, and for future generations. Our vision is a healthy and intact GYE where critical lands and waters are adequately protected, wildlife is managed in a thoughtful, sustainable manner and a strong, diverse base of support is working to conserve and sustain this special place as part of a larger, connected Northern Rocky Mountain Region. The CGNF forest plan revision process is critical to support the overall health of the GYE.

Greater Yellowstone Coalition is grateful to the Forest Service to be able to participate in forest plan revision at this early stage of the process. We look forward to helping plan for climate change, water, wildlife and wilderness. The issues the forest must address are not easy but with a robust planning process the outcome will be a well-managed, healthy and resilient forest.

Sincerely,

Darcie Warden

Darcie Warden
Montana Conservation Coordinator

Literature Cited

Aubry, K. L., K. S. McKelvey, and J. P. Copeland. 2007. Distribution and broadscale habitat associations of the wolverine in the contiguous United States. Journal of Wildlife Management 71:2147–2158.

Bailey, J.A., 2013. Rewilding an icon. 238 pp. Helena, MT. Sweetgrass Books.

Carroll, C., Noss, R. F., & Paquet, P. C. 2001. Carnivores as focal species for conservation planning in the Rocky Mountain region. Ecological Applications, 11(4): 961-980.

Copeland, J.P., J.M. Peek, C.R. Groves, W.E. Melquist, K.S. McKelvey, G.W. McDaniel, C.D. Long, and C.E. Harris. 2007. Seasonal habitat association of the wolverine in Central Idaho. Journal of Wildlife Management 71:2201–2212.

Copeland, J. P. 2009. Investigating the relationship between winter recreation and wolverine spatial use in Central Idaho. Unpublished report. U.S. Forest Service Rocky Mountain Research Station, Missoula, Montana, USA.

Copeland, J.P., K.S. McKelvey, K.B. Aubry, A. Landa, J. Persson, R.M. Inman, J. Krebs, E. Lofroth, H. Golden, J.R. Squires, A Magoun, M.K. Schwartz, J. Wilmot, C.L. Copeland, R.E. Yates, I. Kojola, and R. May. 2010. The bioclimatic envelope of the wolverine (Gulo gulo): do climatic constraints limit its geographic distribution? Canadian Journal of Zoology 88: 233-246.

Craighead, A.C., E.A. Roberts, and F.L. Craighead. 2001. Bozeman Pass wildlife linkage and highway safety study. Progress Report. Craighead Environmental Research Institute. Bozeman, MT.

Cushman, S. A., McKelvey, K. S. and Schwartz, M. K. (2009), Use of Empirically Derived Source-Destination Models to Map Regional Conservation Corridors. Conservation Biology, 23: 368–376.

Dood, A. R., S. J. Atkinson, and V. J. Boccadori. 2006. Grizzly bear management plan for western Montana: Final programmatic environmental impact statement 2006-2016. Montana Department of Fish, Wildlife and Parks, Helena, Montana, USA.

Gates, CC & K Aune. 2008. Bison bison. The IUCN Red List of Threatened Species 2008: e.T2815A9485062. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T2815A9485062.en. Downloaded on 12 January 2016

Gehman, S. 2010. Wildlife of the Gallatin Mountains, Southcentral Montana. 40 pp. Available at: www.wildthingsultd.org/publications/wildlife-of-the-gallatin-mountains/

Gunther, K. A. , M. A. Haroldson, K. Frey, S. L. Cain, J. Copeland, and C. C. Schwartz. 2004. Grizzly bear-human conflicts in the Greater Yellowstone ecosystem, 1992-2000. Ursus 15(1):10-22 Hanski, I. A. and M. E. Gilpin. 1997. Metapopulation biology: ecology and evolution. Toronto, Academic Press.

Haber, J., P. Nelson, R. Ament, G. Costello, W. Francis and M. Salvo. 2015. Planning for Connectivity: A guide to connecting and conserving wildlife within and beyond America's

national forests. Available at: http://www.defenders.org/sites/default/files/publications/planning-for-connectivity.pdf

Haber, J., and P. Nelson. 2015. Planning for Diversity: A guide to national forest planning to conserve America's wildlife. Available at: http://www.defenders.org/sites/default/files/publications/planning-for-diversity.pdf

Heinemeyer, K. and J. Squires. 2012. Idaho Wolverine – Winter Recreation Research Project: Investigating the Interactions between Wolverines and Winter Recreation 2011-2012 Progress Report. 26pps.)

Idaho Department of Fish and Game. 2014. Management plan for the conservation of wolverines in
Idaho. Idaho Department of Fish and Game, Boise, USA.

Interagency Grizzly Bear Committee. 2001. Support for the concept of linkage zones, signed memo.

Inman, R. 2013. Wolverine Ecology and Conservation in the Western United States. Doctoral Thesis No. 2013:4. Faculty of Natural Resources and Agricultural Sciences. Swedish University of Agricultural Sciences. Uppsala, Sweden. 145 pps.

Inman, R. M., B. L. Brock, K. H. Inman, S. S. Sartorius, B. C. Aber, B. Giddings, S. L. Cain, M. L. Orme, J. A. Fredrick, B. J. Oakleaf, K. L. Alt, E. Odell, and G. Chapron. 2013. Developing priorities for metapopulation conservation at the landscape scale: Wolverines in the western United States. Biological Conservation 166:276-286.
Krebs, J. A., E. C. Lofroth, J. Copeland, V. Banci, D. Cooley, H. Golden, A. Magoun, R. Mulders, and B. Shults. 2004. Synthesis of survival rates and causes of mortality in North American wolverines. Journal of Wildlife Management 68:493–502.

Krehbiel, R. 2015. Bears on the move: Challenges and Opportunities Associated with Grizzly Bear Connectivity in the Northern Rockies. M.S. Thesis. Sustainable Development and Conservation Biology, University of Maryland.

Lindgren, PMF and TP Sullivan. 2014. Response of forage yield and quality to thinning and fertilization of young forests: implications for silvopasture management. Canadian Journal of Forest Research 44(4): 281-289. http://www.nrcresearchpress.com/doi/abs/10.1139/cjfr-2013-0248?journalCode=cjfr#.Vx_NXtUrIwF

May, R., A. Landa, J. van Dijk, J.D.C. Linnell, and R. Andersen. 2006. Impact of infrastructure on habitat selection of wolverines Gulo gulo. Wildlife Biology 12: 285–295.

McKelvey, K.S., J.P. Copeland, M.K. Schwartz, J.S. Littell, K.B. Aubry, J.R. Squires, S.A. Parks, M.M. Elsner, and G.S. Mauger. 2011. Climate change predicted to shift wolverine distributions, connectivity, and dispersal corridors. Ecological Applications, 21:2882-2897.

Montana's Comprehensive Fish and Wildlife Conservation Strategy. 2005. Montana Fish, Wildlife & Parks, 1420 East Sixth Avenue, Helena, MT 59620.

Montana Fish, Wildlife and Parks (MFWP). 2013. Grizzly bear management plan for Southwestern

Montana 2002-2013. Helena, Montana, USA.

Montana. 2013. Joint Draft Environmental Assessment: Year Round Habitat for Yellowstone Bison. Montana Fish, Wildlife and Parks, 1420 East Sixth Avenue, Helena, MT 59620.

Montana's State Wildlife Action Plan. 2015. Montana Fish, Wildlife & Parks, 1420 East Sixth Avenue, Helena, MT 59620. 441 pp. file:///C:/Users/SForrest/Downloads/Montana%202015%20SWAP%20FINAL.%20Table%20of%20Contents,%20Introduction,%20and%20Methods.pdf
Montana Fish, Wildlife, and Parks (FWP). 2015. Draft Environmental Impact Statement Bison Conservation and Management in Montana. Helena, MT.

Murphy, K., J. Wilmot, J. Copeland, D. Tyers, J. Squires, R. M. Inman, M. L. Packila, D. McWhirter. 2011. Wolverine conservation in Yellowstone National Park: Final report. YCR-2011-02. National Park Service, Yellowstone National Park, Yellowstone Center for Resources, Yellowstone National Park, Wyoming. http://www.greateryellowstonescience.org/node/3523

Olimb, S. and E. Williamson. 2006. Regional habitat connectivity analysis: crown of the continent ecosystem. American Wildlands, Bozeman, MT. 29 pp. www.wildlands.org

Rowland, M.M., M.J. Wisdom, D.H. Johnson, B.C. Wales, J.P. Copeland, and F.B. Edelmann. 2003. Evaluation of landscape models for wolverine in the interior Northwest, United States of America. Journal of Mammalogy 84:92–105.

Servheen, C., J.S. Waller, and P. Sandstrom. 2003. Identification and management of linkage zones for wildlife between the large blocks of public lands in the northern Rocky Mountains. Updated July 8, 2003. USDI, Fish and Wildlife Service, Missoula, MT. www.cfc.umt.edu/research/MFCES/programs/GrizzlyBearRecovery/Linkages_Report_2003.pdf

Schwartz, C. C., P. H. Gude, L. Landenburger, M. A. Haroldson and S. Podruzny. 2012. Impacts of rural development on Yellowstone wildlife: linking grizzly bear Ursus arctos demographics with projected residential growth. Wildlife Biology 18: 246-257.

US Department of Interior. 2000. Record of decision for final environmental impact statement and bison management plan for the State of Montana and Yellowstone National Park. Washington, D.C. Retrieved from: http://www.ibmp.info/Library/1%20-%20IBMP%20EIS%20Record%20of%20Decision.pdf

US Fish and Wildlife Service. 1993. Grizzly bear recovery plan. Missoula, MT.

U.S. Fish and Wildlife Service. 2007. Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area.

U.S. Fish and Wildlife Service. 2011. Grizzly Bear (Ursus arctos horribilis) 5-Year Review: Summary and Evaluation. Missoula, MT.

U.S. Fish and Wildlife Service. 2013. Northern Continental Divide Ecosystem Grizzly Bear Conservation Strategy-Draft.

U.S. Forest Service. Forest Plan Amendment for Grizzly Bear Habitat Conservation for the Greater Yellowstone Area National Forests. Final Environmental Impact Statement. April 2006.

U.S. Forest Service. 2006. Travel Plan Final Environmental Impact Statement. Gallatin National Forest, Montana.
Walker, R. and L. Craighead. 1997. Analyzing wildlife movement corridors in Montana using GIS. Report No. 11, American Wildlands. http://www.wildlands.org

White, P.J., R. L. Wallen, C. Geremia, J. J. Treanor, D. W. Blanton. 2011. Management of Yellowstone bison and brucellosis transmission risk – Implications for conservation and restoration. Biological Conservation 144 (2011) 1322–1334

Appendix A

USDA United States Department of Agriculture Forest Service Region One

Northern Region
200 East Broadway
Missoula, MT 59802

File Code: 1950/2320
Date: OCT 04 2007

Sandra Mitchell
Public Lands Director
Idaho Snowmobile Association
P.O. Box 70001
Boise, ID 83707

Dear Ms. Mitchell:

Thank you for taking time to meet with us in Missoula last month. I appreciate having the opportunity to share my thoughts on management of recommended wilderness and hear your concerns on how snowmobilers would be affected.

In our meeting you asked to see, in writing, the guidance that has been provided to the field on management of recommended wilderness. Enclosed is a paper that has been developed to provide consistency across the Region. I also am enclosing an explanation of the methodology and process that the forests and grasslands are using to determine which of the roadless areas should be considered for recommendation for inclusion in the National Wilderness Preservation System. I hope you will see that the process is very rigorous and intended to eliminate from consideration those areas that are really best suited for uses that are not compatible with wilderness designation. The final decision on which areas to recommend is done through a thorough and open public involvement process.

My hope is that you and your constituents are active players in these discussions.

Sincerely,

Thomas L. Tidwell

THOMAS L. TIDWELL
Regional Forester

Enclosure

Consistency in Land and Resource Management Plans

Topic: Management of recommended wilderness

Purpose: During plan revision, the national forests and grasslands will be evaluating the areas that were recommended for wilderness designation in the first round of planning to determine if they should still be recommended. They also will be evaluating all other inventoried roadless areas to determine if they should also be recommended. For all of these areas, the forest needs to determine, through public involvement and the wilderness evaluation process, the best use of each area.

Guidance: If it is determined that the area is best suited to motorized or mechanized recreation, the area should not be recommended for wilderness. If it is determined that the best future use is inclusion in the National Wilderness Preservation System, the desired condition (dc) should reflect that. If there are established uses that are incompatible with that dc, such as motorized or mechanized recreation, forests should choose to implement one of the following actions:

1. Pursue a non-motorized/non-mechanized approach to management of the area through travel planning
2. Adjust management area boundary to eliminate the area with established uses,
3. Not recommend the area for wilderness designation.

Administrative use of motorized equipment for maintenance (chain saws, rock drills, limited use of helicopters) will continue to be allowed.

Background: Through the first round of planning, approximately 1.3 million acres of inventoried roadless was recommended for wilderness designation. The plan standards for most of those areas allowed for existing uses to continue as long as they did not degrade wilderness character. These standards are vague and have resulted in problems:

- **Lack of understanding of wilderness characteristics**. There has been some confusion over how wilderness characteristics are defined and what activities or what level of use would result in degradation of wilderness characteristics. In some areas, uses have changed or certain types of use have increased significantly, possibly degrading wilderness characteristics. In most cases, use has not been monitored closely enough, if at all, to make a call on how use has changed over the years.
- **Inconsistent management of recommended wilderness across the region.** Some areas are managed by more than one unit and the units have different management approaches, particularly for motorized recreation. This results in public confusion and can result in encroachments of illegal activities on to the adjacent forest.

Wilderness Characteristics

National Wilderness Monitoring Committee

Untrammeled—Lack of evidence of human control or manipulation.

- Prescribed fire
- Fire suppression
- Rehab with non-native species
- Mechanical fuel reduction

Undeveloped or "Does not Occupy"—Lack of evidence of modern human presence, occupation, modification.

- Signs
- Structures
- Road and trails
- Special provisions; livestock grazing, electronic sites, etc.

Natural—Ecological systems are substantially free from effects of modern civilization.

- Exotic species
- Changes to air quality
- Changes to water quality
- Effects of past timber harvest

Opportunities for solitude or primitive and unconfined recreation—Remoteness, solitude, freedom, risk, challenge.

- Human noise
- Sights of human civilization
- Number of people/parties
- Types of use; motorized, mechanized

KIPZ FOREST PLAN REVISION
IRA EVALUATION FOR WILDERNESS
EVALUATION METHODOLOGY AND PROCESS
Version **7/26/05**

METHODOLOGY

The 85 Inventoried Roadless Areas (IRA)[1] on the Kootenai and Idaho Panhandle National Forests revision zone (KIPZ) will be evaluated for suitability for wilderness recommendation. The three tests of capability, availability, and need will be used to determine suitability as set forth in Forest Service Handbook (FSH) 1909.12, Chapter 72.[2] In addition to the inherent wilderness quality an IRA might possess, the area must provide opportunities and experiences that are dependent upon and enhanced by a wilderness environment. The area and boundaries must allow the area to be managed as wilderness.

Capability is defined in FSH 1909.12, Chapter 72 as the degree to which the area contains the basic characteristics that make it suitable for wilderness designation without regard to its availability for or need as wilderness. **Availability** determination is conditioned on the value of and need for the wilderness resource compared to the value of and need of the area for other resources. **Need** is the determination that the area should be designated as wilderness through an analysis of the degree that the area contributes to the local and national distribution of wilderness.

Capability

There are five basic characteristics identified to evaluate the capability of an IRA: environment, challenge, outdoor recreation opportunities, special features, and manageability.

The environment provides the person the opportunity to feel or experience solitude and serenity, a spirit of adventure and awareness, and a sense of self-reliance. The area needs to appear natural and free from disturbance and where the normal activities and life cycles of biotic species take place. A range of geological, biological, and ecological variability exists and is identified. Any scientific, educational, or historical values are identified and considered. Social and economic factors must blend with the environment and natural features to make the area desirable and manageable as wilderness.

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1. There are 48 IRAs on the Idaho Panhandle NF and 43 IRAs on the Kootenai NF. Six of the IRAs are located on both forests. They are counted separate for each forest but only once for the planning zone.

2. This chapter of FSH 1909.12 was reissued in March 2005. Changes in the new issue included using new chapter numbers and the use of some new terminology. It did not alter the direction for analysis or the evaluation process. The methodology and process used to evaluate the IRAs in KIPZ meet the March 2005 handbook direction. Chapter numbers used in this document reference the March 2005 handbook.

Challenge considers the degree that the area offers people the opportunity to experience adventure, excitement, challenge, initiative, or self-reliance.

Outdoor recreation opportunities that are primitive and unconfined include hiking, backpacking, stock riding, hunting, fishing, skiing, snowshoeing, and rafting. These may or may not currently exist within an individual area. Other outdoor recreational activities may currently exist but are not compatible with a wilderness setting or other wilderness characteristics.

Special features recognize scientific, educational, historical, and scenic values found in the area. The abundance and variety of wildlife and fish, including threaten and endangered species, will be considered. Other special features that are unique or are outstanding will be identified.

Manageability considers the ability to manage the area as wilderness as required by the 1964 Wilderness Act. Such factors as size, shape, and juxtaposition to external situations are considered. Boundary location and the ability to easily identify the boundary on the ground are critical in meeting this characteristic.

The combinations of basic natural characteristics are of infinite variety. No two areas possess any of theses characteristics in the same measure. The process, then, is to analyze the quality and quantity of these characteristics and determine if they can be provided by establishing management, protective, mitigation, or enhancement measures.

In order to evaluate the five basic characteristics, they will be broken down into elements, activities, or features that describe the basic characteristics and provide a basis for rating. At least two criteria will be established for each element, activity, or feature with three criteria considered optimal. While there is no limit on the number of criteria that can be established, the number of criteria must be kept to a number that can reasonably provide for evaluation of the characteristics. Since criteria will probably not be of equal importance, criterion will be listed in order of priority for each element, activity, or feature. Criteria will be established to consider existing as well as future conditions both inside and adjacent to the IRA.

Forest and district resource specialists and managers will rate the criterion as high, medium, or low depending on how well the criterion is or can be met in the IRA. For IRAs that crossed forest boundaries, the criteria will be evaluated only for the portion that lies within the Kootenai or Idaho Panhandle Forest boundary. Final evaluation of these IRAs will not be completed until reconciliation with the adjoining forest can be made.

Three specialists from each of the two forests in the zone will then evaluate the elements, activities, or features based on the criteria rating given in the first evaluation. The IRA will then be given a summary rating of high, moderate, or low in capability. Methodology will use three Forest Service specialists who are familiar with the IRA along with three that generally do not know the IRA and will be limited to the criteria ratings and comments provided by the districts during the first evaluation.

Availability
Availability of an IRA for wilderness management must be evaluated against other resource needs, demands, and uses of the area. To be available for wilderness, the wilderness value, both tangible and intangible, should offset the value of the other resources. The predominant value does not necessarily reflect the use or combination of uses that would yield the greatest dollar return or the greatest unit output. In evaluating other resources, current uses, trends, and potential future uses and outputs need to be considered.

Wilderness designation and management of an area can have an effect on the management of adjacent lands. Therefore, evaluation of other resource needs may need to be considered in the area adjacent to an IRA. FSH 1909.12, Chapter 72.21 provides some examples and guidance in evaluating the development and management for sustained yield production of resources other than the wilderness resource.

Other resources to be evaluated will be determined from resource specialists' knowledge of the areas and public comments. Once the resources have been identified, criteria will be established for evaluation. Forest and District resource specialists will rate the criteria as high, medium, or low. Two to six forest program mangers will then evaluate each IRA's availability for wilderness designation.

Need
The need for an area to be designated as wilderness will be through an analysis to determine the degree the area can contribute to the local and national distribution of wilderness. There should be clear evidence of current or future public need for additional designated wilderness in the general vicinity of the area being considered. This evidence will include public involvement. Need analysis will use such factors as the geographic distribution of areas, representations of landforms and ecosystems, and the presence of wildlife expected to be visible in a wilderness environment.

To best analyze the need for additional wilderness in the Northern Region, the Regional Forester decided the needs assessment would be completed at the Regional level. Once that assessment is completed, two to six program managers will use the assessment to rate the IRAs for need of additional wilderness designations. A rating of high, moderate, or low will be assigned to each IRA.

Suitability of an IRA for potential wilderness designation will be based on the inherent wilderness quality determined in the capability, availability and needs assessment. In addition to the inherent quality, the area must provide opportunities and experiences that are dependent upon and enhanced by a wilderness environment. The size and shape of the area must allow the area to be managed as wilderness. Forest Land Managers will review the evaluation and determine which IRAs are suitable for wilderness designation.

Proposed wilderness boundaries and mapping will be completed following the guidelines in FSH 1909.12, Chapter 72.5 for each IRA determined to be suitable. Boundaries must

be easy to define, locatable on the ground, and must be manageable. Priority of boundary in descending order of desirability is:

1. Use natural features locatable on both a map and on the ground, such as a ridge top, mountain peak, or lake shore.

2. Use semipermanent human-made features such as roads and powerlines. The boundary may be set back a given distance from these features.

3. Use previously surveyed lines or legally determined lines such as section and township lines, property lines, or State boundaries.

4. Use a straight line from one locatable, visible point to another, such as between two mountain peaks.

5. Use a series of bearings and distances between locatable points that are not visible.

PROCESS

Evaluation of the 85 IRAs for wilderness suitability and recommendation was based on the methodology established above. IRAs that crossed the Kootenai and Idaho Panhandle National Forests boundaries but remained totally within the KIPZ revision boundary were rated first for the respective forest, then given a consolidated rating for the zone. IRAs that crossed the KIPZ boundary on to the Flathead, Lolo, Clearwater, or Colville National Forests were not given an overall rating until the adjacent forest had provided evaluation comments. Coordination of IRA evaluation with adjacent forests was completed in December 2004.

The results of each step or test established in FSH 1909.12, Chapter 72 are provided below.

Capability

Methodology required identifying elements, activities, or features that described the basic characteristics and provided a base for rating. This was completed by the two Forest Recreation Program Managers and assisted by a NEPA Specialist and the Forest Planners. The format was adapted from the White River National Forest in Colorado. Work began in September 2002 and was completed in early June 2003.

The five basic characteristics were broken down into 19 elements, activities, or features. A total of 47 criteria were established and used to rate each of the 85 IRAs. Generally each criterion listed first for an element, activity, or feature received a heavier weighting in evaluation than the following criteria. Criteria were established to consider existing as well as future conditions both inside and adjacent to the IRA.

Evaluation of the criteria was performed by District Recreation Managers, Forest Fishery and Wildlife Biologists, and Forest Hydrologists. Each criterion was rated as high, medium, or low. For IRA's that crossed forest boundaries, the evaluation was only for the portion that lies within the Kootenai or Idaho Panhandle Forest boundary. This evaluation was completed in June 2003.

In December 2003, three specialists from each of the two forests in the zone rated the 19 elements, activities, or features as high, medium, or low based on the rating given in the first step. The IRA was then rated as high, moderate/high, moderate, moderate/low, or low in capability. The moderate/high and moderate/low ratings were used only when an IRA did not clearly fit in one of the ratings established in methodology and was consider in a transition area between two established ratings. Specialists for each forest consisted of the Forest Recreation and Wilderness Program Manager and two District Resource Managers.

Table IRA-1 shows the 19 elements, activities and features and the 47 criteria used to rate the 85 IRAs.

Table IRA-1: AREA CAPABILITY ASSESSMENT ELEMENT AND CRITERIA

ENVIRONMENTAL ELEMENTS		
Opportunity for Solitude		
High	**Medium**	**Low**
Feeling of being alone or remote from civilization.	Feeling of being alone is possible but signs of civilization are likely.	Little opportunity of feeling alone.
The possibility of meeting another party is remote.	The possibility of meeting or not meeting another party is about equal.	It would be rare to not meet another party.
Recreation use is light.	Recreation use is moderate.	Recreation use is high.
Natural and Free from Disturbance		
High	**Medium**	**Low**
IRA appears free of human disturbance. Any disturbance appears to be natural, such as a small wildfire.	IRA appears mostly free of human disturbance. Natural disturbance evident, but does not dominate the landscape.	IRA shows signs of human disturbance. Natural disturbance dominates the landscape, such as a stand replacing wildfire.
Area visible in surrounding foreground (outside the IRA) may show some human disturbance but does not dominate the view.	Area visible in surrounding foreground has signs of human activity such as a road or farmhouse.	Area visible in surrounding foreground shows obvious human activity such as clearcuts or a town.
Has only a minor improvement, such as a trail.	Has several minor improvements.	Has a major improvement such as a power line, dam, or road.
Noxious weeds not evident.	Noxious weeds evident in isolated spots.	Noxious weeds common or scattered throughout the area.
High water quality. Fully supports beneficial uses.	Good water quality. Partially supports beneficial uses.	Poor water quality. Does not support beneficial uses.
Provides Challenge and Adventure		
High	**Medium**	**Low**
Terrain generally rugged.	Terrain typical for general forest area.	Terrain more gentle and rolling.
Requires above average physical ability, knowledge,	Requires similar physical ability, knowledge, or skill	Area easily accessible; requires average physical

or skill to safely recreate in the area.	as the general forested area.	ability, limited knowledge and skill as compared to the abilities required in the general forest area.
Nonhunting outfitting permitted within area.	Nonhunting outfitting permitted but rarely used.	Nonhunting outfitting not permitted within area.
Manageable		
High	**Medium**	**Low**
Size and shape of area allows for effective management.	Size or shape will affect manageability but can be mitigated by boundary changes.	Size is small or has irregular shape that makes management difficult.
Minimum activity in surrounding area that effects manageability	Activity is evident and ongoing in surrounding area but will not keep the area from being managed	Activity in surrounding area will effect the manageability of the IRA
Located adjacent to existing Wilderness or other IRAs	Located near existing Wilderness or other IRAs. May be difficult to access.	Isolated, small parcel of land
SPECIAL FEATURES		
Scientific, Educational, or Historical Values		
High	**Medium**	**Low**
Several significant scientific, educational, or historical values have been identified in the IRA	At least one significant or several minor scientific, educational, or historical values have been identified in the IRA	No scientific, educational, or historical value has been identified in the IRA
Identified values are unique to the northern Rockies.	Identified values are common in northwestern US but is uncommon on KIPZ	Any identified values are common through out KIPZ and northwest US.
Scenic Features		
High	**Medium**	**Low**
Area has peaks or rocky formations considered spectacular from the rest of the Forest and/or special vegetative features that are considered very scenic.	Area has a peak or formation that stands out from surrounding terrain and/or vegetative features considered scenic.	Terrain is typical of the forest or surrounding area and the vegetation is common to the surrounding area.
Area has alpine lakes, creeks in alpine meadows, or waterfalls.	Area may have bodies of water but are typical for the Forest.	Area has no permanent lakes but may have perennial creeks or ponds.

Variety and Abundance of Wildlife		
High	**Medium**	**Low**
There is a diverse community of native mammals, birds, and fish.	There is a moderate variety of native mammals, birds, and fish.	The community of native mammals, birds, and fish is not diverse.
There is a known high variety of TE&S Species within the IRA.	There is a known moderate variety of TE&S Species within the IRA.	There is a known low variety of TE&S Species within the IRA.
Overall wildlife habitat integrity rating of high	Overall wildlife habitat integrity rating of moderate	Overall wildlife habitat integrity rating of low
Provides critical linkage between wildlife areas or habitats	Provides linkage between wildlife areas or habitats	Does not provide linkage between wildlife areas or habitats
Other Special Features		
High	**Medium**	**Low**
Area has at least one major other special feature, such as a grove of western red cedars, high mountain meadow, bog, etc.	Area has several minor other special features, such as old growth stand, flat creek bottom, or small water falls.	Area has no major or very few minor other special features
Contains a designated special area such as a W+S River or SIA, etc.	Contains a candidate or eligible special area.	Does not contain an established, candidate, or eligible special area.
PRIMITIVE AND UNCONFINED RECREATION		
Hiking Opportunities		
High	**Medium**	**Low**
Two or more trails, class 3 or higher, that are routinely maintained	At least one trail, class 2 or higher, that is routinely maintained	No system trails that are maintained
Terrain is gentle and vegetation open to allow easy cross-country travel	Terrain is moderate or vegetation brushy that impedes cross-country travel	Terrain is steep or vegetation too dense (including down material) that cross-country travel is difficult
Backpacking Opportunities		
High	**Medium**	**Low**
Two or more trails, class 3 or higher, that are routinely maintained	At least one trail, class 2 or higher, that is routinely maintained	No system trails that are maintained
Area has several dispersed camping sites that are routinely used	Area has at least one dispersed camping site that is occasionally used	Area does not have dispersed camping sites that are used but progressive

		camping may occur
Saddle Stock Opportunities		
High	**Medium**	**Low**
At least one trail, class 3 or higher, designed for saddle stock and routinely maintained	At least one trail, class 2 or higher, that is suitable for saddle stock and routinely maintained	No system trails that are maintained
Trailhead has stock facilities, such as unloading ramp	Trailhead has room to turn around stock truck or stock trailer	Trailhead does not support use of stock
Hunting Opportunities		
High	**Medium**	**Low**
Good populations of the big game animals or fair population of permitted animals, such as sheep or goats	Has fair populations of game animals	Has scattered small herds of big game animals
Terrain is gentle and vegetation open to allow easy hunting access off trails and ridges	Terrain is moderately steep or vegetation brushy that limits hunting on much of the area	Terrain is steep or vegetation too dense that hunting is limited to trails or ridges
Fishing Opportunities		
High	**Medium**	**Low**
Good populations of native game fish	Has fair populations of native game fish	Has low populations of native game fish
Stream bottoms are generally gentle with minor brush allowing access to water	Stream channel has enough brush to limit access; channel bottom or side slopes not overly steep	Stream channel steep, or steep rocky side slopes, or brush along channel makes access difficult
Skiing and Snowshoeing Opportunities		
High	**Medium**	**Low**
Terrain is gentle and vegetation open to allow easy cross-country travel	Terrain is moderate or vegetation brushy that impedes cross-country travel	Terrain is steep or vegetation too dense that cross-country travel is difficult
Area is easily accessible in winter by motorized wheel vehicles	Snow keeps wheeled vehicles several miles from area but access is possible by snowmobile	Area is difficult or rarely accessed by snowmobile

Snowmobiling Opportunities		
High	**Medium**	**Low**
Terrain is steep or vegetation too dense that cross-country travel is difficult	Terrain is moderate or vegetation brushy that impedes cross-country travel	Terrain is gentle and vegetation open to allow easy cross-country travel
Snowmobile use prohibited, or if allowed, rarely used	Snowmobile use restricted to two months or less, or on half or less of the area	Snowmobile use permitted.
MANAGEABILITY – THE EXTENT THAT		
Area Boundaries are Recognizable		
High	**Medium**	**Low**
The vast majority of the boundary follows features that can be easily found and identified on the ground, such as a dominate ridge, creek, road, or trail	More than half of the boundary follows a feature that can be easily found and identified on the ground	Boundary generally lies across the hill side and can rarely be located without equipment, such as a gps unit
Boundary can be easily adjusted to follow locatable and identifiable features without significantly modifying the area boundaries	Boundary can be adjusted to follow locatable and identifiable features but will modify the general size and shape of the IRA. Boundary may be identified with minimal signing.	Boundary can not be adjusted to follow locatable and identifiable features, or requires extensive signing.
Area Boundaries promote Remoteness		
High	**Medium**	**Low**
Area accessed by trail or closed and revegetated road; adjacent area has natural setting	May be accessed by narrow or two track open road that is lightly traveled; minimal human presence evident	Boundary adjacent to heavily used road or along area showing high human presence, such as a number of farm houses with outbuildings, pasture land, etc.
No active disturbance near boundary	May have disturbance near boundary but is short term such as a logging operation.	Boundary adjacent to long term disturbance like farmland or mining operations
Natural processes take place undisturbed and unmanipulated.	Minimal disturbance of natural processes.	Natural processes cannot occur without human intervention.

Area Boundaries are Manageable		
High	**Medium**	**Low**
Boundary total on National Forest and not adjacent to private property	Boundary follows property line forming irregular shape.	Boundary crosses private property so there are in-holdings along the boundary.
No inholdings.	Few small inholdings may be present.	Several small or a large inholding.
Area Boundaries Constitute Barrier to Prohibited Use		
High	**Medium**	**Low**
Topographic feature provides a natural barrier, such as major stream or steep hill side	Topography generally makes it difficult to participate in prohibited use	Topography not a deterrent to prohibited use
Human improvement is significant to physically provide a barrier, such as a road cut slope	Human improvement places user on notice of prohibited use, such as a sign.	Human improvement not a deterrent; may provide point of access of prohibited use

Table IRA-2 shows the rating for each criteria and element and the overall rating for each IRA.

Add the table.

Availability

While Capability evaluated the wilderness characteristics of an IRA, Availability considered other resources needs. FSH 1909.12, Chapter 72.2 and internal and external comments were used to identify other resources for evaluation and establish the criteria. Eight criteria were established by the two Forest Recreation and Wilderness Program Managers in August 2004. The two managers selected resource specialists from each forest to rate the criteria using a high, medium, or low rating system. Specialists included recreation managers, wildlife and fishery biologists, hydrologists, ecologists, geologists, fuels and wildfire specialists, land specialists (special use permits), and Silviculturists. These ratings were completed by October 2004.

Individual district and forest specialists rating and resource needs were summarized for each IRA. An overall availability rating was then established by the two forest program managers. This was completed in December 2004.

Table IRA-3 lists the eight resources and criteria. The availability for an area for proposed wilderness designation will be the opposite of the rating for other resource requirements. For example, a rating of high mineral value will mean a low rating for wilderness designation.

Table IRA-3: AREA AVAILABILITY RESOURCE ASSESSMENT AND CRITERIA

RESOURCES
1. Areas that are of high value for water yield or on-site storage where installation and maintenance of improvements may be required.
2. Areas needing management for wildlife or aquatic animals that MIGHT conflict with Wilderness management.
3. Area needing active aquatic restoration activates.
4. Area needing active vegetative restoration activity due to specific species survival, or identifiable fuel reduction activity to reduce the risk of catastrophic wildfire, or known areas of severe insect infestation that will lead to heavy tree mortality.
5. Areas of high value mineral deposits of economic or strategic importance.
6. Areas having such unique characteristics or natural phenomena that general public access should be developed to facilitate public use and enjoyment including winter sports sites.
7. Lands committed through contracts, permits, or agreements that would be in conflict with Wilderness management (some minor permitted uses may still be allowed.)
8. Forest Service does not have sufficient control to prevent development or irresolvable, incompatible uses that would lessen wilderness character and potential.
RATING
HIGH = Areas having an evidence and high priority need for treatment in the category addressed in the question. Availability would equate to Low.
MEDIUM = Areas having a need for treatment in the category addressed in the question. Availability would equate to Moderate.

LOW = Areas have no to little need of treatments or management addressed in the question. Availability would equate to High.

Table IRA-4 shows the ratings determined for each resource and the overall rating for each IRA.

Add table.

Need

After evaluating an area's capability for providing wilderness characteristics and availability for wilderness designation, the last step of the evaluation process is to determine if the area is needed as part of the National Wilderness Preservation System. A Wilderness Needs Assessment was completed in 2003 by an interdisciplinary team at the regional level. This allowed the assessment to cover Montana, northern Idaho, and parts of the Dakotas – a much larger area than the KIPZ. The assessment focused on social and ecological factors. The social factors included current levels of use in designated wilderness in the Northern Region, national and local trends in outdoor activities, and population statistics. Ecological factors included representative-ness of vegetative cover types and ecological sections, fisheries, and wildlife. A copy of the Northern Region Wilderness Needs Assessment is attached as Appendix A.

Since the regional needs assessment covers a large and diverse area, it could not address individual IRA's. The two Forest Recreation and Wilderness Program Managers met in December 2004 to apply the regional needs assessment to the 85 IRAs in the KIPZ. The assessment was broken down into six questions and each IRA rated high, moderate, or low. Maps created for the regional assessment were available and used to determine the significance of the resource being addressed by each question to every individual IRA. Table IRA-5 shows the six questions and the rating criteria used to determine need.

Diversity within KIPZ and application of the broad regional needs assessment required that ratings be established for individual IRA's, for individual forests, for portions of a forest, or for the zone. Ratings for questions 1 and 2 were determined for each IRA based on the presence or absence of the species being addressed. Question 3 was split based on whether the IRA was located adjacent to an existing wilderness boundary or located near another IRA. A rating was determined for either 3a or 3b, but not both. A rating for Question 4 was determined for the entire forest or section of forest. It was split for the Idaho Panhandle between the north and south halves but only one rating was used for the Kootenai Forest. A single population center was selected for each forest from the list in the regional needs assessment for question 5. Couer d'Alene, Idaho was selected for the population center for the Idaho Panhandle Forest. Kalispell, Montana was selected as the population center for the Kootenai. For Question 6, each forest produced a map that showed the four selected under-represented plant communities that are typically available in the KIPZ. The four selected were Vegetation Response Units (VRU) 2 (ponderosa pine), 5 (western red cedar and western hemlock), and 8 (western red cedar and western hemlock – wet) and Aquatic Response Unit (ARU) types representing forest-dominated riparian areas. Other under-represented communities were not considered because they do not exist or are only found in small quantities within the IRAs.

An overall rating was then applied for the IRA based on the following parameters:

The overall rating would be high if:

- Three or more questions were rated high, or
- Two questions were rated high and at least two of the remaining four questions were rated moderate.

The overall rating would be moderate if:

- Two questions were rated high and not more than one of the remaining four questions was rated moderate, or
- One question was rated high and at least one of the remaining five was rated moderate, or
- No question was rated high but two or more were rated moderate.

The overall rating would be low if:

- Five of the questions rated low, or
- No question was rated high and no more than two were rated moderate.

Table IRA-5: AREA NEEDS ASSESSMENT AND CRITERIA

Questions	High	Moderate	Low
1. Areas having the presence of Westslope cutthroat, Yellowstone cutthroat, or bull trout.	Presence of 2 fish	Presence of 1 fish	None of the species present
2. Presence of sensitive plant species.	Sensitive plant(s) identified in IRA are globally rare	Sensitive plants identified in IRA would benefit from wilderness designation = **moderate/high** Sensitive plants present in IRA = **moderate/low**	No sensitive plants identified in IRA.
3a. Areas adjacent to existing Wilderness (larger reserved size beneficial for wildlife conservation.)	IRA is adjacent to existing Wilderness boundary	IRA adjacent but separated by corridor	Not applicable
3b. IRAs could be combined to form large habitat patches.	Two or more IRAs adjacent and separated only by a narrow corridor, such as a road.	Two or more IRAs could be connected by a wildlife travel corridor.	IRA not adjacent or close to another IRA
4. Ecological Sections represented in Wilderness.	Ecological Section represented by not more than 10,000 acres.	Ecological Section represented by 10,001 to 100,000 acres.	Ecological Section represented by more than 100,000 acres.
5. Number of	Wilderness acres of	Wilderness acres of	Wilderness acres of

Wilderness acres within 100 miles of Kalispell or Couer d'Alene.	approximately 100,000 acres.	approximately 500,000 acres.	approximately 1,000,000 acres.
6. Under-represented plant communities.	VRU 2, 5, or 8 and ARU forest-dominated riparian covers more than 2/3 of the IRA.	VRU 2, 5, or 8 and ARU forest-dominated riparian covers 1/3 to 2/3 of the IRA.	VRU 2, 5, or 8 and ARU forest-dominated riparian covers less than 1/3 of the IRA.

Table IRA-6 shows the ratings and overall ratings for the IRAs.

Add the table.

DETERMINATION OF SUITABILITY AND PROPOSAL

Each individual IRA received a rating from the three tests of capability, availability, and need as described above. To be determined suitable for wilderness designation, the three ratings must indicate the IRA has an inherent wilderness quality. In addition to the three ratings, the area must provide opportunities and experiences that are dependent upon and enhanced by a wilderness environment. The size and shape of the area and the area boundaries must allow the area to be managed as wilderness. Suitability must also consider adjacent land, whether public or private, so that the entire national forest can be managed in accordance to public laws, including the protection and management of a variety of resources, both inside and outside the IRA.

The evaluation process described in FSH 1909.12, Chapter 72 is to determine the mix of land and resource uses that best meet public needs. This process may recommend management of an IRA through a theme different than proposed wilderness designation. Some management themes provide protection of existing wilderness characteristics while providing for resource management that is not compatible with a wilderness management theme. IRAs determined not to be suitable for wilderness designation will be evaluated for management under one of the other themes.

The three ratings of capability, availability, and needs provided the beginning determination of suitability. Other considerations such as size and shape, wilderness opportunities, and the ability to manage the area as wilderness were then applied. For areas determined to be suitable, proposed wilderness boundaries were mapped that supported wilderness management of the included land while providing protection of other resources and public safety.

An IRA's inherent wilderness quality could be demonstrated if the capability rating was high or moderate/high. Availability and need for wilderness designation could be demonstrated if at least one of these ratings was high and the other moderate or high. A rating of low for any of the three tests indicated the IRA did not meet the suitability determination. Appling the other considerations either confirmed or modified the beginning determination and completed the suitability determination for each IRA.

Determination of suitability included the Forest Supervisor, District Rangers, Forest Staff Officer, and Forest Wilderness Program Manager.

Parameters for mapping proposed wilderness for those IRAs determine to be suitable are, in order of priority:

1. Boundaries must be identifiable on the ground. Major ridges and roads provide the best topography or human development feature that can identify a boundary. Minor or broad ridges are often hard to identify on the ground and should not be used. Major creeks or rivers are suitable for boundaries but small creeks should not be used. Contour lines are difficult to locate even with the proper equipment

and generally will not be used except for short distances. Meandering lines are impossible to locate and may not be used.

Points and connecting straight lines using the Global Position System (GPS) may provide adequate boundary identification in the near future. Small handheld GPS units can locate boundaries to within a few feet. This system was allowed when other, better boundary locations did not exist.

2. Boundaries must allow for wildfire protection by providing a wildland fire interface zone near private property, along state and federal highways and county roads and along major utility corridors. The boundary was to be at least ½ mile from these features. Shorter distances were allowed in cases where management of private property was not conducive for human occupancy, such as high elevation corporation timber lands, where existing proclaimed wilderness boundary abuts against private land, or where remoteness of the area allowed for a shorter interface zone. These boundaries may not correlate to the Wildland Urban Interface (WUI) boundaries developed under the Healthy Forests Restoration Act of 2003. It is possible to have proposed wilderness boundaries inside a WUI boundary.

3. Boundaries must allow for maintenance of existing roads. The boundary was set 300 feet (horizontal distance) on either side of the road centerline to provide adequate area to maintain clearing limits, provide fuel breaks, handle slumps and slides, maintain water drainage structures, and allow for improvements necessary for safe travel. Along major arterial roads where traffic is normally heavy and the road provides the main access to the national forest, the distance was increased to ¼ mile.

4. Boundaries could allow motorized travel corridors through the proposed wilderness area. When two or more IRAs were separated by an open road, the IRAs could be proposed as a single wilderness but a 600 foot (300 foot either side of the road) motorized travel corridor could be maintained.

5. Old harvest units and the access roads could be included within the proposed wilderness boundary provided the evaluation process indicated wilderness management was the highest resource value for the treated lands, adequate mitigating measures had been taken to reduce erosion and other watershed issues on the access roads, and the inclusion of the treated lands eliminated intrusion corridors within the proposed wilderness.

Boundary mapping was completed in April 2005.

IRAs proposed for wilderness designation and the recommended boundaries are shown in the Forest Plan Revision documents and on the accompanying maps.

GREATERYELLOWSTONE.ORG
LOCATIONS IN MONTANA, IDAHO & WYOMING

HEADQUARTERS
215 South Wallace Avenue
Bozeman, Montana 59715
406.586.1593

May 15, 2015

Attn: Forest Plan Revision
Flathead National Forest Supervisor's Office
650 Wolfpack Way, Kalispell, MT 59901

Dear Flathead National Forest Planning Team -

Thank you for the opportunity to comment on the proposed Forest Plan Amendment to integrate the Northern Continental Divide Ecosystem (NCDE) Grizzly Bear Conservation Strategy (GBCS) into the forest plans for the Helena, Kootenai, Lewis and Clark, and Lolo National Forests.

The Greater Yellowstone Coalition (GYC) represents over 40,000 supporters, both in Montana and nationally, that have a continued and vested interest in the management of grizzly bears in Montana and throughout the Greater Yellowstone Ecosystem (GYE). We advocate for a thriving population of grizzly bears throughout the GYE by protecting core habitat, working to achieve functional connectivity for bears between the GYE and Crown of the Continent, and helping local communities coexist with the bear by building awareness and providing proactive conflict mitigation tools. We view grizzly bears within the GYE, the Northern Continental Divide Ecosystem (NCDE), and other recovery areas as integral components of a larger, interconnected grizzly bear population throughout the Northern Rockies.

Defenders is a national non-profit conservation organization founded in 1947 focused on conserving and restoring native species and the habitat upon which they depend. We have more than 1,200,000 members and supporters nationwide, including more than 5,000 in Montana. Over the last two decades, Defenders has played an important role in the recovery of grizzly bears in the Northern Rockies. Recognizing that the largest threat facing long term grizzly bear recovery is human related mortalities, Defenders has focused heavily on reducing conflict through our coexistence program. Since 1997, we have spent more than $500,000 on more than 250 projects designed to minimize or eliminate conflicts between people and grizzly bears. These efforts assist communities living in grizzly country with the tools necessary to prevent conflicts with grizzly bears and promote tolerance. We operate these projects in partnership with local communities and residents as well as county, state, tribal and federal agencies.

The grizzly bear is currently listed as a threatened species under the U.S. Endangered Species Act (ESA) in the conterminous 48 states. 40 Fed. Reg. 31,734 (July 28, 1975). Prior to any delisting attempt, the U.S. Fish and Wildlife Service (FWS) must determine that this species (or any population proposed for

delisting) is no longer threatened by the five factors outlined in 16 U.S.C. § 1533(a)(1). These five factors include the present or threatened destruction, modification, or curtailment of the grizzly bear's habitat or range; the inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting the species' continued existence. Pursuant to this five-factor analysis, the FWS must consider how the currently isolated GYE grizzly bear population can qualify as recovered without regulatory mechanisms to provide for connectivity between this population and the NCDE population. The Forest Planning process now underway offers the federal government an unparalleled opportunity to commit to and provide for such connectivity.

Connectivity is a guiding principle under the National Forest Management Act (NFMA) as well. NFMA requires that the Secretary of Agriculture promulgate land management planning regulations that "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives." 16 U.S.C. § 1604(3)(B).

Section 219.9 of the 2012 Planning Rule implements this statutory mandate, and provides for a "complementary ecosystem and species-specific approach to maintaining the diversity of plant and animal communities and the persistence of native species in the plan area." 77 Fed. Reg. 21,162, 21,265 (Apr. 9, 2012), to be codified at 36 C.F.R. § 219.9. As part of this approach, plans must include, inter alia, "components to maintain or restore [ecosystem] structure, function, composition, and connectivity." 77 Fed. Reg. at 21,265, to be codified at 36 C.F.R. § 219.9(a)(1) (emphasis added). The components outlined in a plan must be sufficient to conserve threatened and endangered species and maintain viable populations of species of conservation concern; if the components are insufficient in this regard, additional, species-specific components must be included. 77 Fed. Reg. at 21,265, to be codified at 36 C.F.R. § 219.9(b).

Under NFMA's diversity requirement, and because the long-term goal for listed grizzly bears is to "achiev[e] connectivity and manag[e] grizzly bear populations in the northern Rockies as subpopulations of a metapopulation" (2011 Grizzly Bear 5-Year Review, p.14), the U.S. Forest Service (USFS) must consider the impacts of this Proposed Action (PA) for not only the NCDE, but also for the GYE grizzly bear population (as well as other recovery areas) under Section 7 of the ESA (a)(1) http://www.fws.gov/endangered/laws-policies/section-7.html.

We are concerned that the forest plan amendments, as currently drafted, neither provide for the required level of connectivity between the NCDE and the GYE, nor fulfill the ecosystem and species-specific approach called for in the NFMA regulations. As an initial matter, we are concerned that these amendments are based on a *"draft"* Conservation Strategy that has not fully incorporated public comments and recommendations in accordance with the National Environment Policy Act (NEPA) process. One of the purposes of NEPA is to bring forth all relevant data and the "best available science" into one place for the purposes of analysis (40 CFR 1500.1(b)). In these comments we have provided additional science that may be missing or excluded from the final Conservation Strategy but is very

relevant for the purposes and direction for forest planning under NFMA and ESA, even though the U.S. Fish and Wildlife Service may have not considered or dismissed this information in the "draft" Conservation Strategy.

Additionally, the purpose of this forest plan amendment is to incorporate "relevant habitat-related direction" from the NCDE GBCS. We request a description of what is meant by "relevant" habitat-related direction and a disclosure of where the proposed forest plan amendments deviate from recommendations provided in the GBCS. We ask the Forest Service to clearly describe all current Forest Plan standards, guidelines, monitoring, and desired conditions related to grizzly bear conservation and including the proposed amendments, for each of the forests within the NCDE in the Draft Environmental Impact Statement (DEIS).

Finally, please demonstrate how current plan components, along with the proposed amendment, will ensure continued expansion of grizzly bears throughout Zone 2 and the Demographic Connectivity Areas to promote eventual connectivity to the GYE and other populations. GYC suggests that this be added as a desired future condition within Zone 2 and that this goal is consistent with current Forest Planning direction.

We are focusing the remainder of our comments on the Forest Plan Amendment for Zone 2, due to the areas importance for connectivity to the GYE grizzly bear population, and our organizational interest in this geography consistent with our mission. It is our goal to ensure that the GYE population remains robust and eventually connects to the NCDE and other populations as part of one large interconnected Northern Rockies grizzly bear metapopulation.

Connectivity and Metapopulation Theory

"The future of grizzly bear persistence in southwest Canada and northwest USA is likely dependent on management actions that promote and ensure meta-population function" (Proctor et al. 2005).

Connectivity provides for the adaptation of species to effects of climate change and is critical to the conservation of species diversity (Heller and Zaveleta 2009). It is also generally accepted that isolated populations are at greater risk of extinction over the long term, and the largest and rarest species tend to disappear first (Soule 1983). Some level of movement and gene flow between geographically separate populations however, decreases the probability of extinction (Soule 1987; Harrison 1994; Hanski 1999), promotes population persistence (Hanski and Gilpin 1997), mitigates genetic erosion, and allows for immigration and emigration in response to random genetic, demographic, and environmental changes, including disease epidemics, cyclical food shortages, climate change or large scale fire events (Breitenmoser et al. 2001, Hedrick 1996, Hedrick and Gilpin 1996).

A metapopulation is a population of spatially separated populations whose range is composed more or less of isolated patches that are interconnected through patterns of movement between them (Lande and

Barrowclough 1987). Boyce et al. (2001) demonstrated the importance of multiple "connected" populations to the survival of the grizzly in the Northern Rockies, and metapopulation theory directs that connectivity is the best long-term strategy to increase the resiliency and probability of persistence of remaining grizzly bear populations in the lower 48 States (Boyce 2000).

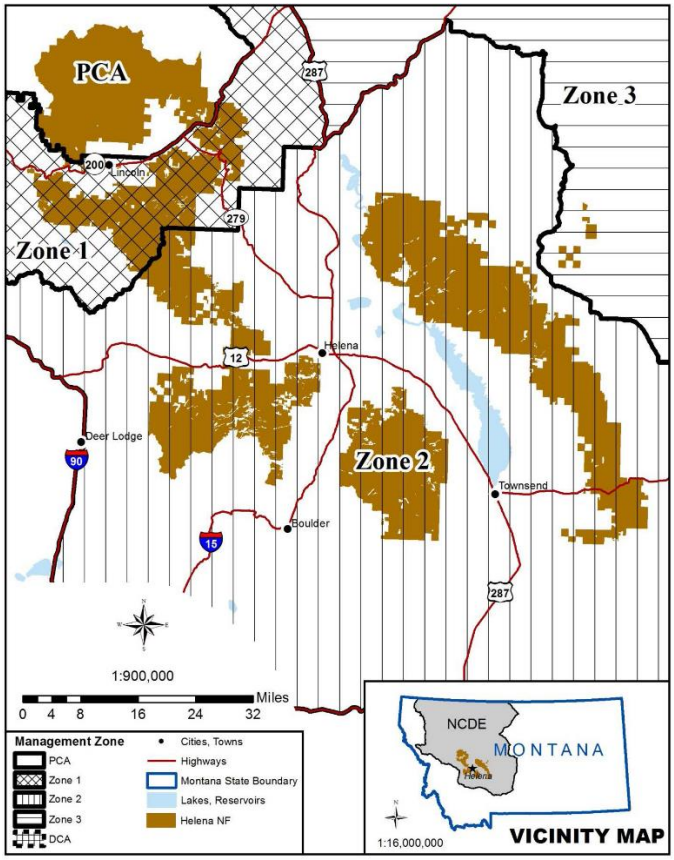
The grizzly bear was listed as a threatened species in the *contiguous* lower 48 states under the ESA, and should be recovered and managed as a large well-connected Northern Rockies metapopulation. Historic evidence supports the existence of a true metapopulation structure for grizzly bears in the contiguous United States (Craighead and Vyse 1996) including connectivity between the NCDE and the GYE (Picton 1986, Merriam 1922), as well as other populations. While the NCDE GBCS "envisions the NCDE serving as a 'source population' for grizzly bear populations in the Cabinet-Yaak, Bitterroot, and Greater Yellowstone ecosystems" (page 32), the intervening lands that support connectivity between the various populations are considerably fragmented (*see* Servheen et al. 2001), requiring significant habitat protections for the remaining blocks of undeveloped/public lands.

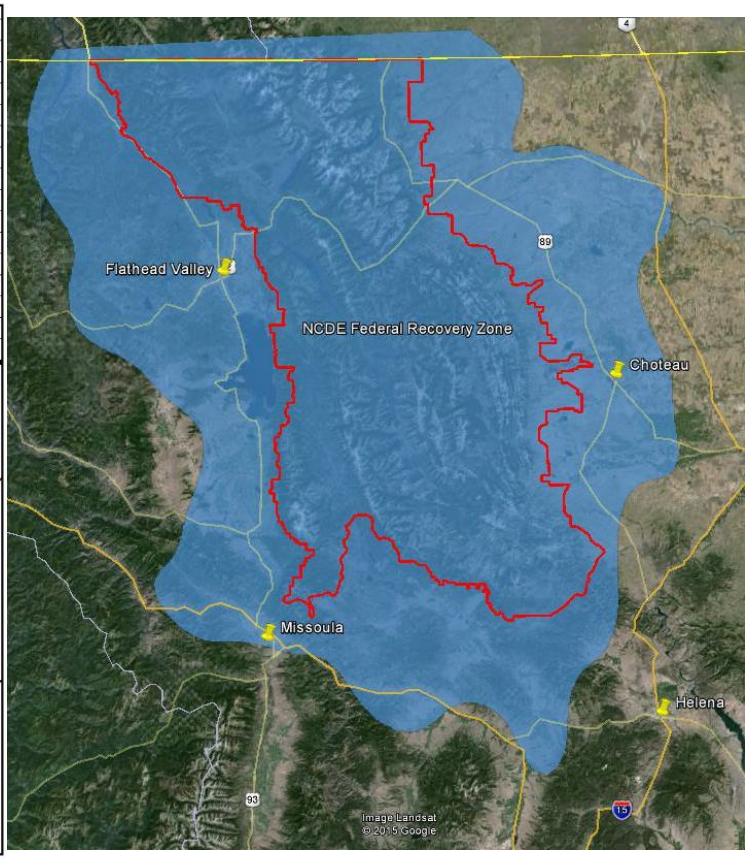
The lack of connectivity is a concern for the long-term genetic health of the isolated GYE population (Haroldson et al. 2010). Studies indicate that 1-2 male migrants every 10 years (i.e., genetic rescue) may be adequate to maintain current levels of genetic diversity in the GYE (Miller and Waits 2003). Because genetic exchange has not yet happened, the FWS has suggested that human assisted techniques (i.e. translocation of bears from other ecosystems to the GYE) be employed if natural connectivity/genetic exchange has not occurred by the year 2022 (Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area (2007), page 37). However, the need for human-assisted translocation does not support the notion that the GYE grizzly bear population has been "[r]estor[ed] … to the point where it is again a secure, self-sustaining member of its ecosystem" (78 Fed. Reg. at 17708), and it is unacceptable for the Forest Service to agree with the FWS that human-assisted techniques should qualify as functional connectivity (immigration and breeding). Translocation-based strategies do not create self-sustaining populations as mandated under the ESA "but rather rel[y] on long-term intensive management to counteract the effect of connectivity loss on species viability" (Carroll et al. 2014, page 2).

Furthermore, the success rate of translocations is uncertain into habitat that is already fully occupied by grizzlies (see Cabinet-Yaak ecosystem translocations from 1990-1994, Kasworm et al. 2004). In their comments to the FWS regarding delisting of the Yellowstone Grizzly Bear DPS, Craighead et al. (2005) stated "We believe the solution to maintaining genetic diversity in the Yellowstone population lies not in agency-engineered translocation but rather includes: 1) the establishment of a grizzly bear population in central Idaho, and 2) restoration and enhanced occupancy of the connective habitat between Yellowstone and central Idaho, and between Yellowstone and the NCDE." (Page 9)(emphasis added). Ensuring habitat connectivity between the NCDE and GYE would benefit not only grizzly bears, but multiple wildlife species, and would be consistent with the NCDE Grizzly Bear Conservation Strategy (2013), USFWS Grizzly Bear Recovery Plan (USFWS 1993, pp. 24-25), the Grizzly Bear Management Plan for Western (Dood et al. 2006, pp. 54-56) and Southwestern Montana (MFWP 2013, p. 41), the Western Governors'

Association Resolution 07-01 (2007), and the interagency statement of support for the concept of linkage zones signed by the state wildlife agencies in Montana, Washington, Idaho, and Wyoming and the USFS, USFWS, USGS, NPS, and BLM (IGBC 2001).

A truly recovered metapopulation of grizzly bears in the Northern Rockies requires well-connected populations occupying suitable habitat with adequate protections. Arguably, on their own these linkage areas are not currently occupied to the desired extent to promote the aforementioned connectivity (see Figures 1 and 2), nor at present could they be considered as supporting viable populations of grizzly bears. In short, we are concerned that these forest amendments are inadequate to ensure viable populations, provide functional connectivity or restore a metapopulation of grizzly bears in the Northern Rockies.





Figures 1 & 2: Grizzly Bear Conservation Strategy Zone 2 (left) compared to NCDE Grizzly bear distribution map using all verified grizzly bear locations from 2000-2014. Note: Use Helena as a point reference.

NFMA's 1982 and 2012 Planning Rules

Ensuring grizzly bear occupancy in Zone 2 will also help ensure compliance with the NFMA, which requires Forest Plans to "provide for diversity of plant and animal communities" and "maintain viable

populations" 16 U.S.C. § 1604(g)(3)(B). In 1982, the Forest Service promulgated regulations to ensure such diversity:

> Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed within the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area 36 C.F.R. § 219.19.

Both NEPA and ESA require that the effects of the proposed amendment on grizzly bears be determined. NFMA requires that these effects be evaluated in terms of its diversity and viability requirements, while the ESA requires a determination of whether the effects of the amendment will contribute to the recovery of the species, range wide. These analyses require a clear presentation of the amendment's decisions and where they apply in relation to important habitat – including connectivity lands in Zone 2.

The DEIS should include a viability analysis for grizzly bears and provide an explanation for how management of connectivity under the amendment contributes to or detracts from habitat for a viable population. The DEIS should also demonstrate how management of connectivity conserves and recovers grizzly bears by implementing the grizzly bear recovery plan.

After completing these required analyses, the Forest Service may find that it must provide more specific and proactive guidance for management of connectivity. Areas to be managed for connectivity should be defined and identified in the amendment, and a map of areas to be managed for connectivity should be included. In order to 'ensure' that grizzly bears' 'continued existence is well distributed in the planning area' (36 CFR 219.19), this direction must be in the form of mandatory standards that prohibit activities and developments detrimental to connectivity.

Should grizzly bears be delisted in the future, for planning and management purposes, we suggest that they be considered by the Forest Service as a Species of Conservation Concern consistent with the 2012 Planning Rule (SCC, 12.52d-2b 2012 Planning Handbook p.36). As a likely future SCC across its range, the Forest Service should begin to consider the ecological conditions necessary to maintain and contribute to grizzly bear populations that will "persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments" (36 CFR 219.19).

While this PA is primarily focused on the NCDE grizzly bear population, the actions taken will affect (still threatened) populations in the Cabinet-Yaak, Bitterroot and Yellowstone ecosystems. The viability and recovery of the above still threatened populations may depend on the long-term occupancy *throughout* these connectivity areas. In other words, regardless of the status of the NCDE population and where management zones are delineated by FWS, the Forest Service must contribute to the recovery of still

federally listed threatened and endangered species and provide for population viability under NFMA.

Given the Helena National Forest is currently in the forest plan revision process, which falls under the 2012 Planning Rule, the Forest Service should consider the 2012 Rule's connectivity requirements for this PA, and consider the development of an alternative that would allow the Helena NF to meet the rule's requirements. The 2012 Planning Rule includes explicit requirements for managing for ecological connectivity on national forest lands and facilitating connectivity planning across land ownerships, including state managed and private lands relevant to populations of species of conservation concern (36 C.F.R. § 219.9(b)(2)(ii), as well as coordination with plans and land-use policies of other jurisdictions (36 C.F.R. § 219.4(b)) (see also Haber and Nelson 2015 and Haber et al. 2015). Specifically, this directs the Forest Service to identify and manage key ecosystem characteristics, including "Connectivity," for the purpose of sustaining ecosystems contributing to the recovery of listed species. The Rule defines "Connectivity" as the "Ecological conditions that exist at several spatial and temporal scales that provide landscape linkages that permit…the dispersal and genetic interchange between populations; and long-distance range shifts of species, such as in response to climate change" (36 C.F.R. § § 219.19). The "functional" example of this includes the "measure of the ability of native species to move through the planning area and cross in to adjacent areas" (36 C.F.R. § § 219.19). As a key characteristic of ecosystems, connectivity should be addressed through either ecosystem-scale plan components in order to restore "ecological integrity", or it may need to be addressed at the species level (i.e. connectivity as an "ecological condition" needed to contribute to the recovery of a listed species). Upon revision if not before, the Helena NF will need to develop plan components – including connectivity plan components – to contribute to the recovery and viability of the NCDE and GYE grizzly bear populations. In order to facilitate efficient planning within the Helena NF revision, we encourage the Forest Service to develop an alternative within the DEIS that will meet the requirements of the 2012 Planning Rule.

GYC asks that within the DEIS, special plan components be developed to ensure that all grizzly bear populations are well-connected to promote the long-term viability and recovery of this at-risk species. The Forest Service should also engage with MTFWP, the BLM, and other FS jurisdictions that have objectives to manage for grizzly bear connectivity and have identified corridors that should be recognized and managed for through the forest planning process. Montana has made protection of connectivity and linkage areas a priority for Associated Species of Greatest Conservation Need (Tier I Species including grizzly bears) in their Comprehensive Fish and Wildlife Conservation Strategy and identified as a conservation strategy to "Identify and prioritize key wildlife linkage areas, and work with other state and federal agencies, conservation groups, and landowners to restore wildlife connectivity." (Page 45). Similarly, the BLM Record of Decision and approved Dillon Resource Management Plan (2006) states a commitment to manage wildlife migration/dispersal corridors that provide connectivity for special status species including grizzly bears and to coordinate with others to identify critical barriers and potential passage locations (page 70). Under the 2012 Planning Rule the Forest Service is directed to consider lands and jurisdictions beyond their boundaries through a coordinated approach to ensure broader landscape connectivity; we encourage the Forest Service to develop alternatives within the DEIS that are consistent with this requirement.

Linkage Areas

Characteristics associated with effective linkage zone function for large carnivores and ungulates include low open road density, low concentrations of human occupancy and development, an abundance of productive foraging habitat, and a healthy mix of forested and nonforested lands (Craighead et al. 2001; Walker and Craighead 1997; Servheen et al. 2003; Olimb and Williamson 2006). Walker and Craighead (1997) identified three potential corridors linking the NCDE grizzly population to the GYE; through the (1) Big Belt–Bridger–Gallatin mountain ranges, (2) the Boulder–Tobacco Root–Gravelly–Taylor–Hilgard ranges (see Figure 3), and (3) the Selway–Bitterroot–Lemhi– Centennial–Madison ranges, and Krehbiel 2015 (see Figure 4), Cushman et al. (2009) (see Figure 5), and the WCS CircuitScape Models produced similar results. Thus, we contend that connectivity is possible through Zone 2 with improvements in habitat protections, and the Forest Service must consider this per the 2012 Planning Rule or provide justification for ignoring the best available science on connectivity.

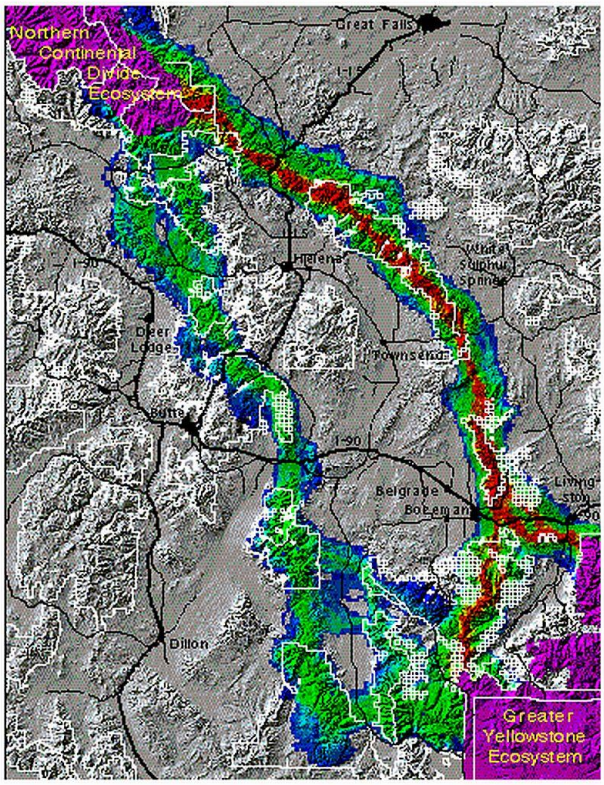


Figure 3. Corridors linking grizzly bear habitat in Montana. The first and second best corridors are shown, with warmer colors indicating better areas of habitat connectivity. One route is far superior to others: through the Gallatin, Bridger, and Big Belt mountain ranges. © 2010 Nature Education Courtesy of Richard Walker & Lance Craighead. All rights reserved. Source: Clark, W. (2010) Principles of Landscape Ecology. Nature Education Knowledge 2(2):34

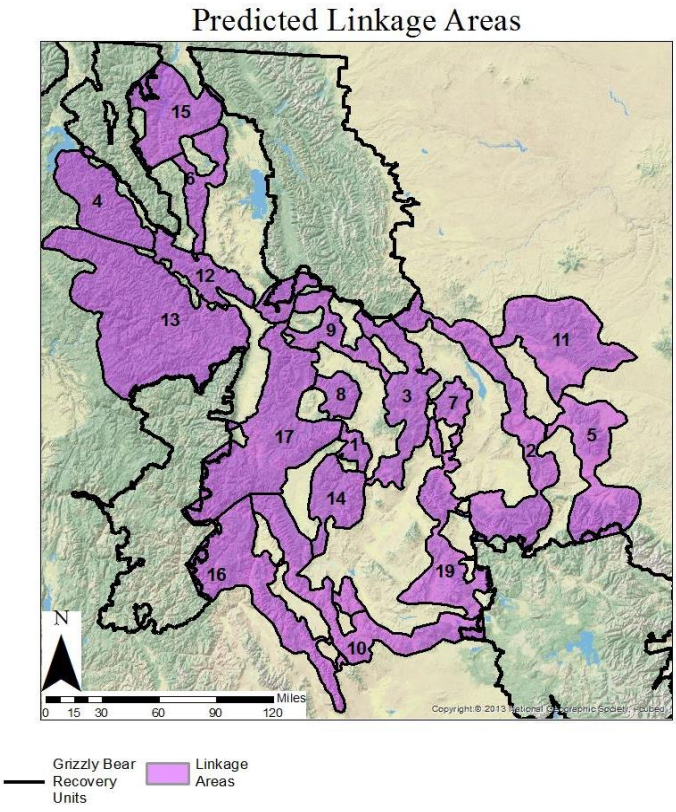


Figure 4. From Krehbiel 2015. Grizzly bear linkage areas identified using cumulative dispersal-cost matrix: 1. Anaconda, 2. Big Belts, 3. Boulders, 4. Couer d'Alene, 5. Crazy, 6. East Cabinets, 7. Elkhorn, 8. Flint Creek, 9. Garnett, 10. High Divide, 11. Little Belts, 12. Nine Mile, 13. North Bitterroots, 14. Pioneers, 15. Salmon, 16. Salish, 17. Sapphires, 18. Tendoy, 19. Tobacco Roots.

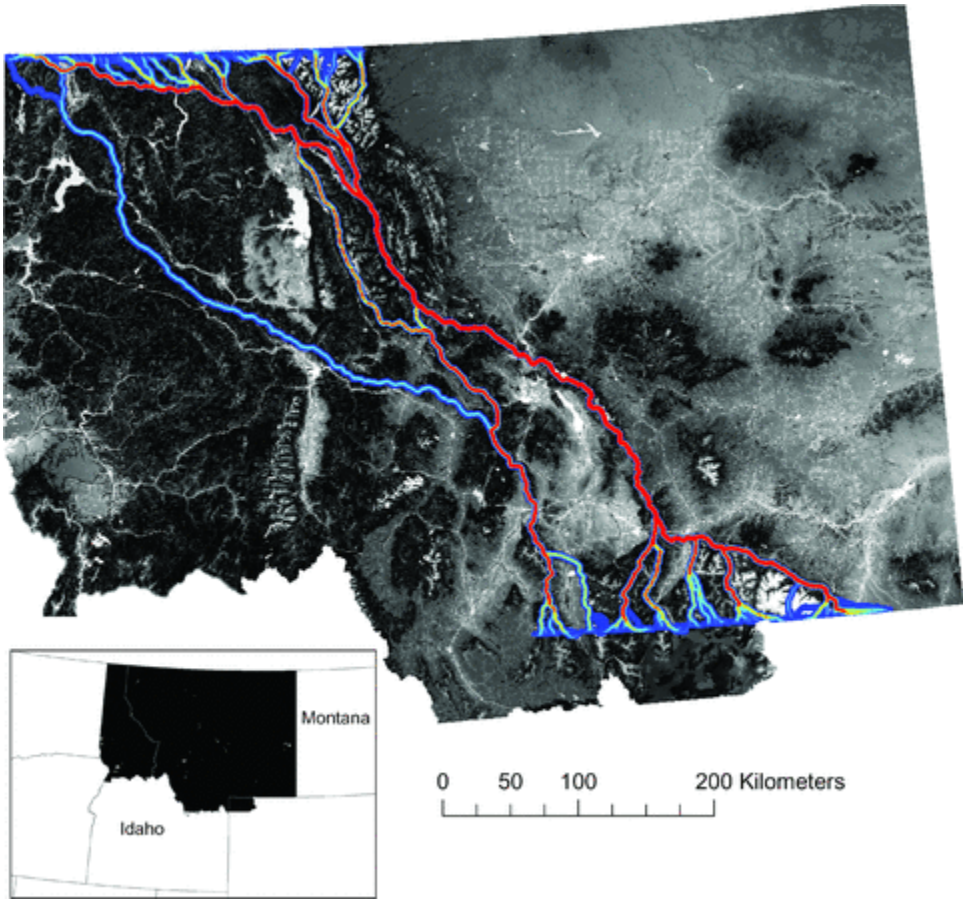


Figure 5. From Cushman et al. 2009: "The movement-resistance map and source and source-destination paths for least-cost path analysis. Resistance to movement is a function of elevation, forest cover, and human developments (Cushman et al. 2006) and is scaled from black at minimum to white at maximum. The number of source-destination paths in each corridor is reflected by the color scheme, ranging from blue (few paths) to red (many paths)."

The Proposed Action Does Not Contain Adequate Habitat Standards for Zone 2

The NCDE Grizzly Bear Conservation Strategy (GBCS) objective for Zone 2 is to provide the opportunity for grizzly bears, particularly males, to move between the NCDE and adjacent ecosystems (e.g., the GYE) (page 4, 35). The Zone 2 objective also includes maintaining existing resource management and recreational opportunities following motorized use restrictions that already exist as of 2011, with management emphasis on conflict prevention and response (page 41). However, under current conditions, grizzly bears from the NCDE have still not connected to the Greater Yellowstone Ecosystem via Zone 2 or any other route (Haroldson et al. 2010). It seems unlikely then that bears will move through Zone 2 in the future if they have not done so already without significant improvements in habitat protections. Though current protections for other species such as elk may provide some habitat protections for grizzly bears, their long-term persistence on a landscape overlapping significant human

densities may “require extraordinary management beyond that normally applied to most ungulates and/or black bears” (Procter et al. 2012). There are currently no bear-based habitat standards in place in Zone 2.

One of the Demographic and Genetic Management Goals stated in the GBCS is to “maintain genetic linkage opportunities between the NCDE south toward Yellowstone with consistent grizzly bear presence in these intervening areas” (page 37) (emphasis added). The Forest Service has not demonstrated that grizzly bears currently have a “consistent presence” in these intervening areas in Zone 2 (see Figures 1 and 2). If we are to realize this goal, then significantly more well-distributed male grizzly bears will need to occupy this area to ensure that a few can successfully migrate to (and breed within) the GYE. Serveen et al. 2001 pointed out that “[f]or carnivores to get between ecosystems they require habitats that can support their feeding and behavioral needs in these intervening areas” and that “[l]inkage zones are areas that will support low density carnivore populations often as seasonal residents – they are not just travel areas.” (Serveen et al. 2001, page 164). Furthermore, Zone 2 spans a large distance between the NCDE and GYE which likely requires longer term occupancy in these intervening areas if we ever hope to connect these two populations. There’s a 165 km distance between current occupied ranges for these populations which is more than 3 times the mean dispersal distance for male grizzly bears (males = 41.9 km, females =14.3 km) (Proctor et al. 2004). Linkage areas need to provide some degree of habitat security to achieve permanent and sustainable connectivity (Primm and Wilson, 2004) and therefore it is important to ensure Zone 2 has adequate habitat standards in place that will allow for seasonal occupation of grizzly bears, not just sporadic use by dispersing individuals.

Furthermore, Zone 2 contains a patchwork of public and private lands, with rapid development of private lands predicted in the coming years. Private lands often create mortality sinks (Schwartz, et. al. 2012); thus, grizzly bears will likely rely more heavily on the large blocks of contiguous public lands for security, requiring more rigorous habitat protections (not less) and placing ever-increasing importance on properly managed public lands to promote grizzly bear occupancy and connectivity. The Forest Service recognizes the Divide area of Zone 2 as a potential linkage zone in the Helena National Forest Divide Travel Plan DEIS (2014), and further acknowledges that increasing human development in the valley places “emphasis on NFS lands along the Divide mountain ranges to provide connectivity” (HNF DEIS p. 249). However, there is a lack of understanding as to how this region functions as a linkage area or provides for connectivity as stated in the HNF Divide DEIS: “More research is needed to reveal more precisely how this area may be functioning as a linkage zone” (p. 250). We recommend that the USFS assess the general status of habitat security and potential for connectivity throughout Zone 2 and consider modeling efforts already conducted to identify, map, and manage linkage habitats essential to grizzly bear movement between ecosystems.

Schwartz et al. (2010) found that open motorized route density, secure habitat, developed sites, and the amount of time bears spent in areas open to ungulate hunting were the best predictors of grizzly bear survival in the GYE. These models were used to spatially depict areas of risk and define source/sink habitats in areas of otherwise good habitat (see Figures 6 and 7) to guide resource management. We

recommend a similar assessment of current habitat security and grizzly bear survival/mortality risk in Zone 2 using such a model to identify areas of low mortality risk (i.e. with suitable habitat protections), as well as areas of high mortality risk where management standards can be improved. In high risk (or "sink") areas we strongly recommend an emphasis on resource management aimed at reducing motorized route densities and use as well as site development restrictions. In areas with adequate secure habitat (i.e. low mortality risk) we recommend standards aimed at maintaining current management direction and thus potential for grizzly bear occupancy and survival in the long term. Throughout all of Zone 2, we recommend the *prevention* of conflicts through proactive measures, rather than simply *reacting to* conflicts which typically results in dead bears. Grizzly bears are less likely to come in conflict with people if they have both secure and suitable habitat with adequate bear foods available to them (Gunther et al. 2004). Without this, there will most certainly be conflicts and thus, increased mortality of bears.

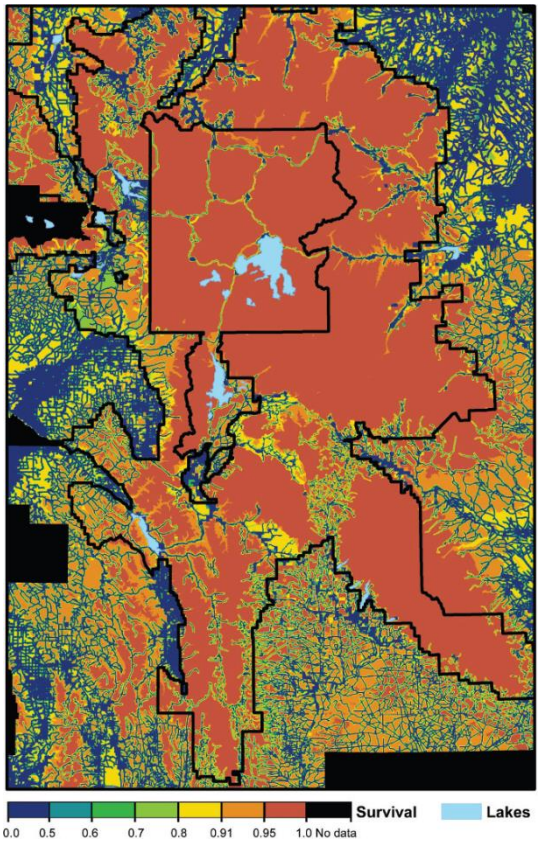


Figure 6. From Schwartz et al. 2010. Spatial variation in estimated probability of survival for a female grizzly bear in the GYE, 1983–2003. The model contains covariates describing sex, sample, winter season, open motorized-route density, secure habitat, the natural logarithm of total homes, developed sites, elevation, areas open to elk hunting, and an intercept term.

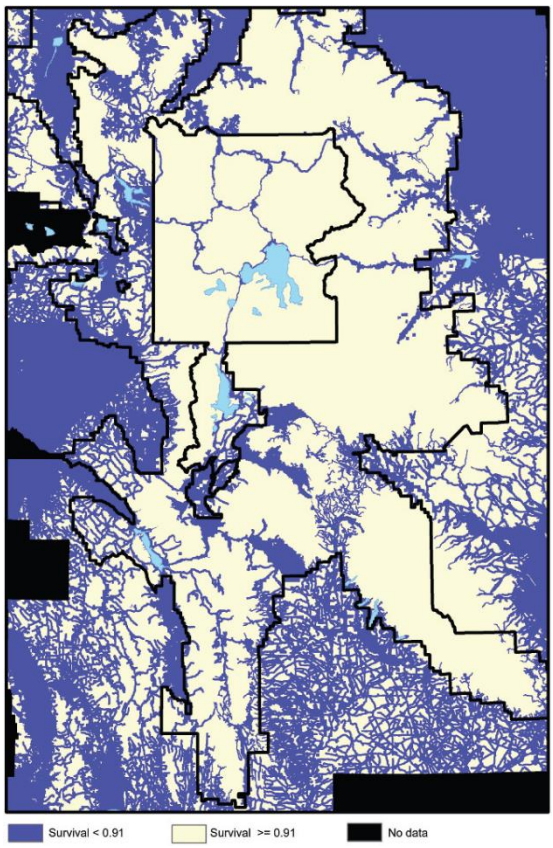


Figure 7. From Schwartz et al. 2010. An illustration of the source and sink habitats for the Greater Yellowstone Ecosystem grizzly bear population, 1983–2003. Source habitats (white) are areas where a female grizzly bear survival was ≥0.91, and sink habitats (blue) are areas where a female grizzly bear survival was ≤0.91.

Specific Recommendations for Zone 2

Based on the above corridor assessments and modeling results, Zone 2 or a portion of Zone 2 that is most likely to serve as an effective linkage area (based on current conditions or with improved habitat protections) for grizzly bears between the NCDE and GYE, should be designated as a Demographic or Genetic Connectivity Area, or managed as such. Specifically, we recommend special provisions that more closely resemble those suggested for the two existing Demographic Connectivity Areas (DCAs), including road density and site development restrictions to support grizzly bear occupancy and eventual dispersal to the GYE.

While we applaud the Forest Service for implementing the Standard NCDE-STD-WL 02, requiring Food/Wildlife Attractant Storage Special Order(s) on all NFS lands within the NCDE PCA, Zone 1, and Zone 2, we feel additional bear-based habitat standards and protections are essential for achieving the desired objective of functional connectivity between the NCDE and GYE populations.

Road Density, Site Development, & Human Use

As stated in the 1993 Grizzly Bear Recovery Plan, "Roads probably pose the most imminent threat to grizzly habitat today….the presence of open roads in grizzly habitat often leads to increased bear-human contact and conflict, and can ultimately end in grizzly mortality," (USFWS 1993).

The Forest Service must consider that roads (permanent or temporary, open or closed) and site development will increase human-bear conflicts and grizzly bear mortality and affect the potential for connectivity through this important linkage area. Both roads and development significantly contribute to habitat deterioration and fragmentation and are the two strongest predictors of grizzly bear survival/mortality on the landscape (Mace et al. 1996, Schwartz et al. 2010). Road density is also strongly related to secure habitat, which is critical to the survival and reproductive success of grizzly bears (Mattson et al. 1987; IGBC 1994; Schwartz et al. 2010) and is primarily achieved through motorized access management. As such, connectivity and secure habitat are often described in terms of open road density and large non-motorized habitat blocks.

Managing the landscape to reduce hazards to bears requires balancing road density standards with the amount of secure habitat available (Summerfield et al. 2004); "[I]f road densities become too great, secure areas become isolated islands surrounded by heavily roaded areas. Travel among secure islands then becomes more hazardous, effectively fragmenting the landscape" (Schwartz at al. 2010, page 661).

Open road densities above 1.0 mi/mi^2 and total road densities above 2.0 mi/mi^2 have been shown to suppress local habitat use by grizzly bears (Mace and Manley 1993). Secure habitat in Zone 2 is limited particularly in the Divide region of the HNF where open (1.69 mi/mi^2) and total (average = 2.07mi/mi^2) road densities are high (HNF Divide FEIS p. 280), and the proposed amendment does not include any standards or guidelines for limiting future increases in road density or motorized use. Though the Divide Landscape has not been identified or designated as a primary linkage zone (Servheen et al. 2003; Walker and

Craighead 1997), this is due mostly to "intense roading in the Helena National Forest" (Walker and Craighead 1998).

The U.S.F.S. Biological Assessment for Grizzly Bears on the Westside of Helena National Forest (2013) addressed "the potential for adverse effects of management activities to bears in those areas where they are known to occur both within the NCDE Recovery Zone and in the expanded Grizzly Bear Distribution Zone as a result of management activities described within the Helena National Forest Plan" (page 2). In their analysis they concluded that "implementation of the Forest Plan **"may affect and is likely to adversely affect grizzly bears"** in the Action Area. This determination is based on the following:

- Activities consistent with the Forest Plan direction could cause short-term displacement;
- The portion of the Action Area outside of the NCDE has moderate to high road densities and a lack of core habitat;
- Human-caused grizzly bear mortality has occurred in the area and the risk of mortality would remain moderate;
- As anticipated in the recovery plan (USDI-1993), bears seem to be expanding their range outside the recovery zones (Kendall et al. 2009, Mace et al. 2012);" (page 34).

Similarly, the Butte Ranger District on the Beaverhead-Deerlodge National Forest (BDNF) has the highest level of motorized route densities in the state of Montana, in particular the Boulder River and Upper Clark Fork landscapes, which offer Security Core (summer) values of around 30%. Not surprisingly, these are also areas where NCDE grizzly bears moving south are not being detected, indicating a lack of occupancy (Supplement to the Biological Opinion on the Effects of the 2009 Revision of the Beaverhead-Deerlodge National Forest Land and Resource Management Plan on Grizzly Bears, May 28, 2013). Given high road densities in some portions of the HNF (as well as BDNF) any connectivity assessment should include a detailed analysis of how current road densities and a "no net increase" of open roads standard will contribute to grizzly bear occupancy and connectivity throughout Zone 2. To meet the standard of utilizing the "best available science," motorized access standards should be improved in some areas of Zone 2 to ensure consistent connectivity standards are applied on NFS lands. In the very least, a standard comparable to NCDE-Lincoln GA-STD-01, that "there shall be no net increase in miles of roads open to public motorized use on NFS lands above the baseline," should be implemented throughout Zone 2. As well, we also request inclusion of NCDE-DC-AR-02 and NCDE-STD-AR-05 pertaining to and limiting site development to one increase in baseline per decade throughout Zone 2. All Forest Plan Amendment standards (NCDE-STD-MIN-01 - NCDE-STD-MIN-07) and guidelines (NCDE-GDL-MIN-01 - NCDE-GDL-MIN-06) related to mining and oil and gas activities on NFS lands should also be considered for Zone 2, as well as a monitoring and mitigation plan (NCDE-MON-04) implemented for mineral activities associated with potential substantial effects to the grizzly bear population or its habitat. The DEIS should also evaluate the potential increase of recreation use throughout the plan area (including Zone 2) as a result of construction of new temporary or permanent roads associated with projects and how this may impact future use and survival of grizzly bears *throughout* Zone 2. Without

substantial mitigation efforts, impacts of roads on species and ecosystems persist and accumulate long after a road is no longer in use (Robinson et al. 2010); for example through the creation of permanent off-route trails, illegal OHV use, firewood collection, and dispersed camping. Thus, we recommend standards that require any temporary roads associated with existing or future projects in Zone 2 be adequately removed after project completion following appropriate measures (see Loyd et al. 2013), so as to discourage continued illegal use of "closed" roads. We also ask that the Forest Service impose seasonal closures and/or vehicle restrictions, based on grizzly bears and other wildlife needs, on roads that remain open and enforce and prosecute illegal use of off-road vehicles. Efforts should also be directed towards improving the quality of habitat in site specific areas of habitually high conflicts and human-caused bear mortality and through increased sanitation measures, seasonal road or trail closures, decommissioning of roads, and public education and outreach.

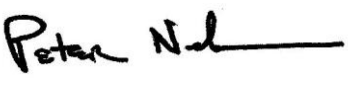
Inclusion of the Beaverhead-Deerlodge National Forest

Lastly, we request that the portion of the Beaverhead-Deerlodge National Forest (BDNF) that lies north of I-90 be included in this Forest Plan Amendment since it lies within Zone 2 of the NCDE, and to be consistent with the stated purpose: " to have an integrated set of plan direction consistent across the national forests that are part of the NCDE." In order to achieve a truly integrated and consistent plan direction for grizzly bear conservation all relevant forests should be included, and thus any suggestions pertaining to Zone 2 should also apply to the BDNF.

Conclusion

In closing, thank you for the opportunity to provide comments on the proposed Forest Plan Amendment to integrate the NCDE Grizzly Bear Conservation Strategy in to the forest plans for the NCDE National Forests. We are committed to ensuring that the GYE grizzly population remains robust and resilient through eventual linkage to the NCDE and other populations. While we are encouraged by the Forest's intent to facilitate connectivity between the NCDE and GYE and other populations through this Proposed Action, we feel there is need for improvement to truly achieve the long term goal of a connected, sustainable, and resilient Northern Rockies grizzly bear population. We request that the Forest Service commit to grizzly bear recovery based on a metapopulation structure by providing habitat protections that ensure grizzly bear connectivity between populations and based on the best available science. Thank you for your consideration of these comments.

Sincerely,



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Literature Cited

Boyce, M.S. 2000. Metapopulation analysis for the Bitterroot population. Appendix 21C. Pages 6-242 – 6-246 in Grizzly bear recovery in the Bitterroot ecosystem, Final Environmental Impact Statement. U.S. Fish and Wildlife Service, Missoula, MT, USA.

Boyce, M. S., B. M. Blanchard, R. R. Knight, and C. Servheen. 2001. Population viability for grizzly bears: a critical review. International Association for Bear Research and Management, Monograph Series 4.

Breitenmoser, U., C. Breitenmoser-Wurston, L. Carbyn, S. Funk. 2001. Assessment of carnivore reintroductions. In J. Gittleman, S. Funk, D. MacDonald, and R. Wayne (eds.) Carnivore conservation, pp. 241-281. Cambridge University Press.

Bureau of Land Management. 2006. Record of Decision and Approved Dillon Resource Management Plan. Dillon, Montana.

Carroll, C., Rohlf, D. J., Li, Y.-W., Hartl, B., Phillips, M. K. and Noss, R. F. (2015), Connectivity Conservation and Endangered Species Recovery: A Study in the Challenges of Defining Conservation-Reliant Species. Conservation Letters, 8: 132–138. doi: 10.1111/conl.12102

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

Craighead, A.C., E.A. Roberts, and F.L. Craighead. 2001. Bozeman Pass wildlife linkage and highway safety study. Progress Report. Craighead Environmental Research Institute. Bozeman, MT.

Craighead, F.L., and E. Vyse. 1996. Brown/grizzly bear metapopulations. In: D. McCullough (Ed.) Metapopulations and Wildlife Conservation Management. Island Press, Washington DC and Covelo CA. Chapter 14: pp. 325-351.

Cushman, S. A., K. S. McKelvey, J. Hayden, and M. K. Schwartz. 2006. Gene flow in complex landscapes: testing multiple hypotheses with causal modeling. The American Naturalist 168:486–499.

Cushman, S. A., McKelvey, K. S. and Schwartz, M. K. (2009), Use of Empirically Derived Source-Destination Models to Map Regional Conservation Corridors. Conservation Biology, 23: 368–376.

Dood, A. R., S. J. Atkinson, and V. J. Boccadori. 2006. Grizzly bear management plan for western Montana: Final programmatic environmental impact statement 2006-2016. Montana Department of Fish, Wildlife and Parks, Helena, Montana, USA.

Gunther, K. A. , M. A. Haroldson, K. Frey, S. L. Cain, J. Copeland, and C. C. Schwartz. 2004. Grizzly bear-human conflicts in the Greater Yellowstone ecosystem, 1992-2000. Ursus 15(1):10-22 Hanski, I. A. and M. E. Gilpin. 1997. Metapopulation biology: ecology and evolution. Toronto, Academic Press.

Haber, J., P. Nelson, R. Ament, G. Costello, W. Francis and M. Salvo. 2015. Planning for Connectivity: A guide to connecting and conserving wildlife within and beyond America's national forests. Available at: http://www.defenders.org/sites/default/files/publications/planning-for-connectivity.pdf

Haber, J., and P. Nelson. 2015. Planning for Diversity: A guide to national forest planning to conserve America's wildlife. Available at: http://www.defenders.org/sites/default/files/publications/planning-for-diversity.pdf

Hanski, I. 1999. Metapopulation ecology. Oxford University Press, Oxford, U.K. Harrison, S. 1994. Metapopulations and conservation. Pages 111-128 in P. J. Edwards, R. M. May and N. R. Webb, eds. Large-scale ecology and conservation biology. Blackwell Scientific Press, Oxford, U.K.

Haroldson, M. A., C. C. Schwartz, K. C. Kendall, K. A. Gunther, D. S. Moody, K. Frey, and D. Paetkau. 2010. Genetic analysis of individual origins supports isolation of grizzly bears in the Greater Yellowstone Ecosystem. Ursus 21:1–13. BioOne

Hedrick, P.W. 1996. Genetics of metapopulations: Aspects of a comprehensive prospective. In: D. McCullough (Ed.) Metapopulations and Wildlife Conservation Management. Island Press, Washington DC and Covelo CA. Chapter 3: pp. 29-51.

Hedrick, P.W., and M.E. Gilpin. 1996. Metapopulation genetics: Effective population size. In I. Hanski and M. Gilpin, (Eds.) Metapopulation dynamics: Ecology, genetics, and evolution. Academic Press, New York. Pp. 1-29.

Heller, N. E. and E. S. Zavaleta. 2009. Biodiversity management in the face of climate change: a review of 22 years of recommendations. Biological Conservation. 142(1): 14-32.

Interagency Grizzly Bear Committee. 1994. Interagency grizzly bear committee task force report: grizzly bear/motorized access management. Missoula, Montana, USA.

Interagency Grizzly Bear Committee. 2001. Support for the concept of linkage zones, signed memo.

Kasworm, W. F., H. Carriles, and T. G. Radandt. 2004. Cabinet-Yaak grizzly bear recovery area 2003 research and monitoring progress report. U.S. Fish and Wildlife Service, Missoula, Montana. 62 pp.

Krehbiel, R. 2015. Bears on the move: Challenges and Opportunities Associated with Grizzly Bear Connectivity in the Northern Rockies. M.S. Thesis. Sustainable Development and Conservation Biology, University of Maryland.

Lande, R. and G.F. Barrowclough. Effective population size, genetic variation, and their use in population management. Pp. 87-123. in M. Soule (ed.) Viable Populations for Conservation. Cambridge University Press. New York, New York.

Lloyd, R., K. Lohse, and TPA Ferré. 2013. Influence of road reclamation techniques on forest ecosystem recovery. Frontiers in Ecology and the Environment 11: 75 81. http://dx.doi.org/10.1890/120116

Mace, R. D, and T. L. Manley. 1993. South Fork Grizzly Study; Progress Report. Montana Department of Fish, Wildlife and Parks, Kalispell, Montana.

Mace, R. D., and J. S. Waller, T. L. Manley, L. J. Lyon, and H. Zuuring. 1996. Relationships among grizzly bears, roads and habitat in the Swan Mountains, Montana. Journal of Applied Ecology 33:1395–1404.

Mattson, D. J., R. R. Knight, and B. M. Blanchard. 1987. The effects of developments and primary roads on grizzly bear habitat use in Yellowstone National Park, Wyoming. Pages 259-273 in Bears: their biology and management. Proceedings of the 7th International Conference on Bear Research and Management, Williamsburg, Virginia, USA.

Merriam, C.H. 1922. Distribution of grizzly bears in U.S. Outdoor Life 50:405-406. Miller, C.R., and L.P. Waits. 2003. The history of effective population size and genetic diversity in the Yellowstone grizzly (Ursus arctos): Implications for conservation. Proceedings of the National Academy of Sciences 100:4334-4339.

Montana's Comprehensive Fish and Wildlife Conservation Strategy. 2005. Montana Fish, Wildlife & Parks, 1420 East Sixth Avenue, Helena, MT 59620.

Montana Fish, Wildlife and Parks (MFWP). 2006. Grizzly Bear Management Plan for Western Montana. Final Programmatic Environmental Impact Statement 2006-2016.

Montana Fish, Wildlife and Parks (MFWP). 2013. Grizzly bear management plan for Southwestern Montana 2002-2013. Helena, Montana, USA.

Olimb, S. and E. Williamson. 2006. Regional habitat connectivity analysis: crown of the continent ecosystem. American Wildlands, Bozeman, MT. 29 pp. www.wildlands.org

Picton, H. D. 1986. A possible link between Yellowstone and Glacier grizzly bear populations. Int. Conf. Bear Res. and Mgmt. 6:7-10.

Primm, S. and S.M. Wilson, 2004. Re-connecting grizzly bear populations: Prospects for participatory projects. Ursus, 15:104-114.

Proctor, Michael F., D. Paetkau, B.N. Mclellan, G.B. Stenhouse, K.C. Kendall, R.D. Mace, W.F. Kasworm, C. Servheen, C.L. Lausen, M.L. Gibeau, W.L. Wakkinen, M.A. Haroldson, G. Mowat, C.D. Apps, L.M. Ciarniello, R.M.R. Barclay, M.S. Boyce, C.C. Schwartz, C. Stobeck. 2012. Population Fragmentation and Inter-Ecosystem Movements of Grizzly Bears in Western Canada and the Northern United States. Wildlife Monographs 180:1-46.

Proctor M., B. McLellan, D. Paetkau, C. Servheen, W. Kasworm, K. Kendall, G. Stenhouse, M. Boyce, and C. Strobeck. 2005. Delineation of sub-population boundaries due to anthropogenic fragmentation of grizzly bears in southwest canada and northwest usa using genetic analysis. Oral presentation. International Bear Association 16th annual conference. Trentino, Italy.

Proctor M., B. McLellan, C. Strobeck, R. Barclay. 2004. Gender-specific dispersal distances of grizzly bears estimated by genetic analysis. Canadian Journal of Zoology 82:1108-1118, 10.1139/z04-077.

Robinson, C., P.N. Duinker, and K.F. Beazley. 2010. A conceptual framework for understanding, assessing, and mitigating ecological effects of forest roads. Environmental Reviews 18:61–86.

Schwartz, C. C., P. H. Gude, L. Landenburger, M. A. Haroldson and S. Podruzny. 2012. Impacts of rural development on Yellowstone wildlife: linking grizzly bear Ursus arctos demographics with projected residential growth. Wildlife Biology 18: 246-257.

Schwartz, C. C., M. A. Haroldson, G.C. White. 2010. Hazards Affecting Grizzly Bear Survival in the Greater Yellowstone Ecosystem. Journal of Wildlife Management 74(4):654-667.

Servheen C., J.S. Waller, and P. Sandstrom. 2001. Identification and Management of Linkage Zones for Wildlife between the Large Blocks of Public Land in the Northern Rocky Mountains.

Servheen, C., J.S. Waller, and P. Sandstrom. 2003. Identification and management of linkage zones for wildlife between the large blocks of public lands in the northern Rocky Mountains. Updated July 8, 2003. USDI, Fish and Wildlife Service, Missoula, MT.
www.cfc.umt.edu/research/MFCES/programs/GrizzlyBearRecovery/Linkages_Report_2003.pdf

Soulé, M.E., editor. 1987. Viable populations for conservation. Cambridge University Press, New York.

Summerfield, B., W. Johnson, and D. Roberts. 2004. Trends in road development and access management in the Cabinet–Yaak and Selkirk grizzly bear Recovery Zones. Ursus 15:115–122.

USDA Forest Service. 2013. Biological assessment for grizzly bears on the west side of the Helena National Forest. Unpublished agency document, on file. Helena National Forest. Helena, MT.

USDA Forest Service. 2014. Divide Travel Plan DEIS. Helena Ranger District, Helena National Forest, Helena, MT

USDA Forest Service. 2014. Divide Travel Plan FEIS. Helena Ranger District, Helena National Forest, Helena, MT

US Fish and Wildlife Service. 1993. Grizzly bear recovery plan. Missoula, MT.

U.S. Fish and Wildlife Service. 2007. Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area.

U.S. Fish and Wildlife Service. 2011. Grizzly Bear (Ursus arctos horribilis) 5-Year Review: Summary and Evaluation. Missoula, MT.

U.S. Fish and Wildlife Service. 2013. Northern Continental Divide Ecosystem Grizzly Bear Conservation Strategy-Draft.

Walker, R. and L. Craighead. 1997. Analyzing wildlife movement corridors in Montana using GIS. Report No. 11, American Wildlands. http://www.wildlands.org

Walker, R. and L. Craighead. 1998. Corridors: key to wildlife from Yellowstone to Yukon. Pages 113-121 in L. Wilcox, B. Robinson, A. Harvey (editors). A Sense of Place: An Atlas of Issues, Attitudes, and Resources in the Yellowstone to Yukon Ecoregion. Yellowstone to Yukon Conservation Initiative. Cranmore, Alberta.

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Dear Director Ashe,

The Greater Yellowstone Coalition (GYC) appreciates the opportunity to provide comments regarding the U.S. Fish and Wildlife Service's (USFWS or FWS) listing of wolverines on the Federal List of Endangered and Threatened Wildlife. GYC is a regional conservation organization based in Bozeman, MT, with offices in Idaho Falls, ID and Cody and Jackson, Wyoming and over 27,000 supporters from within the Northern Rockies and across the country. Because of our history of work in petitioning for the listing of wolverine and the importance of the Greater Yellowstone Ecosystem (GYE) as climate refugia for wolverines, we have a strong interest in wolverine listing. For our members, wolverines are the emblem of wildness of Greater Yellowstone, and listing the wolverine should have significant conservation benefits for the wolverine.

GYC supports the USFWS determination in the 2010 12-month finding[1] and in this listing proposal[2] that the wolverine population in the lower 48 states meets both the discreteness and significance criteria and is a listable entity under the Endangered Species Act (ESA) as a Distinct Population Segment (DPS). Section 1533(b)(1)(A) of the ESA directs that determinations as to whether a species is endangered or threatened must be made ''solely on the basis of the best scientific and commercial data available.'' The best available science and the proposed listing rule supports the conclusion that the wolverine is an imperiled species and that the primary

[1] 75 FR 78030-78061

[2] 78 FR 78630-7890

threats to the wolverine population loss of habitat and threats associated with climate change. FWS must therefore list the wolverine as a threatened or endangered species under the ESA.[3]

In addition to supporting the listing proposal, we would like to provide further comment on the proposal as summarized below:

1) Climate change threats and suitability of the GYE
2) Effects of small population size
3) Determination of Critical Habitat
4) Precautionary principle and agencies requirement to provide benefit of the doubt to species
5) Assessment of 4(d) rule
6) FWS assessment of habitat impacts due to human use and disturbance
7) Mitigation measures, and;
8) Ensuring continuity with previous federal agency actions

Climate change threats and suitability of the GYE

GYC supports listing wolverines on the basis that climate change is the primary threat to the species. The best available science has documented the threat of climate change to wolverines and how it currently threatens wolverines through loss of snowpack in suitable habitat, loss of habitat critical to biological functions, and shrinking functional movement corridors.[4,5] Wolverines require spring snowpack which is the only studied habitat condition that fully corresponds with known denning sites, according to research by U.S. Forest Service scientists.[6] Wolverines are also vulnerable in a second way, in that, as adequate spring snow becomes restricted to only higher elevations, wolverines could become isolated in smaller areas, making it more difficult for wolverines to disperse into new territory—reducing the chances for genetic exchanges among different populations.[7,8] The small population size of wolverines increases risk from climate change and challenges connectivity. Functional connectivity is a combination of

[3] 16 U.S.C. 1531 et seq.

[4] McKelvey, K.S., J.P. Copeland, M.K. Schwartz, J.S. Littell, K.B. Aubry, J.R. Squires, S.A. Parks, M.M. Elsner, and G.S. Mauger. 2011. Climate change predicted to shift wolverine distributions, connectivity, and dispersal corridors. Ecological Applications, 21:2882-2897.

[5] Copeland, J.P., K.S. McKelvey, K.B. Aubry, A. Landa, J. Persson, R.M. Inman, J. Krebs, E. Lofroth, H. Golden, J.R. Squires, A Magoun, M.K. Schwartz, J. Wilmot, C.L. Copeland, R.E. Yates, I. Kojola, and R. May. 2010. The bioclimatic envelope of the wolverine (Gulo gulo): do climatic constraints limit its geographic distribution? Canadian Journal of Zoology 88: 233-246.

[6] K. B. Aubry, K. S. McKelvey, and J. P. Copeland, "Distribution and broadscale habitat relations of the wolverine in the contiguous United States," Journal of Wildlife Management, vol. 71 (2007), pp. 2147–2158, p. 2151.

[7] Schwartz, M.K., J.P. Copeland, N.J. Anderson, J.R. Squires, R.M. Inman, K.S. McKelvey, K.L. Pilgrim, L.P. Waits, and S.A. Cushman. 2009. Wolverine gene flow across a narrow climatic niche. Ecology 90:3222-3232.

[8] Murphy, K., J. Wilmot, J. Copeland, D. Tyers, J. Squires, R. M. Inman, M. L. Packila, D. McWhirter. 2011. Wolverine conservation in Yellowstone National Park: Final report. YCR-2011-02. National Park Service, Yellowstone National Park, Yellowstone Center for Resources, Wyoming. Pg. 42.

population distribution and dispersal, which the above threats from climate change will predictably impede.

Confounding our understanding of climate change, many models used to predict future shifts in temperature have underestimated greenhouse gas emissions, including the model relied upon in the USFWS analysis and cited above (McKelvey et. al. 2011). The authors in that study conclude that wolverine habitat may shrink by an estimated 63% by the end of the century. The most aggressive model used by McKelvey et al. -- using high temperature increases of miroc 3.2 -- projected nearly 90 percent reduction in habitat by the end of the century and may be the more accurate projection. Climate change has already impacted wolverine habitat, and future effects are likely worse than projected." The threat from climate change is imminent, and there are no meaningful plans to address or reduce the effects of climate change or change its course over the next 20 years.

A significant change in climate has already occurred in Wyoming and other parts of the GYE with trends towards warmer mean temperatures, reduced precipitation, increases in nighttime lows, and shifting low temperatures upwards in elevation. The remote areas of Yellowstone National Park have shown no immunity to these changes. For example, "Mammoth in Yellowstone National Park where 80% of years from 1978 to 2007 were >1 sd warmer than the 1895–1978 mean."[9] Human disruption of climate has been cited as the top threat to the GYE with significant impacts to fish, vegetation, and Yellowstone's iconic wildlife.[10] This disruption is particularly threatening to wolverines as the GYE stands out as being some of the most resilient future habitat against climate change for the species in the lower 48. Furthermore, there is no indication that climate change will be abated or reversed.

The GYE has significant topographic diversity with more microclimates that mean more options for conserving a species with the threats of climate change. The GYE also should be conserved as an area that can support wolverine populations as a potential ''source'' population because in that it can provide surplus individuals through reproduction. The large expanse of protected federal lands and the significant topographic diversity of the GYE validate the need maintaining protected corridors to this ecosystem so it can function as a source population. Research supports the need to protect these source populations as they become more isolated as cited above (Aubry et. al. 2007). See also: Appendix A: Wolverines (*Gulo gulo*): A Metapopulation Dependent on "Linkage."

The proposal states: "While we acknowledge that listing will not have a direct impact on the loss of deep, persistent, late spring snowpack or the reduction of greenhouse gases, we expect that it will indirectly enhance national and international cooperation and coordination of conservation efforts, enhance research programs, and encourage the development of mitigation measures that

[9] Shuman, B. 2012. Recent Wyoming temperature trends, their drivers, and impacts in a 14,000-year context. Climatic Change 112, no.2: 429-447.

[10] Saunders, S., Findlay, D. and T. Easterly. 2011. Yellowstone in Peril: The Threats of Climate Disruption. The Rocky Mountain Climate Organization. http://www.greateryellowstone.org/uploads/YellowstoneInPeril_final_web.pdf

could help slow habitat loss and population declines."[11] Since the listing proposal does not seek to restrict greenhouse gases or human impacts from other activities that may increase the impacts from climate change, then the USFWS should encourage activities that may help alleviate the impacts to wolverines, and should fully describe the impacts and plan to reduce them in the final rule.

The USFWS should also consider the potential that reduced snowpack and other effects of climate change will lead to the concentration of human recreational areas in suitable wolverine habitat, increasing the effects of the above human activities on wolverines.

Small Population Size

The Service acknowledges that "demographic stochasticity and loss of genetic diversity due to small effective population sizes is a threat to wolverines when considered cumulatively with habitat loss due to climate," and we agree.[12]

The most recent population estimate for the western United States is approximately 310 individuals with a population capacity estimate of 580 individuals (Inman 2013). Additionally, genetic sampling suggests the minimum effective population size (did not include samples from all areas of known and likely distribution) has been estimated at 35 individuals (95% credible limits 28–52; Schwartz et al. 2009). These two studies in combination suggest two conclusions: First, populations are currently well below, nearly 50%, of what the available habitat could support, and second, the isolated nature of wolverines and suitable habitat are currently not well connected in a metapopulation. When combined with current and future climate shifts, these concerns will only be further exacerbated.

It is therefore prudent for the USFWS to list the wolverine as threatened, and further, to demonstrate in the final rule how a network of suitable reproductive habitat for wolverines will be maintained. As outlined in the following sections, it is unreasonable for the USFWS to determine that there are no impacts associated with further fragmentation of connectivity due to human activities of transportation corridors and development. Protecting natural areas in habitat suitable for wolverine dispersal and in current known areas of dispersal should be achieved in the final listing rule.

Determination of Critical Habitat

Under the ESA, the USFWS is directed "to the maximum extent prudent and determinable" to designate critical habitat for listed species concurrently with listing. 16 U.S.C. § 1533(a)(3). Critical habitat designation can be determined at this time using the best available science and many of the studies cited in the proposed rule that demonstrate geographically suitable habitat, known occupancy, and dispersal corridors. The best available science regarding biological needs of the species, including the biologically significant areas (e.g., sites for denning and persistent

[11] 78 Fed. Reg. 7887

[12] 78 Fed. Reg. 7885

spring snowpack), are already known and discussed in the proposal: "Physical and biological features essential to the wolverine may include (1) Areas defined by persistent spring snowpack and (2) areas with avalanche debris (bottom of avalanche chutes where large trees, rocks, and other debris are swept) and talus slopes or boulder fields (debris piles of large rocks, trees, and branches) in which females can construct dens which provide security from large predators and buffer against wind and low temperatures." [13]

These areas are also known, are determinable, or can be modeled. FWS has access to information about all known den sites located within the DPS and decades of snowpack information showing where late spring snow persists and can be modeled to persist given climate change. Key linkage zones for wolverine connectivity are documented as well (Schwartz et al. 2009; McKelvey et al. 2011). Critical habitat designation should protect core areas and den sites occupied by wolverine, whether modeled or known, especially in areas outside protected National Parks and Wilderness Areas.

As mentioned throughout the proposed listing rule, the wolverine populations in the DPS "exist as small and semi-isolated subpopulations in a larger metapopulation that requires regular dispersal of wolverines between habitat patches to maintain itself."[14] Connectivity between isolated suitable habitats will be essential and limiting in the future, so designating dispersal habitat between these areas will be crucial for the long-term ability of the species to persist.

Within particular landscapes, there are clear connectivity linkage zones that likely provide vital dispersal habitat (Schwartz et al. 2009; McKelvey et al. 2011). There is a body of science on modeling and then defining dispersal corridors. Best available science techniques include circuit modeling and linkage mapping for species dispersal.[15] Additionally, recent research has cited the importance of the "Central Linkage Region," stating that the area between three major core areas of suitable habitat (an estimated 90% of the current population) is critical (Inman 2013). Maintaining occupancy of adult females and reproductive rates in this region would benefit metapopulation demographics and gene flow (Inman 2013). However, there is little known data on actual wolverine dispersal (aside from least resistance paths) from areas of high elevation to other islands of high elevation. Determining critical habitat should be updated with knowledge of the types of landscapes and forest stands important for reproduction, movement, dispersal, and general home range use by wolverines.

Currently unoccupied but suitable habitat should also be designated, as recovery should involve the expansion of wolverines to all suitable habitats, including habitat that will likely maintain spring snowpack into the future. These areas have been modeled and documented by numerous researchers (McKelvey at al. 2011; Copeland et al. 2010). Indeed, some areas appear to rise above others in their ability to buffer against climate change, such as the Greater Yellowstone Ecosystem. Critical habitat should include protections for these key areas of climate refugia.

Under 50 C.F.R. § 424.12(a)(1), critical habitat designation is prudent since designation would not threaten the species, but rather would benefit wolverines. As the designation process includes

[13] 78 Fed. Reg. 7889
[14] 78 Fed. Reg. 7886

peer-review and public comment, this valuable process will further be of benefit. The benefits of critical habitat designation also include additional regulatory certainty - that wolverine habitat will have protections, and that those utilizing wolverine habitat must prevent destruction or adverse effects to habitat. See 16 U.S.C. § 1536(a)(2). Adoption of an approach similar to the Lynx Conservation Assessment Strategy may be appropriate in identifying specific habitat modification limits. Furthermore, USFWS must issue a Biological Opinion if the proposed action may affect critical habitat and the Biological Opinion must contain reasonable and prudent alternatives to avoid any action resulting in the adverse modification of critical habitat. See 50 C.F.R. § 402; 16 U.S.C. § 1536 (b)(3)(A). The analysis of effects to critical habitat "is a separate and different analysis from that of the effects to the species, and may provide greater regulatory benefits to the recovery of a species than listing alone."[16] In addition, critical habitat designation will bring increased awareness as well as funds to the region: "Designation of critical habitat serves to educate landowners, State and local governments, and the public regarding the potential conservation value of an area. This helps focus and promote conservation efforts by other parties by clearly delineating areas of high conservation value for the affected species." [17]

Work to restore a wolverine population to Colorado and subsequent monitoring of this relocation through GPS (Global Positioning Systems) transmitters should be used to validate movement paths and linkage corridors and refine critical habitat designation as wolverines disperse from relocation areas. Using the lynx (*Lynx Canadensis*) restoration efforts in Colorado as an example, it can be expected that a long-range disperser such as the wolverine will embark on long distance migration from Colorado contributing to the genetics of the population of wolverines in the GYE and greatly increasing our knowledge on movement. For example, 8 lynx from Colorado of 218 relocated have dispersed into the GYE.[18] GYC is generally supportive of restoration/relocation efforts in Colorado and realize that critical habitat is not designated for the 10(j) area. Although these separate recovery plans are outside of the geography and our advocacy efforts for the GYE, they should bolster GYE populations eventually by dispersal. We are concerned that the source population for animals relocated should not be from the GYE population.

If USFWS chooses not to designate critical habitat simultaneously with the final listing rule, we urge the agency to do so in a timely manner following the listing rule's release.

Precautionary principle and agencies requirement to provide benefit of the doubt to species

In listing the wolverine, the Fish and Wildlife Service should follow the rule of "institutionalized caution" enveloped by the Endangered Species Act throughout the listing rule. See, e.g., Tennessee Valley Authority v. Hill, 437 U.S. 153, 194 (1978) ("Congress has spoken in the plainest of words, making it abundantly clear that the balance has been struck in favor of

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[16] 74 Fed. Reg. 8624

[17] 74 Fed. Reg. 8647

[18] Least-Cost Corridor Analysis for Evaluation of Lynx Habitat Connectivity in the Middle Rockies - Bates, Jones - 2007

affording endangered species the highest of priorities, thereby adopting a policy which it described as 'institutionalized caution.'"); Sierra Club v. Marsh, 816 F.2d 1376, 1383 (9th Cir. 1987) (same). In following this paradigm, the agency must utilize the best available science, giving the benefit of the doubt to the species. See Conner v. Burford, 848 F.2d 1441, 1454 (9th Cir. 1988). Courts have found that this principle applies to listing of species and specifically requires providing the benefit of the doubt to protecting species when information is incomplete or uncertain. See Miccosukee Tribe of Indians of Fla. v. U.S., 566 F.3d 1257, 1267 (11th Cir. 2009) ("agencies, including the Service, cannot hide behind uncertain scientific data to shirk their duties under the Act."); Ctr. for Biological Diversity v. Lohn, 296 F.Supp.2d 1223, 1239 (W.D. Wash. 2003), *rev'd on other grounds*, 483 F.3d 984 (9th Cir. 2007) ("To deny listing of a species simply because one scientific field has not caught up with the knowledge in other fields does not give the benefit of the doubt to the species and fails to meet the best available science requirement"). Indeed, "a tie in the evidence should go to the species. . . ." Rock Creek Alliance v. U.S. Fish and Wildlife Serv., 390 F.Supp.2d 993 1008 (D. Mont. 2005).

In the USFWS's analysis of impacts of human use and disturbance it has neither given the 'benefit of the doubt" or used precautionary principles concerning effects to wolverines. For example, the USFWS is quick to conclude that there is no impact to wolverines from recreation, despite the lack of evidence to support this conclusion. The agency acknowledges that "[n]o rigorous assessments of anthropogenic disturbance on wolverine den fidelity, food provisioning, or offspring survival have been conducted."[19] In fact, in the single study examined -- preliminary results of a multi-year study -- one could conclude that recreation could be impacting denning success.[20] For instance, one female monitored for 3 years in a landscape with significant human recreational activity has attempted to den but failed in the first year and has not denned in the subsequent 2 years of monitoring.[21]

Additionally, the small sample size of the study (6 females) that the agency relies upon should cast doubt on the generality of the findings. The principle authors of the study even cite that the results are preliminary and more research is required: "In order to significantly advance our understanding of the potential effects of winter recreation on wolverines, we need to both continue to monitor additional wolverines in other highly recreated landscapes. We are currently working to identify additional study areas with wolverines and relatively high levels of recreation . . . We especially lack sufficient data (recreation and wolverine) in areas with intense, high levels of recreation."[22]

Further, past efforts to analyze the impacts of human use have cited the possibilities of failed denning and den abandonment.[23] Relying upon preliminary and individual studies to conclude

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[19] 78 Fed. Reg. 7878

[20] Heinemeyer, K. and J. Squires. 2012. Idaho Wolverine – Winter Recreation Research Project: Investigating the Interactions between Wolverines and Winter Recreation 2011-2012 Progress Report. 26pps.)

[21] Id. (Table 3)

[22] Id. (pg. 18)

[23] Carroll et al. 2001, Rowland et al. 2003, May et al. 2006, Copeland et al. 2007, Krebs et al. 2007

that recreation has no impact on wolverines falls far short of giving the benefit of the doubt to the species. With the lack of information, the agency must not draw such a sweeping conclusion and should acknowledge that recreation may negatively impact wolverines. The agency may also state the need for additional studies and information in order to make a more definitive conclusion in the future as more information becomes available. At this point in time, the conclusion of no impact is clearly not supported by the best available science.

Additionally, wolverines near human disturbance are likely changing their behavior and activity level in response to human disturbance. As noted in the proposed listing, "Preliminary evidence suggests that wolverines can coexist amid high levels of dispersed motorized and nonmotorized use, possibly shifting activity to avoid the most heavily used areas within their home ranges."[24] As evidenced with different species, these behavioral changes caused by an animal's response to human recreational activity can negatively affect individuals' vital rates.[25]

Similarly, the Service drew strong conclusions regarding the impacts of transportation corridors. Little research has changed between 2010 and 2013, yet a different tone and conclusion is drawn regarding human impacts to wolverines. The following is text regarding possible impacts to wolverines from transportation taken from the 2010 12-month finding that no longer occur in the 2013 proposed listing:

"Transportation corridors provide access to areas otherwise not affected by humans, which exacerbates the effects of human disturbance from a variety of activities. Outside of wolverine habitat, transportation corridors may affect wolverines if they present barriers to movement between habitat patches or result in direct mortality to dispersing wolverines. Because wolverines are capable of making long-distance movements between patches of suitable habitat, transportation corridors located many miles away from wolverine home ranges may affect their ability to disperse or recolonize vacant habitats after local extirpation events."

If the Fish and Wildlife Service wishes to change its tune regarding the potential impacts that transmission corridors may have on wolverines, the agency must explain the rationale behind the new determination. See, e.g., Bush-Quayle '92 Primary Committee, Inc. v. Fed. Election Comm'n, 104 F.3d 448, 453 (D.C. Cir. 1997); Louisiana Public Service Comm'n v. Fed. Energy Reg. Comm'n, 184 F.3d 892, 897 (D.C. Cir. 1999); Rock Creek Alliance v. U.S. Fish and Wildlife Serv., 390 F.Supp.2d 993, 1010 (D. Mont. 2005). This is especially true, whereas here, there has been no new information upon which the agency can rely to support its sudden shift in opinion.

How roads act as barriers to movements currently may be different than how roads are barriers in response to climate change. In one study, human development was found to be more a more important factor for home range location than habitat alone, and habitat selectivity was higher in

[24]78 Fed. Reg. 7888

[25]Creel et.al. 2002. Snowmobile Activity and Glucocorticoid Stress Responses in Wolves and Elk. Conservation Biology, Vol. 16 #3, pgs. 809-814.

undeveloped habitats.[26] Wolverines have crossed major highways (e.g., Interstate 80 for animal that traveled from Greater Yellowstone Ecosystem to Colorado in 2009; 43 crossings of U.S. or state highways by 12 individuals in the Greater Yellowstone area during 2000- 2007). To do so may require a behavioral response in dial activity, such as moving when traffic volumes are lower. Road mortalities do occur and are of concern with a low-density species. Some female home ranges are bounded by road systems, suggesting they are not inclined to cross. These behavioral responses may have costs beyond direct mortality in the function of connectivity, availability of preferred habitats, and caloric expenditures. Listing of the wolverine should channel more resources and attention to mitigating the impacts of roads on wolverines in the form of functional safe wildlife passages, such as highway underpasses and overpasses.

Assessment of 4(d) Rule

Section 4(d) of the ESA allows FWS to "issue such regulations as he deems necessary and advisable to provide for the conservation of [threatened] species." 16 U.S.C. § 1553(d). Further, "[t]he Secretary may by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1), in the case of fish or wildlife." Id. FWS proposes a "Special Rule Under Section 4(d) of the Act" here, but the 4(d) Rule as proposed fails to accomplish the stated purpose of Section 4(d) of the Act: "to provide for the conservation of" the wolverine.

A. The Language of the 4(d) Rule.

The 4(d) Rule proposed by FWS "would prohibit take of any wolverine in the contiguous United States when associated with or related to trapping, hunting, shooting, collection, capturing, pursuing, wounding, killing, and trade."[27] It further clarifies that "any activity where wolverines are attempted to be, or are intended to be, trapped, hunted, shot, captured, or collected, in the contiguous United States, will be prohibited."[28] "It will also be prohibited to incidentally trap, hunt, shoot, capture, pursue, or collect wolverines in the course of otherwise legal activities."[29]

Additionally, the 4(d) Rule notes that "[a]ll otherwise legal activities involving wolverines and their habitat that are conducted in accordance with applicable State, Federal, tribal, and local laws and regulations are not considered to be take under this regulation."[30] This take exemption includes activities laid out in the Rule, such as dispersed recreation, logging, prescribed fire, mining, infrastructure development, transportation corridors, and urban development.

B. The Purpose of Section 4(d) is to Allow FWS to Strengthen Protections for Threatened Species, Not Limit Them.

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[26] May, R., A. Landa, J. van Dijk, J.D.C. Linnell, and R. Andersen. 2006. Impact of infrastructure on habitat selection of wolverines *Gulo gulo*. Wildlife Biology 12:285–295.

[27] 78 Fed. Reg. 7863, 7888.

[28] Id.

[29] Id.

[30] Id.

Section 9(a)(1)(B) prohibits the "take" of any species listed as endangered under the ESA. 16 U.S.C. § 1538(a)(1)(B). "Take" is defined broadly to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engaged in any such conduct." Id. § 1532(19). The ESA originally limited this take prohibition to threatened species, but provided that under Section 4(d) FWS could "by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1) . . . ." Id. § 1553(d). The purpose of Section 4(d) was to extend take prohibitions to threatened species where FWS "deem[ed] it necessary and advisable to provide for the conservation of [a threatened] species." Id.

Following passage of the ESA, however, the Fish and Wildlife Service promulgated regulations extending the take prohibition of Section 9(a)(1) to species listed as threatened. 50 C.F.R. § 17.31(a). Promulgation of this regulation was within the Fish and Wildlife Service's authority and eviscerated the need for the second part of Section 4(d) allowing the FWS to extend the take prohibition to threatened species. However, under Section 4(d), FWS can still issue regulations "necessary and advisable to provide for the conservation" of threatened species.

Rather than use Section 4(d) to extend additional protections to the wolverine that FWS deems "necessary and advisable" for the wolverine's conservation, FWS here uses 4(d) to limit the take prohibition on wolverines that is applicable under 50 C.F.R. Section 17.31(a). This completely undermines the purpose of Section 4(d) and the ESA, and FWS should therefore eliminate this 4(d) rule from the Final Listing Rule and allow that all take or wolverines is prohibited under 50 C.F.R. Section 17.31(a). Prohibitions under this Section would include take from any activity that harms or harasses wolverine, including incidental take from hunting or trapping.[31]
This approach would give the benefit of the doubt to wolverines and would exemplify the precautionary principle that should be afforded to listed species. See supra Pages 6-8.

Furthermore, this approach still grants FWS the discretion to grant incidental take permits for otherwise legal activities that result in incidental take of wolverines. 16 U.S.C. § 1539(a)(1)(B). However, it is important that FWS does not allow those who may cause incidental take to forego the incidental take permit process. This process would require the applicant to submit a conservation plan demonstrating ways minimize impacts to wolverines and laying out alternative actions to the proposed activity that may prevent harm to wolverines. Id. § 1539(a)(2)(A). Further, the process allows for an opportunity for public comment and then allows FWS to determine if a permit is appropriate. Id. § 1539(a)(2)(B).

For these reasons, we propose that FWS remove the 4(d) rule and rather clarify that 50 C.F.R. Section 17.31(a) applies to wolverines, and thus all take of wolverines is prohibited.
If FWS chooses to keep the 4(d) rule, the agency must complete a NEPA process with public and comment before approving and implementing the rule. See In re Polar Bear Endangered Species Act Listing and § 4(d) Rule Litigation, 818 F.Supp.2d 214, 234-37 (D.D.C. 2011). This may require completion of an Environmental Impact Statement.

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[31] Notably, intent is irrelevant under the ESA's prohibitions on take. See, e.g., Babbitt v. Sweet Home Chapter of Communities for a Great Oregon, 515 U.S. 687, 704 (1995); Nat'l Wildlife Federation v. Burlington Northern Railroad, 23 F.3d 1508, 1512 (9th Cir. 1994).

C. We Urge FWS to Retain the Prohibition on Legal Trapping and Incidental Take by Trapping.

In the event that FWS decides to retain the 4(d) Rule, we urge FWS to also retain the prohibitions on legal trapping and incidental take by trapping. We strongly support FWS's conclusions that legal trapping and incidental trapping, along with the cumulative impacts of climate change, is likely to threaten the conservation and recovery of the DPS.

Montana is the only state in the contiguous United States that still legally allows wolverine trapping. Wyoming, for example, classified the wolverine as a non-game species in 1977, prohibiting intentional shooting and trapping. Wolverines are especially vulnerable to targeted trapping due to their behavior of searching widely for available carrion. Wolverines in Montana appear to be no exception; in northern Montana, 15 of 18 wolverines studied in 1981 died as a result of trapping, and many of their other study animals had missing toes and broken teeth, presumably from leg-hold traps. [32] High trapping mortalities have also been documented in southwestern Montana. It has been suggested that a human caused mortality of only 7-8% would cause wolverine populations to decline. [33, 34]

As we noted above, trapping of wolverines is not permitted in Wyoming. Accidental trapping of wolverines and poaching, is assumed to occur in Wyoming, but the extent of such activities is unknown. Legal trapping of wolverines in Montana is believed to put wolverines in northern Wyoming at risk because wolverines travel over extensive areas and are likely to be in southern Montana at some point during their lives. Also, "because there appear to be very few wolverines in Wyoming, the persistence of the species in the state may depend largely on individuals dispersing southward from Montana." [35] The authors of this report went on to conclude that because of "typically low densities and reproductive rates, wolverine populations may not be able to persist under additional mortality from trapping, vehicle collisions, and other human activities." It's reasonable to conclude that high trapping mortality in Montana may translate into fewer wolverines in Wyoming and elsewhere in the contiguous United States where there is suitable wolverine habitat. We support the USFWS conclusions that "Harvest,when combined with the likely effects of climate change, may contribute to the likelihood that the wolverine will become extirpated in the future," [36] and thus the final rule must explicitly prohibit legal trapping.

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[32] Hornocker, M.G. and H.S. Hash. 1981. Ecology of the wolverine in northwestern Montana. Canadian Journal of Zoology 59:1286-1301.

[33] Banci, V. 1994. Wolverine. Pages 99-127 *in* L.F. Ruggiero, K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski, editors. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. USDA Forest Service General Technical Report RM 254.

[34] Weaver, J.L., P.C. Paquet, and L.F. Ruggiero. 1996. Resilience and conservation of large carnivores in the Rocky Mountains. Conservation Biology 10:964-976.

[35] Beauvais, Gary P., and Lain Johnson. Species Assessment for Wolverine (*Gulo Gulo*) in Wyoming. Rep. Bureau of Land Managment, Jan. 2004. Web. <http://www.blm.gov/pgdata/etc/medialib/blm/wy/wildlife/animal-assessmnts.Par.90309.File.dat/Wolverine.pdf>.

[36] 78 Fed. Reg. 7881.

We also urge FWS to retain the prohibition against incidental trapping of wolverines. Although reported incidental trapping rates are relatively low, the isolation and small local population numbers of wolverines make them especially vulnerable to mortality from incidental trapping. FWS recognizes this threat, noting that three mortalities caused by incidental trapping in recent years may be "locally significant for wolverines in these areas because local populations in each of the mountain ranges are small and relatively isolated from nearby source populations."[37]

Furthermore, it is likely that more incidental trapping cases have occurred over recent years than those that have been reported and are documented here. Although many trappers may abide by the rules and report all incidental trapping occurrences, there are likely trappers who do not take the time to report such incidents. Additionally, trappers may know that the wolverine has been a candidate species for listing under the ESA, which may act as a disincentive to reporting any incidental take of wolverines. We are concerned that prohibiting incidental take of wolverines will act as a further disincentive to reporting and thus we urge FWS to propose how to deal with these issues.

We also note here that at least one incidental trapping incident has not been documented in this Proposed Listing Rule. Idaho Department of Fish and Game personnel recently informed me that a wolverine was incidentally trapped in 2009.[38] Mr. White stated that the wolverine was caught in a foothold trap that was intended for a bobcat, and that the wolverine was outfitted with a radio-transmitter implant and released alive. It is unclear why this incident does not appear in the Proposed Listing Rule. In any event, we urge FWS to complete a more thorough inquiry as to incidental trapping through the range of the DPS to ensure that all known and reported incidents are captured in the Final Rule.

In order to minimize incidental take mortalities from trapping, FWS should keep this prohibition in place unless and until states can demonstrate that they have made changes in the form of regulatory mechanisms that will prevent incidental take. Memorandums of Understanding or other unenforceable promises should be deemed insufficient to meet this requirement. Such regulatory mechanisms may prohibit certain types of traps that are more likely to lead to incidental trapping of wolverines. States may also want to consider prohibiting trapping in certain high elevation areas inhabited by wolverines.

Additionally, FWS should ask that states reconsider their wolf trapping regulations, in recognition that wolf trapping may lead to increased occurrence of incidental wolverine trapping. It is premature to determine whether or not wolf trapping will lead to a dramatic increase in wolverine trapping, but FWS should require studies to determine the impact from wolf trapping regulations that allow trapping within the range of the wolverine DPS.

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[37] 78 Fed. Reg. 7863, 7881.

[38] Email correspondence with Craig White, Idaho Department of Fish and Game (May 1, 2013).

D. FWS Should Not Provide a Blanket Exemption for Other Activities that Result in Take of Wolverines.

As it stands, the 4(d) rule provides a blanket exemption for a number of activities that may result in take of wolverines, including logging, mining, prescribed fire, transportation corridors, transmission lines, urban development, and dispersed recreation. To allow these activities to continue in light of the impact they may have on this struggling wolverine DPS without any agency review is nonsensical. For the reasons stated above on pages 6-8 of these comments as repeated below, it is especially inappropriate to provide a blanket exemption for dispersed recreation.

FWS concludes in this Proposed Listing Rule that dispersed recreation does not harm wolverines. Remarkably, the agency draws this conclusion from three studies that say no such thing.[39] Even the three studies relied upon by the agency -- Heinemeyer & Copeland 1999, Heinemeyer et al. 2001, and Heinemeyer et al. 2012 -- note that the results of the studies are preliminary and that it would be premature to draw any definitive conclusions regarding the potential impact of dispersed recreation of wolverines from the studies. Nevertheless, the agency does just that.

The agency seems to hint that its conclusions are premature. For example, it notes that "[n]o rigorous assessments of anthropogenic disturbance on wolverine den fidelity, food provisioning, or offspring survival have been conducted."[40] "Little is known about the behavioral responses of individual wolverines to human presence, or about the species' ability to tolerate and adapt to repeated human disturbance."[41] "How or whether effects of disturbance extend from individuals to characteristics of subpopulations and populations, such as vital rates (e.g., reproduction, survival, emigration, and immigration) and gene flow, and ultimately to wolverine population or metapopulation persistence, remains unknown at this time."[42] The agency also recognizes that wolverine habitat is often characterized by a lack of human use and disturbance.[43] To draw a definitive conclusion of no harm in the face of all of this missing data is illogical.

To complicate matters further, some studies cited by FWS suggest that recreational use may indeed have an impact on wolverines. For example, some studies have shown that female wolverines have abandoned dens and relocated kits in areas experiencing recreational use.[44] Although direct causation was not clear in these studies, they are just as inconclusive as other studies that the agency relies upon to state there is no harm.

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[39] See 78 Fed. Reg. 7863, 7877-7878 (relying on three studies authored by Heinemeyer et al. to conclude that dispersed recreation does not harm wolverines.

[40] Id. at 7878.

[41] Id. at 7877.

[42] Id.

[43] Id.

[44] Id. at 7878 (citing Pulliainen 1968, p. 343; Myrberget 1968, p. 115; Magoun and Copeland 1998, p. 1316; Inman et al. 2007c, p. 71).

In fact, a common sense approach would suggest that dispersed recreation is likely to have an impact on wolverines. Over the past few decades, areas utilized by wolverines have experienced an explosion in recreational use. FWS even notes that "recreational use of wolverine habitat is heavy in some areas."[45] It is illogical to conclude that there is no impact on wolverines from dispersed recreation without the data to back this assumption.

To address this issue, we propose that FWS help fund studies to fill in some of the gaps in relation to the impacts from dispersed recreation on wolverines. Additionally, we urge the agency to prohibit dispersed recreation in high elevation an area utilized by wolverines and near known denning sites until more information is available.

Mitigation and Monitoring

It is crucial for the USFWS to move beyond theoretical mitigation measures on climate change and regulatory mechanisms and move toward implementation of effective enforceable systems. The most recent publication on climate change adaptation, , National Fish, Wildlife and Plants Climate Change Adaptation Strategy (NFWPCAS), with USFWS listed as a co-contributor, has numerous examples of effective measures that should be implemented to offset and adapt to the impacts of climate change.[46] However there is no indication how the agency would apply such measures in the proposed rule. Many of these listed strategies address our above-listed concerns and should be incorporated into the final conservation plan.

For example, our emphasis of designation of critical habitat and what landscapes are crucial to the species are clearly outlined in the report under Goal 1 (page 55). "Conserve habitat to support healthy fish, wildlife, and plant populations and ecosystem functions in a changing climate." This goal goes on to state, "we will need well-connected networks of conservation areas to allow for the movement of species in response to climate change," recognizing the need to protect important corridors and dispersal areas. Similarly, it states that "[a]nother challenge will be providing corridors between conservation areas so that species can freely move to new locations with suitable habitat. Protecting and restoring large blocks of habitat and using linkages and corridors to develop networks for movement will facilitate connectivity." Moreover, it guides agencies to "Conserve, restore, and as appropriate and practicable, establish new ecological connections among conservation areas to facilitate fish, wildlife, and plant migration, range shifts, and other transitions caused by climate change."

Some of the recommendations described as initial steps towards climate change adaptation have already been assessed for wolverine conservation. For example Action 1.1.1 (page 58), "identify and map high priority areas for conservation using information such as species distributions

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[45] Id.

[46] National Fish, Wildlife and Plants Climate Adaptation Partnership. 2012. National Fish, Wildlife and Plants Climate Adaptation Strategy. Association of Fish and Wildlife agencies, Council on environmental Quality, Great Lakes Indian Fish and Wildlife Commission, National oceanic and atmospheric administration, and U.S. Fish and Wildlife Service. Washington, DC.

(current and projected), habitat classification, land cover, and geophysical settings (including areas of rapid change and slow change)."

An area that we haven't discussed, but is critical for the source population of wolverines, is coordinating with Canada on wolverine management. The NFWPCAS report also lists this as a critical step in addressing climate change and species conservation in Strategy 3.2 (page 65): "Facilitate a coordinated response to climate change at landscape, regional, national, and international scales across state, federal, and tribal natural resource agencies and private conservation organizations."

As we cited in sections above, the USFWS must reduce impacts of non-climate factors like human disturbance, habitat fragmentation, and legal and incidental take that may cumulatively affect the species, especially when exacerbated by climate change. The NFWPCAS report puts similar emphasis on reducing non-climate stressors as a technique that has traditionally benefitted species prior to our knowledge on climate change in Goal 7 (page 76): "Reduce non-climate stressors to help fish, wildlife, plants, and ecosystems adapt to a changing climate." Strategy 7.4 (page 78) of this goal states "reduce destructive capture practices (e.g., fisheries bycatch, destructive fishing gear), over-harvesting and illegal trade to help increase fish, wildlife, and plant adaptation." This strategy should be implemented for wolverines on issues surrounding incidental take and currently legal harvest.

The NFWPCAS report even discusses the need for agencies to overcome reluctance for making difficult decisions and making the commitment to successfully implement mitigation strategies under Strategy 5.2 (page 90). "Successful implementation of this *Strategy* will take commitment and resources by government and non- government entities, and must include steps to formulate specific objectives, select and implement conservation actions, and evaluate, learn, and adjust our course of action as needed to achieve our goals in a changing world." We ask the Service to implement the Strategy's direction for adapting to climate change and believe the above measures should be implemented as enforceable regulatory mechanisms to benefit the species.

Beyond mitigation measures, an effective monitoring program that is designed at the metapopulaton level to inform specific management actions is crucial. (Inman 2013) The NFWPCAS report gives informed guidance on building a monitoring program into an adaptive management plan in Goal 4 (page 67): "Support adaptive management in a changing climate through integrated observation and monitoring and use of decision support tools." The goal states that, "monitoring systems, especially those that meet local to regional needs, will allow managers and other decision makers to evaluate the efficacy of management actions. International efforts are critical to monitor and track climate impacts on species that migrate to and depend on areas beyond U.S. borders." With a critically small population size and an even smaller sample size for much of the research conducted on wolverines, it is imperative for the USFWS to build and implement an effective monitoring program that is adequately funded to further discern the threats to the species.

Ensuring Continuity with Previous Agency Actions

In some cases there already exist examples where management agencies such as the USDA National Forest Service (USFS) has taken precautionary steps to avoid possible impacts from agency allowed actions to wolverines. For example, the USFS has listed wolverines as a sensitive species in Regions 1, 2, 4, and 6, which requires the agency to consider the consequences of management actions on wolverine habitat and populations in those Regions (USFS 1994). Under Forest Plans, quantifiable objectives are to be developed to identify and improve the status of Sensitive species. The USFS also has given direction on management considerations for wolverines in Chapter 6 of their report *The Scientific Basis for Conserving Forest Carnivores American Marten, Fisher, Lynx, and Wolverine in the Western United States.* The report makes a number of management recommendations. For example, the report states that "although there is insufficient information available to develop highly reliable conservation strategies, this should not deter management from developing conservative interim guidelines that will maintain future options," giving the benefit of the doubt to the species and directing conservative USFS guidelines.

We believe that the proposed action may dilute some of these well-intended agency decisions that gave consideration to wolverines and the impacts of proposed actions. The USFWS is seeking information on the current regulatory mechanisms and thus we felt it was relevant to review and incorporate current land management regulations that used wolverines as a determining factor in the final decision.

For example, in 2009 the Beaverhead-Deerlodge National Forest adjusted its Revised Forest Plan Final Environmental Impact Statement (FEIS) to minimize impacts to wolverine and its habitat. In the FEIS, the Forest Service explicitly identifies impacts such as displacement to numerous wildlife species including wolverines, and identifies specific potential impacts to female and young wolverines at their den, citing "increasing evidence" of such impact. (pages 48, 509, 513). The agency took steps in the final plan to minimize conflicts with wolverines between human uses and connect with other landscapes covered in the plan with wolverine habitat in outside of the Beaverhead-Deerlodge National Forest.

Similarly, in a USFS FEIS regarding heli-skiing in 2004, the Bridger-Teton and Caribou-Targhee National Forests included mitigation measures for heli-skiing related to wolverines.
"If a wolverine is sighted, a minimum of a 0.25 mile (1320 feet) vertical and 0.5 mile (2640 feet) horizontal clearance distance from aircraft flight paths will be maintained from the animal by will apply until a determination is made by biologists if the den is active and additional protections are necessary within the vicinity. The permittee is required by the permit to report any sightings of wolverine or suspected snow digging activity within 24 hours of making the observations. The Forest Service will work with the permittee to provide training on identifying wolverine tracks from the air so as to increase knowledge of wolverine activity in the SUP area. If sensitive areas are identified (such as den sites), these will be closed to all forms of winter recreation activities. All closed areas would become a permanent part of the special use permit" (page 50).

In the FEIS analysis of effects, it cited that "activities and environments across the affected area that could cumulatively be adverse to wolverines are: snowmobiling, non-guided backcountry skiing/snowboarding, out-of-bounds ski resort proposal at Teton Pass, and future highway work and traffic changes at Teton Pass" (page 49). Further it cited, "cumulative effects of snowmobiling, backcountry skiing, and heli-skiing may deter wolverines from denning in the permit area" (page 21). We urge the USFWS to ensure that the analysis of such impacts in the final listing decision not dilute previous agency decisions which acknowledged the potential impact on wolverines from recreation and other human disturbances and acted to protect the wolverine.

Conclusions

In summary, overall we support the USFWS efforts to list the wolverine as threatened under the ESA. We urge the USFWS to boldly act on the on the planning documents and directives that are currently in place, as cited in our comments. Using the best available science to locate key areas of dispersal or connectivity, USFWS should identify appropriate protective measures in the final listing rule and include regulatory protections and mitigation options such as wildlife over/underpasses, protective land designations, development restrictions that effectively promote and sustain wolverine movement and then work to implement such measures. There are a lot of well-intentioned plans and agency directives about implementing climate change adaptation measures and other actions, but there are few examples of agencies actually doing this. Most importantly, our interest is in maintaining the ecological integrity of the GYE and the best science available as demonstrated above and in the proposed rule shows the GYE being a key climate refuge for wolverines. The large expanse of protected federal lands and the significant topographic diversity of the GYE validate the need maintaining protected corridors to this ecosystem so it can function as a source population of wolverines for geographies that have fewer options.

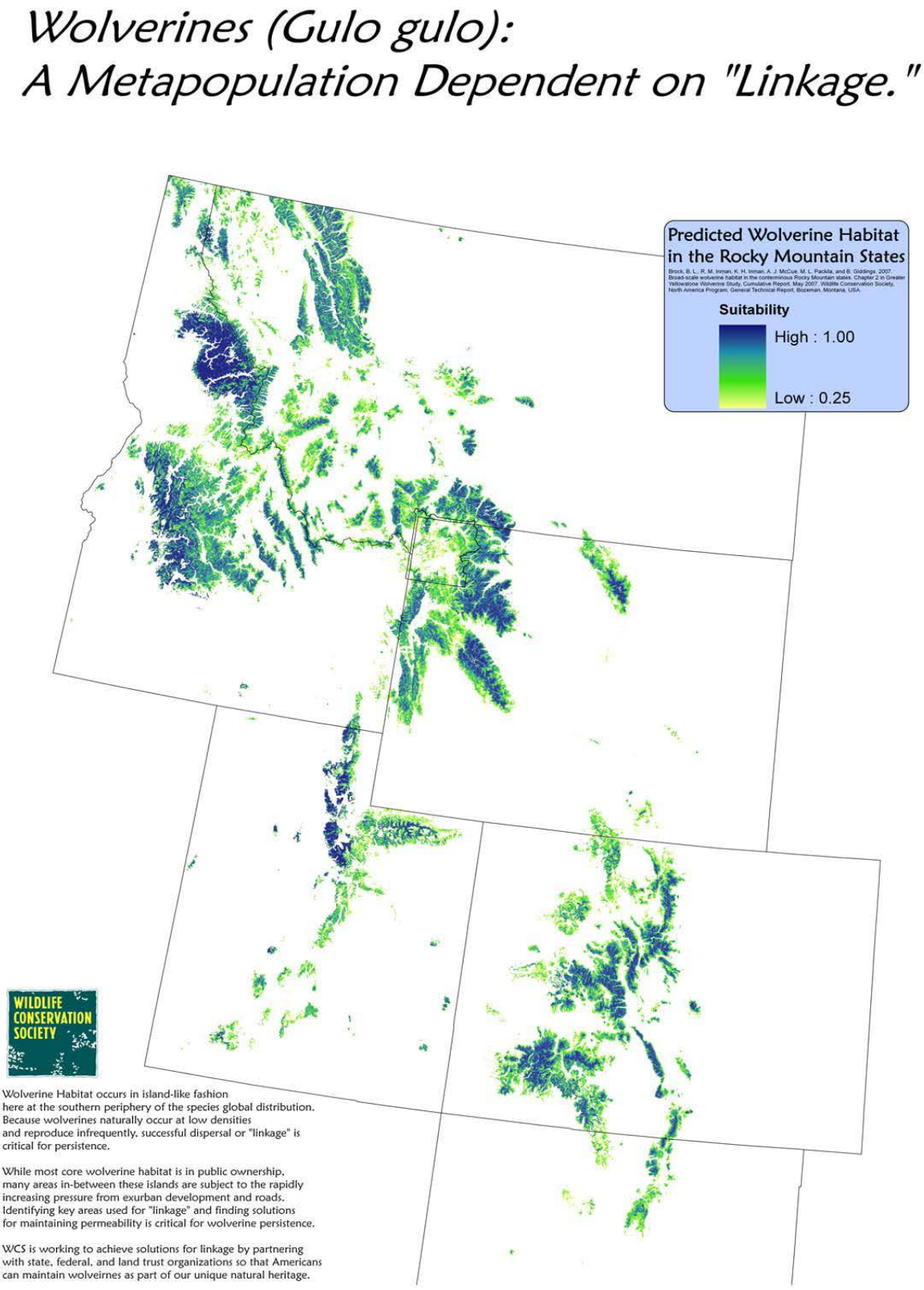
Even though this proposed listing decision is based on climate change and there is currently no solution in sight for this large, overarching issue, this does not mean the USFWS can't do anything to benefit wolverines. Wolverines are somewhat of a test case, in that they are a species inhabiting the lower 48 that is directly challenged by climate change, and the final listing decision under the ESA in response to this challenge. There are important opportunities ahead for the conservation community and the USFWS to identify and pursue measures that will protect the species and their habitat now, help them adapt to challenging conditions. This response should be used as a case study for future species that will be challenged by climate change.

Because of our history of work on wolverine listing and the importance of this species to our membership, we ask the USFWS to consider the above comments. We thank you for the opportunity to comment on this proposed action.

Sincerely,

Chris Colligan
Wildlife Program Manager, Greater Yellowstone Coalition

Appendix A: Wolverines (*Gulo gulo*): A Metapopulation Dependent on “Linkage.”



Appendix D:

Proposed Action Joint Bison Letter

March 21, 2018

Leanne Marten
Regional Forester
Northern Region, Region 1
26 Fort Missoula Road
Missoula, MT 59804

Mary Erickson
Forest Supervisor
Custer Gallatin National Forest
10 E. Babcock, P.O. Box 130
Bozeman, MT 59771

RE: Custer Gallatin Forest Plan revision – bison conservation and management

Dear Ms. Marten and Ms. Erickson,

Please accept the following letter on behalf of Defenders of Wildlife, Greater Yellowstone Coalition and the National Parks Conservation Association.

Defenders of Wildlife (Defenders) is a national non-profit conservation organization founded in 1947 focused on conserving and restoring native species and the habitat upon which they depend, including the plains bison. We submit the following comments on behalf of our more than 1.2 million members and supporters, including more than 5,000 in Montana. Defenders has long participated in bison conservation and specifically in the conservation and restoration of the important bison of the Yellowstone region.

The Greater Yellowstone Coalition (GYC) represents over 90,000 supporters, both in Montana and nationally, that have a continued and vested interest in the conservation and management of wild bison in Montana and throughout the Greater Yellowstone Ecosystem (GYE). GYC has a long history of involvement with issues of bison management surrounding Yellowstone National Park, and our members consider bison one of the most treasured and iconic species in the region.

Ultimately, Defenders is working to ensure wild bison are valued and managed like other wildlife in Greater Yellowstone. Specifically, Defenders envisions a day when Yellowstone bison are sustainably managed as healthy, free-roaming wildlife throughout national parks, national forests and other suitable habitats within the GYE, and are used to restore conservation herds elsewhere in appropriate areas throughout the West.

Since 1919, National Parks Conservation Association (NPCA) has worked to protect and enhance America's national park system for present and future generations. NPCA and our over 7,000 members and supporters in Montana and over 1.3 million members and supporters nationwide have a long history of advocating for Yellowstone-area bison to be managed as valued native wildlife not just inside Yellowstone National Park but on park adjacent lands in Montana.

The following comments are in response to the "Proposed Action – Revised Forest Plan, Custer Gallatin National Forest," and specifically to the Regional Forester's determination that bison are secure and not a *Species of Conservation Concern (SCC)* within the Custer Gallatin planning area. Below, we include a science-based rationale for why the Forest Service should reconsider their SCC determination for bison. In addition, we respond to proposed Custer Gallatin plan direction for bison, and offer specific bison management recommendations.

POLICY FOR IDENTIFYING SPECIES OF CONSERVATION CONCERN

The Forest Service established what amounts to a two-step process for demonstrating compliance with the requirement for conserving at-risk species. First, it requires the regional forester to identify the species that must be addressed during the forest planning process. These include federally listed threatened and endangered species, species proposed for listing and candidate species, determined in accordance with the Endangered Species Act.

Plans must also address SCC. SCC are defined as species that are 1) "known to occur in the plan area," and 2) "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." The SCC designation applies to "native species that are not included in federal categories but have declining populations, habitat threats, restricted habitat range or other factors of concern…" (USDA, 2017).

The second step is for the responsible official (normally a forest supervisor) to develop plan components that provide ecological conditions that are necessary for these species. For SCC, the conditions are those necessary to "maintain a viable population" within the plan area (or for some species, "to contribute to maintaining a viable population of the species within its range").[1]

[1] The Planning Rule defines a viable population as one that "continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments." (36 CFR 219.19)

The directives in Section 12.52b direct responsible officials to use the criteria in Section 12.52d to select the species to consider. This section distinguishes between species that "must" be considered and species that "should" be considered. This is an unnecessary distinction.[2] It is worth thinking about what it means to "consider" in this administrative context. It requires that the regional forester document the information that was taken into account and provide a rationale for including or rejecting a species. Moreover, the information must include the "best available scientific information."[3] With regard to SCC, the documentation must explain how the information indicated or did not indicate "substantial concern about the species' capability to persist over the long-term in the plan area." Note that this is referring to scientific concern that has been expressed that is applicable to species persistence in the plan area rather than a subjective perception of concern by the regional forester.

The directives also make an important distinction between species of broader-scale concern and those where there is local conservation concern. All but one of the categories in the directives address the former by encompassing concerns expressed by NatureServe or government agencies about viability of the species at a broader scale than the plan area. The overall approach is to cast a wide net so that the regional forester can consider species where concern about persistence is indicated for either or both of these reasons. Local conditions in a plan area are relevant at the SCC identification stage as a basis for including additional species for which there might not be broader concern; not as a sole basis for rejecting species for which there is a broader concern. For a species for which there is documented broad-scale concern, the regional forester is obligated to document why the threats suggested by that evidence are not currently present or relevant in the plan area.

Overall, the process developed by the Forest Service is very expansive and inclusive in identifying SCC. The actual needs of these species related to management of the national forest may then be determined when plan components are being developed.

THE CASE OF DESIGNATING BISON AS A SPECIES OF CONSERVATION CONCERN

1. Bison are known to be of substantial conservation concern across their range, and therefore are of concern on the Custer Gallatin, unless the best available science indicates that threats are not present or relevant in the plan area.

Across North America, wild plains bison are considered to be ecologically extinct throughout most of their historic range and heading toward genetic extinction (Bailey, 2013). Freese et al. (2007)

[2] There should be no practical difference between species that "must" and "should" be considered as SCC in any case. The Handbook explains the degree of compliance required by the term "should" (Section 05.1): "Action is mandatory, unless a justifiable reason exists for not taking action. Employees must fully consider, but may depart from based on a written finding as applied to specific circumstances that the deviation will enhance program management efficiency or better achieve desired results or other objectives."

[3] A requirement of all aspects of the planning process, but repeated in 36 CFR 219.9(c)). "Such documentation must: Identify what information was determined to be the best available scientific information, explain the basis for that determination, and explain how the information was applied to the issues considered" (36 CFR 219.3).

documented that the North American bison is ecologically extinct across its former range and, along with Sanderson et al. (2008), called for urgent measures to conserve the remaining wild and free-ranging bison, and restore the species as wildlife in focal areas across its historic range.

Bison are currently listed as "Near Threatened" by the International Union for Conservation of Nature (IUCN) (Gates and Aune, 2008). NatureServe (2015) classifies bison as SH - Possibly Extirpated in Idaho, S1 (*Critically Imperiled*) in Wyoming and S2 (*Imperiled*) in Montana (NatureServe 2015). Bison are considered a "Species of Greatest Conservation Need" (Montana SWAP, 2015) and a "Species of Concern" in Montana "because they are considered to be 'at risk' due to historic extirpation, limited populations, loss of genetic diversity, threats to their habitat, and/or restricted distribution" (DEIS Bison Conservation and Management in Montana, page 9).

The SCC Rationale for the Forest acknowledges the NatureServe S2 ranking, meaning bison are "at risk because of very limited and/or potentially declining population numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state." As discussed, the Forest Service must document why the threats suggested by these science-based rankings are not present or relevant in the plan area. In discussing relevant threats, the SCC Rationale for the Forest acknowledges that limited distribution, abundance and social intolerance are threats to bison, but states that "the IBMP provides high assurance that bison will continue to persist in the long term." First, the rationale does not successfully argue that these threats are not present on the Forest. We note that other species' rationales cite the absence of threats within the plan area. Second, it is not valid to rely on the IBMP as a surrogate for forest plan area persistence, discussed below.

2. <u>The Forest Service cannot rely on the IBMP as a surrogate for forest plan viability.</u>

In the rationale determining that bison are secure within the plan area, the Forest Service argues that "the IBMP provides high assurance that bison will continue to persist in the long term." We do not agree with this logic. The Forest needs to make an independent determination of concern and cannot assume that the IBMP will satisfy NFMA obligations. For the Forest Service, operating under NFMA, the Forest Plan comes first, and the IBMP must be consistent with the Forest Plan, not the other way around.

Similarly, in the rationale, the Forest Service essentially argues that because the Yellowstone herd meets population objectives established by the IBMP, that there is no concern for bison persistence in the plan area. A population objective established for the Yellowstone herd in the context of IBMP management and decision making, while relevant, is not directly applicable to Forest Service SCC decision making. Furthermore, the IBMP population objective of 3,000-3,500 is an arbitrary number (not based on science), meant to keep the population at a lower density to reduce the number of bison leaving the Park and entering Montana where historically, there was very limited tolerance for bison. In fact, the Park's winter carrying capacity for bison has been estimated at 5,500 to 7,500 bison (National Park Service). The National Park Service and State of Montana acknowledge that the current IBMP is outdated (including its population objective) due to changed

conditions on the landscape, increased tolerance for bison, and new science/information regarding the risk of brucellosis transmission. In 2015, the state and NPS began the process to write a new Yellowstone-Area Bison Management Plan (aka IBMP) to reflect these changes and this process is still ongoing. It is not an appropriate or sufficient rational to conclude that the bison population meets the arbitrary objectives based on an outdated plan that is currently being revised. The Forest must make an independent NFMA-based determination that bison are secure within the plan area.

Rather than looking at Yellowstone herd population numbers alone to make a "secure" determination for bison in the planning area, the Forest Service should be evaluating whether the current distribution of bison in the plan area is sufficient to be persistent and viable (i.e. resilient and adaptable over time). The science raises concerns over limited distribution, which must be responded to. While the Yellowstone herd may be at carrying capacity given current constrained distribution, this does not equate to an absence of concern over long-term persistence in the planning area given threats and limited distribution. The fact that there is an overabundance of bison within the Park is evidence that the herd does not have sufficient distribution to meet life history requirements and make meaningful contributions to bison persistence range wide. Abundance numbers alone do not alone justify a finding that the herd is not of conservation concern or value. As noted by Plumb et al. "Conservation of the migratory and nomadic tendencies of bison, as well as their genetic integrity and ecological role, is *paramount for the perpetuation of the species*" (emphasis added). The fact that bison nomadic and migratory tendencies are constrained raises substantial concern over their persistence in the planning area.

3. <u>The Forest Service should not conflate the ESA with NFMA.</u>

The SCC Rationale states that "a host of factors" were recently evaluated by the USFWS when they made a negative 90-day finding on bison, under a nonrelated statute, the ESA. The Forest Service "reviewed and accepted" the USFWS decision as best available science "indicating that none of the factors present substantial concern to long-term persistence in the plan area, since the same population of bison occur in both areas." While the bison may be the same, the ESA decision framework is not as surrogate for viability under NFMA. The Forest Service must provide this evaluation to the public. It is not appropriate to conflate the ESA with NFMA; the USFWS did not determine that there was "no concern" over the persistence of Yellowstone bison within the Custer Gallatin plan area. We also note that a court recently remanded the 90-day finding to USFWS because of a failure to appropriately consider best available science, contrary to what the Forest Service argues in their rationale. The Forest Service should address this issue going forward.

4. <u>The restricted distribution of Yellowstone Bison is a known threat to the viability of bison within the Custer Gallatin plan area.</u>

As noted, the best available science has determined that bison are threatened by restricted distribution, among other factors. Plumb et al. (2009) noted the concern over restricted distribution for the conservation of the Yellowstone herd stating that "management agencies should continue to

prioritize conservation of bison migration to essential winter range area within and adjacent to the park." Bison require access to large areas of land and habitat for viability, this is one of the ecological conditions necessary for their persistence. Current management of bison limits their distribution, thus perpetuating one of the threats noted by the best available science. The limited distribution of Yellowstone bison, thus clearly limits their distribution within the Custer Gallatin plan area. This limited distribution raises substantial concern over their persistence on the Forest.

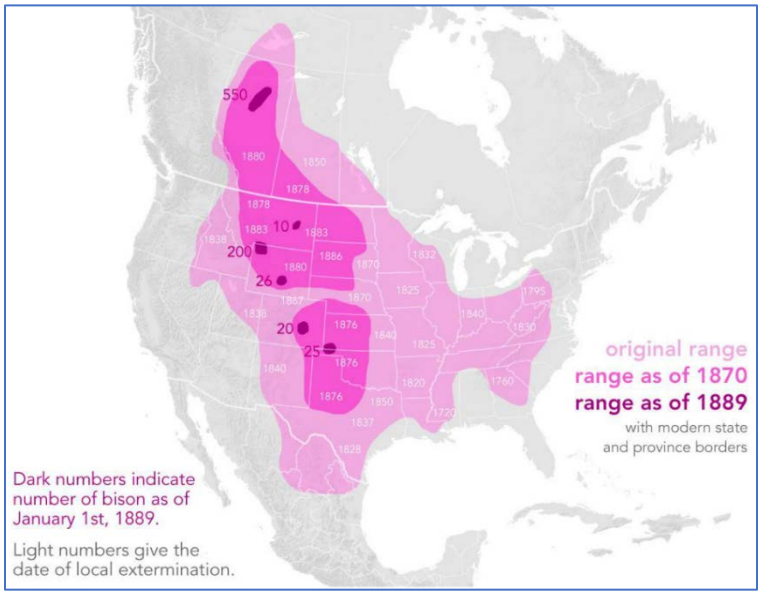


Figure 1. Historical distribution of American plains bison.

When making an SCC determination the Forest Service must consider the historic distribution and abundance of bison (FSH 1909.12 12.53). The Forest Service acknowledges in the SCC Rationale for the Forest that distribution (as well as abundance) are departed from historical conditions on the plan area. It is not sufficient to state that current measures of viability in the plan area are "less bad" than they were in the recent past. (The Forest Service rationale states that there is "potential" to see changes in abundance and distribution in the plan area. While this may be true, it does not supplant a determination that bison are sufficiently distributed within the plan area to be persistent over time.)

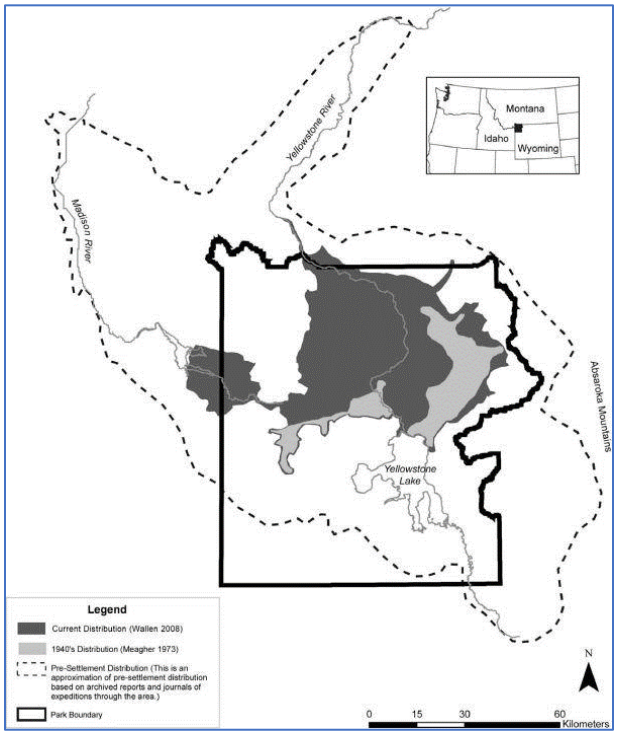


Figure 2. Current and predicted historical distribution of the Yellowstone bison herds. From: White et al. 2011.

Though bison historical distribution once covered much of the state of Montana, including many areas of the Custer Gallatin (see Figures 1 and 2), currently the only truly "wild" bison in the state are those essentially confined to the boundaries of Yellowstone National Park. Yellowstone bison have a significantly restricted distribution (Figure 2) due to social intolerance and unsubstantiated fears around brucellosis transmission risk.

Historically, bison inhabited about 20,000 square kilometers (4,942,108 acres) in the headwaters of the Yellowstone and Madison Rivers (Plumb et al., 2009). As of 2008, they occupied 3,175 square kilometers (784,560 acres), predominantly inside Yellowstone National Park. The current tolerance areas include about 200,000 acres on the west side and about 105,000 acres in Gardiner Basin on the north side. Prior to the Governor's decision, the tolerance zones were 12,500 acres on the north and about 70,000 acres to the west (Custer Gallatin report, 2017). Currently, within the Madison, Gallatin, and Beartooth landscapes, there are 293,151 acres (12.5 percent) of potentially suitable habitat for bison on the Custer Gallatin National Forest (USDA, 2017).

Yellowstone National Park is a high elevation plateau that does not provide optimal ecological conditions for high density year-round use by native ungulates including bison. As the result of harsh winters, bison seek to migrate outside the Park to access adequate forage and calving grounds.

In the past, bison were not constrained to the Park, and exhibited a much more dynamic distribution, as conditions changed due herbivory, seasonal weather conditions, and snowpack. Historically, bison may have occupied lands within the plan area year-round.

Because of intensive management actions however, this migratory movement is limited, as is the opportunity to expand winter range (and the bison range in general) throughout suitable habitats north and west of the Park (Plumb et al., 2009). Plumb et al. also noted that population levels of about 550 and 1,500 for the Northern and Central herds, respectively, trigger migration outside of the Park. In making an SCC determination, the Forest Service must acknowledge the fact that the current distribution of bison within the planning area is limited, which raises concerns over the resiliency, adaptability and persistence of the planning area population.

Yellowstone bison are of concern within the Custer Gallatin plan area because they have limited ability to migrate and utilize key habitats on the Forest, including distribution within winter range, spring calving grounds, and with an increasingly important extent, summer-fall habitat. The absence of these necessary ecological conditions, combined with the manifestation of threats within the plan area, raise concerns over whether the planning area population is likely be adaptable and resilient over time.

5. <u>The Forest Service must consider genetic diversity and the decline of the Central Herd when making SCC determinations.</u>

Yellowstone bison are considered by many to be the last truly wild, ecologically viable, genetically pure, and wide-ranging population of plains bison in existence. As such, the Yellowstone bison population plays a vital role in restoring the species across its range. As with Yellowstone bison, genetically important herds, both those that are apparently free of cattle genes and those that harbor unique parts of the total bison gene pool, <u>need to be conserved</u> (Freese et al., 2007, p. 181). A precautionary approach dictates that we create viable satellite herds of each of the existing (and last remaining) genetically important bison herds of North America (Freese et al., 2007, p. 181). An SCC

determination will allow the Forest to manage Yellowstone bison with the precautionary principle for conservation. This means developing best management practices and applying them to existing herds; an SCC determination will afford the Forest such an opportunity.

Yellowstone's bison population is of high genetic value for supplementing other conservation herds in the West. The health of this highly-valued population, so key to recovery of the species, includes the animals that occupy forest lands. Outside of the national park, the Custer Gallatin is the only forest where bison are managed in Montana; therefore, the Forest can play a distinct and integral role as a federal partner in its recovery.

Historically, the Yellowstone bison population has been described by numbers of bison using and breeding in two different geographic regions of the park (Northern and Central), while also noting bison migrate out of the Park during the winter months, with many animals inhabiting those areas today year-round (Hayden and Lamar valleys). As of August 2017, there was an estimated 4,816 bison in Yellowstone, including two primary breeding herds: Northern (3,969) and Central (847) (Geremia et al., 2017). In recent years (since 2005), there has been a dramatic decline in the Central herd from 3,500 animals in 2005 to 847 currently (Geremia et al., 2014), which has been a significant cause for concern. With the decline to 847, the risk of this population dropping to below 400 is very real. This minimum herd size for sustainability is the minimum number of animals needed to sustain the long-term genetic health of a herd (Freese et al., 2007). In fact, Pérez-Figueroa et al. 2012 suggested a minimum of 3,250 bison for the total population with at least 1,000 bison in each breeding herd to ensure the long-term demographic and genetic integrity and health of both the Northern and Central herds is maintained. It is also noteworthy that this decline has occurred since 2005, not merely for just one year but representing an actual trend in decline.

6. A *Species of Interest* designation is not appropriate for bison.

The proposal to designate bison as a *Species of Interest* does not provide the proper mechanism for adequate conservation and management of bison on the Forest. It fails to acknowledge the best available science indicating concern within the plan area, and does not ensure that the forest plan will provide the necessary direction to provide the ecological conditions necessary to maintain or contribute to the viability of bison.

7. The Forest Service should contribute to broad efforts to conserve bison.

In failing to acknowledge widespread concern over bison persistence, the Forest is failing to support the goals of the U.S. Department of Interior and the International Union for Conservation Nature for restoring the species throughout its historic range as well as with the State of Montana's management of bison as a *Species of Concern*. Through a Forest Service SCC determination, the Custer Gallatin Forest can fulfill its lawful obligations under the National Forest Management Act to sustain the diversity of national forest lands, play a significant role in contributing to bison recovery,

and more effectively employ the management tools needed to take the appropriate steps in bison conservation on the Forest.

Of critical importance to the conservation of this species is the need for all jurisdictions to act together and have a shared responsibility in management and recovery goals. To do this effectively, a similar conservation designation of bison – across jurisdictions – is needed. This rationale for consistency, whether a *Species of Concern* or *Species of Greatest Conservation Need (MT)*, *Near Threatened* (IUCN), *Near Critically Imperiled* (MT and WY), and in the case of the Forest, due to an artificial construct resulting in limited range and restricted access to vital habitats; therefore, a SCC designation– all underscore a shared commitment to restore bison to its historic range. Our national mammal deserves this collaborative approach and with shared management goals in conservation.

8. The Forest Service must consider the ecological importance of bison.

The Forest has an obligation to manage ecosystems for ecological integrity. When considering the SCC question, the Forest Service must acknowledge that bison play a fundamental and essential role in maintaining and restoring grassland ecology and function. The fact that bison are essential to restoring the ecological integrity of the ecosystems to which they belong bolsters the case for SCC status (FSH 1909.12 12.53 requires the Forest Service to consider the ecological function of species when determining SCC). Bison can in fact be a conservation tool for the Forest to better utilize habitat for management. Lost is the large influence of bison as a grazer that once roamed over large areas creating a mosaic of grazing intensities, as a major converter of grass to animal biomass that provided food for Native Americans, predators, scavengers and decomposers, as a key link to nutrient recycling, and as a maker of walls and mini-wetlands, among other factors (Knapp et al., 1999; Turett et al., 2001). Heavily grazed areas also may have acted as fire breaks, which further influenced plant species diversity and structural heterogeneity in tall grass prairie (Hartnett et al., 1996). If allowed, this is something bison could continue to do on the forest today.

MANAGEMENT RECOMMENDATIONS

The Custer Gallatin National Forest surrounds much of Yellowstone National Park and is critical habitat for and used by wild, migratory and resident bison. Approximately 88% of lands in the newly designated tolerance zone (~380,000 acres in total) outside of the Park are on Custer Gallatin lands (Montana, 2013). As an SCC for which the Forest Service likely does not have the capability to maintain a viable planning area population, the Forest has an obligation to maintain or restore ecological conditions on the Forest that contribute to maintaining a viable population of bison within their range (36 CFR 219.9(b)(2)(ii)). Facilitating dispersal throughout the tolerance areas is the necessary ecological condition that the Forest should provide to contribute to bison viability.

As an IBMP partner, the Forest's principle role in implementing that plan is to provide habitat for bison on Forest Service lands (USDA et al., 2000). Furthermore, restoring bison to public lands such as the Custer Gallatin will maximize public access to and benefits from, bison on the landscape.

Though Yellowstone bison now have access to ~380,000 acres of land outside the Park, they are still only using a small fraction of this area. This severely constrained distribution is not only a viability concern for the population and the species as a whole, as mentioned above, but it also further perpetuates the significant management issues surrounding this population (i.e. dependence on the unacceptable practice of shipping bison to slaughter, unsafe and inhumane hunting in overcrowded small patches of land, etc.). While we realize constraints on their current distribution are due in part to current and past management actions and hunting, there is much more the forest can do, from a habitat perspective, to help facilitate dispersal and use throughout current tolerance areas. Certainly, range expansion within current tolerance zones is acceptable and should be encouraged given the expansion was made considering social tolerance issues and the low potential for conflict in this area. The Forest should prioritize providing for significant suitable habitat for bison throughout current tolerance areas as a critical and essential piece to improving the future of bison Yellowstone management *and* contributing to the restoration of species viability.

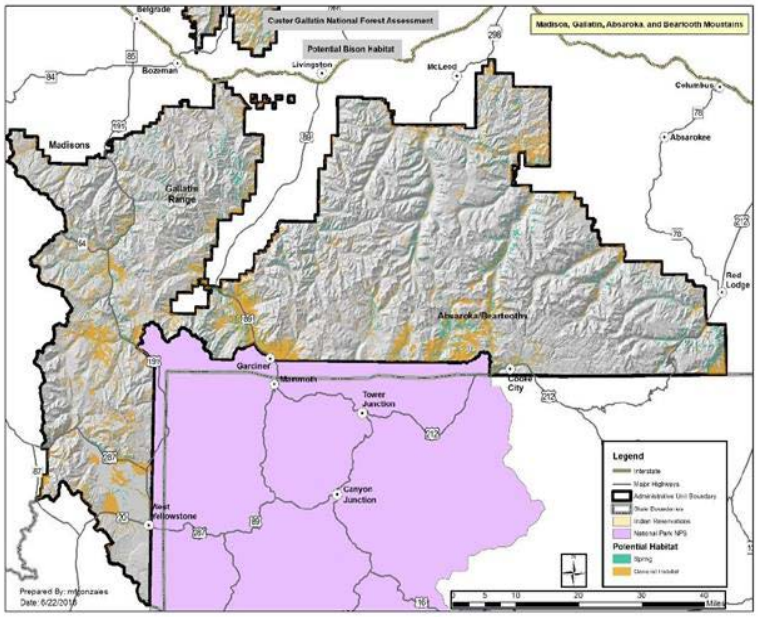


Figure 3. Figure 18 from the Terrestrial Wildlife Report showing potential bison habitat in the Madison, Gallatin, Absaroka, and Beartooth analysis area.

As stated, "The key role of Custer Gallatin National Forest relative to bison is to provide and improve suitable habitat" (Draft Terrestrial Wildlife Report of the Forest Plan Revision Assessment, page 134). Thus, forest plan components must be developed to manage for bison habitat on Forest lands and encourage habitat restoration projects aimed toward improving habitat for bison in appropriate areas. For example, thinning, prescribed burns, meadow and aspen restoration, restoration of native grass species and fertilization can enhance forage production in lodgepole pine stands (Lindgren and Sullivan, 2014) that predominate over much of the lower elevation Forest lands west of the Park. Such prescriptions could also likely address other key wildlife species needs, so long as such activities take careful consideration of the effects and potential impacts to other species. While plains bison are known to use a variety of habitats including forested areas, they are primarily grazers and therefore thrive in open grasslands and meadow complexes. Suitable (general and winter) habitat for bison exists in a patchwork of areas throughout the Forest, including in the new western tolerance area. However, as shown in Figure 18 from the Terrestrial Wildlife Report (see Figure 3 above), there is a lack of contiguous suitable

habitat providing effective corridor areas for bison to migrate and disperse farther out on the landscape and in to places such as the Taylor Fork and Upper Gallatin. The Forest should identify and manage for corridor/migration route areas for bison migrating from the Park to the Forest to facilitate dispersal throughout new and existing tolerance areas. Specifically, routes to the Taylor Fork and Upper Gallatin tolerance area should be identified in the forest plan, and habitat improvement projects implemented to provide a contiguous pathway of suitable habitat to facilitate the restoration of native bison to this area.

The following management recommendations should be incorporated into specific plan components, including Desired Conditions, Guidelines, Goals, and Standards, as part of the Forest Plan Revision Process:

- The forest plan should aim to improve utilization of expanded bison habitat, especially in the new west side tolerance area. This includes working with the Park Service and MFWP to identify areas outside the Park that could serve as suitable winter and year-round habitat (taking into consideration private lands and inholdings) as well as identify the most likely migration corridors for bison to reach these areas from the Park.

- The forest plan should direct the Forest to work closely with the Park, MFWP, and other IBMP partner agencies to assess options for how to effectively restore bison to suitable habitat areas throughout tolerance zones, and establish objectives to implement plan components to support such restoration.

- The forest plan should commit to and prioritize (through plan components and other plan content) improving and maintaining potential habitat and corridor areas for bison through habitat improvement projects including: thinning, prescribed burns, meadow and aspen restoration, and restoration of native grass species and fertilization to enhance forage production.

- The forest plan should encourage volunteer grazing allotment retirement, acquisition of private lands/conservation easement opportunities as those opportunities arise, and work with other jurisdictions and agencies to facilitate safe highway crossings for bison (and other wildlife).

While we appreciate the following plan components offered in the proposed action, we believe the Forest has an obligation to do more in terms of recognizing and prioritizing the conservation and restoration of bison as a native, at-risk wildlife species. The Forest can sufficiently meet their obligation to provide habitat and necessary ecological conditions for bison through the adoption of additional plan components.

Specific Plan Components related to bison management in the Proposed Action.

Desired Conditions (FW-DC-WLBI)

> 01 Native bison have access to forage, security and movement corridors to facilitate distribution of the species to suitable habitats within state-approved tolerance zones.
>
> 02 Educational materials, including signage at trailheads and campgrounds where bison may occur, are available to help forest users understand bison behavior and avoid conflicts.

We support the above Desired Conditions and thank the Forest for their inclusion. However, we recommend the forest include an additional desired condition to "provide suitable habitat to support bison as a native wildlife species on forest lands, to promote migratory behavior and further expansion throughout tolerance areas and contribute to the conservation of the species as a whole."

Goal (FW-GO-WLBI)

> 01 The Forest Service engages with state, Federal and Tribal partners to expand the science of bison ecology, improve social tolerance for the species on public land, and cooperatively develop adaptive strategies to manage bison and their habitats to facilitate natural movement of bison into suitable habitats within state-approved bison tolerance zones.

We support the above Goal. However, we recommend the addition of a goal for the Forest Service to work with state, Federal and Tribal partners to identify suitable habitat and corridor areas for bison to use throughout current tolerance zones.

Guidelines (FW-GDL-WLBI)

> 01 Within bison tolerance zones, vegetation management projects that could improve bison habitat near residential or other high human use areas should be designed to minimize potential bison-human conflicts.
>
> 02 Except to minimize bison human conflict, management actions should not limit bison expansion into unoccupied habitat within state-delineated tolerance zones.

We support the above guidelines, especially FW-GDL-WLBI-02. However, the Forest should also include a guideline that states, "Vegetation management projects aimed to improve and maintain existing bison habitat and potential corridor areas, will be implemented to encourage bison expansion throughout current tolerance zones."

CONCLUSION

The Forest Service is a critical leader in the collective effort to conserve bison and other at-risk wildlife. As partners committed to conservation of bison and the Custer Gallatin, we look forward to working with the Forest to restore ecological conditions with the likelihood that bison will persist and thrive on forest lands long into the future. To accomplish this goal, the Forest Service needs to acknowledge concerns over bison viability, and reconsider the SCC determination. As evidenced above, the risk of plan area extirpation is supported by the science. The Forest should include bison as a SCC and use the forest plan to improve limited distribution through habitat improvement projects, facilitating safe highway crossings for bison (and other wildlife), and pursuing volunteer allotment buyouts and acquisition of private lands/conservation easement opportunities as those opportunities arise.

Sincerely,

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LITERATURE CITED

Bailey, J.A., 2013. Rewilding an icon. Helena, MT. Sweetgrass Books. 238 pp.

Custer Gallatin National Forest, Final Terrestrial Wildlife Report, (Feb. 16, 2017).

Dratch, P. A. and Gogan, P. J. P., 2010. Bison Conservation Initiative: Bison Conservation Genetics Workshop: report and recommendations. Natural Resource Report NPS/NRPC/BRMD/NRR-2010/257. National Park Service, Fort Collins, Colorado.

Freese, C.H., Aune, K.E., Boyd, D.P., Derr, J.N., Forrest, S.C., Gates, C.C., Gogan, P.J., Grassel, S.M., Halbert, N.D., Kunkel, K., and Redford, K.H., 2007. Second chance for the plains bison. Biological Conservation 136. 175-184.

Gates, CC & K Aune, 2008. Bison bison. The IUCN Red List of Threatened Species 2008: e.T2815A9485062. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T2815A9485062.en. Downloaded on 12 January 2016.

Gates, C.C., Freese, C.H, Gogan, P.J., and Kotzman, M., 2010. American bison: status survey and conservation guidelines 2010. IUCN. 154 pp.

Geremia, C., Rick Wallen & P.J. White, Population Dynamics and Adaptive Management of Yellowstone Bison, (Yellowstone National Park, National Park Service, Aug. 5, 2014).

Geremia, C., Wallen, R., White, P.J., 2017. Status Report on the Yellowstone Bison Population, September 2017. Yellowstone National Park, National Park Service. 14 pp.

Gray, S., Andersen, C. 2009. Assessing the Future of Wyoming's Water Resources: Adding Climate Change to the Equation. William D. Ruckelshaus Institute of Environment and Natural Resources. University of Wyoming, Laramie, WY. 28 pp.

Interagency Bison Management Plan, 2000.

International Union of Conservation Nature, 2017. The IUCN Red List of Threatened Species. http://www.iucnredlist.org/ (Accessed: February 20, 2018).

Knapp, A.K., Blair, J.M. Briggs, J.M., Collins, S.L., Hartnett, D.C., Johnson, L.C., Towne, E.G., 1999. The keystone role of bison in North American tallgrass prairie. BioScience 49: 39-50.

Lindgren, P.M.F. and Sullivan, T.P., 2014. Response of forage yield and quality to thinning and fertilization of young forests: implications for silvopasture management. Canadian Journal of Forest

Research 44(4): 281-289. http://www.nrcresearchpress.com/doi/abs/10.1139/cjfr-2013 0248?journalCode=cjfr#.Vx_NXtUrIwF
Montana. 2013. Joint Draft Environmental Assessment: Year Round Habitat for Yellowstone Bison. Montana Fish, Wildlife and Parks, 1420 East Sixth Avenue, Helena, MT 59620.

Montana Fish, Wildlife, and Parks (FWP), 2015. Draft Environmental Impact Statement Bison Conservation and Management in Montana. Helena, MT.
NatureServe. 2016. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia.
http://explorer.natureserve.org/servlet/NatureServe?searchName=Bison+bison (Accessed: February 20, 2017).

Montana's State Wildlife Action Plan, 2015. Montana Fish, Wildlife & Parks, 1420 East Sixth Avenue, Helena, MT 59620. 441 pp.
http://fwp.mt.gov/fishAndWildlife/conservationInAction/actionPlan.html (Accessed: February 20, 2018).

Pérez-Figueroa, A., R. L. Wallen, T. Antao, J. A. Coombs, M. K. Schwartz, P.J. White, G. Luikart, 2012. Conserving genomic variability in large mammals: Effect of population fluctuations and variance in male reproductive success on variability in Yellowstone bison. Biological Conservation 150: 159–166.

Plumb, G.E., P.J. White, Michael B. Coughenour & Rick L. Wallen, Carrying capacity, migration, and dispersal in Yellowstone bison, 2009. Biological Conservation 2377-2387.

Sanderson, E. W., Redford, K. H., Weber, B., Aune, K., Baldes, D., Berger, J., Carter, D., Curtin, C., Derr, J., Dobrott, S., Fearn, E., Fleener, C., Forrest, S., Gerlach, C., Gates, C. C. Gross, J. E., Gogan, P., Grassel, S., Hilty, J. A., Jensen, M., Kunkel, K., Lammers, D., List, R., Minkowski, K., Olson, T., Pague, C., Robertson, P. B. and Stephenson, B., 2008. The ecological future of the North American bison: Conceiving long-term, largescale conservation of wildlife. Conservation Biology 22: 252-266.

U.S. Department of Agriculture, U.S. Forest Service, 2017. Final Assessment Report of Ecological of Ecological, Social and Economic Considerations on the Custer Gallatin National Forest. 136 pp.

U.S. Department of Interior, 2000. Record of decision for final environmental impact statement and bison management plan for the State of Montana and Yellowstone National Park. Washington, D.C. Retrieved from:
http://www.ibmp.info/Library/1%20%20IBMP%20EIS%20Record%20of%20Decision.pdf
Yellowstone National Park. 2017. Bison. https://www.nps.gov/yell/learn/nature/bison.htm (Accessed: November 20, 2017).

Appendix E:

NCDE FPA for grizzly bear management direction Join Letter

GREATERYELLOWSTONE.ORG
LOCATIONS IN MONTANA, IDAHO & WYOMING

HEADQUARTERS
215 South Wallace Avenue
Bozeman, Montana 59715
406.586.1593

May 15, 2015

Attn: Forest Plan Revision
Flathead National Forest Supervisor's Office
650 Wolfpack Way, Kalispell, MT 59901

Dear Flathead National Forest Planning Team -

Thank you for the opportunity to comment on the proposed Forest Plan Amendment to integrate the Northern Continental Divide Ecosystem (NCDE) Grizzly Bear Conservation Strategy (GBCS) into the forest plans for the Helena, Kootenai, Lewis and Clark, and Lolo National Forests.

The Greater Yellowstone Coalition (GYC) represents over 40,000 supporters, both in Montana and nationally, that have a continued and vested interest in the management of grizzly bears in Montana and throughout the Greater Yellowstone Ecosystem (GYE). We advocate for a thriving population of grizzly bears throughout the GYE by protecting core habitat, working to achieve functional connectivity for bears between the GYE and Crown of the Continent, and helping local communities coexist with the bear by building awareness and providing proactive conflict mitigation tools. We view grizzly bears within the GYE, the Northern Continental Divide Ecosystem (NCDE), and other recovery areas as integral components of a larger, interconnected grizzly bear population throughout the Northern Rockies.

Defenders is a national non-profit conservation organization founded in 1947 focused on conserving and restoring native species and the habitat upon which they depend. We have more than 1,200,000 members and supporters nationwide, including more than 5,000 in Montana. Over the last two decades, Defenders has played an important role in the recovery of grizzly bears in the Northern Rockies. Recognizing that the largest threat facing long term grizzly bear recovery is human related mortalities, Defenders has focused heavily on reducing conflict through our coexistence program. Since 1997, we have spent more than $500,000 on more than 250 projects designed to minimize or eliminate conflicts between people and grizzly bears. These efforts assist communities living in grizzly country with the tools necessary to prevent conflicts with grizzly bears and promote tolerance. We operate these projects in partnership with local communities and residents as well as county, state, tribal and federal agencies.

The grizzly bear is currently listed as a threatened species under the U.S. Endangered Species Act (ESA) in the conterminous 48 states. 40 Fed. Reg. 31,734 (July 28, 1975). Prior to any delisting attempt, the U.S. Fish and Wildlife Service (FWS) must determine that this species (or any population proposed for

delisting) is no longer threatened by the five factors outlined in 16 U.S.C. § 1533(a)(1). These five factors include the present or threatened destruction, modification, or curtailment of the grizzly bear's habitat or range; the inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting the species' continued existence. Pursuant to this five-factor analysis, the FWS must consider how the currently isolated GYE grizzly bear population can qualify as recovered without regulatory mechanisms to provide for connectivity between this population and the NCDE population. The Forest Planning process now underway offers the federal government an unparalleled opportunity to commit to and provide for such connectivity.

Connectivity is a guiding principle under the National Forest Management Act (NFMA) as well. NFMA requires that the Secretary of Agriculture promulgate land management planning regulations that "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives." 16 U.S.C. § 1604(3)(B).

Section 219.9 of the 2012 Planning Rule implements this statutory mandate, and provides for a "complementary ecosystem and species-specific approach to maintaining the diversity of plant and animal communities and the persistence of native species in the plan area." 77 Fed. Reg. 21,162, 21,265 (Apr. 9, 2012), to be codified at 36 C.F.R. § 219.9. As part of this approach, plans must include, inter alia, "components to maintain or restore [ecosystem] structure, function, composition, and connectivity." 77 Fed. Reg. at 21,265, to be codified at 36 C.F.R. § 219.9(a)(1) (emphasis added). The components outlined in a plan must be sufficient to conserve threatened and endangered species and maintain viable populations of species of conservation concern; if the components are insufficient in this regard, additional, species-specific components must be included. 77 Fed. Reg. at 21,265, to be codified at 36 C.F.R. § 219.9(b).

Under NFMA's diversity requirement, and because the long-term goal for listed grizzly bears is to "achiev[e] connectivity and manag[e] grizzly bear populations in the northern Rockies as subpopulations of a metapopulation" (2011 Grizzly Bear 5-Year Review, p.14), the U.S. Forest Service (USFS) must consider the impacts of this Proposed Action (PA) for not only the NCDE, but also for the GYE grizzly bear population (as well as other recovery areas) under Section 7 of the ESA (a)(1) http://www.fws.gov/endangered/laws-policies/section-7.html.

We are concerned that the forest plan amendments, as currently drafted, neither provide for the required level of connectivity between the NCDE and the GYE, nor fulfill the ecosystem and species-specific approach called for in the NFMA regulations. As an initial matter, we are concerned that these amendments are based on a *"draft"* Conservation Strategy that has not fully incorporated public comments and recommendations in accordance with the National Environment Policy Act (NEPA) process. One of the purposes of NEPA is to bring forth all relevant data and the "best available science" into one place for the purposes of analysis (40 CFR 1500.1(b)). In these comments we have provided additional science that may be missing or excluded from the final Conservation Strategy but is very

relevant for the purposes and direction for forest planning under NFMA and ESA, even though the U.S. Fish and Wildlife Service may have not considered or dismissed this information in the “draft” Conservation Strategy.

Additionally, the purpose of this forest plan amendment is to incorporate “relevant habitat-related direction” from the NCDE GBCS. We request a description of what is meant by “relevant” habitat-related direction and a disclosure of where the proposed forest plan amendments deviate from recommendations provided in the GBCS. We ask the Forest Service to clearly describe all current Forest Plan standards, guidelines, monitoring, and desired conditions related to grizzly bear conservation and including the proposed amendments, for each of the forests within the NCDE in the Draft Environmental Impact Statement (DEIS).

Finally, please demonstrate how current plan components, along with the proposed amendment, will ensure continued expansion of grizzly bears throughout Zone 2 and the Demographic Connectivity Areas to promote eventual connectivity to the GYE and other populations. GYC suggests that this be added as a desired future condition within Zone 2 and that this goal is consistent with current Forest Planning direction.

We are focusing the remainder of our comments on the Forest Plan Amendment for Zone 2, due to the areas importance for connectivity to the GYE grizzly bear population, and our organizational interest in this geography consistent with our mission. It is our goal to ensure that the GYE population remains robust and eventually connects to the NCDE and other populations as part of one large interconnected Northern Rockies grizzly bear metapopulation.

Connectivity and Metapopulation Theory

"The future of grizzly bear persistence in southwest Canada and northwest USA is likely dependent on management actions that promote and ensure meta-population function" (Proctor et al. 2005).

Connectivity provides for the adaptation of species to effects of climate change and is critical to the conservation of species diversity (Heller and Zaveleta 2009). It is also generally accepted that isolated populations are at greater risk of extinction over the long term, and the largest and rarest species tend to disappear first (Soule 1983). Some level of movement and gene flow between geographically separate populations however, decreases the probability of extinction (Soule 1987; Harrison 1994; Hanski 1999), promotes population persistence (Hanski and Gilpin 1997), mitigates genetic erosion, and allows for immigration and emigration in response to random genetic, demographic, and environmental changes, including disease epidemics, cyclical food shortages, climate change or large scale fire events (Breitenmoser et al. 2001, Hedrick 1996, Hedrick and Gilpin 1996).

A metapopulation is a population of spatially separated populations whose range is composed more or less of isolated patches that are interconnected through patterns of movement between them (Lande and

Barrowclough 1987). Boyce et al. (2001) demonstrated the importance of multiple "connected" populations to the survival of the grizzly in the Northern Rockies, and metapopulation theory directs that connectivity is the best long-term strategy to increase the resiliency and probability of persistence of remaining grizzly bear populations in the lower 48 States (Boyce 2000).

The grizzly bear was listed as a threatened species in the *contiguous* lower 48 states under the ESA, and should be recovered and managed as a large well-connected Northern Rockies metapopulation. Historic evidence supports the existence of a true metapopulation structure for grizzly bears in the contiguous United States (Craighead and Vyse 1996) including connectivity between the NCDE and the GYE (Picton 1986, Merriam 1922), as well as other populations. While the NCDE GBCS "envisions the NCDE serving as a 'source population' for grizzly bear populations in the Cabinet-Yaak, Bitterroot, and Greater Yellowstone ecosystems" (page 32), the intervening lands that support connectivity between the various populations are considerably fragmented (*see* Servheen et al. 2001), requiring significant habitat protections for the remaining blocks of undeveloped/public lands.

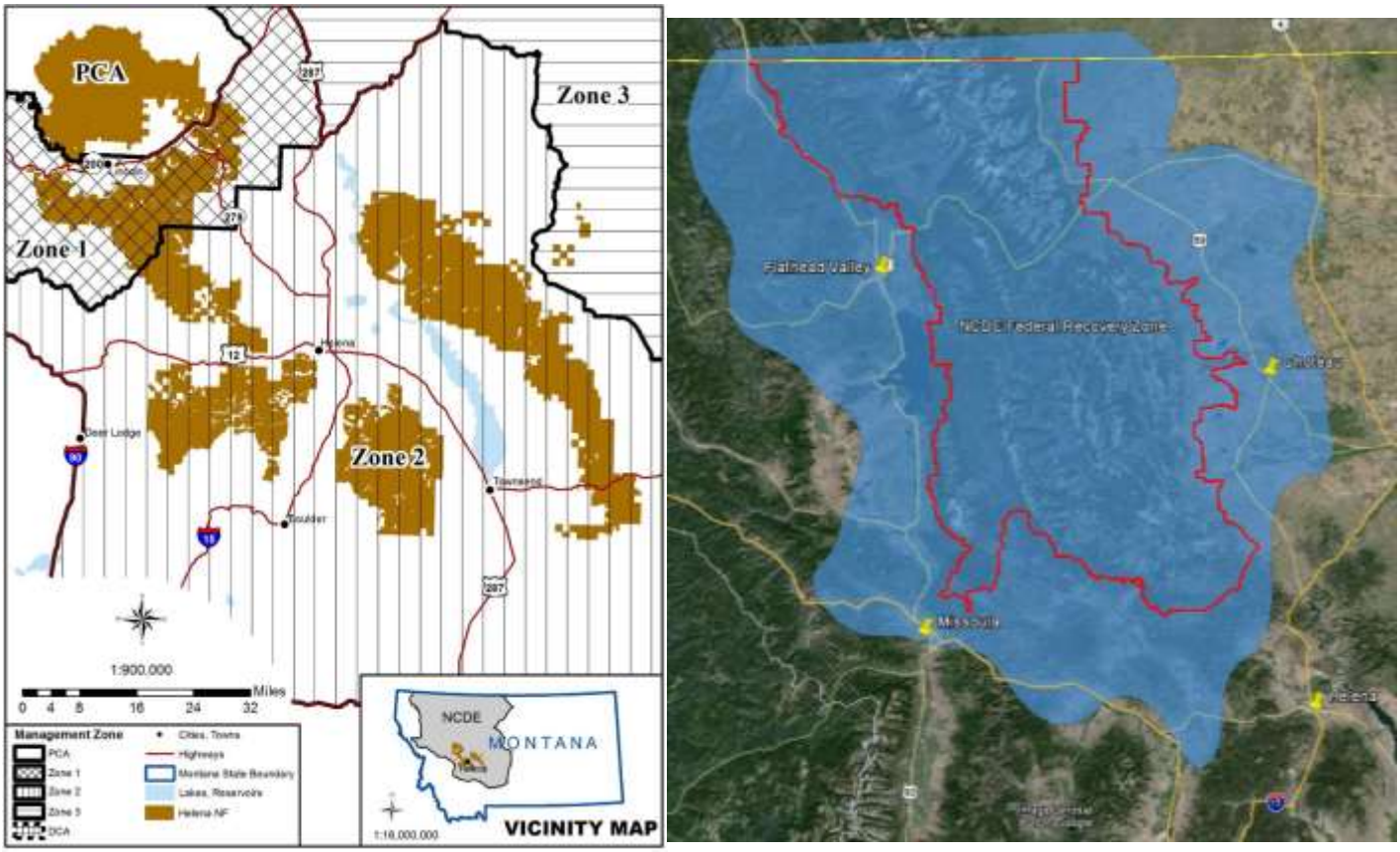
The lack of connectivity is a concern for the long-term genetic health of the isolated GYE population (Haroldson et al. 2010). Studies indicate that 1-2 male migrants every 10 years (i.e., genetic rescue) may be adequate to maintain current levels of genetic diversity in the GYE (Miller and Waits 2003). Because genetic exchange has not yet happened, the FWS has suggested that human assisted techniques (i.e. translocation of bears from other ecosystems to the GYE) be employed if natural connectivity/genetic exchange has not occurred by the year 2022 (Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area (2007), page 37). However, the need for human-assisted translocation does not support the notion that the GYE grizzly bear population has been "[r]estor[ed] … to the point where it is again a secure, self-sustaining member of its ecosystem" (78 Fed. Reg. at 17708), and it is unacceptable for the Forest Service to agree with the FWS that human-assisted techniques should qualify as functional connectivity (immigration and breeding). Translocation-based strategies do not create self-sustaining populations as mandated under the ESA "but rather rel[y] on long-term intensive management to counteract the effect of connectivity loss on species viability" (Carroll et al. 2014, page 2).

Furthermore, the success rate of translocations is uncertain into habitat that is already fully occupied by grizzlies (see Cabinet-Yaak ecosystem translocations from 1990-1994, Kasworm et al. 2004). In their comments to the FWS regarding delisting of the Yellowstone Grizzly Bear DPS, Craighead et al. (2005) stated "We believe the solution to maintaining genetic diversity in the Yellowstone population lies not in agency-engineered translocation but rather includes: 1) the establishment of a grizzly bear population in central Idaho, and 2) restoration and enhanced occupancy of the connective habitat between Yellowstone and central Idaho, and between Yellowstone and the NCDE." (Page 9)(emphasis added). Ensuring habitat connectivity between the NCDE and GYE would benefit not only grizzly bears, but multiple wildlife species, and would be consistent with the NCDE Grizzly Bear Conservation Strategy (2013), USFWS Grizzly Bear Recovery Plan (USFWS 1993, pp. 24-25), the Grizzly Bear Management Plan for Western

(Dood et al. 2006, pp. 54-56) and Southwestern Montana (MFWP 2013, p. 41), the Western Governors' Association Resolution 07-01 (2007),

and the interagency statement of support for the concept of linkage zones signed by the state wildlife agencies in Montana, Washington, Idaho, and Wyoming and the USFS, USFWS, USGS, NPS, and BLM (IGBC 2001).

A truly recovered metapopulation of grizzly bears in the Northern Rockies requires well-connected populations occupying suitable habitat with adequate protections. Arguably, on their own these linkage areas are not currently occupied to the desired extent to promote the aforementioned connectivity (see Figures 1 and 2), nor at present could they be considered as supporting viable populations of grizzly bears. In short, we are concerned that these forest amendments are inadequate to ensure viable populations, provide functional connectivity or restore a metapopulation of grizzly bears in the Northern Rockies.



Figures 1 & 2: Grizzly Bear Conservation Strategy Zone 2 (left) compared to NCDE Grizzly bear distribution map using all verified grizzly bear locations from 2000-2014. Note: Use Helena as a point reference.

NFMA's 1982 and 2012 Planning Rules

Ensuring grizzly bear occupancy in Zone 2 will also help ensure compliance with the NFMA, which requires Forest Plans to "provide for diversity of plant and animal communities" and "maintain viable populations" 16 U.S.C. § 1604(g)(3)(B). In 1982, the Forest Service promulgated regulations to ensure such diversity:

> Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed within the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area 36 C.F.R. § 219.19.

Both NEPA and ESA require that the effects of the proposed amendment on grizzly bears be determined. NFMA requires that these effects be evaluated in terms of its diversity and viability requirements, while the ESA requires a determination of whether the effects of the amendment will contribute to the recovery of the species, range wide. These analyses require a clear presentation of the amendment's decisions and where they apply in relation to important habitat – including connectivity lands in Zone 2.

The DEIS should include a viability analysis for grizzly bears and provide an explanation for how management of connectivity under the amendment contributes to or detracts from habitat for a viable population. The DEIS should also demonstrate how management of connectivity conserves and recovers grizzly bears by implementing the grizzly bear recovery plan.

After completing these required analyses, the Forest Service may find that it must provide more specific and proactive guidance for management of connectivity. Areas to be managed for connectivity should be defined and identified in the amendment, and a map of areas to be managed for connectivity should be included. In order to 'ensure' that grizzly bears' 'continued existence is well distributed in the planning area' (36 CFR 219.19), this direction must be in the form of mandatory standards that prohibit activities and developments detrimental to connectivity.

Should grizzly bears be delisted in the future, for planning and management purposes, we suggest that they be considered by the Forest Service as a Species of Conservation Concern consistent with the 2012 Planning Rule (SCC, 12.52d-2b 2012 Planning Handbook p.36). As a likely future SCC across its range, the Forest Service should begin to consider the ecological conditions necessary to maintain and contribute to grizzly bear populations that will "persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments" (36 CFR 219.19).

While this PA is primarily focused on the NCDE grizzly bear population, the actions taken will affect (still threatened) populations in the Cabinet-Yaak, Bitterroot and Yellowstone ecosystems. The viability and

recovery of the above still threatened populations may depend on the long-term occupancy *throughout* these connectivity areas. In other words, regardless of the status of the NCDE population and where management zones are delineated by FWS, the Forest Service must contribute to the recovery of still federally listed threatened and endangered species and provide for population viability under NFMA.

Given the Helena National Forest is currently in the forest plan revision process, which falls under the 2012 Planning Rule, the Forest Service should consider the 2012 Rule's connectivity requirements for this PA, and consider the development of an alternative that would allow the Helena NF to meet the rule's requirements. The 2012 Planning Rule includes explicit requirements for managing for ecological connectivity on national forest lands and facilitating connectivity planning across land ownerships, including state managed and private lands relevant to populations of species of conservation concern (36 C.F.R. § 219.9(b)(2)(ii), as well as coordination with plans and land-use policies of other jurisdictions (36 C.F.R. § 219.4(b)) (see also Haber and Nelson 2015 and Haber et al. 2015). Specifically, this directs the Forest Service to identify and manage key ecosystem characteristics, including "Connectivity," for the purpose of sustaining ecosystems contributing to the recovery of listed species. The Rule defines "Connectivity" as the "Ecological conditions that exist at several spatial and temporal scales that provide landscape linkages that permit…the dispersal and genetic interchange between populations; and long-distance range shifts of species, such as in response to climate change" (36 C.F.R. § § 219.19). The "functional" example of this includes the "measure of the ability of native species to move through the planning area and cross in to adjacent areas" (36 C.F.R. § § 219.19). As a key characteristic of ecosystems, connectivity should be addressed through either ecosystem-scale plan components in order to restore "ecological integrity", or it may need to be addressed at the species level (i.e. connectivity as an "ecological condition" needed to contribute to the recovery of a listed species). Upon revision if not before, the Helena NF will need to develop plan components – including connectivity plan components – to contribute to the recovery and viability of the NCDE and GYE grizzly bear populations. In order to facilitate efficient planning within the Helena NF revision, we encourage the Forest Service to develop an alternative within the DEIS that will meet the requirements of the 2012 Planning Rule.

GYC asks that within the DEIS, special plan components be developed to ensure that all grizzly bear populations are well-connected to promote the long-term viability and recovery of this at-risk species. The Forest Service should also engage with MTFWP, the BLM, and other FS jurisdictions that have objectives to manage for grizzly bear connectivity and have identified corridors that should be recognized and managed for through the forest planning process. Montana has made protection of connectivity and linkage areas a priority for Associated Species of Greatest Conservation Need (Tier I Species including grizzly bears) in their Comprehensive Fish and Wildlife Conservation Strategy and identified as a conservation strategy to "Identify and prioritize key wildlife linkage areas, and work with other state and federal agencies, conservation groups, and landowners to restore wildlife connectivity." (Page 45). Similarly, the BLM Record of Decision and approved Dillon Resource Management Plan (2006) states a commitment to manage wildlife migration/dispersal corridors that provide connectivity for special status species including grizzly bears and to coordinate with others to identify critical barriers and potential passage locations (page 70). Under the 2012 Planning Rule the Forest Service is directed to consider

lands and jurisdictions beyond their boundaries through a coordinated approach to ensure broader landscape connectivity; we encourage the Forest Service to develop alternatives within the DEIS that are consistent with this requirement.

Linkage Areas

Characteristics associated with effective linkage zone function for large carnivores and ungulates include low open road density, low concentrations of human occupancy and development, an abundance of productive foraging habitat, and a healthy mix of forested and nonforested lands (Craighead et al. 2001; Walker and Craighead 1997; Servheen et al. 2003; Olimb and Williamson 2006). Walker and Craighead (1997) identified three potential corridors linking the NCDE grizzly population to the GYE; through the (1) Big Belt–Bridger–Gallatin mountain ranges, (2) the Boulder–Tobacco Root–Gravelly–Taylor–Hilgard ranges (see Figure 3), and (3) the Selway–Bitterroot–Lemhi– Centennial–Madison ranges, and Krehbiel 2015 (see Figure 4), Cushman et al. (2009) (see Figure 5), and the WCS CircuitScape Models produced similar results. Thus, we contend that connectivity is possible through Zone 2 with improvements in habitat protections, and the Forest Service must consider this per the 2012 Planning Rule or provide justification for ignoring the best available science on connectivity.

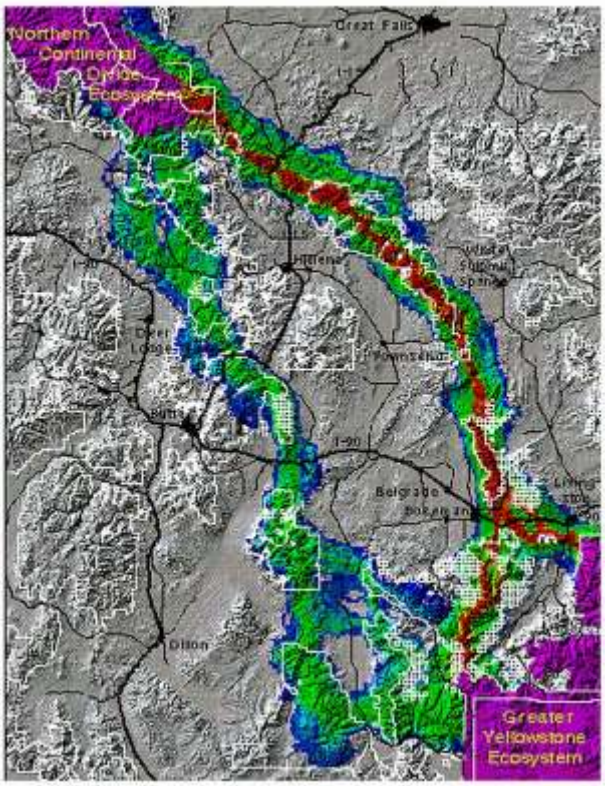


Figure 3. Corridors linking grizzly bear habitat in Montana. The first and second best corridors are shown, with warmer colors indicating better areas of habitat connectivity. One route is far superior to others: through the Gallatin, Bridger, and Big Belt mountain ranges. © 2010 Nature Education Courtesy of Richard Walker & Lance Craighead. All rights reserved. Source: Clark, W. (2010) Principles of Landscape Ecology. Nature Education Knowledge 2(2):34

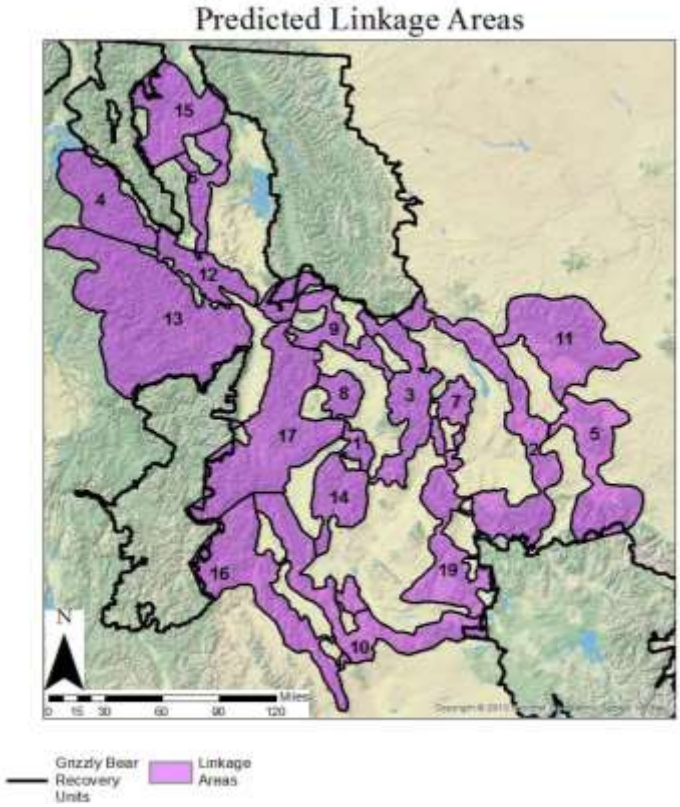


Figure 4. From Krehbiel 2015. Grizzly bear linkage areas identified using cumulative dispersal-cost matrix: 1. Anaconda, 2. Big Belts, 3. Boulders, 4. Couer d'Alene, 5. Crazy, 6. East Cabinets, 7. Elkhorn, 8. Flint Creek, 9. Garnett, 10. High Divide, 11. Little Belts, 12. Nine Mile, 13. North Bitterroots, 14. Pioneers, 15. Salmon, 16. Salish, 17. Sapphires, 18. Tendoy, 19. Tobacco Roots.

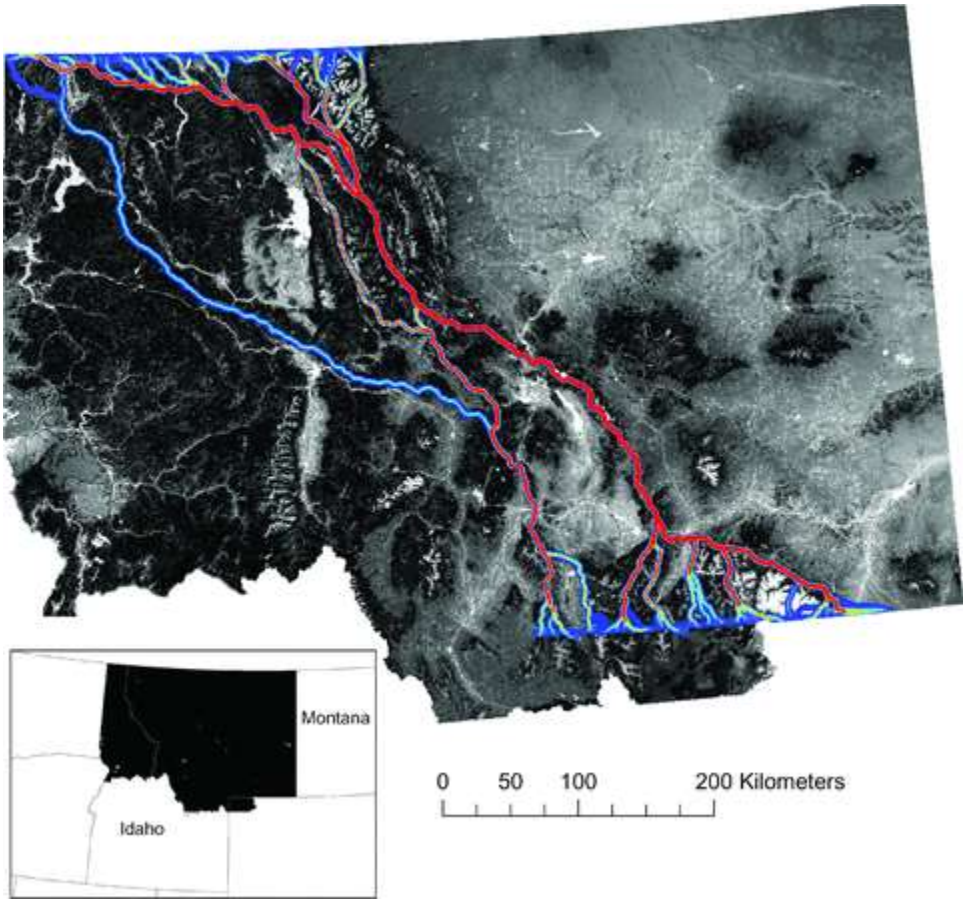


Figure 5. From Cushman et al. 2009: "The movement-resistance map and source and source-destination paths for least-cost path analysis. Resistance to movement is a function of elevation, forest cover, and human developments (Cushman et al. 2006) and is scaled from black at minimum to white at maximum. The number of source-destination paths in each corridor is reflected by the color scheme, ranging from blue (few paths) to red (many paths)."

The Proposed Action Does Not Contain Adequate Habitat Standards for Zone 2

The NCDE Grizzly Bear Conservation Strategy (GBCS) objective for Zone 2 is to provide the opportunity for grizzly bears, particularly males, to move between the NCDE and adjacent ecosystems (e.g., the GYE) (page 4, 35). The Zone 2 objective also includes maintaining existing resource management and recreational opportunities following motorized use restrictions that already exist as of 2011, with management emphasis on conflict prevention and response (page 41). However, under current conditions, grizzly bears from the NCDE have still not connected to the Greater Yellowstone Ecosystem via Zone 2 or any other route (Haroldson et al. 2010). It seems unlikely then that bears will move through Zone 2 in the future if they have not done so already without significant improvements in habitat protections. Though current protections for other species such as elk may provide some habitat protections for grizzly bears, their long-term persistence on a landscape overlapping significant human

densities may “require extraordinary management beyond that normally applied to most ungulates and/or black bears” (Procter et al. 2012). There are currently no bear-based habitat standards in place in Zone 2.

One of the Demographic and Genetic Management Goals stated in the GBCS is to “maintain genetic linkage opportunities between the NCDE south toward Yellowstone with consistent grizzly bear presence in these intervening areas” (page 37) (emphasis added). The Forest

Service has not demonstrated that grizzly bears currently have a “consistent presence” in these intervening areas in Zone 2 (see Figures 1 and 2). If we are to realize this goal, then significantly more well-distributed male grizzly bears will need to occupy this area to ensure that a few can successfully migrate to (and breed within) the GYE. Serveen et al. 2001 pointed out that “[f]or carnivores to get between ecosystems they require habitats that can support their feeding and behavioral needs in these intervening areas” and that “[l]inkage zones are areas that will support low density carnivore populations often as seasonal residents – they are not just travel areas.” (Serveen et al. 2001, page 164). Furthermore, Zone 2 spans a large distance between the NCDE and GYE which likely requires longer term occupancy in these intervening areas if we ever hope to connect these two populations. There’s a 165 km distance between current occupied ranges for these populations which is more than 3 times the mean dispersal distance for male grizzly bears (males = 41.9 km, females =14.3 km) (Proctor et al. 2004). Linkage areas need to provide some degree of habitat security to achieve permanent and sustainable connectivity (Primm and Wilson, 2004) and therefore it is important to ensure Zone 2 has adequate habitat standards in place that will allow for seasonal occupation of grizzly bears, not just sporadic use by dispersing individuals.

Furthermore, Zone 2 contains a patchwork of public and private lands, with rapid development of private lands predicted in the coming years. Private lands often create mortality sinks (Schwartz, et. al. 2012); thus, grizzly bears will likely rely more heavily on the large blocks of contiguous public lands for security, requiring more rigorous habitat protections (not less) and placing ever-increasing importance on properly managed public lands to promote grizzly bear occupancy and connectivity. The Forest Service recognizes the Divide area of Zone 2 as a potential linkage zone in the Helena National Forest Divide Travel Plan DEIS (2014), and further acknowledges that increasing human development in the valley places “emphasis on NFS lands along the Divide mountain ranges to provide connectivity” (HNF DEIS p. 249). However, there is a lack of understanding as to how this region functions as a linkage area or provides for connectivity as stated in the HNF Divide DEIS: “More research is needed to reveal more precisely how this area may be functioning as a linkage zone” (p. 250). We recommend that the USFS assess the general status of habitat security and potential for connectivity throughout Zone 2 and consider modeling efforts already conducted to identify, map, and manage linkage habitats essential to grizzly bear movement between ecosystems.

Schwartz et al. (2010) found that open motorized route density, secure habitat, developed sites, and the amount of time bears spent in areas open to ungulate hunting were the best predictors of grizzly bear

survival in the GYE. These models were used to spatially depict areas of risk and define source/sink habitats in areas of otherwise good habitat (see Figures 6 and 7) to guide resource management. We recommend a similar assessment of current habitat security and grizzly bear survival/mortality risk in Zone 2 using such a model to identify areas of low mortality risk (i.e. with suitable habitat protections), as well as areas of high mortality risk where management standards can be improved. In high risk (or "sink") areas we strongly recommend an emphasis on resource management aimed at reducing motorized route densities and use as well as site development restrictions. In areas with adequate secure habitat (i.e. low mortality risk) we recommend standards aimed at maintaining current management direction and thus potential for grizzly bear occupancy and survival in the long term. Throughout all of Zone 2, we recommend the *prevention* of conflicts through proactive measures, rather than simply *reacting to* conflicts which typically results in dead bears. Grizzly bears are less likely to come in conflict with people if they have both secure and suitable habitat with adequate bear foods available to them (Gunther et al. 2004). Without this, there will most certainly be conflicts and thus, increased mortality of bears.

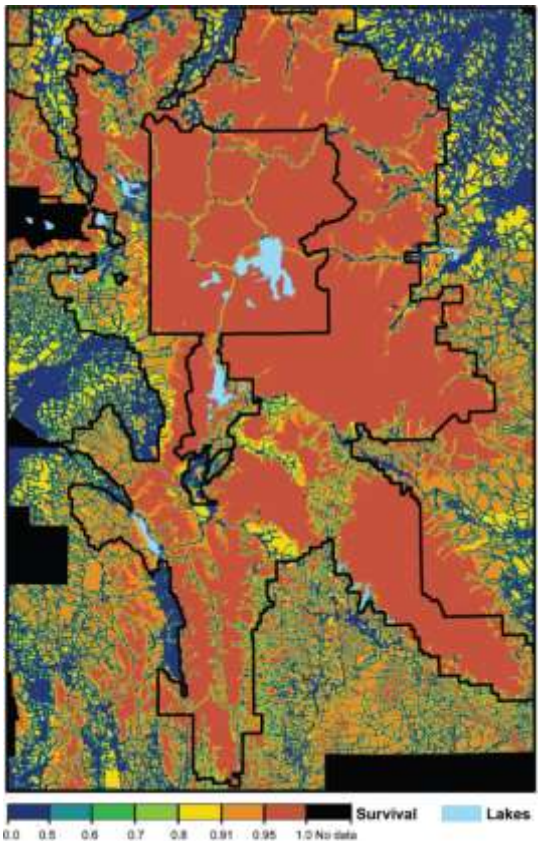


Figure 6. From Schwartz et al. 2010. Spatial variation in estimated probability of survival for a female grizzly bear in the GYE, 1983–2003. The model contains covariates describing sex, sample, winter season, open motorized-route density, secure habitat, the natural logarithm of total homes, developed sites, elevation, areas open to elk hunting, and an intercept term.

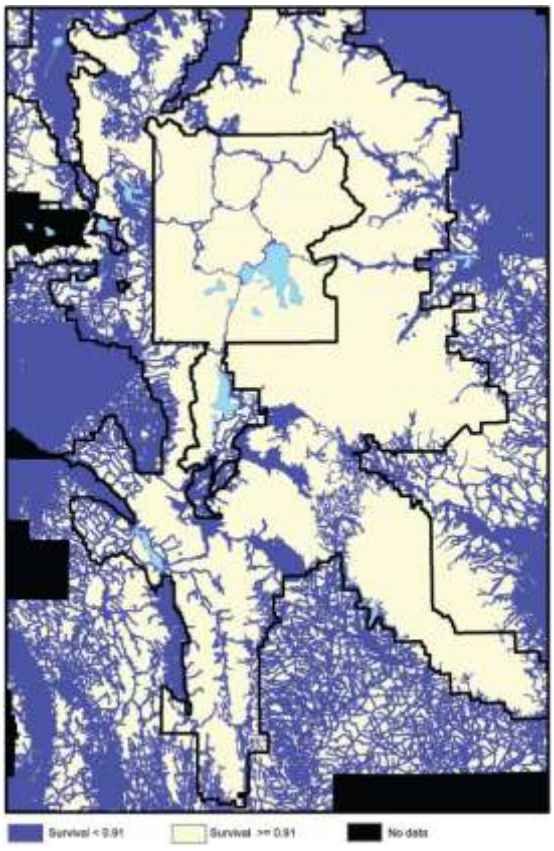


Figure 7. From Schwartz et al. 2010. An illustration of the source and sink habitats for the Greater Yellowstone Ecosystem grizzly bear population, 1983–2003. Source habitats (white) are areas where a female grizzly bear survival was ≥0.91, and sink habitats (blue) are areas where a female grizzly bear survival was ≤0.91.

Specific Recommendations for Zone 2

Based on the above corridor assessments and modeling results, Zone 2 or a portion of Zone 2 that is most likely to serve as an effective linkage area (based on current conditions or with improved habitat protections) for grizzly bears between the NCDE and GYE, should be designated as a Demographic or Genetic Connectivity Area, or managed as such. Specifically, we recommend special provisions that more closely resemble those suggested for the two existing Demographic Connectivity Areas (DCAs), including road density and site development restrictions to support grizzly bear occupancy and eventual dispersal to the GYE.

While we applaud the Forest Service for implementing the Standard NCDE-STD-WL 02, requiring Food/Wildlife Attractant Storage Special Order(s) on all NFS lands within the NCDE PCA, Zone 1, and Zone 2, we feel additional bear-based habitat standards and protections are essential for achieving the desired objective of functional connectivity between the NCDE and GYE populations.

Road Density, Site Development, & Human Use

As stated in the 1993 Grizzly Bear Recovery Plan, "Roads probably pose the most imminent threat to grizzly habitat today….the presence of open roads in grizzly habitat often leads to increased bear-human contact and conflict, and can ultimately end in grizzly mortality," (USFWS 1993).

The Forest Service must consider that roads (permanent or temporary, open or closed) and site development will increase human-bear conflicts and grizzly bear mortality and affect the potential for connectivity through this important linkage area. Both roads and development significantly contribute to habitat deterioration and fragmentation and are the two strongest predictors of grizzly bear survival/mortality on the landscape (Mace et al. 1996, Schwartz et al. 2010). Road density is also strongly related to secure habitat, which is critical to the survival and reproductive success of grizzly bears (Mattson et al. 1987; IGBC 1994; Schwartz et al. 2010) and is primarily achieved through motorized access management. As such, connectivity and secure habitat are often described in terms of open road density and large non-motorized habitat blocks.

Managing the landscape to reduce hazards to bears requires balancing road density standards with the amount of secure habitat available (Summerfield et al. 2004); "[I]f road densities become too great, secure areas become isolated islands surrounded by heavily roaded areas. Travel among secure islands then becomes more hazardous, effectively fragmenting the landscape" (Schwartz at al. 2010, page 661).

Open road densities above 1.0 mi/mi^2 and total road densities above 2.0 mi/mi^2 have been shown to suppress local habitat use by grizzly bears (Mace and Manley 1993). Secure habitat in Zone 2 is limited particularly in the Divide region of the HNF where open (1.69 mi/mi^2) and total (average = 2.07mi/mi^2) road densities are high (HNF Divide FEIS p. 280), and the proposed amendment does not include any standards or guidelines for limiting future increases in road density or motorized use. Though the Divide Landscape has not been identified or designated as a primary linkage zone (Servheen et al. 2003; Walker and

Craighead 1997), this is due mostly to "intense roading in the Helena National Forest" (Walker and Craighead 1998).

The U.S.F.S. Biological Assessment for Grizzly Bears on the Westside of Helena National Forest (2013) addressed "the potential for adverse effects of management activities to bears in those areas where they are known to occur both within the NCDE Recovery Zone and in the expanded Grizzly Bear Distribution Zone as a result of management activities described within the Helena National Forest Plan" (page 2). In their analysis they concluded that "implementation of the Forest Plan **"may affect and is likely to adversely affect grizzly bears"** in the Action Area. This determination is based on the following:

- Activities consistent with the Forest Plan direction could cause short-term displacement;
- The portion of the Action Area outside of the NCDE has moderate to high road densities and a lack of core habitat;
- Human-caused grizzly bear mortality has occurred in the area and the risk of mortality would remain moderate;
- As anticipated in the recovery plan (USDI-1993), bears seem to be expanding their range outside the recovery zones (Kendall et al. 2009, Mace et al. 2012);" (page 34).

Similarly, the Butte Ranger District on the Beaverhead-Deerlodge National Forest (BDNF) has the highest level of motorized route densities in the state of Montana, in particular the Boulder River and Upper Clark Fork landscapes, which offer Security Core (summer) values of around 30%. Not surprisingly, these are also areas where NCDE grizzly bears moving south are not being detected, indicating a lack of occupancy (Supplement to the Biological Opinion on the Effects of the 2009 Revision of the Beaverhead-Deerlodge National Forest Land and Resource Management Plan on Grizzly Bears, May 28, 2013). Given high road densities in some portions of the HNF (as well as BDNF) any connectivity assessment should include a detailed analysis of how current road densities and a "no net increase" of open roads standard will contribute to grizzly bear occupancy and connectivity throughout Zone 2. To meet the standard of utilizing the "best available science," motorized access standards should be improved in some areas of Zone 2 to ensure consistent connectivity standards are applied on NFS lands. In the very least, a standard comparable to NCDE-Lincoln GA-STD-01, that "there shall be no net increase in miles of roads open to public motorized use on NFS lands above the baseline," should be implemented throughout Zone 2. As well, we also request inclusion of NCDE-DC-AR-02 and NCDE-STD-AR-05 pertaining to and limiting site development to one increase in baseline per decade throughout Zone 2. All Forest Plan Amendment standards (NCDE-STD-MIN-01 - NCDE-STD-MIN-07) and guidelines (NCDE-GDL-MIN-01 - NCDE-GDL-MIN-06) related to mining and oil and gas activities on NFS lands should also be considered for Zone 2, as well as a monitoring and mitigation plan (NCDE-MON-04) implemented for mineral activities associated with potential substantial effects to the grizzly bear population or its habitat. The DEIS should also evaluate the potential increase of recreation use throughout the plan area (including Zone 2) as a result of construction of new temporary or permanent roads associated with projects and how this may impact future use and survival of grizzly bears *throughout* Zone 2. Without substantial mitigation efforts, impacts of roads on species and ecosystems persist and accumulate long

after a road is no longer in use (Robinson et al. 2010); for example through the creation of permanent off-route trails, illegal OHV use, firewood collection, and dispersed camping. Thus, we recommend standards that require any temporary roads associated with existing or future projects in Zone 2 be adequately removed after project completion following appropriate measures (see Loyd et al. 2013), so as to discourage continued illegal use of "closed" roads. We also ask that the Forest Service impose seasonal closures and/or vehicle restrictions, based on grizzly bears and other wildlife needs, on roads that remain open and enforce and prosecute illegal use of off-road vehicles. Efforts should also be directed towards improving the quality of habitat in site specific areas of habitually high conflicts and human-caused bear mortality and through increased sanitation measures, seasonal road or trail closures, decommissioning of roads, and public education and outreach.

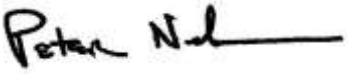
Inclusion of the Beaverhead-Deerlodge National Forest

Lastly, we request that the portion of the Beaverhead-Deerlodge National Forest (BDNF) that lies north of I-90 be included in this Forest Plan Amendment since it lies within Zone 2 of the NCDE, and to be consistent with the stated purpose: " to have an integrated set of plan direction consistent across the national forests that are part of the NCDE." In order to achieve a truly integrated and consistent plan direction for grizzly bear conservation all relevant forests should be included, and thus any suggestions pertaining to Zone 2 should also apply to the BDNF.

Conclusion

In closing, thank you for the opportunity to provide comments on the proposed Forest Plan Amendment to integrate the NCDE Grizzly Bear Conservation Strategy in to the forest plans for the NCDE National Forests. We are committed to ensuring that the GYE grizzly population remains robust and resilient through eventual linkage to the NCDE and other populations. While we are encouraged by the Forest's intent to facilitate connectivity between the NCDE and GYE and other populations through this Proposed Action, we feel there is need for improvement to truly achieve the long term goal of a connected, sustainable, and resilient Northern Rockies grizzly bear population. We request that the Forest Service commit to grizzly bear recovery based on a metapopulation structure by providing habitat protections that ensure grizzly bear connectivity between populations and based on the best available science. Thank you for your consideration of these comments.

Sincerely,



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Literature Cited

Boyce, M.S. 2000. Metapopulation analysis for the Bitterroot population. Appendix 21C. Pages 6-242 – 6-246 in Grizzly bear recovery in the Bitterroot ecosystem, Final Environmental Impact Statement. U.S. Fish and Wildlife Service, Missoula, MT, USA.

Boyce, M. S., B. M. Blanchard, R. R. Knight, and C. Servheen. 2001. Population viability for grizzly bears: a critical review. International Association for Bear Research and Management, Monograph Series 4.

Breitenmoser, U., C. Breitenmoser-Wurston, L. Carbyn, S. Funk. 2001. Assessment of carnivore reintroductions. In J. Gittleman, S. Funk, D. MacDonald, and R. Wayne (eds.) Carnivore conservation, pp. 241-281. Cambridge University Press.

Bureau of Land Management. 2006. Record of Decision and Approved Dillon Resource Management Plan. Dillon, Montana.

Carroll, C., Rohlf, D. J., Li, Y.-W., Hartl, B., Phillips, M. K. and Noss, R. F. (2015), Connectivity Conservation and Endangered Species Recovery: A Study in the Challenges of Defining Conservation-Reliant Species. Conservation Letters, 8: 132–138. doi: 10.1111/conl.12102

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

Craighead, A.C., E.A. Roberts, and F.L. Craighead. 2001. Bozeman Pass wildlife linkage and highway safety study. Progress Report. Craighead Environmental Research Institute. Bozeman, MT.

Craighead, F.L., and E. Vyse. 1996. Brown/grizzly bear metapopulations. In: D. McCullough (Ed.) Metapopulations and Wildlife Conservation Management. Island Press, Washington DC and Covelo CA. Chapter 14: pp. 325-351.

Cushman, S. A., K. S. McKelvey, J. Hayden, and M. K. Schwartz. 2006. Gene flow in complex landscapes: testing multiple hypotheses with causal modeling. The American Naturalist 168:486–499.

Cushman, S. A., McKelvey, K. S. and Schwartz, M. K. (2009), Use of Empirically Derived Source-Destination Models to Map Regional Conservation Corridors. Conservation Biology, 23: 368–376.

Dood, A. R., S. J. Atkinson, and V. J. Boccadori. 2006. Grizzly bear management plan for western Montana: Final programmatic environmental impact statement 2006-2016. Montana Department of Fish, Wildlife and Parks, Helena, Montana, USA.

Gunther, K. A. , M. A. Haroldson, K. Frey, S. L. Cain, J. Copeland, and C. C. Schwartz. 2004. Grizzly bear-human conflicts in the Greater Yellowstone ecosystem, 1992-2000. Ursus 15(1):10-22 Hanski, I. A. and M. E. Gilpin. 1997. Metapopulation biology: ecology and evolution. Toronto, Academic Press.

Haber, J., P. Nelson, R. Ament, G. Costello, W. Francis and M. Salvo. 2015. Planning for Connectivity: A guide to connecting and conserving wildlife within and beyond America's national forests. Available at: http://www.defenders.org/sites/default/files/publications/planning-for-connectivity.pdf

Haber, J., and P. Nelson. 2015. Planning for Diversity: A guide to national forest planning to conserve America's wildlife. Available at: http://www.defenders.org/sites/default/files/publications/planning-for-diversity.pdf

Hanski, I. 1999. Metapopulation ecology. Oxford University Press, Oxford, U.K. Harrison, S. 1994. Metapopulations and conservation. Pages 111-128 in P. J. Edwards, R. M. May and N. R. Webb, eds. Large-scale ecology and conservation biology. Blackwell Scientific Press, Oxford, U.K.

Haroldson, M. A., C. C. Schwartz, K. C. Kendall, K. A. Gunther, D. S. Moody, K. Frey, and D. Paetkau. 2010. Genetic analysis of individual origins supports isolation of grizzly bears in the Greater Yellowstone Ecosystem. Ursus 21:1–13. BioOne

Hedrick, P.W. 1996. Genetics of metapopulations: Aspects of a comprehensive prospective. In: D. McCullough (Ed.) Metapopulations and Wildlife Conservation Management. Island Press, Washington DC and Covelo CA. Chapter 3: pp. 29-51.

Hedrick, P.W., and M.E. Gilpin. 1996. Metapopulation genetics: Effective population size. In I. Hanski and M. Gilpin, (Eds.) Metapopulation dynamics: Ecology, genetics, and evolution. Academic Press, New York. Pp. 1-29.

Heller, N. E. and E. S. Zavaleta. 2009. Biodiversity management in the face of climate change: a review of 22 years of recommendations. Biological Conservation. 142(1): 14-32.

Interagency Grizzly Bear Committee. 1994. Interagency grizzly bear committee task force report: grizzly bear/motorized access management. Missoula, Montana, USA.

Interagency Grizzly Bear Committee. 2001. Support for the concept of linkage zones, signed memo.

Kasworm, W. F., H. Carriles, and T. G. Radandt. 2004. Cabinet-Yaak grizzly bear recovery area 2003 research and monitoring progress report. U.S. Fish and Wildlife Service, Missoula, Montana. 62 pp.

Krehbiel, R. 2015. Bears on the move: Challenges and Opportunities Associated with Grizzly Bear Connectivity in the Northern Rockies. M.S. Thesis. Sustainable Development and Conservation Biology, University of Maryland.

Lande, R. and G.F. Barrowclough. Effective population size, genetic variation, and their use in population management. Pp. 87-123. in M. Soule (ed.) Viable Populations for Conservation. Cambridge University Press. New York, New York.

Lloyd, R., K. Lohse, and TPA Ferré. 2013. Influence of road reclamation techniques on forest ecosystem recovery. Frontiers in Ecology and the Environment 11: 75 81. http://dx.doi.org/10.1890/120116

Mace, R. D, and T. L. Manley. 1993. South Fork Grizzly Study; Progress Report. Montana Department of Fish, Wildlife and Parks, Kalispell, Montana.

Mace, R. D., and J. S. Waller, T. L. Manley, L. J. Lyon, and H. Zuuring. 1996. Relationships among grizzly bears, roads and habitat in the Swan Mountains, Montana. Journal of Applied Ecology 33:1395–1404.

Mattson, D. J., R. R. Knight, and B. M. Blanchard. 1987. The effects of developments and primary roads on grizzly bear habitat use in Yellowstone National Park, Wyoming. Pages 259-273 in Bears: their biology and management. Proceedings of the 7th International Conference on Bear Research and Management, Williamsburg, Virginia, USA.

Merriam, C.H. 1922. Distribution of grizzly bears in U.S. Outdoor Life 50:405-406. Miller, C.R., and L.P. Waits. 2003. The history of effective population size and genetic diversity in the Yellowstone grizzly (Ursus arctos): Implications for conservation. Proceedings of the National Academy of Sciences 100:4334-4339.

Montana's Comprehensive Fish and Wildlife Conservation Strategy. 2005. Montana Fish, Wildlife & Parks, 1420 East Sixth Avenue, Helena, MT 59620.

Montana Fish, Wildlife and Parks (MFWP). 2006. Grizzly Bear Management Plan for Western Montana. Final Programmatic Environmental Impact Statement 2006-2016.

Montana Fish, Wildlife and Parks (MFWP). 2013. Grizzly bear management plan for Southwestern Montana 2002-2013. Helena, Montana, USA.

Olimb, S. and E. Williamson. 2006. Regional habitat connectivity analysis: crown of the continent ecosystem. American Wildlands, Bozeman, MT. 29 pp. www.wildlands.org

Picton, H. D. 1986. A possible link between Yellowstone and Glacier grizzly bear populations. Int. Conf. Bear Res. and Mgmt. 6:7-10.

Primm, S. and S.M. Wilson, 2004. Re-connecting grizzly bear populations: Prospects for participatory projects. Ursus, 15:104-114.

Proctor, Michael F., D. Paetkau, B.N. Mclellan, G.B. Stenhouse, K.C. Kendall, R.D. Mace, W.F. Kasworm, C. Servheen, C.L. Lausen, M.L. Gibeau, W.L. Wakkinen, M.A. Haroldson, G. Mowat, C.D. Apps, L.M. Ciarniello, R.M.R. Barclay, M.S. Boyce, C.C. Schwartz, C. Stobeck. 2012. Population Fragmentation and Inter-Ecosystem Movements of Grizzly Bears in Western Canada and the Northern United States. Wildlife Monographs 180:1-46.

Proctor M., B. McLellan, D. Paetkau, C. Servheen, W. Kasworm, K. Kendall, G. Stenhouse, M. Boyce, and C. Strobeck. 2005. Delineation of sub-population boundaries due to anthropogenic fragmentation of grizzly bears in southwest canada and northwest usa using genetic analysis. Oral presentation. International Bear Association 16th annual conference. Trentino, Italy.

Proctor M., B. McLellan, C. Strobeck, R. Barclay. 2004. Gender-specific dispersal distances of grizzly bears estimated by genetic analysis. Canadian Journal of Zoology 82:1108-1118, 10.1139/z04-077.

Robinson, C., P.N. Duinker, and K.F. Beazley. 2010. A conceptual framework for understanding, assessing, and mitigating ecological effects of forest roads. Environmental Reviews 18:61–86.

Schwartz, C. C., P. H. Gude, L. Landenburger, M. A. Haroldson and S. Podruzny. 2012. Impacts of rural development on Yellowstone wildlife: linking grizzly bear Ursus arctos demographics with projected residential growth. Wildlife Biology 18: 246-257.

Schwartz, C. C., M. A. Haroldson, G.C. White. 2010. Hazards Affecting Grizzly Bear Survival in the Greater Yellowstone Ecosystem. Journal of Wildlife Management 74(4):654-667.

Servheen C., J.S. Waller, and P. Sandstrom. 2001. Identification and Management of Linkage Zones for Wildlife between the Large Blocks of Public Land in the Northern Rocky Mountains.

Servheen, C., J.S. Waller, and P. Sandstrom. 2003. Identification and management of linkage zones for wildlife between the large blocks of public lands in the northern Rocky Mountains. Updated July 8, 2003. USDI, Fish and Wildlife Service, Missoula, MT.
www.cfc.umt.edu/research/MFCES/programs/GrizzlyBearRecovery/Linkages_Report_2003.pdf

Soulé, M.E., editor. 1987. Viable populations for conservation. Cambridge University Press, New York.

Summerfield, B., W. Johnson, and D. Roberts. 2004. Trends in road development and access management in the Cabinet–Yaak and Selkirk grizzly bear Recovery Zones. Ursus 15:115–122.

USDA Forest Service. 2013. Biological assessment for grizzly bears on the west side of the Helena National Forest. Unpublished agency document, on file. Helena National Forest. Helena, MT.

USDA Forest Service. 2014. Divide Travel Plan DEIS. Helena Ranger District, Helena National Forest, Helena, MT

USDA Forest Service. 2014. Divide Travel Plan FEIS. Helena Ranger District, Helena National Forest, Helena, MT

US Fish and Wildlife Service. 1993. Grizzly bear recovery plan. Missoula, MT.

U.S. Fish and Wildlife Service. 2007. Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area.

U.S. Fish and Wildlife Service. 2011. Grizzly Bear (Ursus arctos horribilis) 5-Year Review: Summary and Evaluation. Missoula, MT.

U.S. Fish and Wildlife Service. 2013. Northern Continental Divide Ecosystem Grizzly Bear Conservation Strategy-Draft.

Walker, R. and L. Craighead. 1997. Analyzing wildlife movement corridors in Montana using GIS. Report No. 11, American Wildlands. http://www.wildlands.org

Walker, R. and L. Craighead. 1998. Corridors: key to wildlife from Yellowstone to Yukon. Pages 113-121 in L. Wilcox, B. Robinson, A. Harvey (editors). A Sense of Place: An Atlas of Issues, Attitudes, and Resources in the Yellowstone to Yukon Ecoregion. Yellowstone to Yukon Conservation Initiative. Cranmore, Alberta.

Appendix F:

GYC Objection to the NCDE FPA for grizzly bear management direction

GREATERYELLOWSTONE.ORG
LOCATIONS IN MONTANA, IDAHO & WYOMING

HEADQUARTERS
215 South Wallace Avenue
Bozeman, Montana 59715
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February 12, 2018

ATTN: Objection Reviewing Officer
USDA Forest Service
Northern Region
26 Fort Missoula Road, Missoula, MT 59804

RE: Objection for the NCDE Grizzly Bear Forest Plan Amendments
Submitted Electronically to: appeals-northern-regional-office@fs.fed.us

Please accept the following Objections for the Northern Continental Divide Ecosystem (NCDE) Grizzly Bear Forest Plan Amendments to incorporate relevant direction from the NCDE Draft Grizzly Bear Conservation Strategy (GBCS) into the Forest Plans for the Helena, Kootenai, Lewis and Clark, and Lolo National Forests. We provided substantive comments for the proposed Forest Plan Amendments (FPA) during scoping (submitted on May 15, 2015 and included here in Appendix A) and for the Draft Environmental Impact Statement (DEIS) (submitted on Oct. 3, 2016 and included here in Appendix B). Our focus for this objection remains on critical habitat protections for management Zone 2, as defined in the NCDE GBCS, due to the areas importance for connectivity to the Greater Yellowstone Ecosystem (GYE) grizzly bear population. It is our goal to ensure that the GYE population remains robust and eventually connects to the NCDE and other populations as part of one large interconnected Northern Rockies grizzly bear metapopulation.

The Greater Yellowstone Coalition (GYC) represents over 90,000 supporters, both in Montana and nationally, that have a continued and vested interest in the management of grizzly bears in Montana and throughout the GYE. We advocate for a thriving population of grizzly bears throughout the GYE by protecting core habitat, working to achieve functional connectivity for bears between the GYE and NCDE, and helping local communities coexist with the bear by building awareness and providing proactive conflict mitigation tools. We view grizzly bears within the GYE, the NCDE, and other recovery areas as integral components of a larger, interconnected grizzly bear population throughout the Northern Rockies.

We provided extensive science-based comments during scoping and for the DEIS for the proposed NCDE Forest Plan Amendments that the FPA Final EIS has failed to address. The Forest Service's selected Alternative 2 Modified (or "Selected Alternative") does not adequately address connectivity between the NCDE and other ecosystems including the GYE, and remains biologically and legally deficient according to the best-available science and today's legal framework. Under the Selected Alternative, Zone 2 will be managed to allow for existing resource and recreational opportunities with status quo habitat protections despite the fact that under current conditions, Greater Yellowstone grizzly bears remain isolated and bears from the NCDE have still not connected to the GYE via Zone 2 or any other route (Haroldson et al. 2010). In short, we believe the Selected Alternative is inadequate to provide for long-term functional connectivity to the GYE or restore a metapopulation of grizzly bears in the Northern Rockies. The Forest Service has a responsibility to manage for grizzly bear habitat on all Forest

lands both within the NCDE and in the corridor areas connecting to other populations (i.e. the GYE) to support population viability and recovery for grizzly bears. This should be an objective of the Forest Service and adequate habitat protections should have been included for Zone 2 to support/achieve this.

The objections we are raising below are consistent with our previous advocacy and comments regarding this process. Those comments, attached as appendices, detailed our concerns over the proposed actions and their inadequacies under the Endangered Species Act (ESA) [1] and National Forest Management Act (NFMA) [2]. Our goal in this objection process is to offer a specific set of remedies (i.e. "solutions") that would improve the decision from both a legal and biological perspective. We believe that by addressing our objections the Forest Service will adequately meet their legal requirements as stated below to support population viability and recovery for grizzly bears.

Summary of Objections

Below is the summary of the objections we are raising.

1. The Selected Alternative does not meet ESA or NFMA requirements and is inconsistent with the best available science.
2. The purpose and need of the FPA is too narrowly focused on the NCDE population.
3. The Forest Service failed to provide a rigorous analysis of the true conditions on the ground with respect to habitat security and grizzly bear survival/mortality risk throughout Zone 2, and whether those are adequate to allow for "consistent grizzly bear presence" in the "intervening areas" between the NCDE and GYE to support functional connectivity to the GYE.
4. Plan components for Zone 2 under the Selected Alternative are inadequate to support long-term functional connectivity and dispersal between populations.
    a. The Desired Condition NCDE-HNF Zone 1&2-DC-02 to support efforts to reduce barriers to genetic connectivity between the NCDE and GYE only applies to a limited area in Zone 2 rendering it ineffective to achieve its purpose.
    b. The Forest Service failed to consider the effects of future site development and anthropogenic impacts in Zone 2 and how that could affect successful movement of grizzly bears between the NCDE and GYE.
    c. Existing road density standards may be inadequate to promote functional connectivity between ecosystems.
    d. The Selected Alternative fails to provide any grazing related management direction to reduce the potential for grizzly bear mortality due to livestock conflicts.
5. The Beaverhead-Deerlodge National Forest was purposely omitted from this process leaving a disconnect in Forest Plan direction throughout Zone 2 and resulting in inadequate protections to support connectivity between ecosystems.

[1] Endangered Species Act (Public Law 93-205)

[2] National Forest Management Act (Public Law 94-588)

1. The Selected Alternative does not meet ESA or NFMA requirements and is inconsistent with best available science (refer also to our Scoping and DEIS comments on pages 1-6 and 2-5 respectively).

Process flaws under the Endangered Species Act

The grizzly bear was listed as a threatened species in the contiguous lower 48 states under the U.S. Endangered Species Act (ESA) (40 Fed. Reg. 31,734 (July 28, 1975), and should be recovered and managed as a large well-connected Northern Rockies metapopulation. As stated in previous comments, historic evidence supports the existence of a true metapopulation structure for grizzly bears in the contiguous United States (Craighead and Vyse 1996) including connectivity between the NCDE and the GYE (Picton 1986, Merriam 1922). Indeed, the long-term goal for listed grizzly bears is to "achiev[e] connectivity and manag[e] grizzly bear populations in the northern Rockies as subpopulations of a metapopulation" (2011 Grizzly Bear 5-Year Review, p.14). The U.S. Forest Service (USFS) is required to adequately consider the impacts of the Forest Plan Amendments/future plan components not only for the NCDE, but also for the GYE grizzly bear population (as well as other recovery areas) under Section 7 of the ESA (a)(1) http://www.fws.gov/endangered/laws-policies/section-7.html. The viability and recovery of still threatened populations may depend on grizzly bear occupancy and movement through connectivity areas. Therefore, regardless of the status of the GYE or NCDE population and where management Zones are delineated by FWS, the Forest Service must contribute to the recovery of still federally listed threatened and endangered species and provide for population viability under the National Forest Management Act (NFMA) (see below). The Forest Service has failed to do all of the above and instead has narrowly and deficiently focused on just the NCDE population through this process.

National Forest Management Act (NFMA) requirements.

As stated in our previous comments, providing habitat conditions to promote grizzly bear occupancy within and connectivity through Zone 2 would ensure compliance with the National Forest Management Act (NFMA), which requires Forest Plans to "provide for diversity of plant and animal communities" and "maintain viable populations" 16 U.S.C. § 1604(g)(3)(B) (emphasis added). In 1982, the Forest Service promulgated regulations to ensure such diversity:

> Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed within the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area 36 C.F.R. § 219.19. (emphasis added)

In the case of grizzly bears, the viability requirement applies to the species as a whole, and the involved National Forests must provide habitat to contribute to that. National Forest lands comprise over 60% of the NCDE, stressing the importance of managing these lands for grizzly bear habitat so that bears are well distributed and well-connected to maintain a viable population of grizzly bears across the range of the species as required by NFMA. As we outlined in our previous comments, grizzly bear populations must be well-connected to ensure long-term viability, and the best available science indicates that the long-term resiliency and conservation of this species depends on an interconnected metapopulation (see pages 3 - 5 and 4 - 5 from our Scoping and DEIS comments respectively for relevant metapopulation

science). However, plan components for the NCDE population and associated Forests throughout Zone 2 fail to provide for this outcome, making this decision biologically deficient according to the best available science and a violation of NFMA.

Solution: The Forest Service should commit to providing for population viability for the species as a whole, both within the NCDE and between populations/ecosystems, thereby supporting the recovery of other still threatened populations as well as a connected Northern Rockies grizzly bear metapopulation. To achieve this, the F.S. should incorporate specific Amendment plan components to support long-term functional connectivity through Zone 2 as described in subsequent sections.

2. In general, the purpose of the proposed Forest Plan Amendments is too narrowly focused on the NCDE population.

As previously stated, the USFS should have adequately considered the impacts of this Proposed Action for not only the NCDE, but also for the GYE grizzly bear population, as well as other recovery areas, under Section 7 of the ESA (a)(1) http://www.fws.gov/endangered/laws-policies/section-7.html and as required by NFMA. The draft Grizzly Bear Conservation Strategy (GBCS) recognizes the NCDE population serving as a "source population" for other populations, acknowledging the need for connectivity between the NCDE and the Cabinet-Yaak, Bitterroot and Yellowstone populations (GBCS, p. 32). However, throughout this FEIS, the F.S. is clearly focused on recovery of the NCDE population rather than supporting further range expansion and connectivity between populations. The Purpose and Need for Action for the grizzly bear amendments states:

> "The purpose of alternative 2 modified, which is evaluated in this volume of the final EIS, is to amend the Helena, Kootenai, Lewis and Clark, and Lolo National Forest plans to provide consistent direction that will support continued *recovery of the NCDE grizzly bear population*… There is a need to incorporate updated habitat management direction informed by the draft Conservation Strategy into Forest Plans to provide adequate regulatory mechanisms that would support the potential *future delisting of the NCDE population.* (emphasis added, Amendment FEIS, p. 8)

The FEIS further states, "All alternatives are designed to conserve the grizzly bear and to provide the regulatory framework to support recovery of the grizzly bear population *in the NCDE*" (emphasis added, Amendment FEIS, p. 36). Though language can be found within the FEIS suggesting potential benefits to other grizzly bear populations, it is not backed by regulatory mechanisms to support long-term connectivity or allow for the NCDE to serve as a source population.

Solution: The Forest Service should expand their Purpose and Need to include a commitment to supporting the NCDE as a source population to aide in the recovery of all grizzly bear populations and thereby supporting one large connected Northern Rockies grizzly bear metapopulation. As stated above specific plan components should then be implemented to support long-term functional connectivity through Zone 2 as described in our following objections/solutions.

3. The Forest Service failed to provide a rigorous analysis of the true conditions on the ground with respect to habitat security and grizzly bear survival/mortality risk throughout Zone 2, and whether those are adequate to allow for "consistent grizzly bear presence" in the "intervening areas" between the NCDE and GYE to support functional connectivity to the GYE.

Schwartz et al. (2010) found that open motorized route density, secure habitat, developed sites, and the amount of time bears spent in areas open to ungulate hunting were the best predictors of grizzly bear survival in the GYE. To guide resource management, Schwartz et al. (2010) used these models to spatially depict areas of risk and define source/sink habitats in areas of otherwise good habitat for grizzly bears in the GYE (see Figures 6 and 7 from our FPA Scoping Comments). We realize that not all lands throughout Zone 2 are equality suitable to provide connectivity for bears. In our previous comments, we recommended a similar assessment of current habitat security and grizzly bear survival/mortality risk throughout Zone 2 to help identify important connectivity habitat including areas of low mortality risk (i.e. with suitable habitat protections), as well as areas of higher mortality risk where management standards could be improved. We went on to recommend that Zone 2 or a portion of Zone 2 most likely to serve as an effective linkage area for grizzly bears be designated as a Genetic Connectivity Area (GCA), or managed as such (see page 11 of our DEIS comments). We argued that a *contiguous area or path connecting the NCDE and GYE populations* through Zone 2 should be defined and managed for genetic connectivity by providing adequate habitat protections and standards to promote male grizzly bear occupancy and successful movement *through* this area to the GYE. For example, we recommended the Forest Service consider a GCA for the *entire* Continental Divide region of the Helena National Forest *south through* the Beaverhead-Deerlodge National Forest to the Yellowstone Distinct Population Segment (DPS) boundary (see Figure 5 from our DEIS comments for an approximate example of this).

However, the Forest Service ignored these recommendations stating the following:

> "The Greater Yellowstone Ecosystem has a robust bear population. However, in recognition of its geographic isolation, Zone 2 was identified to facilitate movement of bears, particularly male bears, between the NCDE and the Greater Yellowstone Ecosystem populations. Because existing direction in Forest Service and U.S. Bureau of Land Management land management plans has not precluded male grizzly bears from occupying Zone 2 in low densities, the draft Conservation Strategy recommended continuing to apply the existing direction with no changes needed." Page 25, Amendment FEIS.

We are disappointed by this response. Though male bears have been documented using some portions of Zone 2 in low densities, they do not have a "consistent presence" in these intervening areas in Zone 2, nor have any grizzly bears from the NCDE successfully connected to the GYE (or vice versa) via Zone 2 or any other route. Furthermore, the intent of Zone 2 is not to simply have male bears occupying portions of Zone 2 in low densities, the intent is to "facilitate movement of bears, particularly male bears, between the NCDE and the Greater Yellowstone Ecosystem populations." Again, existing conditions thus far have not allowed for this. Stating that existing conditions are sufficient to support the above objective is merely an assumption. The Forest Service is failing to provide a rigorous analysis of the true conditions on the ground and whether those will support long-term functional connectivity between the NCDE and GYE. In fact, Peck et al. (2017) determined that "the probability of successful dispersal into the Greater Yellowstone Ecosystem remains low, due to the distance between the current occupied ranges for the two populations". We agree that for dispersal of NCDE grizzly bears to occur, it is necessary to have "consistent grizzly bear presence" in the "intervening areas" (GBCS, p. 37) and suggest a need to expand the "occupied range" by providing additional protective measures throughout a defined connectivity area.

Solution: The Forest Service should use existing modeling efforts (see pages 8 - 9 and 9 – 11 from our Scoping and DEIS comments respectively, and Peck et al. (2017)) to conduct an assessment comparable to Schwartz et al. (2010), that identifies potential connectivity habitat including areas of low mortality risk

(i.e. with suitable habitat protections), as well as areas of higher mortality risk where management standards could be improved. A Genetic Connectivity Area (GCA) should be defined, informed by those results, and designated in the Final EIS spanning a contiguous path between the NCDE and GYE. Within the GCA, resource management aimed at reducing motorized route densities and use as well as site development restrictions should be implemented in high risk areas. In areas with adequate secure habitat (i.e. low mortality risk) standards aimed at maintaining current management direction should be implemented. See specific recommendations for plan components below.

4. Plan components for Zone 2 under the Selected Alternative are inadequate to support long-term functional connectivity and dispersal between populations.

Under the Selected Alternative, "in Zone 2, existing Forest Plan direction would be retained with the addition of desired conditions that relate to providing genetic connectivity between the NCDE and the Greater Yellowstone Ecosystem" (Amendment FEIS, page 14). Specifically, these include 1). A desired condition that applies to Zone 1 and the *portion of Zone 2 west of Interstate 15* "to consolidate NFS lands adjacent to highways and to support other efforts to reduce barriers to genetic connectivity between the NCDE and the Greater Yellowstone Ecosystem populations" (Draft ROD, page 9), and 2). A desired condition and standard regarding food/wildlife attractant storage special order(s) that will apply across the primary conservation area, Zone 1 including the demographic connectivity areas, and Zone 2.

4a. The Desired Condition NCDE-HNF Zone 1&2-DC-02 to support efforts to reduce genetic connectivity between the NCDE and GYE only applies to a limited area in Zone 2 rendering it ineffective to achieve its purpose.

First, while the inclusion of the Desired Condition NCDE-HNF Zone 1&2-DC-02 that applies to Zone 1 and the *portion of Zone 2 west of Interstate 15* "to consolidate NFS lands adjacent to highways and to support other efforts to reduce barriers to genetic connectivity between the NCDE and the Greater Yellowstone Ecosystem populations" is a commendable one, it does not go far enough. From the Divide area, NCDE grizzly bears will have to successfully move through either the Boulder Mountains of the BDNF, the Elkhorns, or (less likely) the Big Belts in order to connect to the GYE (see page 8 from our FPA Scoping Comments). Supporting genetic connectivity to the GYE cannot be done through piecemeal efforts. The Divide area represents just the northern tip of Zone 2. How does this desired condition being applied to a very limited area in Zone 2 support connectivity *through* Zone 2 to the GYE? At minimum, this DC (or one comparable to it) should be applied either *throughout* Zone 2 or a portion of Zone 2 (i.e. Genetic Connectivity Area) that represents the mostly likely *contiguous route* for bears to reach the GYE (for example, the Divide region south through the Boulder Mountains of the BDNF). The Forest Service should also define what is meant by "other efforts" to reduce barriers to genetic connectivity between the NCDE and the Greater Yellowstone Ecosystem populations. "A desired condition (DC) is a description of specific social, economic, and/or ecological characteristics of the plan area, or a portion of the plan area, toward which management of the land and resources should be directed. Desired conditions must be described in terms that are specific enough to allow progress toward their achievement to be determined, but not include completion dates (36 CFR 219.7(e)(1)(i))" (page 2, emphasis added).

Solution: Extend the Desired Condition NCDE-HNF Zone 1&2-DC-02 to include either all of Zone 2, or a portion of Zone 2 (i.e. Genetic Connectivity Area) that represents the most likely contiguous route for bears to move between the GYE and NCDE. Further define what is meant by "other efforts" to reduce barriers to genetic connectivity and implement standards to ensure this desired condition is obtained.

4b. The Forest Service failed to consider the effects of future site development and anthropogenic impacts in Zone 2 and how that could affect successful movement of grizzly bears between the NCDE and GYE.

While we recognize the Forest Service's efforts to implement Food/Wildlife Attractant Storage Special Order(s) on all NFS lands within the NCDE PCA, Zone 1, and Zone 2, we feel additional bear-based habitat standards and protections related to road density, site development, and human use, are essential for achieving the desired objective of functional connectivity between the NCDE and GYE populations as described below.

One of the Demographic and Genetic Management Goals stated in the draft GBCS is to "maintain genetic linkage opportunities between the NCDE south toward Yellowstone with consistent grizzly bear presence in these intervening areas" (page 37) (emphasis added). The stated goal for Zone 2 is "to maintain existing resource management and recreational opportunities while providing the opportunity for grizzly bears, particularly males, to move between the NCDE and the Greater Yellowstone Ecosystem to provide genetic connectivity" (Page 29, Amendment FEIS). As stated in our previous comments, maintaining existing resource management direction may not be sufficient to support successful movement of grizzly bears between ecosystems since it hasn't allowed for this already under existing conditions. Furthermore, managing for the status quo is unacceptable especially when considering potential climate change impacts, projected human population growth and development, and the increasing demands that will be placed on National Forest lands as a result.

From page 4 of our FPA DEIS Comments:

> Zone 2 contains a patchwork of public and private lands, with rapid development of private lands predicted in the coming years as Montana's human population is forecasted for continued growth (Census and Economic Information Center 2013). Private lands often create mortality sinks (Schwartz et. al. 2012); thus, grizzly bears will likely rely more heavily on the large blocks of contiguous public lands for security, requiring more rigorous habitat protections and placing ever-increasing importance on properly managed public lands to promote functional connectivity to support a truly recovered, resilient, and viable meta-population of grizzly bears.

Zone 2 is dominated by private landownership (page 30, Amendment FEIS) and encroaching development on private lands will further reduce connectivity options between blocks of public land. However, the Forest Service is not proposing *any* limits on site development in Zone 2. Clearly, the F.S. failed to consider the potential increase of recreation use throughout Zone 2 as a result of construction of new temporary or permanent roads associated with projects, as well as the inevitable increase in recreation and use on F.S. lands even without new roads or developments due to increasing numbers of people, and how these may impact future use and survival of grizzly bears *throughout* Zone 2. In the very least, more needs to be done on federal lands to help prioritize *maintenance* of existing connectivity habitat in to the future. Though food storage orders help reduce the potential for conflicts associated with unsecured attractants, enforcement is often difficult and compliance not guaranteed. Limiting the number of developed sites on public lands is another means to prevent increased bear-human conflicts and associated mortalities as bears begin using these areas as desired (see site development recommendations from our previous DEIS comments, page 14).

Solution: Implement a standard pertaining to and limiting site development to one increase in baseline (as existed in 2011) per decade throughout Zone 2, or in the very least a Genetic Connectivity Area that spans a contiguous path between the NCDE and GYE.

4c. Existing road density standards may be inadequate to promote functional connectivity between ecosystems.

As stated in the 1993 Grizzly Bear Recovery Plan, "Roads probably pose the most imminent threat to grizzly habitat today….the presence of open roads in grizzly habitat often leads to increased bear-human contact and conflict, and can ultimately end in grizzly mortality," (USFWS 1993). As stated in previous our comments, motorized access standards should be improved in some areas of Zone 2 (see pages 12 – 14 and 5 – 7 from our Scoping and DEIS comments respectively) to support functional connectivity between the NCDE and GYE. Specifically, we recommended the following standards in our previous comments that were discarded in the FEIS:

- To be applied to FS lands throughout a Genetic Connectivity Area: Standards that limit future increases in open road densities in areas where secure core is adequate, and standards that reduce open road densities where it is currently too high to promote use by male grizzly bears (see Schwartz et al. 2010). Specifically, areas with road densities at or below 1 mi/mi^2 should be maintained at this level, and areas with high road densities (>2mi/mi^2) should be reduced to 2mi/mi^2.
- To be applied to FS lands throughout Zone 2: A standard that "there shall be no net increase in miles of roads open to public motorized use on NFS lands above the baseline."

As an initial matter, within the PCA road densities are properly calculated at the scale of female grizzly bear home ranges, however it appears that road density on F.S. lands is assessed across Zone 2 as a whole in the FEIS:

> "Across Zone 2 as a whole, the existing density of open roads and motorized trails on NFS lands was less than 1.5 miles/square mile (Ake, 2015)" (Amendment FEIS, p. 59). "The current open motorized route density on NFS lands during the non-denning season is 1.5 miles/square mile in Zone 1 and 0.9 miles/square mile in Zone 2." (Amendment FEIS p. 63)

We are concerned that aggregating road density across Zone 2 as a whole does not provide an appropriate comparison against road density thresholds from existing research nor would it capture high road densities in certain areas that could in effect be serving as barriers to linkage and essentially fragmenting the landscape. In other words, we argue that this is too course of a scale to consider the potential effects of road density on the likelihood of successful movement by grizzly bears through this area. Successful dispersal of grizzly bears would depend on where the actual roads occur relative to the most likely routes grizzly bears would use.

Furthermore, we know that secure habitat in Zone 2 is already limited particularly in the Boulder Mountains of the BDNF (see below) as well as the Divide region of the HNF where open (1.69 mi/mi^2) and total (average = 2.07mi/mi^2) road densities are high (HNF Divide FEIS p. 280), and the selected amendment does not include any standards or guidelines for limiting future increases in road density or motorized use. Rather, the Forest Service cites research by Boulanger and Stenhouse (2014) throughout the Amendment FEIS as justification for higher road densities based on the threshold values they estimated. For example, from page 55:

> "Based on the threshold values identified in Alberta by Boulanger and Stenhouse (2014), the existing road densities on NFS lands in this portion of the Helena National Forest are compatible with supporting the presence of grizzly bears (< 2.4 miles/square mile), including adult females (< 2 miles/square mile), and with minimizing bear mortality (< 1.6 miles/square mile)."

However, open road densities above 1.0 mi/mi^2 and total road densities above 2.0 mi/mi^2 have been shown to suppress local habitat use by grizzly bears (Mace and Manley 1993, Wakkinen and Kasworm 1997), while survival rates for grizzly bears decreases relative to high road density with sub-adult male survival decreasing sharply with road densities above 1.0 mi/mi^2 (Boulanger and Stenhouse 2014). Arguably, subadult males will be the most likely dispersers to move between ecosystems (GYE Final GBCS Appendix J, page 5). The Forest Service should consider the body of evidence available on road density effects rather than components of one single study that fits their agenda. The Forest Service should also consider that monitoring of road density both inside and adjacent to Forest Service lands is important. As road densities increase outside of Forest Service lands and the habitat become increasingly fragmented, the Forest Service has an obligation to ensure road densities are at levels that support a viable population of grizzly bears.

Under Alternative 3, the following standard was included:

> NCDE -HNF Zone 1&2-STD-02: Within the Helena-Lewis and Clark National Forest portion of the NCDE Zone 1 and Zone 2 that is west of Interstate 15 (see figure 1-72), motorized routes (roads and trails) open to public motorized use during the non-denning season shall not exceed 2.4 miles/square mile, calculated as the miles of motorized routes on National Forest System lands divided by the acres of National Forest System lands.

The FEIS states that, "the purpose of this standard is to support grizzly bear presence and the opportunity for movement of male bears from the NCDE to the Greater Yellowstone Ecosystem" (page 17, Amendment FEIS). As stated on page 67 of this FEIS, this added component to Alternative 3 "would help to ensure that conditions that support grizzly bear presence and the opportunity for movement of male bears from the NCDE to the Greater Yellowstone Ecosystem would be maintained through time" (emphasis added). This standard was not included in the Selected Alternative however. Though we believe that road density limits should be lower to reflect Mace and Manley's (as well as others) research, this standard would still limit future increases in the density of roads and should be included in the selected Alternative *and* extended down *through a contiguous* area that reaches the Yellowstone DPS boundary, for example through the Boulder Mountains of the BDNF as well as through the Elkhorns. In other potential Zone 2 connectivity areas, in the very least, there should be a "no net increase" in miles of roads open to public motorized use on NFS lands above the baseline.

Solutions related to inadequate road density standards in Zone 2:

1. *The Forest Service should provide a more spatially explicit/appropriate analysis of road density throughout Zone 2 to assess whether conditions will support a "consistent presence" in intervening areas between the NCDE and GYE and the likelihood of grizzly bears successfully moving through these areas. Road density standards should be implemented based on these results and at the appropriate spatial scale to support successful movement of adult and subadult male grizzly bears between the NCDE and GYE.*

2. *In the very least, implement the road density standard NCDE -HNF Zone 1&2-STD-02, and extend it down through a potential genetic connectivity area to the Yellowstone DPS boundary (as described above on page 5 regarding modeling). In other potential Zone 2 connectivity areas,*

apply a "no net increase" in miles of roads open to public motorized use on NFS lands above the baseline.

4d. The Selected Alternative fails to provide any grazing related management direction to reduce the potential for grizzly bear mortality due to livestock conflicts (refer to page 14 of our DEIS comments).

The high potential for conflicts between grizzly bears and domestic livestock grazing is well supported (Knight et al. 1983) and livestock depredation is a leading cause of lethal removal of grizzly bears. Active sheep grazing allotments in particular can serve as a population sink as bears are often attracted to these flocks, and following repeat depredations (which is often the case), are killed or removed from the population (Knight et al. 1988). However, the Selected Alternative contains no plan components for managing grazing in Zone 2.

Solution: Previously we asked for the following and do so again here: The Desired Condition, Standards and Guidelines for grazing proposed for Zone 1 and the DCAs in Alternative 3 be expanded in to Zone 2 or in the very least a Genetic Connectivity Area through the Divide landscape and Boulder Mountains. In addition, the following guidelines (NCDE-GDL_GRZ-01 and 02; FW-GDL-GR-01 and 02) allowing for the phase out of grazing or moving livestock where recurring conflicts occur if there is a willing permittee as well as incorporating within allotment management plans/Plans of Operations measures to protect key grizzly bear food production areas from grazing effects, should be applied to Zone 2 or a Genetic Connectivity Area.

5. Omitting the Beaverhead-Deerlodge National Forest in this process leaves a disconnect in Forest Plan direction throughout Zone 2 resulting in inadequate protections to support connectivity between ecosystems.

We are disappointed that our recommendation to include the Beaverhead-Deerlodge National Forest in the Amendment process to address connectivity between the NCDE and the GYE (see pages 14 and 8 from our Scoping and DEIS comments respectively) was discarded. A large section of BDNF land north of I-90 is located within the FWS identified Zone 2 (400,000 acres to be exact (NCDE GBCS, pg. Table 9, p. 91)), whereas a portion of the BDNF south of I-90 was included in the Forest Plan Amendment for Grizzly Bear Habitat Conservation for the Greater Yellowstone Area National Forests in 2006. Exclusion of the northern portion of the BDNF from the FPA process for the NCDE creates a gap and inconsistency in how grizzly bear habitat will be managed both within the BDNF and between Forests in Zone 2, an area intended to support connectivity between Yellowstone and the NCDE.

The Forest Service discarded this recommendation again sighting the draft Conservation Strategy as stating: "Because we know that management direction in current USFS and BLM land management plans in Zone 2 did not preclude male grizzly bears from occupying this area in low densities, existing direction will continue to apply." And that though they "agree that connectivity between ecosystems is important"… "movement of bears from the NCDE to the Greater Yellowstone Ecosystem is supported by the food storage order on the Beaverhead-Deerlodge National Forest and by limits on open road densities under the revised Beaverhead-Deerlodge Forest Plan." (page 27, Amendment FEIS)

First, as previously stated, the argument that current BLM and USFS direction in Zone 2 "did not preclude male grizzly bears from occupying this area in low densities" is misleading. Sure, the occasional male grizzly bear has been documented using certain areas of Zone 2, but bears from the NCDE have yet to successfully reach the GYE (or vice versa) and BDNF lands may provide the most likely stepping stones

for this to happen (see pages 8-9 and 10-11 from our Scoping and DEIS comments respectively, as well as Peck et al. 2017). Again, until grizzly bears have been observed successfully moving *through* Zone 2 reaching the GYE (or vice versa) it is erroneous and misleading to claim that current direction is sufficient to support genetic connectivity between the GYE and NCDE.

We realize the importance of a food storage order on lands throughout Zone 2, including the BDNF and applaud the Forest Service for implementing this standard. However, a food storage order does not go far enough given the importance of this area for connectivity and in light of existing road densities on portions of the BDNF as well as future projected human population growth and development. In fact, current conditions on the BDNF are more likely inhibiting (rather than supporting) the area's ability to act as an effective linkage corridor. For example, the Butte Ranger District on the BDNF has the highest level of motorized route densities in the state of Montana, in particular the Boulder River (with open motorized/trail densities of over 2mi/mi^2) and Upper Clark Fork landscapes, which offer Security Core (summer) values of around 30%. In fact, according to the recent Biological Opinion for the West and North Analysis Area on the BDNF, "the Boulder River, Jefferson River, Clark Fork-Flints, and Upper Clark Fork landscapes and corresponding hunting districts exhibit the highest open linear motorized road and trail densities within the WNAA." Not surprisingly, these are also areas where NCDE grizzly bears moving south have not been detected prior to 2016 (Supplement to the Biological Opinion on the Effects of the 2009 Revision of the Beaverhead-Deerlodge National Forest Land and Resource Management Plan on Grizzly Bears, May 28, 2013).

As stated on page 58 of this FEIS, "the final Greater Yellowstone Ecosystem grizzly bear conservation strategy (USFWS, 2016) describes the desirability of maintaining grizzly bear presence in the Tobacco Root and Highland Mountains to facilitate genetic connectivity with the NCDE." These portions of the BDNF were also acknowledged as significant to connectivity in the FWS's final rule for the Greater Yellowstone grizzly bear population, and in recent research identifying potential male movement pathways between the NCDE and the Yellowstone ecosystems:

> "Maintaining the presence of non-conflict grizzly bears in areas between the NCDE management area and the DMA of the GYE, such as the Tobacco Root and Highland Mountains, would likely facilitate periodic grizzly bear movements between the NCDE and GYE" (USFWS, Fed. Reg. 82 at 30534).
>
> "The Tobacco Root Mountains may be particularly pivotal stepping stone, as many different paths converge on this mountain range" (Peck et al, 2017).

We realize the Tobacco Roots fall outside of Zone 2 however we include the above examples to highlight the growing recognition of the BDNF in providing the public land stepping stones to support connectivity between the NCDE and GYE as well as other ecosystems. Excluding the northern portion of the BDNF that falls within Zone 2 leaves a serious disconnect in planning direction. As stated above (and in previous comments), the Forest Service, including the BDNF, must contribute to the recovery of still federally listed threatened and endangered species under Section 7 of the ESA and provide for population viability under NFMA. The BDNF must consider that the viability and recovery of still threatened populations may depend on grizzly bear occupancy and movement through connectivity areas on BDNF lands. The BDNF must also manage their lands for grizzly bear habitat so that bears are <u>well distributed</u> and well-connected to maintain a viable population of grizzly bears across the range of the species as required by NFMA. Given the importance of the BDNF for connectivity between the NCDE and GYE as well as to other recovery areas, the BDNF must be included in this process, with improved and consistent habitat protections implemented for all Zone 2 Forests (including the BDNF) to meet the above

mentioned NFMA and ESA requirements and to ensure effective linkage area function between the NCDE and other ecosystems including the GYE.

*Solution: The FEIS should include the Beaverhead-Deerlodge National Forest and include a desired condition to provide for long-term functional connectivity throughout all Forests in Zone 2 (including the BDNF) and implement the road density, site development, and grazing standards and guidelines recommended above on all Zone 2 Forests to achieve that condition***.**

FPA Alternative 3 would provide better protection for grizzly bears through time.

The Forest Service admits that FPA Alternative 3 would provide better protection for bears through time as stated in their conclusion for Alternative 3:

> "The additional plan components would reduce the risk of grizzly bear-human conflicts and the potential for disturbance or displacement of grizzly bears somewhat compared to the other alternatives. The importance of Zone 1 and the portion of Zone 2 west of Interstate 15 in facilitating the movement of bears, particularly males, to the Greater Yellowstone Ecosystem would be recognized and road density specifically would be managed to support the presence of bears. Thus, alternative 3 may better ensure that conditions that support the movement of bears from the NCDE to the Greater Yellowstone Ecosystem would be maintained through time." Page 67, FEIS

In closing, we request that the Forest Service select Alternative 3 from the Amendment FEIS in addition to including the BDNF in this process, providing an adequate analysis of the on-the-ground conditions to support grizzly bear occupancy and movement through Zone 2, designation of a genetic connectivity area informed by those results, implementation of the above recommended road density, site development and grazing standards and guidelines, and extension of the desired condition NCDE-HNF Zone 1&2-DC-02 as described above.

Thank you for the opportunity to provide objection comments for the Final Environmental Impact Statement for the Forest Plan Amendments to integrate the NCDE Grizzly Bear Conservation Strategy into the Forest Plans for the NCDE National Forests. We are committed to ensuring that the GYE grizzly population remains robust and resilient through eventual linkage to the NCDE and other populations. While we appreciate the Forest Service's stated intent to facilitate connectivity between the NCDE and GYE and other populations through this process, the Selected Alternative is inadequate to achieve this. We request that the Forest Service commit to grizzly bear recovery based on a metapopulation structure by providing increased habitat protections as stated above that ensure grizzly bear connectivity between populations and based on the best available science.

Sincerely,

Shana Drimal
Wildlife Program Associate
Greater Yellowstone Coalition

Literature Cited

Boulanger, J., & Stenhouse, G. B. (2014). The impact of roads on the demography of grizzly bears in Alberta. *PLoS ONE, 9*(12), 22. doi:10.1371/journal.pone.0115535. Retrieved from <Go to ISI>://WOS:000348845100074, http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0115535.

Census and Economic Information Center. Regional Economic Model. 2013. www.ceic.mt.gov (Accessed April 20, 2015)

Craighead, F.L., and E. Vyse. 1996. Brown/grizzly bear metapopulations. In: D. McCullough (Ed.) Metapopulations and Wildlife Conservation Management. Island Press, Washington DC and Covelo CA. Chapter 14: pp. 325-351.

Haroldson, M. A., C. C. Schwartz, K. C. Kendall, K. A. Gunther, D. S. Moody, K. Frey, and D. Paetkau. 2010. Genetic analysis of individual origins supports isolation of grizzly bears in the Greater Yellowstone Ecosystem. Ursus 21:1–13. BioOne

Knight, R. R., and S. L. Judd. 1983. Grizzly Bears That Kill Livestock. International Conference on Bear Research and Management, Madison, Wisconsin, USA,
Knight, R. R., Blanchard B. M., and Eberhardt L. L. "Mortality Patterns and Population Sinks for Yellowstone Grizzly Bears, 1973-1985." *Wildlife Society Bulletin (1973-2006)* 16.2 (1988): 121-25. Web.

Merriam, C.H. 1922. Distribution of grizzly bears in U.S. Outdoor Life 50:405-406. Miller, C.R., and L.P. Waits. 2003. The history of effective population size and genetic diversity in the Yellowstone grizzly (Ursus arctos): Implications for conservation. Proceedings of the National Academy of Sciences 100:4334-4339.

Peck, C. P., F. T. Van Manen, C. M. Costello, M. A. Haroldson, L. A. Landenburger, L. L. Roberts, D. D. Bjornlie, and R. D. Mace. 2017. Potential paths for male-mediated gene flow to and from an isolated grizzly bear population. Ecosphere 8(10):e01969. 10.1002/ecs

Picton, H. D. 1986. A possible link between Yellowstone and Glacier grizzly bear populations. Int. Conf. Bear Res. and Mgmt. 6:7-10.

Schwartz, C. C., M. A. Haroldson, G.C. White. 2010. Hazards Affecting Grizzly Bear Survival in the Greater Yellowstone Ecosystem. Journal of Wildlife Management 74(4):654-667.

Schwartz, C. C., P. H. Gude, L. Landenburger, M. A. Haroldson and S. Podruzny. 2012. Impacts of rural development on Yellowstone wildlife: linking grizzly bear Ursus arctos demographics with projected residential growth. Wildlife Biology 18: 246-257.

USDA Forest Service. 2014. Divide Travel Plan FEIS. Helena Ranger District, Helena National Forest, Helena, MT

US Fish and Wildlife Service. 1993. Grizzly bear recovery plan. Missoula, MT.

U.S. Fish and Wildlife Service. 2011. Grizzly Bear (Ursus arctos horribilis) 5-Year Review: Summary and Evaluation. Missoula, MT.

U.S. Fish and Wildlife Service. April 2013. Northern Continental Divide Ecosystem Conservation Strategy-Draft.

U.S. Fish and Wildlife Service. 2016. Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area.

Appendix G:

GYC comments on the HLC NF DEIS

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October 9, 2018

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Helena, MT 59602

Comments submitted electronically October 9, 2018 at: https://cara.ecosystem-management.org/Public/CommentInput?Project=44589

Dear Helena - Lewis and Clark National Forest Plan Revision Team -

Thank you for the opportunity to comment on the Draft Revised Forest Plan/Draft Environmental Impact Statement (DEIS) for the Helena - Lewis and Clark National Forest (HLC NF) Plan Revision.

Greater Yellowstone Coalition represents over 90,000 supporters, distributed throughout Montana and across the nation. Our supporters have a strong interest in management that affects grizzly bears in Montana and throughout the rest of the Greater Yellowstone Ecosystem (GYE). We advocate for a thriving population of grizzly bears in the GYE by working to protect core habitat and areas that will help ensure GYE grizzly bears connect with the population in the Northern Continental Divide Ecosystem (NCDE). We also work to protect grizzly bears through proactive on-the-ground projects that reduce human-bear conflicts throughout the GYE and in important connective areas.

We provided extensive science based comments during scoping and following the DEIS for the Forest Plan Amendment (FPA) to integrate the NCDE Grizzly Bear Conservation Strategy (GBCS) into the forest plans for the Helena, Kootenai, Lewis and Clark, and Lolo National Forests (attached as appendix A). The FPA Final EIS did not address our comments, resulting in our objection dated February 12, 2018 (attached as appendix B). We evaluated the HLC NF DEIS through a similar lens of providing for adequate habitat protections to secure functional connectivity between the NCDE and GYE populations of grizzly bears. Despite our disappointment with the responses to our FPA objections, we are optimistic that forest plan revision for the HLC NF provides an opportunity to address some of the habitat protections not established in the FPA but necessary to allow for functional connectivity between the GYE and NCDE populations of grizzly bears. In general, our concerns around extending habitat protections established in the FPA to zones 1 and 2 still stand.

The grizzly bear was listed as a threatened species in the contiguous lower 48 states under the U.S. Endangered Species Act (ESA) (40 Fed. Reg. 31,734 (July 28, 1975), and should be recovered and managed as a large well-connected Northern Rockies meta-population. The recent ruling by Chief District Judge Dana Christensen in *Crow Indian Tribe et al. vs. United States of America et al*. (2018) underscores the importance of considering population segments like the GYE and NCDE populations

within a broader context. Judge Christensen found that the U.S. Fish and Wildlife Service, "Failed to consider how reduced protections in the Greater Yellowstone Ecosystem would impact the other grizzly populations" (page 3). Additionally, the judge found the U.S. Fish and Wildlife Service to be arbitrary and capricious in their application of the ESA threats analysis for two reasons, one of which related to the "illogical" conclusion that the Greater Yellowstone grizzly population can remain genetically self-sufficient (page 3). The FEIS for the HLC NF plan must take into account this new information. Adequate regulatory mechanisms for protecting habitat in important connectivity areas will play an important role in future attempts to de-list distinct population segments. As detailed in appendices A and B, section 7 of the ESA requires that the HLC NF consider effects of forest plan components on the viability of both the NCDE population and other recovery areas (https://www.fws.gov/endangered/laws-policies/section-7.html). Page 258 of the DEIS states that connectivity is not a limiting factor for the NCDE population of grizzly bears that occupies the HLC NF, yet fails to recognize ESA requirements for considering potential impacts on other recovery areas. The FEIS should take into account the July 2018 version of the NCDE conservation strategy, which states, "...providing the opportunity for demographic and/or genetic connectivity with other ecosystems (Cabinet-Yaak, Bitterroot, Greater Yellowstone)" as part of the overarching goal of the strategy (page 14; NCDE Subcommittee 2018).

Connectivity between the NCDE and GYE populations is key to restoring the meta-population structure that historically characterized grizzly bear presence within the intermountain west (Merriam 1922, Picton 1986, Craighead and Vyse 1996). Due to connectivity between NCDE grizzly bears and Canada, the NCDE contains a potential source population able to provide genetic diversity to other subpopulations in the northwestern United States. Genetic isolation poses a threat to self-sustainability of the GYE grizzly bear population over the long-term (Haroldson et al. 2010), and management that restores and supports a meta-population structure will be important to the future of grizzly bears in the United States (Proctor et al. 2005). The grizzly bear management plans for both western Montana and southwestern Montana (respectively, Dood et al. 2006 and Montana Fish, Wildlife, and Parks 2013) articulate connectivity between the NCDE and GYE grizzly bear populations as a long term management goal. The 2006 Dillon Resource Management Plan (page 70) includes habitat requirements that support connectivity for dispersing species like grizzly bears (BLM 2006). The Interagency Grizzly Bear Committee included enhancing connectivity between ecosystems as a goal in its 2018-2022 plan (IGBC 2018). The National Forest Management Act (NFMA) 16 U.S.C. § 1604(g)(3)(B) requires the Forest Service to manage for diverse plant and animal communities and maintain viable populations. Ultimately, grizzly bear viability will depend on an interconnected meta-population structure where the NCDE serves as a source population providing genetic connectivity to isolated populations like the GYE.

The implied argument by the Forest Service in the August response to eligible objections for the FPA is that the NCDE FPA as it stands is compatible with the conservation strategy by addressing conflicts as the primary barriers to movements by male grizzly bears in zone 2 (and therefore maintaining existing activities is not problematic). The NCDE conservation strategy (NCDE Subcommittee 2018) states on page 100, "In zone 2, habitat management direction compatible with the goal of providing for genetic connectivity will be maintained." Status quo management direction in zone 2 has not facilitated functional genetic connectivity. Current habitat management direction for zone 2 is arguably not **compatible** with providing for functional genetic connectivity and therefore needs improvement. Protections in the FPA fall short but can be made up in the HLC NF plan revision process. The DEIS

contains statements that the revised forest plan will create opportunity for connectivity, but there is little analysis to back up these statements.

Conflicts are not the only potential threats to male bear ability to move through zone 2, and given the IGBC goal of genetic and/or demographic connectivity, management should not be specific to male bears only. Currently occupied ranges in the NCDE and GYE are around a minimum of 110 kilometers apart (Peck et al. 2017). While this distance between occupied ranges is within the range of dispersal distances identified for male grizzly bears (Blanchard and Knight 1991, McLellan and Hovey 2001, Proctor et al. 2004), dispersal over these distances would likely take place over a year or even several (Peck et al. 2017). Dispersal over this time frame requires conditions suitable for seasonal occupancy; others have shown secure habitat is important for connectivity for this very reason (Primm and Wilson 2004). Given this, it is reasonable to assume that the conditions needed in zone 2 to allow for genetic connectivity would not be all that different than those necessary to foster demographic connectivity, which in the NCDE conservation strategy are structured around consistent evidence that roads negatively impact grizzly bears. Demographic connectivity areas to the Cabinet-Yaak (CYE) and Bitterroot (BE) ecosystems require no increase in road density using conditions that have allowed for female occupancy in zone 1 as the baseline. Page 262 of the DEIS states that some blocks of HLC NF land within zone 2 contain habitat suitable for bear use, yet the analysis fails to define these areas specifically and how management in those areas will affect bear use.

We are encouraged to see all action alternatives contain plan components that enhance habitat protections in the Divide Geographic Area (GA) and Upper Blackfoot GA. Specifically, DI-WL-DC-01/UB-WL-DC-01 acknowledge the importance of the areas for habitat connectivity for grizzly bears between the Northern part of Montana and the GYE (Peck et al. 2017). DI-WL-GO-01 provides one potential mechanism for enhancing such connectivity in the Divide GA and DI-WL-GDL-01/UB-WL-GDL-01 acknowledge the well documented potential for human activity, specifically motorized access, to limit habitat availability for grizzly bears, including in connectivity areas. More could be done, however, to add further specifications to the connectivity related guidelines that address the potential for added developed sites to negatively influence bear use (Schwartz et al. 2010) and thus opportunities for connective habitat. For example, NCDE-STD-AR-05 that limits the increase of developed sites managed for overnight use during the non-denning season should be expanded to zone 1 and 2. Additionally, NCDE-GDL-AR-03 that requires one or more measures to reduce grizzly/human conflicts in cases where the number or capacity of overnight developed recreation sites is increased should be extended to zones 1 and 2. Given grizzly bear depredations on livestock as bears move across the landscape may result in management removals of problem bears, guidelines that specifically limit active grazing allotments at current levels in the important GAs of zone 1 and 2 and encourage voluntary closure of allotments, would be important to successful and sustainable genetic connectivity. We also suggest guidelines that require conflict prevention measures as part of grazing allotment management plans.

Recent research on potential grizzly bear movement corridors used a randomized shortest path algorithm and step selection functions based on individual grizzly bear movement data within the GYE and NCDE (Peck et al. 2017). This approach allows for a more realistic look than least cost path modeling at the movement characteristics of a dispersing grizzly bear (Peck et al. 2017). In other words, the highest quality habitat that provides the least resistance to movement may not actually be the most likely corridor for a species like the grizzly bear, where movements are much more exploratory in nature (Peck et al. 2017). The model predictions in currently unoccupied range were validated by 21 confirmed

observations (Peck et al. 2017). Model predictions indicated NCDE bears are most likely to travel to the GYE via either the Highlands, the Nevada-Garnet -> Boulder Mountains, the Nevada -> Boulder -> Elkhorn -> Southern Big Belts, or Big Belts, all of which converge on the Tobacco Roots in the Beaverhead Deerlodge NF and Bridger mountains in the Custer Gallatin NF.

Use of current rigorous methods make the Peck et al. (2017) study the most plausible look at where male movements between the NCDE and GYE would be possible, and the results corroborate linkage areas identified in other studies (Krehbiel 2015, Cushman et al. 2009, Walker and Craighead 1997). This best available science has not been fully considered in the current HLC NF DEIS. The best available science clearly highlights the potential for the Elkhorns GA (which is the most probable next stepping stone for bears traveling through the Divide GA) and Big Belts GA to facilitate movement of male bears between the NCDE and GYE, and yet the areas lack plan components to ensure habitat protections that would provide for connectivity. The ecological characteristics described for these areas in the draft HLC revised forest plan do not even acknowledge their potential role as connective corridors in a broader landscape (pages 112, 140).

The same or similar plan components as those drafted for the Divide and Upper Blackfoot GAs need to be extended to include (at a minimum) the Elkhorns GA and Big Belts GA. This specifically relates to our FPA objection concern 4a in that only protecting a portion of zone 2 renders the area useless in its ability to facilitate genetic connectivity. Concentrating additional connectivity plan components on the Elkhorns and Big Belts GAs would target habitat protections in areas most likely to facilitate connectivity, similar to the intent of the demographic connectivity areas to the BE and CYE.

An NCDE population level model containing covariates for indicators of human use such as road density was among the best fitting models out of the entire set of candidates in the Peck et al. (2017) study, providing another piece to the already large body of evidence indicating that grizzly bear habitat selection and as a result movement is influenced by roads and motorized access. Roads also influence grizzly bear survival (Proctor et al. 2018). Motorized access management in linkage areas between occupied habitats is an important component of maintaining genetic and demographic connectivity, and thus healthy and sustainable grizzly bear populations (Proctor et al. 2018). Anecdotal evidence indicates a high amount of human activity and motorized recreation currently exist in the Big Belts GA (supported by table 65). Incorporating a desired condition that specifies that the Big Belts landscape provides habitat connectivity and an associated guideline that does not allow for an increase in motorized access or other trail access that would impact movement corridors is the absolute minimum that must be done to foster this habitat as a feasible connectivity area between the NCDE and GYE. Implementing similar components that at a minimum do not allow for an increase in motorized route density in the Elkhorns GA expands the options for grizzly bears exploring the landscape between occupied habitats in the North and South.

However, restricting increase in motorized access is probably not enough. In fact, a more rigorous approach to calculating motorized route density should be taken in the Big Belts and Elkhorn geographic areas to better understand the spatial patterns of motorized route density and prioritize areas where decommissioning roads should be emphasized as opportunities arise. While zone 2 is not organized into bear management subunits (as stated in the DEIS), it is still possible to conduct a moving window analysis procedure using the same search radius as that defined in the NCDE conservation strategy. FW-RT-GDL-12 is an opportunity to incorporate language about decommissioning roads not needed in the

long run in cases where it would improve habitat security and thus enhance habitat connectivity for wide-ranging wildlife species like grizzly bears. If connectivity related plan components are extended to the Big Belts and Elkhorns GA, then monitoring of progress on securing improvements in secure habitat (and thus value for connectivity) should be extended to these areas as well.

Aside from GA plan components, Alternatives B and D are the most plausible alternatives for facilitating connectivity between the NCDE and GYE grizzly bear populations because they add additional recommended wilderness areas and do not allow for the non-conforming uses of mechanized and motorized transportation. However, the DEIS (page 269) did not include specific geographical information about the additional recommended wilderness areas in all alternatives and the characteristics of those areas/their role in providing for connectivity. Given Alternative D may not be socially feasible due to the miles of lost motorized and mechanized access, perhaps Alternative B in conjunction with additional plan components specific to the Big Belts and Elkhorns GA (as previously described) would secure reasonable levels of protections that might allow for genetic connectivity to occur between the NCDE and GYE. Additionally, we recommend requirements around design of new mountain biking trails forest wide that reduce the potential for conflict with grizzly bears and increase human safety, like those recommended by Servheen et al. (2017). Lastly, we suggest designating grizzly bears a Species of Conservation Concern in the event the NCDE population is de-listed.

Greater Yellowstone Coalition is committed to ensuring habitat protections that facilitate the restoration of a viable meta-population of grizzly bears in the northwestern United States. The opportunity to facilitate genetic connectivity between the NCDE and isolated GYE is more feasible than ever before given current distance between occupied ranges (Peck et al. 2017). Targeted habitat protections in an otherwise fragmented landscape will be key to fostering genetic flow between occupied ranges. Conflict reduction alone will not be enough to ensure functional connectivity is restored, given the potential time it may take for bears to disperse between ecosystems. Seasonal occupancy will necessitate habitat standards similar to the demographic connectivity areas between the NCDE and CYE/BE. Recent research highlights clear potential paths based on real exploratory movements by male bears and provide the opportunity to target more rigorous habitat protections to the important corridors in the Divide, Big Belts, and Elkhorn GAs. We are disappointed in the responses to our objection to the NCDE FPA but encouraged by improvements in the HLC NF DEIS from the standpoint of improving connectivity. We hope the HLC NF will further commit to the opportunity to facilitate functional genetic connectivity between the NCDE and GYE grizzly bear populations through habitat protections that enhance opportunities for movement in potential connective corridors.

Crazy Mountains

The (north) Crazy Mountains (57,618 acres), include the headwaters of the Shields River and two roadless conservation areas; 12,920 acre Box Canyon and 24,924 acre Crazy Mountains. The latter is part of larger 136,547 acre Crazy Mountains roadless area, with the remaining wild lands located in the Yellowstone Ranger District, Custer-Gallatin National Forest.

GYC supports Recommended Wilderness (RW) for the Loco Mountain area, (24,977 acres which includes most of the (north) Crazy Mountains Roadless Area and surrounding land), as proposed in Alternative D. The RW is very remote with outstanding solitude and opportunities for primitive recreation such as

hunting, camping, hiking and horseback travel. It is consistent with the adjoining wildlands of the Gallatin that are managed for traditional foot and stock travel year-round.

The Crazies face management challenges due to a lack of public access in the North, as well as private land checkerboards with the National Forest lands. However, the Crazies are one of Montana's crown jewels, rugged and wild, filled with soaring peaks, waterfalls, glaciers, snowfields and crystal clear mountain lakes.

GYC supports Recommended Wilderness for Loco Mountain to maintain the wild, primitive character and traditional foot and stock travel in the North Crazy Mountains.

Sincerely,

Brooke S. Shifrin
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Greater Yellowstone Coalition

Literature Cited:

Blanchard, B. M. and R. R. Knight. 1991. Movements of Yellowstone grizzly bears, 1975–87. *Biological Conservation*, 58:41–67.

Bureau of Land Management. 2006. Record of Decision and Approved Dillon Resource Management Plan. *Dillon, Montana, USA*.

Craighead, F.L., and E. Vyse. 1996. Brown/grizzly bear metapopulations. In: D. McCullough (Ed.) Metapopulations and Wildlife Conservation Management. *Island Press, Washington DC and Covelo CA*. Chapter 14: pp. 325-351.

Crow Indian Tribe et al., Plaintiffs vs. United States of America et al., Federal Defendants and State of Wyoming et al., Defendant-Intervenors. 2018. *United States District Court for the District of Montana Missoula Division, Case 9:17-cv-00089-DLC*.

Cushman, S. A., K.S. McKelvey and M.K. Schwartz. 2009. Use of Empirically Derived Source Destination Models to Map Regional Conservation Corridors. *Conservation Biology*, 23: 368–376.

Dood, A., S. J. Atkinson and V. J. Boccadori. 2006.Grizzly bear management plan for western Montana: final programmatic environmental impact statement, 2006–2016. *Montana Department of Fish, Wildlife and Parks, Helena, Montana, USA*.

Haroldson, M. A., C. C. Schwartz, K. C. Kendall, K. A. Gunther, D. S. Moody, K. Frey, and D. Paetkau. 2010. Genetic analysis of individual origins supports isolation of grizzly bears in the Greater Yellowstone Ecosystem. *Ursus,* 21:1–13.

[IGBC] Interagency Grizzly Bear Committee. 2018. 5 Year (2018-2022) Plan: Goals, Objectives, and 2018 Planned Actions.

Krehbiel, R. 2015. Bears on the move: Challenges and Opportunities Associated with Grizzly Bear Connectivity in the Northern Rockies. *M.S. Thesis. Sustainable Development and Conservation Biology, University of Maryland*.

Merriam, C.H. 1922. Distribution of grizzly bears in U.S. *Outdoor Life*, 50: 405-406.

Montana Department of Fish, Wildlife and Parks. 2013. Grizzly bear management plan for southwestern Montana: final programmatic environmental impact statement. *Montana Department of Fish, Wildlife and Parks, Helena, Montana, USA*.

McLellan, B.N. and F.W. Hovey. 2001. Natal dispersal of grizzly bears. *Canadian Journal of Zoology*, 79:838–844.

NCDE Subcommittee. 2018. Conservation strategy for the grizzly bear in the Northern Continental Divide Ecosystem.

Peck, C. P., F.T. van Manen, C.M. Costello, M.A. Haroldson, L.A. Landenburger, L.L. Roberts, D.D. Bjornlie and R.D. Mace. 2017. Potential paths for male-mediated gene flow to and from an isolated grizzly bear population. *Ecosphere*, *8*(10) article e01969.

Picton, H. D. 1986. A possible link between Yellowstone and Glacier grizzly bear populations. *Int. Conf. Bear Res. and Mgmt*, 6:7-10.

Primm, S. and S.M. Wilson. 2004. Re-connecting grizzly bear populations: Prospects for participatory projects. *Ursus*, 15:104-114.

Proctor M., B. McLellan, D. Paetkau, C. Servheen, W. Kasworm, K. Kendall, G. Stenhouse, M. Boyce, and C. Strobeck. 2005. Delineation of sub-population boundaries due to anthropogenic fragmentation of grizzly bears in southwest Canada and northwest USA using genetic analysis. *Oral presentation, International Bear Association 16th annual conference, Trentino, Italy.*

Proctor, M. F., B. N. McLellan, G. B. Stenhouse, G. Mowat, C. T. Lamb, and M. Boyce. 2018. Resource Roads and Grizzly Bears in British Columbia, and Alberta. Canadian Grizzly Bear Management Series, Resource Road Management. *Trans-border Grizzly Bear Project. Kaslo, BC, Canada*. http://transbordergrizzlybearproject.ca/research/publications.html.

Proctor, M. F., B. N. McLellan, C. Strobeck, and R. M. R. Barclay. 2004. Gender-specific dispersal distances of grizzly bears estimated by genetic analysis. *Canadian Journal of Zoology*, 82:1108–1118.

Servheen, C., T. Manley, D.M. Starling, A. Jacobs, and J. Waller. 2017. The death of Mr. Brad Treat due to a grizzly bear attack June 29, 2016 on the Flathead National Forest. *Interagency Board of Review Report*.

Schwartz, C. C., M. A. Haroldson, G.C. White. 2010. Hazards Affecting Grizzly Bear Survival in the Greater Yellowstone Ecosystem. *Journal of Wildlife Management*, 74(4):654-667.

Walker, R. and L. Craighead. 1997. Analyzing wildlife movement corridors in Montana using GIS. *Report No. 11, American Wildlands*. http://www.wildlands.org

Appendix H:

GYC Recreation Literature Review

Recreation Impact Science Applications to the Interagency Visitor Use Management Framework

Abstract:

We evaluated scientific literature on recreation impacts and benefits to wildlife, lands, waters, and people. Our objective was to describe how current recreation ecology science can and cannot inform current recreation management frameworks. We found substantial evidence for recreation impacts to wildlife behavior, physiology, vegetation cover/composition, and soil properties. The body of literature we evaluated also provided support for the economic and social benefits of recreation to people. There is a disconnect between current science and requirements within recreation management decision-making frameworks, notably around the quantitative relationships between recreational use and impacts to wildlife at levels of ecological organization relevant to wildlife management. There is also a lack of information related to recreation impacts on ecological pattern and process at varying spatial scales, and no attempt in current frameworks to take into account conditions within the context of a broader landscape. We suggest the need for more scientific study that emphasizes quantitative relationships and measures responses at varying levels of ecological organization across multiple spatial scales. Given the evidence suggesting negative impacts, land managers should err on the side of caution when identifying limitations around visitor use.

Management Implications:

Efforts to refine current visitor use management frameworks should include an attempt to more explicitly consider projects in the context of broader spatial scales. Land managers should consider erring on the side of caution in developing strategies to manage visitor use in a way compatible with desired conditions for an area, given the literature suggests recreation may have negative impacts on wildlife, vegetation, soil, and water resources. There is a strong need for more scientific study at varying spatial scales and varying levels of ecological organization.

Keywords:

Recreation, Impacts, Benefits, Management, Frameworks, Greater Yellowstone Ecosystem

Introduction:

Outdoor recreation in the United States is changing - technology advancements are accelerating the emergence of new, fast-paced forms of recreation (Zinn and Graefe 2007), and more people are participating in outdoor recreation nationally (Cordell 2012). Simultaneously, many counties that comprise the Greater Yellowstone Ecosystem (GYE) are growing faster than most places in the United States (U.S. Census Bureau 2017). Despite high growth rates in the GYE and national trends in recreation participation, very little data exists on trends or spatial patterns in recreational use in the region (Regan 2018). Recreation impact monitoring is under-prioritized (Cole 2006). When monitoring does occur, it is rarely empirically based (Cole 2006). As a result, decisions about management tools to address recreation impacts are often founded on anecdotal evidence and managers have little information to assess the effectiveness of their approaches for mitigating recreation disturbances (Cole 2006). Visible recreation impacts are low in spatial extent, which makes it difficult to imagine recreation may have impacts for ecological processes at landscape scales (Cole 2006). Given wild landscapes the way we know them are threatened by climate change (Shaw and Loomis 2008, Moen and Fredman 2007), understanding ways to mitigate the potential cumulative impacts of added human pressure may be key to maintaining the health of the GYE into the future.

Meanwhile, land managers say they are facing new pressures as recreational demand increases, as well as challenges resulting from unmanaged recreation impacts on natural resources, all while agency funding continues to decline (Collins and Brown 2007). Public lands and opportunities for recreation play an important role in the social and economic health of many western communities (Rasker 2012), and outdoor amenities are a primary driver of the growth happening in western states (Rasker 2012). These challenges highlight the need for a proactive, coordinated approach to recreation planning and management that ensures recreation opportunities are maintained in ways that do not degrade the natural resources of the GYE. The purpose of this literature review is to describe the opportunities and limitations of the body of literature we evaluated to inform current recreation management frameworks, with an emphasis on the Interagency Visitor Use Management Framework.

Methods:

In addition to a review of current recreation management theory and tools, we looked at recreation impacts on both non-human nature and humans. We will describe our findings around recreation impacts to non-human nature as they relate to impacts on individual organisms and associated implications for populations and communities. We also evaluated the impacts of recreation

on vegetation, soil, and water resources and the implications of those impacts for processes that affect communities and ecosystems. We assumed recreation impacts to other humans would be social, so limited our search in this realm. For the purposes of this review, we assumed that recreation entirely benefits humans, and focused our benefit search efforts on the economic and social aspects of recreation.

We conducted an opportunistic literature search on each of the previously listed topics between May 2016 and October 2017. We carried out a series of searches in google scholar, and collected relevant articles within the first 15 pages of returned search results. To start, we conducted simple searches on recreation impacts to lands, waters, wildlife, and people. After gathering an initial round of articles, we elaborated our searches to include recreation impacts to vegetation, vegetation communities, soils, soil erosion, water quality, wildlife behavior, wildlife physiology, wildlife survival, wildlife reproduction, wildlife populations, and wildlife communities. We also searched for economic benefits of recreation, social benefits of recreation, and health benefits of recreation, as well as recreation influences on conservation values. We assessed the literature cited in every article we collected, and obtained/reviewed articles with titles directly relevant to our searches. In total, we collected and reviewed 152 articles. We recognize this search protocol was not systematic and therefore our sample of literature may be biased.

Results:

Current management frameworks:

The paradigm in recreation management has shifted from that of managing for pre-determined visitor numbers (i.e. the notion that the ecological system has a recreation carrying capacity), to one where management is guided by decision making frameworks that allow for a wider variety of strategies to achieve desired outcomes (Marion 2016, Farrell and Marion 2002). This shift is largely attributable to application of the most well-established theory in the field of recreation ecology; the relationship between intensity of recreational use and biophysical impact to soil and vegetation is curvilinear (Marion 2016). In other words, in some situations, limiting the amount of use is ineffective at addressing trampling impacts (except in places where use is low; Marion 2016). Recreation management decisions need to be tailored to the particular conditions of an area. A decision-making framework allows for flexibility in particular management strategies to address or mitigate recreation impacts, which is important given that the influential factors are highly variable depending on the particular

system of interest (Marion 2016). Farrell and Marion (2002) proposed the Protected Area Visitor Impact Management (PAVIM) Framework that simplifies decision-making and attempts to integrate stakeholder values into the decision-making process.

Most recently, the Interagency Visitor Use Management Council developed a decision-making framework (IVUM 2016). This framework has been increasingly adopted for use among federal agencies, and we will use this framework at the end of the review to evaluate the applications and limitations of the information we gathered.

The first step of the Interagency Visitor Use Management Framework (IVUM) is to build a foundation of information in order to determine if a project is needed. The outcome of planning at this stage is an understanding of the current conditions of the given area of concern. The framework guides the next phase of planning toward identifying visitor use management direction for the area under consideration. This involves identifying the desired conditions for the area and defining the appropriate visitor activities. Identifying appropriate activities requires a scientific understanding of the impacts of certain uses on the desired ecological or social conditions of the area. Thresholds or indicators can inform what levels of visitor activities are appropriate to maintain desired conditions. Next, the IVUM defines management strategies needed to achieve the desired conditions for the area under consideration. Identifying appropriate management strategies requires both an understanding of the potential impacts of the visitor activities allowed in the area, as well as knowledge around what management techniques are effective at mitigating the associated impacts. Management strategies may include attempts to modify the timing, location, or spatial distribution of human use. They might also involve reducing the amount of use (in other words setting a carrying capacity for an area), increasing the availability of recreation opportunities, modifying visitor behavior or expectations, or increasing the ability of the given area to handle more use. The final phase of this particular management framework is to monitor conditions and adjust strategies as needed.

Recreation impacts to organisms, populations, and communities:

Overview:

Until the 1980s, many thought the main impacts on wildlife were consumptive (e.g. hunting). However, a survey of land managers in 1988 provided anecdotal evidence that many forms of recreation can indirectly impact wildlife (Pomerantz et al. 1988). The study of wildlife response to outdoor recreation is a growing realm of scientific research (Larson et al. 2016, Marion et al. 2016). The primary themes

related to current knowledge of recreation impacts to wildlife were derived in a recent rigorous review by Larson et al. (2016). In general, outdoor recreation has adverse impacts on wildlife (Larson et al. 2016, Boyle and Samson 1985), however there remain substantial gaps in our understanding of the implications of those impacts. To date, the majority of scientific studies measured behavioral and sometimes physiological responses of wildlife to outdoor recreation (Larson et al. 2016). Examples of behavior change related to recreational activity include increased movement rates (resulting in larger home range sizes), habitat avoidance, altered feeding activity, and evidence of flight or changes in alertness (Stalmaster and Kaiser 1998). Physiological responses are documented as changes in wildlife stress hormone levels in areas with varying degrees of human activity (Thiel et al. 2008, Arlettaz et al. 2007, Creel et al. 2002).

While there are relatively less studies that assess recreation impacts to population or community level response (Larson et al. 2016), some hypothesize the impacts of human recreation are analogous to the ways in which individual level behavior based on predation risk may ultimately influence fitness, mate acquisition, parental investment, and as a result population dynamics (Frid and Dill 2002). However, there is a need for further scientific study into the consequences of behavioral or physiological change to survival and reproductive success of individuals, and ultimately to broad scale changes in populations and communities (Larson et al. 2016, Wisdom et al. 2004) over long time frames (Larson et al. 2016, Marion et al. 2016, Courtemanch 2014, Leung and Marion 2000, Boyle and Samson 1985). Of the studies evaluated by Larson et al. (2016), only 9.3% quantified wildlife responses indicative of impacts at the community level, and only 1.9% of the studies measured direct metrics of survival. Evidence of recreational impacts to birds may be an exception to this theme, as we found more evidence for changes in the community make-up of bird species in relation to human recreation (Steven et al. 2011, Miller et al. 1998). These responses may be due to human influences on nestling success (Remacha et al. 2016).

Additionally, little is known about the quantitative relationship between recreational use intensity and strength or significance of impacts to wildlife (Larson et al. 2016). An idea of thresholds beyond which recreational use negatively impacts wildlife would provide useful metrics for monitoring (Larson et al. 2016); these indicators could be included in management frameworks.

Finally, as is usually the case, recreation ecology literature in the wildlife field is biased in favor of charismatic megafauna and North American ecosystems (Larson et al. 2016, Marion et al. 2016). In the

following sections, we take a closer look at individual, population, and community level effects of outdoor recreation on carnivores, ungulates, birds, and other terrestrial organisms.

Recreation Impacts to Individual Organisms:

Human activity tends to influence the spatial and temporal activity patterns of wildlife (Courtemanch 2014, Coleman et al. 2013, Becker et al. 2012, Cadsand 2012, Rogala et al. 2011, George and Crooks 2006, Wisdom et al. 2004, Kasworm and Manley 1990). These changes may persist even after human activity subsides (Wisdom et al. 2004). Grizzly bears, wolves, and elk may even avoid habitat immediately surrounding roads, trails, or campsites, regardless of actual human presence (Kasworm and Manley 1990, Rogala et al. 2011, Coleman et al. 2013). Avoidance behavior could diminish foraging opportunities (Coleman et al. 2013), but very few studies have quantified the actual effects of avoidance behavior.

Recreational activity might influence other wildlife behaviors, like decreases in feeding activity (Stalmaster and Kaiser 1998), declines in song occurrence and consistency among subalpine breeding birds (Gutzwiller et al. 1994), or habituation to human foods and activities that in turn create safety concerns for both humans and wildlife (Merrill 1978). For example, wintering bald eagles may not resume feeding activity in a given day after 40 disturbances from humans (Stalmaster and Kaiser 1998); we found very few examples of thresholds like these that could be incorporated into management frameworks.

Wildlife behavioral responses to human activity may be dependent on the season (Fortin and Andruski 2003, Papouchis et al. 2001). In ungulates, strong behavioral responses like flight or heightened vigilance may be most related to birthing periods (Papouchis et al. 2001) or when herds contain young calves (Fortin and Andruski 2003). For hibernating animals, denning periods could be particularly vulnerable times; some evidence suggests human disturbances might disrupt denning bears from distances of 1 kilometer (Linnell et al. 2000). While denning bear response to human disturbance varies, there are occasions where den abandonment occurs and if the den contains cubs, the energetic costs of den abandonment could potentially influence bear survival rates (Linnell et al. 2000). On the other hand, a recent anecdote suggested a female bear endured 11.5 snowmobile passes a day without abandoning her den (Hegg et al. 2010), highlighting the difficulty in making generalizations in the relatively little studied realm of recreation impacts to wildlife.

In addition to seasonal variation in potential wildlife behavioral response to human disturbance, other factors may amplify wildlife response to human presence. For example, there could be an interaction between nearby road traffic and the amount of trail use that drives the degree of impact that use has on wildlife behavior (Rogala et al. 2011). Or, faster approach speeds by recreationists may elicit stronger flight responses in ungulates (Stankowich 2008). Ungulates may be less likely to respond to human activity when they are closer to escape terrain or are approached by humans from different elevations (Taylor and Knight 2003, Papouchis et al. 2001). Recreationists influenced a stronger flight response in ungulates in areas with less cover and in the morning or evening (Taylor and Knight 2003) and mountain goats selected for more rugged terrain that provided greater security when exposed to human disturbance (Cadsand 2012). In general, dispersed human activity has a stronger influence on ungulate flight response relative to the impacts of more predictable disturbances (Stankowich 2008, Taylor and Knight 2003, Miller et al. 2001, Papouchis et al. 2001). Trails can become a source of predictable activity (Miller et al. 2001).

Some species may be particularly vulnerable to human activity, like amphibians, reptiles, and birds (Larson et al. 2016). Among bird species, ground nesting species are particularly sensitive (Gutzwiller et al. 1994). A recent study found bighorn sheep in the Teton Region (WY) avoided the 'footprint' of winter recreationists regardless of use intensity in the area (Courtemanch 2014).

Among the recreational users we engage in our work, we have found there are conflicting perceptions around the impacts of different types of recreation on wildlife, often founded on anecdotal evidence. A recent meta-analysis suggested there is more evidence of adverse impacts of non-motorized recreation to wildlife than motorized recreation (Larson et al. 2016). However, the spatial scale of study might influence whether or not relationships are detected; it could be that motorized recreation has negative effects on wildlife at larger spatial scales than non-motorized recreation (Larson et al. 2016), and wildlife responses at multiple scales are not often studied. The same Larson et al. (2016) meta-analysis revealed winter recreation has the most negative effects on wildlife. Evidence from individual studies ranges from indicating responses do not vary depending on the type of recreation (Wisdom et al. 2004, Taylor and Knight 2003) to highlighting stronger behavioral changes resulting from motorized recreation relative to quieter uses, and stronger impacts from mountain biking than hiking, or horseback riding (Naylor et al. 2009, Wisdom et al. 2004). In general, there is little empirical evidence describing the relative impacts of different types of recreation on bird species or other wildlife (Steven et al. 2011,

Marion and Wimpey 2007), and a lack of studies at multiple spatial scales make it impossible to generalize about the differential impacts of various use types.

It is difficult to make generalizations about energetic costs for wildlife of habitat avoidance or behavioral responses to human presence. In some studies, the implications of habitat avoidance and increased movement for energy expenditures were unknown (Courtemanch 2014). There are some cases where increased movement rates yield a large increase in energy expenditure (e.g. a doubling of expenditures in wintering moose; Neumann et al. 2009), while in others disturbance may only constitute a small portion of daily energetic budgets (e.g. 5.5% in wintering elk; Cassirer et al. 1992) or is negligible (Reimers et al. 2003).

Recreation may also have physiological implications for wildlife. Human activity in the winter positively correlates to stress hormone levels detected in some wildlife species, including elk, wolves, and some bird species (Thiel et al. 2008, Arlettaz et al. 2007, Creel et al. 2002). However, the implications of increased cortisol levels for fitness and survival are often either unknown (Arlettaz et al. 2007), or there is no evidence to suggest consequences for actual population dynamics (Creel et al. 2002). There might be threshold levels of human use intensity where stress responses could drive changes in survival (Creel et al. 2002); these potential thresholds are not often assessed due to a lack of quantitative studies (Larson et el. 2016). Given that stress responses are likely caused by a variety of factors, such as temperament in conjunction with human visitation (Martin and Reale 2008), understanding these thresholds for survival implications may be the most tangible management application.

There are not many examples demonstrating a link between human activity, wildlife stress response, and associated declines in reproduction and survival (Ellenberg et al. 2007). However, we know from studies of other disturbances (e.g. Blas et al. 2007, Cabezas et al. 2007) that physiological stress responses may lead to declines in body condition or survival. The implications of stress responses associated with human activity may be similar; further study is needed to confirm.

Recreation and Wildlife Populations:

The majority of studies on recreation impacts to wildlife are focused on impacts to individual organisms, and do not evaluate population level metrics (Larson et al. 2016). Behavioral responses resulting from human disturbance might not necessarily have implications for population demographics (Gill et al. 2001); for example, Olympic marmots increased activity levels in response to hikers but showed no

changes in survival or reproductive rates (Griffin et al. 2007). Some hypothesize that behavioral responses to human disturbance in species relying on mobile prey may be most likely to have implications for survival rates (Gill et al. 2001).

For example, an experimental study of human disturbance during elk calving season in Colorado revealed human activity as an important explanatory component for the variation in calf/cow proportions (Phillips and Alldredge 2000); this relationship could have implications for population dynamics. In general, evidence suggests there is an inverse relationship between the level of human development (e.g. homes, road density) and grizzly bear survival (Schwartz et al. 2010). However, the implications of recreation specifically for grizzly bear survival have not been well studied. Additionally, a meta-analysis suggested that in most cases where it was evaluated, human activity negatively related to reproductive success in bird species (Steven et al. 2011). For example, nesting success of two bird species studied in the United Kingdom was negatively correlated to the number of visitors (Beale and Monaghan 2004). Reproductive success is a mechanism that directly affects a population.

Recreation and Wildlife Communities:

A meta-analysis of the effects of winter outdoor recreation on fauna of alpine ecosystems indicated that winter recreation (primarily skiing) may influence fauna richness, abundance, or diversity in high mountain environments (Sato et al. 2013). Anthropogenic noise may mask interspecific wildlife signals; chronic noise exposure could have implications for reproductive success and in turn the structure of terrestrial communities (Barber et al. 2009). Varying levels of quiet forms of recreation in Northern California were related to a greater abundance of non-native carnivore species relative to the community composition of entirely protected areas (Reed and Merenlender 2008). Dogs accompanying recreationists may also relate to changes in native communities (regardless of the dog policy characterizing the area; Reed and Merenlender 2011). Recreational activity tends to favor corvid species like crows and ravens, and has negative implications for nesting success, abundance, or occurrence of native bird species (Steven et al. 2011, Kangas et al. 2010, Marzluff and Neatherlin 2006, Gutzwiller and Anderson 1999). The mechanisms driving responses in wildlife communities are not well understood; for example, edge effects could explain differences in bird species composition along a gradient of distance to trails and human activity (Miller et al. 1998). Caution should be applied in making generalizations, as

there is not enough empirical information to understand the relationship between recreation intensity and the degree of ecological impact at the community level (Sato et al. 2013).

Recreation impacts to vegetation, soil, and water resources:

Overview:

The impact of outdoor recreation on vegetation communities and soil properties is the most heavily studied realm of recreation ecology (Monz et al. 2016, Monz et al. 2010), while relatively little is known about the impacts of recreation on water resources (Marion et al. 2016, Liddle and Scorgie 1980). In general, there is a lack of information on recreation impacts to vegetation, soil, and water resources at broad spatial scales (Monz et al. 2010). There is a need for stronger understanding about whether or not changes in soil properties or plant communities in the immediate vicinity of campsites, for example, has implications for vegetation composition or soil properties across a drainage, watershed, or landscape (Cole 1981).

Early studies documented resource degradation from human trampling (Liddle 1975). Trampling from various forms of outdoor recreation causes a range of potential effects, from relatively minimal impacts such as reduced plant height or loss of organic litter to severe changes including altered plant species composition, loss of plant regeneration, or exposed mineral soil which leads to increased erosion and runoff (Marion et al. 2016, Barros et al. 2013, Monz et al. 2010, Turton 2005). The degree of impact depends in large part on the resistance and resilience of a particular site (Pickering 2010, Cole and Spildie 1998); the ability of a site to handle and recover from disturbance is constrained by the characteristics of the vegetation that define the area (Marion et al. 2016). The relationship between use intensity and impact on soil/vegetation resources is well defined; impact increases with use level up to a point, beyond which increased use yields no change in degree of impact (Marion et al. 2016, Monz et al. 2013, Monz et al. 2010, Deluca et al. 1998). In general, land managers have incorporated this scientific theory into recreation management frameworks (Monz et al. 2013).

Vegetation:

In addition to the physical impacts of trampling, human activity might decrease seed density in soils of subalpine forest disturbed by camping activity (Zabinksi et al. 2000); the implications of this impact for

forest composition at broader scales was not studied. The degree of recreation impacts to vegetation and soil is dictated by ecosystem resistance and resilience (Pickering 2010, Pickering et al. 2010, Pickering and Hill 2007). When forest understory is characterized by woody shrubs and erect forbs, the community may be less resistant than one where turf forming grasses or matted forbs dominate (Cole and Monz 2002). During periods of chronic disturbance, plant communities that are more resistant will endure disturbance better, while plant communities that are more resilient are more responsive to acute disturbances (Cole and Monz 2002). For example, in a Montana forest with a forb dominated understory, resistance to disturbance was low, relative to a shrub dominated understory (Cole and Spildie 1998). However, the forb environment recovered more quickly than the shrub type from trampling disturbance, especially at the highest impact intensity implemented in the study (Cole and Spildie 1998).

Alpine environments or subalpine meadows may be particularly vulnerable to soil loss and loss of native vegetation, especially when social trails are created (Monz et al. 2010b), or pack stock are grazing at moderate intensities (Cole et al. 2004). Social trails develop more readily in sensitive high alpine environments (Monz et al. 2010b). Some environments may be more or less susceptible at certain times of the year; for example, moist trails during the spring season are more vulnerable to soil compaction (Monz et al. 2010). Along a main trail access to a popular mountain in Argentina, vegetation impacts were more severe in meadow environments than steppe vegetation (Barros et al. 2013).

There is not a large amount of empirically based knowledge around the relative impacts of different recreation use types (Monz et al. 2010, Pickering et al. 2010), although there is substantial evidence for stronger motorized recreation impacts to vegetation and soil than other use types (Monz et al. 2010). Additionally, human travel by horse may be more likely to alter vegetation composition, ground cover, or vegetation height around trails thank hikers (Torn et al. 2009, Cole and Spildie 1998). Evidence suggests even rock climbing may influence abundance of certain vegetation species on cliff faces and bases where use is high (Camp and Night 1998). However, in some cases there is a lag following disturbance where the intensity of use may be a more important correlate of the ability of vegetation to recover than the type of use; these may be cases where intensity is low enough that it has not exceeded a threshold in the curvilinear use-impact relationship (Cole and Spildie 1998). Grazing pack stock also impacted plant composition and productivity in subalpine mountain meadows, even at moderate grazing intensities (Cole et al. 2004).

Soil:

Recreation may compact soil, increase erosion rates, result in loss of organic soil and exposure of mineral soil, or alter soil chemical properties (Eagleston and Rubin 2013, Arocenaa et al. 2006, Deluca et al. 1998). Trampled, wet soils may increase runoff, while trampled, dry soils may be more susceptible to sediment loss (Deluca et al. 1998, Wilson and Seney 1994). Soil chemical properties may be substantially different immediately surrounding fire pits and dishwashing stations at campgrounds, indicative of the importance of proper waste disposal at backcountry campsites (Arocenaa et al. 2006).

Winter recreation could have implications for increased soil erosion rates on trails during spring melt and runoff, although whether or not there is actually any net soil loss remains uncertain (Eagleston and Rubin 2013). Factors like soil moisture or recreation intensity may not matter for sedimentation loss when soils are exposed to horse traffic, indicative that horses may have more substantial impacts on soils than other use types (Deluca et al. 1998).

Water:

The scientific community lacks understanding around the mechanisms driving ecological changes resulting from human activity in water bodies (Marion et al. 2016, Liddle and Scorgie 1980), yet the gravel-bed river floodplains that often characterize mountain landscapes play an important role in fostering species diversity, ecological processes, habitat connectivity, and habitat productivity (Hauer et al. 2016). There is little quantitative information; as a result, there is no well documented relationship between recreation intensity level and degree of ecological impact to water bodies (Liddle and Scorgie 1980). The field of recreation ecology would benefit from substantial investment into studies of recreational impacts to aquatic systems (Johnson and Carothers 1982).

The physical impacts of human trampling and associated soil erosion can have indirect consequences for aquatic ecosystems; a review of the impacts of land and water based recreation on riparian systems found multiple studies that documented sediment inputs into stream corridors from recreational trails (Johnson and Carothers 1982). Motorized boats containing propellers may cause direct physical impacts to aquatic vegetation in freshwater systems (Liddle and Scorgie 1980). There is some evidence to suggest that motor boats may also be indirectly responsible for erosion as a result of wave action (Liddle and Scorgie 1980). Trampling of vegetation in riparian corridors can result in loss of vegetation cover,

changes in species composition, introduction of exotic species, and introduction of parasites (Johnson and Carothers 1982).

Recreation could also result in chemical pollution or nutrient inputs into water bodies (Clow et al. 2013, Clow et al. 2011, Derlet and Carlson 2006, Liddle and Scorgie 1980). Evidence suggests backcountry hikers do not affect water quality in areas near streams, however horse packing resulted in increased nutrient inputs in the form of coliform bacteria, especially in mixed use sites where backpackers were also present (Clow et al. 2013, Clow et al. 2011, Derlet and Carlson 2006).

Recreation Impacts to Vegetation, Soil, and Water Resource Related Ecological Processes:

The majority of the recreation ecology research on the relationship between human use and vegetation or soil characteristics is fairly fine scale (Monz et al. 2010). While there is information regarding impacts of recreation on ecological processes (and thus community or ecosystem function) at localized spatial extents, there is a need for an understanding of whether or not human use degrades ecological processes and ecosystem function at much broader landscape scales.

One mechanism that could disrupt ecological processes at multiple scales is habitat fragmentation, which decreases biodiversity, alters nutrient cycling and ultimately ecosystem processes, and decreases species richness/changes community composition (Haddad et al. 2015). User created trails may be common in areas where recreational use is high (Barros et al. 2013, Monz et al. 2010) and as a result cause habitat fragmentation (Ballantyne et al. 2014, Pickering et al 2012). Dense formal and informal trail networks with a lot of access points reduce habitat patch sizes, resulting in edge effects (Ballantyne et al. 2014, Pickering et al. 2012). Edge effects may alter forest composition and thus habitat quality (Harper et al. 2005). Informal trails are also not designed in ways that mitigate erosion and runoff potential (Wimpey and Marion 2011).

A recent meta-analysis suggested one recreational influence that could have impacts across a landscape may be the introduction or spread of non-native seeds and pathogens (Pickering et al. 2010); horse dung is an example of a conduit for transportation of exotic seeds (Campbell and Gibson 2001). Trails may also facilitate the movement and establishment of new species (Dickens et al. 2005, Benninger-Truax et al. 1992). Human waste paper in backcountry areas can be a conduit for disease transmission, especially near water bodies (Cilimburg et al. 2000). Additionally, increases in non-native rodents,

insects and birds that increase in abundance in areas impacted by humans could result in new vectors for disease transmission along riparian corridors (Johnson and Carothers 1982).

Non-motorized winter activity on trails compacts snow and may in turn increase soil erosion rates during spring melt and runoff, however further empirical evidence is needed to confirm whether there is actually any net soil loss (Eagleston and Rubin 2013). Soil erosion may reduce the productivity of an area, result in economic loss among agricultural producers, and disrupt stream ecology (Pimentel and Kounang 1998, Wood and Armitage 1997, Pimentel et al. 1995). Recreation may also lead to freshwater nutrient inputs. This process in turn leads to algal production and disruption of the ecosystem services provided by native aquatic plants, resulting in disrupted ecosystem function (Smith et al. 1999).

Recreation Impacts to People:

A given environment likely has both an ecological and a social carrying capacity in terms of the amount of recreational activity that is tolerable (Manning, 1999). In other words, outdoor recreation may have impacts on people as well as ecological impacts. Most are seeking a particular type of outdoor experience when they recreate, and have wide variety of reasons for participating in their activity (Coupal et al. 1999). As a result, other people's choices may impact their experience. There has been substantial scientific investigation into the issue of crowding, and how to identify the social carrying capacity of a given place. While some studies have found human use intensity on trails only affects a small portion of the array of potential visitor experiences in wilderness (especially remoteness and solitude; Cole and Hall 2012), crowding is a topic on the minds of many recreational users in Greater Yellowstone (Regan 2018). Research that identifies social norms among a collection of personal opinions might be helpful in identifying the social carrying capacity for recreation in various places (Manning 1999). Because crowding is a perception often influenced by characteristics of visitors, traits of the people encountered while recreating, and the context of a situation (Manning et al. 2000), it is difficult to make generalizations about the use level that constitutes the social carrying capacity of outdoor environments. This issue is one land managers must balance in recreation planning and design, and one that warrants more investigation.

Another social issue that is increasingly documented in the literature is that of equity in outdoor recreation. Evidence suggests factors like time, income level, and gender may contribute to perceived constraints on participation in outdoor recreation (Johnson et al. 2001). Race was not identified in the

Johnson et al. (2001) study, however the authors pointed out that structural injustice over a long time-frame may be responsible for perceptions of outdoor recreation in the first place (i.e. the perceived barriers are different than those studied). The outdoor recreation industry cites participation in outdoor recreation as an important determinant of environmental attitudes and behaviors, however environmental attitudes vary substantially among various ethnic groups (Johnson et al. 2004). The probability that a given demographic can participate in outdoor recreational activities falls into a hierarchical structure (Lee et al. 2001). Elderly minority women with low incomes are at the bottom of the hierarchy, while young white men that have higher incomes sit at the top (Lee et al. 2001). Accessibility of outdoor recreation to all demographics is an environmental justice concern that has been under-represented in the scientific literature (Floyd and Johnson 2002).

There is also a growing tourism industry around outdoor recreation, which may have implications for the cultural and social integrity of communities. A review of past studies on resident attitudes toward tourism in their local community suggested people perceive tourism as having some negative social impacts, such as crowding, traffic, and loss of the cultural fabric of the place (Andereck et al. 2005). Those that view the social aspects of tourism in a more positive light are also more likely to be directly benefiting economically from the industry (Andereck et al. 2005).

Recreation Benefits:

Overview:

There is substantial evidence suggesting that outdoor recreation plays a significant role as an economic driver (Rasker 2012, McGranahan et al. 2011). Throughout the Rocky Mountain West, communities are shifting from extractive or agricultural industries to those characterized by lifestyle and access to recreational amenities, in turn shifting their economy to one driven by the service sector (Alexander 2009). The documented social benefits of outdoor recreation are extensive, from playing an important role in human health, well-being, and quality of life, to serving as a conduit for fostering appreciation of the outdoors (Abraham et al. 2012, Zaradic et al. 2009, Bedimo-Rung et al. 2005). Below we take a closer look at the economic and social benefits of outdoor recreation.

Economic:

Communities in the west are outpacing the rest of the United States in terms of economic growth (Rasker 2012). The factor that sets the west apart is public land (Rasker 2012). In Montana alone, National Parks account for $252,004,000 in income and 8,984 jobs (Headwaters Economics 2017). The three states that comprise the GYE benefit from 199,000 direct jobs created by outdoor recreation, $20.5 billion in consumer spending, $6.1 billion in wages and salaries, and $1.25 billion in state and local tax revenue (OIA 2017). There are strong correlations between access to and availability of protected public lands and economic prosperity; every 10,000-acre increase in public lands relates to a $436 increase in average per capita income (Rasker 2012). The west is shifting to a knowledge-based economy where jobs are highly skilled and high paying, primarily because people want to live where there are opportunities for an outdoor lifestyle (Rasker 2012). As a result, western communities are attracting talented workers (Rasker 2012); natural amenities are a driver of population growth in the Greater Yellowstone Ecosystem (Rasker and Hansen 2000) and around the world (Wittemyer et al. 2008). In communities where outdoor amenities are readily available, an educated workforce and interest in entrepreneurial opportunity can interact to yield employment growth in rural counties (McGranahan et al. 2011).

Evidence suggests biking has a tangible, substantial impact on the economies of communities where biking opportunities exist (Argys and Mocan 2000). Economic estimates indicate that a proposed 262 mile Yellowstone and Grand Teton National Park bike pathway could create 1540 jobs, $4.8 million in labor income, $131.8 million in gross regional output, and $74 million in value added impacts (Jenson and Scoresby 2015). Other recreation types like angling generate economic activity in communities surrounding places like the Henry's Fork of the Upper Snake River (Loomis et al. 2005). When the fishery is healthy, angling generates 1438 jobs and $49 million in income in along the Henry's Fork alone (Loomis et al. 2005).

A review of the literature on the economic impacts of wilderness suggested that the economic contributions of wilderness areas may exceed that of extractive industries, and as the use of wilderness areas increases, so does the economic value and impact of wilderness (Holmes et al. 2016). Visitation to federally protected wilderness areas yielded an estimate of recreation value that translated to $634 million in 2001 (Loomis and Richardson 2001). A study of the estimated economic losses attributable to loss in recreation user days resulting from the mountain pine beetle outbreak in Rocky Mountain National Park illustrates the degree of economic benefit from outdoor recreation; a benefit transfer

modeling approach indicated the losses in recreational value translated to anywhere from a $5 million to $59 million loss, depending on the severity of the outbreak (Rosenberger et al. 2013). Results of an Oregon recreation survey indicated that in-state non-motorized recreation alone generated $2.1 billion in expenditure, 21,730 jobs, $1 billion in value added economic impact, and $672 million in labor income (Lindberg and Bertone-Riggs 2015). A study of expenditures associated with recreation on a coastal wetland in Louisiana indicated users spent $118 million during the study in that area alone (Bergstrom et al. 1990).

Social:

People value wilderness areas for the cultural and spiritual values they provide (Cordell et al. 1998). A 2008 study in Teton Valley, Idaho suggested study participants living in households that participated in non-motorized outdoor recreation activities were more likely to demonstrate concern for environmental issues (Peterson et al. 2008). The distinction between environmental attitudes and actual behaviors is important, however, and one study found that outdoor recreation positively mediated the relationship between environmental attitudes and actual behaviors only in cases of appreciative recreation (i.e. hiking, bird-watching, wildlife-watching; Thapa 2010). Other evidence suggests a correlation between participation in hiking and backpacking activities and contributions to conservation organizations (Zaradic et al. 2009). Managing for wildlife viewing opportunities (and thus healthy wildlife habitat) could enhance some recreational experiences; taking into account the social context of a setting could have unexpected benefits for habitat conservation (Duffus and Dearden 1990).

Outdoor environments and the opportunities they provide are immensely beneficial for mental and physical health (Abraham et al. 2012, Bedimo-Rung et al. 2005). Prevalence and availability of outdoor opportunities around a community is positively correlated with the proportion of adults that will be physically active (Rosenberger et al. 2009); this participation has positive implications for societal health issues like obesity. Evidence suggests there is a positive relationship between emotional well-being and participation in nature-based activities (Korpela et al. 2014). Participation in outdoor recreation is also an important correlate of reduced stress levels (Godbey 2009); stress has been linked to many modern diseases.

Scientific gaps and management strategies:

The first step of the IVUM is to build the foundation of information needed to understand whether or not management action in a given area is needed. This process necessitates understanding the current conditions of the area of interest. Information needs for this phase of decision-making are beyond the scope of this literature review. However, the Greater Yellowstone Coalition recently developed an inventory of outdoor recreation in the Greater Yellowstone Ecosystem that suggested information on recreational use patterns, intensity, and user expectations is minimal across the region (Regan 2018). Where accurate measures are most useful to monitor conditions, point sampling monitoring protocol are most effective, whereas if monitoring is aimed at gaining a general spatial understanding of where altered management needs to be directed, managers may consider implementing the problem assessment protocol described by Marion and Leung (2001).

Next in the decision-making process outlined by the IVUM is to define visitor use management direction for the area of concern; land managers can define the desired conditions for the area using stakeholder input. Based upon the desired conditions, managers must then identify the appropriate visitor activities for the area. Identifying activities compatible with desired natural resource conditions is one place where information derived from the scientific literature should play a role in decision-making. One step specifically outlined in the IVUM in this phase is to establish thresholds and indicators based on the visitor use management direction defined. Using the body of literature we evaluated, it would be very difficult to define thresholds of visitor use for various wildlife species, given the rarity of studies that actually assessed the quantitative relationships between human use and wildlife response. Leung and Marion (2000) identified the need for scientific information that helps managers develop indicators.

Our literature sample also indicates not much is known about the relationship between recreational use and measures of population health among species, such as survival and reproduction. If a desired condition for a given area includes a healthy elk herd, for example, land managers are not equipped with much information regarding what level of human recreational activity might be detrimental to that goal. Given the scientific literature is biased in favor of charismatic megafauna (Larson et al. 2016), land managers may not be adequately taking into account the impacts of allowed uses on other species, including birds, reptiles, and amphibians, all of which contribute to biodiversity and thus ecosystem function (Duffy 2009).

Information about the relative impacts of different use types on wildlife varies and it is difficult to make generalizations. The relative impacts may also depend on the spatial scale studied (Larson et al. 2016). As a result, defining specific visitor activities compatible or incompatible with desired wildlife conditions of the area of concern is not possible.

Regardless of the uncertainties of various recreation impacts to wildlife populations or communities, there is substantial evidence that in most cases when studied, human presence has some sort of negative effect (Larson et al. 2016). Therefore, in cases where wildlife is a priority, decision makers should err on the side of caution by identifying ways to limit visitor activities to mitigate effects during the most vulnerable seasons.

When identifying visitor activities compatible with the desired vegetation and soil conditions for a site, there is a substantial amount of scientific information to draw on, including a well-supported theory regarding the relationship between intensity of use and impact on vegetation (Marion et al. 2016, Monz et al. 2013, Monz et al. 2010, Deluca et al. 1998). At some threshold of use, increased intensity does not make a difference for the amount of impact (Marion et al. 2016, Monz et al. 2013, Monz et al. 2010, Deluca et al. 1998). Any visitor activities will impact vegetation composition and soil properties in areas where use is concentrated. The resistance and resilience of the particular area of consideration should be considered when identifying appropriate visitor activities. Turf forming grasses and matted forbs are among the more resistant community types, while forests with understorys dominated by forbs and woody shrubs may be less resistant but recover more quickly (Cole and Monz 2002). The potential for soil erosion and runoff at high use levels, especially when soils are particularly moist or particularly dry, should also be evaluated, as these are processes that can be detrimental to aquatic ecosystems. Visitor activities that facilitate spread of non-native species should also be carefully evaluated, as this is a process that may disrupt community or ecosystem structure and function at multiple spatial scales.

The IVUM framework does not explicitly mention consideration of desired conditions and appropriate visitor activities in the area of interest within the context of desired conditions at broader spatial scales. This is problematic in any scenario, but especially so in a place like the Greater Yellowstone, where there is an intact ecosystem with functions operating across a massive landscape. Wildlife migrations are perhaps the broadest scale functions characterizing the structure of Greater Yellowstone. Landscape connectivity is important to maintaining function of broad scale landscapes (Turner 1989). The ecological processes operating at landscape scales that may affect populations or communities include the heterogeneity of habitat patches in close proximity to one another, the availability of supplemental

habitat patches, source-sink population dynamics, and neighborhood effects (Dunning et al. 1992). The lack of scientific information on recreational impacts at multiple spatial scales, especially broad spatial scales, makes it very difficult to identify how those effects might translate to habitat patterns that effect process within a larger landscape context. Current decision-making frameworks must take into account effects of recreation within this broader context if a landscape like Greater Yellowstone is to persist well into the future. Some evidence suggested informal trail networks may contribute to habitat fragmentation; this is a realm of recreation ecology research ripe for growth.

The next stage of the IVUM framework aims to identify management strategies that ensure desired conditions are maintained in light of allowed visitor activities. Development of tools at this stage requires not only an understanding of the potential impacts (as outlined in the previous few paragraphs), but also an understanding of what strategies are effective at mitigating impacts (Marion 2016). As many as 40.5% of the literature evaluated by Larson et al. (2016) did not provide management recommendations based on the study findings. Additionally, very few studies on recreation impacts to wildlife, vegetation, or soil are structured around testing the effectiveness of a given management strategy (Larson et al. 2016, Marion and Leung 2001). This is a clear area where more information would improve decision-making.

The following are strategies discussed in the literature we evaluated:

1) Bear proof campgrounds using zoning techniques and infrastructure that safely concentrate attractants (Creachbaum et al. 1998); human disturbances involving food habituated bears are more likely around degraded campgrounds (Merrill 1978).
2) Modify spatial or temporal patterns of recreational use (Marion 2016).
    a. Implement seasonal closures around sensitive areas like winter range or nesting sites (Courtemanch 2014, Beale and Monaghan 2004).
    b. Limit dispersed activity in sensitive wildlife habitat (Stankowich 2008, Taylor and Knight 2003, Miller et al. 2001, Papouchis et al. 2001).
3) Modify use amount
    a. Identify thresholds like that defined in Stalmaster and Kaiser (1998) and use as standards guiding use amount compatible with the desired conditions of an area.
4) While empirical evidence is lacking regarding changes in social or resource conditions resulting from modification of visitor behavior (Marion and Reid 2007), this is often a proposed strategy (Marion 2016). Information is most effective when limited to 2 messages per media platform

(Cole et al. 1997). Source credibility is important (Marion et al. 2008) and use of multiple media platforms that appeal to users at multiple phases along the spectrum of moral development are effective (Manning 2003).

   a. Use education around use impacts to increase support for management actions; evidence suggests there is a disconnect in recreational user awareness of their impact (Taylor and Knight 2003).
      i. The strongest correlate of behavioral intent to engage in leave no trace practices may be the perceived effectiveness of such actions; there is real opportunity to positively influence user behavior via education about the importance of leave no trace practices (Lawhon et al. 2013).
   b. Use education to modify user behavior in ways that reduces careless or unintended impacts (Manning 2003).

5) Incorporate patches of forested area into the habitat mosaic of heavily developed recreation areas, like ski resorts (Patthey et al. 2008).
6) Disperse recreational activity at low use levels and concentrate/contain activity at high use levels (Marion et al. 2016).
7) Enhance resource resistance (Marion 2016).
8) Rehabilitate degraded resources using closures, scarification, seeding, transplants and soil amendments (Marion 2016, Stohlgren and Parsons 1986).
9) Identify and address user expectations; sustainable recreation management is most achievable if planning integrates user desires with consideration of conservation priorities and the environmental susceptibility of an area (Goeft and Alder 2001).
   a. Ensure proper trail design and maintenance that meets user expectations, in turn mitigating development of user created trails (Pickering et al. 2010, Marion and Wimpey 2007, Goeft and Alder 2001).

The final stage of the IVUM framework aims to implement identified strategies, monitor success in achieving or maintaining desired conditions, evaluate outcomes, and adjust strategies as needed. In any scenario, it is important to remember there may be synergistic effects of recreation and other environmental stressors (Monz et al. 2010, Cole 1981). Given how little is known regarding these potential reactions, and the reality that every species and system will respond differently to stress depending on other factors that characterize the area, this evaluation and adjustment stage of decision-making is key.

Wilderness Management strategy:

Wilderness management is particularly challenging, given the subjective nature of managing for particular values or experiences such has solitude, primitive and unconfined recreation, and untrammeled landscapes. Some argue there is a need for a widely accepted definition of wilderness character, with associated terminology and measurement standards (Landres et al. 2012). While wilderness research has driven a lot of improvement in wilderness management over the years (Cole 2007), a definition of wilderness character would provide a foundation for more consistent and effective recreation planning, management, and monitoring (Landres et al. 2012). Globally, wildness is a scarce resource (Sanderson et al. 2002), this fact underscores the importance of preserving wilderness character. While the level of visitor use in wilderness areas does not necessarily influence a wide variety of potential visitor experiences, there is evidence to suggest that experiences related to solitude and remoteness (which are both wilderness values) are impacted when trail use levels are high (Cole and Hall 2012). An important challenge wilderness area managers face is a lack of data on which to make decisions, as only ½ of the wilderness areas in the United States have any recreation related baseline data, and only 2.7% have an inventory of user-created trails (Cole and Wright 2004).

Conclusions:

Human recreation has clear fine scale impacts on vegetation and soil, and likely results in behavioral and physiological stress responses in wildlife. Evidence that describes the implications of these impacts for both patterns and processes at broad spatial scales and over long time frames is lacking. Regarding recreation impacts to wildlife, quantitative studies that measure responses like survival or reproduction would provide more insight into potential impacts to higher levels of ecological organization, like populations and communities.

Humans also have impacts on each other, and maintaining high quality recreational experiences must be balanced with accommodating rising participation in recreation and new types of uses. There are also social concerns around the accessibility of outdoor recreation to all demographics in the United States.

Outdoor recreation plays an important economic and social role in growing Western communities. With declining budgets and new pressures, land managers are up against big challenges to plan and design recreational opportunities that maintain high quality experiences, conserve natural resources, and accommodate growing demand for recreation.

Visitor use management frameworks are an opportunity to develop a coordinated, integrated approach to recreation planning, design, and management across jurisdictions. However, these frameworks would benefit from stakeholder input, more information about recreational use and user expectations, and science that answers some of the big remaining questions about the impacts of human presence in wild landscapes.

For conservation of landscapes like the GYE, desired conditions and appropriate visitor activities must be evaluated in the context of a broader ecological structure functioning at a landscape scale. Given the current body of knowledge surrounding recreation impacts is fairly heavy in the realm of trampling impacts to vegetation/soil and it is very difficult to make generalizations regarding impacts to wildlife/waters (Marion et al. 2016), it is likely that many of the specific management strategies outlined in various recreation management frameworks are based on research on vegetation and soil impacts. This kind of research is inherently fine scaled; the current framework would benefit from a toolbox of strategies and associated actions that are derived from knowledge around recreation impacts to ecological processes at much broader scales.

Declaration of Interest:

The author is employed by the Greater Yellowstone Coalition, a 501(c)(3) non-profit that works to protect the lands, waters, and wildlife of the Greater Yellowstone Ecosystem.

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Literature Cited:

Abraham, A., K. Sommerhalder, and T. Abel. 2012. Landscape and well-being: a scoping study on the health-promoting impact of outdoor environments. *International Journal of Public Health*, 55: 59-69.

Alexander, B. 2009. Energy Development and the Changing Economy of the West. *Headwaters*

Economics: Bozeman, MT, USA.

Andereck, K.L., K.M. Valentine, R.C. Knopf, and C.A. Vogt. 2005. Residents' perceptions of community tourism impacts. *Annals of Tourism Research*, 32: 1056-1076.

Argys, L. and N. Mocan. 2000. Bicycling and walking in Colorado: economic impact and household survey results. *Colorado Department of Transportation*.

Arlettaz, R., P. Patthey, M. Baltic, T. Leu, M. Schaub, R. Palme, and S. Jenni-Eiermann. 2007. Spreading free-riding snow sports represent a novel serious threat for wildlife. *Proceedings of the Royal Society of London B: Biological Sciences*, 274: 1219-1224.

Arocena, J.M., S.K. Nepal, and M. Rutherford. 2006. Visitor-induced changes in the chemical composition of soils in backcountry areas of Mt Robson Provincial Park, British Columbia, Canada. *Journal of Environmental Management*, 79: 10-19.

Ballantyne, M., O. Gudes, and C.M. Pickering. 2014. Recreational trails are an important cause of fragmentation in endangered urban forests: a case-study from Australia. *Landscape and Urban Planning*, *130*: 112-124.

Barber, J.R., K.R. Crooks, and K.M. Fristrup. 2009. The costs of chronic noise exposure for terrestrial organisms. *Trends in Ecology and Evolution*, 25: 180-189.

Barros, A., J. Gonnet, and C. Pickering. 2013. Impacts of informal trails on vegetation and soils in the highest protected area in the Southern Hemisphere. *Journal of Environmental Management*, 127: 50-60.

Beale, C.M. and P. Monaghan. 2004. Human disturbance: people as predation-free predators? *Journal of Applied Ecology*, 41: 335-343.

Becker, B.H., C.M. Moi, T.J. Maguire, R. Atkinson, and N.B. Gates. 2012. Effects of hikers and boats on tule elk behavior in a national park wilderness area. *Human-Wildlife Interactions*, 6: 147-154.

Bedimo-Rung, A.L., A.J. Mowen, and D.A. Cohen. 2005. The significance of parks to physical activity and public health: a conceptual model. *American Journal of Preventive Medicine,* 28: 159-168.

Benninger-Truax, M., J.L. Vankat, and R.L. Schaefer. 1992. Trail corridors as habitat and conduits for movement of plant species in Rocky Mountain National Park, Colorado, USA. *Landscape Ecology*, 6: 269-278.

Bergstrom, J.C., J.R. Stoll, J.P. Titre, and V.L. Wright. 1990. Economic value of wetlands-based recreation. *Ecological Economics*, 2: 129-147.

Blas, J., G.R. Bortolotti, J.L. Tella, R. Baos, and T.A. Marchant. 2007. Stress response during development predicts fitness in a wild, long lived vertebrate. *Proceedings of the National Academy of Sciences*, *104*(21): 8880-8884.

Boyle, S.A. and F.B. Samson. 1985. Effects of nonconsumptive recreation on wildlife: a review. *Wildlife Society Bulletin*, 13: 110-116.

Cabezas, S., J. Blas, T.A. Marchant, and S. Moreno. 2007. Physiological stress levels predict survival probabilities in wild rabbits. *Hormones and Behavior*, *51*(3): 313-320.

Cadsand, B.A. 2012. Responses of mountain goats to heli-skiing activity: movements and resource selection. *University of Northern British Columbia Masters Thesis*.

Camp, R.J. and R.L. Knight. 1998. Effects of rock climbing on cliff plant communities at Joshua Tree National Park, California. *Conservation Biology*, 12: 1302-1306.

Campbell, J.E. and D.J. Gibson. 2001. The effect of seeds of exotic species transported via horse dung on vegetation along trail corridors. *Plant Ecology*, 157: 23-25.

Cassirer, E.F., D.J. Freddy, and E.D. Ables. 1992. Elk responses to disturbance by cross-country skiers in Yellowstone National Park. *Wildlife Society Bulletin*, 20: 375-381.

Cilimburg, A., C. Monz, and S. Kehoe. 2000. Wildland recreation and human waste: a review of problems, practices, and concerns. *Environmental Management*, 25: 587-598.

Clow, D.W., H. Forrester, B. Miller, H. Roop, J.O. Sickman, H. Ryu, and J. Santo Domingo. 2013. Effects of stock use and backpackers on water quality in wilderness of Sequoia and Kings Canyon National Parks, USA. *Environmental Management*, 52: 1400-1414.

Clow, D.W., R.S. Peavler, J. Roche, A.K. Panorska, J.M. Thomas, and S. Smith. 2011. Assessing possible visitor-use impacts on water quality in Yosemite National Park, California. *Environmental Monitoring and Assessment*, 183: 197-215.

Cole, D.N. 2007. Managing recreation in wilderness: special areas and specialized research. *United States Department of Agriculture Forest Service General Technical Report PNW 698: 115.*

Cole, D.N. 2006. Visitor and recreation impact monitoring: is it lost between science and management? *The George Wright Forum*, 23: 11-16.

Cole, D. N. (1981). Managing ecological impacts at wilderness campsites: an evaluation of techniques. *Journal of Forestry*, *79*: 86-89.

Cole, D.N. and T.E. Hall. 2012. The effect of use density and length of stay on visitor experience in wilderness. *USDA Forest Service Proceedings, RMRS-P-66*.

Cole, D.N., T.P. Hammond, and S.F. McCool. 1997. Information quantity and communication effectiveness: low-impact messages on wilderness trailside bulletin boards. *Leisure Sciences*, 19: 59-72.

Cole, D.N. and C.A. Monz. 2002. Trampling disturbance of high-elevation vegetation, wind river

mountains, Wyoming, U.S.A. *Arctic, Antarctic, and Alpine Research*, 34: 365-376.

Cole, D.N. and D.R. Spildie. 1998. Hiker, horse and llama trampling effects on native vegetation in Montana, USA. *Journal of Environmental Management*, 53: 61-71.

Cole, D.N., J.W. Van Wagtendonk, M.P. McClaran, P.E. Moore, and N.K. McDougald. 2004. Response of mountain meadows to grazing by recreational pack stock. *Journal of Range Management*, 57: 153-160.

Cole, D.N. and V. Wright. 2004. Information about wilderness visitors and recreation impacts: is it adequate? *International Journal of Wilderness*, 10: 27-31.

Coleman, T.H., C.C. Schwartz, K.A. Gunther, and S. Creel. 2013. Influence of overnight recreation on grizzly bear movement and behavior in Yellowstone National Park. *Ursus*, 24: 101-110.

Collins, S. and H. Brown. 2007. The growing challenge of managing outdoor recreation. *Journal of Forestry*, 105: 371-375.

Cordell, H. K. 2012. Outdoor recreation trends and futures: a technical document supporting the Forest Service 2010 RPA Assessment. *General Technical Report-Southern Research Station, USDA Forest Service*, (SRS-150).

Cordell, H.K., M.A. Tarrant, B.L. McDonald, and J.C. Bergstrom. 1998. How the public views wilderness: more results from the USA survey on recreation and the environment. *International Journal of Wilderness*, 4: 28-31.

Coupal, R.H., C. Bastian, J. May, and D.T. Taylor. 1999. The economic benefits of snowmobiling in Wyoming: a travel cost approach with market segmentation. *Western Agricultural Economics Association Annual Meeting*.

Courtemanch, A.B. 2014. Seasonal habitat selection and impacts of backcountry recreation on a formerly migratory Bighorn Sheep Population in Northwest Wyoming, USA. *University of Wyoming Master's Thesis*.

Creachbaum, M.S., C. Johnson, and R.H. Schmidt. 1998. Living on the edge: a process for redesigning campgrounds in grizzly bear habitat. *Landscape and Urban Planning*, 42: 269-286.

Creel, S., J.E. Fox, A. Hardy, J. Sands, B. Garrott, and R.O. Peterson. 2002. Snowmobile activity and glucocorticoid stress responses in wolves and elk. *Conservation Biology*, 16: 809-814.

Deluca, T.H., W.A. Patterson IV, W.A. Freimund, and D.N. Cole. 1998. Influence of llamas, horses, and hikers on soil erosion from established recreation trails in Western Montana, USA. *Environmental Management*, 22: 255-262.

Derlet, R.W., and J.R. Carlson. 2006. Coliform bacteria in Sierra Nevada wilderness lakes and streams:

what is the impact of backpackers, pack animals, and cattle? *Wilderness and Environmental Medicine*,17: 15-20.

Dickens, S. J. M., F. Gerhardt, and S.K. Collinge. 2005. Recreational Portage Trails as Corridors Facilitating Non-Native Plant Invasions of the Boundary Waters Canoe Area Wilderness (USA). *Conservation Biology*, *19*: 1653-1657.

Duffus, D.A. and P. Dearden. 1990. Non-consumptive wildlife-oriented recreation: a conceptual framework. *Biological Conservation*, 53: 213-231.

Duffy, J. E. 2009. Why biodiversity is important to the functioning of real-world ecosystems. *Frontiers in Ecology and the Environment*, *7*: 437-444.

Dunning, J. B., B.J. Danielson, and H.R. Pulliam. 1992. Ecological processes that affect populations in complex landscapes. *Oikos*, 169-175.

Eagleston, H. and C. Rubin. 2013. Non-motorized winter recreation impacts to snowmelt erosion, tronsen basin, eastern cascades, Washington. *Environmental Management*, 51: 167-181.

Ellenberg, U., A.N. Setiawan, A. Cree, D.M. Houston, and P.J. Seddon. 2007. Elevated hormonal stress response and reduced reproductive output in Yellow-eyed penguins exposed to unregulated tourism. *General and comparative endocrinology*, *152*: 54-63.

Farrell, T.A. and J.L. Marion. 2002. The protected area visitor impact management (PAVIM) framework: a simplified process for making management decisions. *Journal of Sustainable Tourism*, 10: 31-51.

Floyd, M.F. and C.Y. Johnson. 2002. Coming to terms with environmental justice in outdoor recreation: a conceptual discussion with research implications. *Leisure Sciences*, 24: 59-77.

Fortin, D. and M. Andruski. 2003. Behavioral response of free-ranging bison to human disturbance. *Wildlife Society Bulletin*, 31: 804-813.

Frid, A. and L. Dill. 2002. Human-caused disturbance stimuli as a form of predation risk. *Conservation Ecology*, 6: 11.

George, S.L. and K.R. Crooks. 2006. Recreation and large mammal activity in an urban nature reserve. *Biological Conservation*, 133: 107-117.

Gill, J.A., K. Norris, and W.J. Sutherland. 2001. Why behavioural responses may not reflect the population consequences of human disturbance. *Biological Conservation*, 97: 265-268.

Godbey, G., 2009. Outdoor recreation, health, and wellness: Understanding and enhancing the relationship. *Resources for the Future Discussion Paper*.

Goefte, U. and J. Alder 2001. Sustainable mountain biking: a case study from the southwest of Western Australia. *Journal of Sustainable Tourism*, 9: 193-211.

Griffin, S.C., S. Valois, M.L. Taper, and L.S. Mills. 2007. Effects of tourists on behavior and demography

of Olympic marmots. *Conservation Biology*, 21: 1070-1081.

Gutzwiller, K.J. and S.H. Anderson. 1999. Spatial extent of human-intrusion effects on subalpine bird distributions. *The Condor*, 101: 378-389.

Gutzwiller, K.J., H.A. Marcum, H.B. Harvey, J.D. Roth, and S.H. Anderson. 1998. Bird tolerance to human intrusion in Wyoming Montane Forests. *The Condor*, 100: 519-527.

Gutzwiller, K.J., R.T. Wiedenmann, K.L. Clements, and S.H. Anderson. 1994. Effects of human intrusion on song occurrence and singing consistency in subalpine birds. *The Auk*, 111: 28-37.

Haddad, N. M., L.A. Brudvig, J. Clobert, K.F. Davies, A. Gonzalez, R.D. Holt,, ... and W.M. Cook. 2015. Habitat fragmentation and its lasting impact on Earth's ecosystems. *Science Advances*, *1*: e1500052.

Harper, K. A., S.E. Macdonald, P.J. Burton,, J. Chen, K.D. Brosofske, S.C Saunders, , E.S. Euskirchen, D. Roberts, M.S. Jaiteh, and P.A. Esseen. 2005. Edge influence on forest structure and composition in fragmented landscapes. *Conservation Biology*, *19*: 768-782.

Hauer, F.R., H. Locke, V.J. Dreitz, M. Hebblewhite, W.H. Lowe, C.C. Muhlfeld, C.R. Nelson, M.F. Proctor, and S.B. Rood. 2016. Gravel-bed river floodplains are the ecological nexus of glaciated mountain landscapes. *Science Advances*, 2: pe1600026.

Headwaters Economics. 2017, May 30. National Parks Economic Impacts. https://headwaterseconomics.org/dataviz/national-park-service-units/#.

Hegg, S.J., K. Murphy, and D. Bjornlie. 2010. Grizzly bears and snowmobile use: a summary of monitoring a grizzly den on togwotee pass. *Yellowstone Science*, 18: 23-28.

Holmes, T.P., J.M. Bowker, J. Englin, E. Hjerpe, J.B. Loomis, S. Phillips, and R. Richardson. 2016. A synthesis of the economic values of wilderness. *Journal of Forestry*, 114: 320-328.

Interagency Visitor Use Management Council (IVUM). 2016. Visitor Use Management Framework. A guide to providing sustainable outdoor recreation. Edition 1. *Interagency Report*.

Jenson, W. and K. Scoresby. 2015. Yellowstone-Grand Teton loop bicycle pathway estimated economic impact. *Eastern Idaho Entrepreneurial Center Report.*

Johnson, C.Y., J.M. Bowker, and H.K. Cordell. 2004. Ethnic variation in environmental belief and behavior: an examination of the new ecological paradigm in a social psychological context. *Environment and Behavior*, 36: 157-186.

Johnson, C.Y., J.M. Bowker, and H.K. Cordell. 2001. Outdoor recreation constraints: an examination of race, gender, and rural dwelling. *Southern Rural Sociology*, 17: 111-133.

Johnson, R.R. and S.W. Carothers. 1982. Riparian habitats and recreation: interrelationships and impacts in the southwest and rocky mountain region. *Eisenhower Consortium for Western Environmental Forestry Research*, 12.

Kangas, K., M. Luoto, A. Ihantola, E. Tomppo, and P. Siikamaki. 2010. Recreation-induced changes in

boreal bird communities in protected area. *Ecological Applications*, 20: 1775-1786.

Kasworm, W.F. and T.L. Manley. 1990. Road and trail influences on grizzly bears and black bears in northwest Montana. *Bears: Their Biology and Management*, 8: 79-84.

Korpela, K., K. Borodulin, M. Neuvonen, O. Paronen, and L. Tyrvainen. 2014. Analyzing the mediators between nature-based outdoor recreation and emotional well-being. *Journal of Environmental Psychology*, 37: 1-7.

Landres, P., W.M. Vagias, and S. Stutzman. 2012. Using wilderness character to improve wilderness stewardship. *Park Science*, 28 (3).

Larson, C.L., S.E. Reed, A.M. Merenlender, and K.R. crooks. 2016. Effects of recreation on animals revealed as widespread through a global systematic review. *PloS one*, 11: e0167259.

Lawhon, B., P. Newman, D. Taff, J. Vaske, W. Vagias, S. Lawson, and C. Monz. 2013. Factors Influencing Behavioral Intentions for Leave No Trace Behavior in National Parks. *Journal of Interpretation Research*, 18: 23-38.

Lee, J.H., D. Scott, and M.F. Floyd. 2001. Structural inequalities in outdoor recreation participation: a multiple hierarchy stratification perspective. *Journal of Leisure Research*, 33: 427-449.

Leung, Y. and J.L. Marion. 2000. Recreation impacts and management in wilderness: a state-of-knowledge review. *Wilderness science in a time of change conference*, 5: 23-48.

Liddle, M.J. 1975. A selective review of the ecological effects of human trampling on natural ecosystems. *Biological Conservation*, 7: 17-36.

Liddle, M.J. and H.R.A. Scorgie. 1980. The effects of recreation on freshwater plants and animals: a review. *Biological Conservation*, 17: 183-206.

Lindberg, K. and T.Bertone-Riggs. 2015. Oregon non-motorized trail participation and priorities. *Report to Oregon Parks and Recreation Department*.

Linnell, J.D.C., J.E. Swenson, R. Andersen, and B. Barnes. 2000. How vulnerable are denning bears to disturbance? *Wildlife Society Bulletin*, 28: 400-413.

Loomis, J., D. Reading, and L. Koontz. 2005. The economic values of recreational fishing and boating to visitors and communities along the upper Snake River.*Colorado State University Report, Fort Collins, CO*.

Loomis, J.B. and R. Richardson. 2001. Economic values of the U.S. wilderness system: research evidence to date and questions for the future. *International Journal of Wilderness*, 7: 31-34.

Manning, R.E. 2003. Emerging principles for using information/education in wilderness management. *International Journal of Wilderness*, 9: 20-27.

Manning, R., 1999. Crowding and carrying capacity in outdoor recreation: from normative standards to standards of quality. *Leisure Studies: Prospects for the Twenty-First Century. State College, PA: Venture Publishing*, pp.323-34.

Manning, R., W. Valliere, B. Minteer, B. Wang, and C. Jacobi. 2000. Crowding in parks and outdoor recreation: a theoretical, empirical, and managerial analysis. *Journal of Park and Recreation Administration*, 18: 57-72.

Marion, J.L. 2016. A review and synthesis of recreation ecology research supporting carrying capacity and visitor use management decision making. *Journal of Forestry*, 114: 339-351.

Marion, J. L., R.G. Dvorak, and R.E. Manning. 2008. Wildlife feeding in parks: methods for monitoring the effectiveness of educational interventions and wildlife food attraction behaviors. *Human Dimensions of Wildlife*, *13:* 429-442.

Marion, J.L. and Y. Leung. 2001. Trail resource impacts and an examination of alternative assessment techniques. *Journal of Park and Recreation Administration*, 19: 17-37.

Marion, J. L., Y.F. Leung,,H. Eagleston, and K. Burroughs. 2016. A review and synthesis of recreation ecology research findings on visitor impacts to wilderness and protected natural areas. *Journal of forestry*, *114*: 352-362.

Marion, J.L. and S.E. Reid. 2007. Minimising visitor impacts to protected areas: the efficacy of low impact education programmes. *Journal of Sustainable Tourism*, 15: 5-27.

Marion, J. and J. Wimpey. 2007. Environmental impacts of mountain biking: science review and best practices. *Managing mountain biking, IMBA's guide to providing great riding, International Mountain Bicycling Association (IMBA) Boulder*:94-111.

Martin, J.G.A. and D. Reale. 2008. Animal temperament and human disturbance: Implications for the response of wildlife to tourism. *Behavioural Processes*, 77: 66-72.

Marzluff, J.M. and E. Neatherlin. 2006. Corvid response to human settlements and campgrounds: causes, consequences, and challenges for conservation. *Biological Conservation*, 130: 301-314.

McGranahan, D.A., T.R. Wojan, and D.M. Lambert. 2011. The rural growth trifecta: outdoor amenities, creative class, and entrepreneurial context. *Journal of Economic Geography*, 1: 529-557.

Merrill, E.H. 1978. Bear depredations at backcountry campgrounds in Glacier National Park. *Wildlife Society Bulletin*, 6: 123-127.

Miller, S.G., R.L. Knight, and C.K. Miller, 2001. Wildlife responses to pedestrians with dogs. *Wildlife Society Bulletin*, 29: 124-132.

Miller, S.G., R.L. Knight, and C.K. Miller. 1998. Influence of recreational trails on breeding bird communities. *Ecological Applications*, 8: 162-169.

Moen, J. and P. Fredman. 2007. Effects of climate change on alpine skiing in Sweden. *Journal of Sustainable Tourism*, 15: 418-437.

Monz, C.A., D.N. Cole, Y. Leung, and J.L. Marion. 2010. Sustaining visitor use in protected areas: future opportunities in recreation ecology research based on the USA experience. *Environmental Management*, 45: 551-562.

Monz, C.A., J.L. Marion, K.A. Goonan, R.E. Manning, J. Wimpey, and C. Carr. 2010b. Assessment and monitoring of recreation impacts and resource conditions on mountain summits: examples from the Northern Forest, USA. *Mountain Research and Development*, 30: 332-343.

Monz, C.A., C.M. Pickering, and W.L. Hadwen. 2013. Recent advances in recreation ecology and the implications of different relationships between recreation use and ecological impacts. *Frontiers in Ecology and the Environment,* 11: 441-446.

Naylor, L.M., M.J. Wisdom, and R.G. Anthony. 2009. Behavioral responses of North American elk to recreational activity. *The Journal of Wildlife Management*, 73: 328-338.

Neumann, W., G. Ericsson, and H. Dettki. 2009. Does off-trail backcountry skiing disturb moose? *European Journal of Wildlife Research*, 56: 513-518.

Outdoor Industry Association. 2017. The Outdoor Recreation Economy. *Report.*

Papouchis, C.M., F.J. Singer, and W.B. Sloan. 2001. Responses of desert bighorn sheep to increased human recreation. *The Journal of Wildlife Management*, 65: 573-582.

Patthey, P., S. Wirthner, N. Signorell, and R. Arletazz. 2008. Impact of outdoor winter sports on the abundance of a key indicator species of alpine ecosystems. *Journal of Applied Ecology*, 45: 1704-1711.

Peterson, M.N., V. Hull, A.G. Mertig, and J. Liu. 2008. Evaluating household-level relationships between environmental views and outdoor recreation: The Teton Valley case. *Leisure Sciences*, 30: 293-305.

Phillips, G.E. and A.W. Alldredge, 2000. Reproductive success of elk following disturbance by humans during calving season. *The Journal of Wildlife Management*, 64: 521-530.

Pickering, C.M. 2010. Ten factors that affect the severity of environmental impacts of visitors in protected areas. AMBIO: *A Journal of the Human Environment*, 39: 70-77.

Pickering, C. M., J.G. Castley, andK. Richardt, K. 2012. Informal trails fragmenting endangered remnant vegetation in Australia. In *Sixth international conference on monitoring and management of visitors in recreational and protected areas, Stockholm, Sweden*, 362-363.

Pickering, C., J.G. Castley, W. Hill, and D. Newsome. 2010. Environmental, safety and management issues of unauthorized trail technical features for mountain bicycling. *Landscape and Urban Planning*, 97: 58-67.

Pickering, C.M. and W. Hill. 2007. Impacts of recreation and tourism on plant biodiversity and vegetation in protected areas in Australia, *Journal of Environmental Management*, 85: 791-800.

Pickering, C.M., W. Hill, D. Newsome, and Y, Leung. 2010b. Comparing hiking, mountain biking, and horse riding impacts on vegetation and soils in Australia and the United States of America. *Journal of Environmental Management*, 91: 551-562.

Pimentel, D. and N. Kounang. 1998. Ecology of soil erosion in ecosystems. *Ecosystems*, *1*: 416-426.

Pimentel, D., C. Harvey, P. Resosudarmo, K. Sinclair, D. Kurz, M. McNair, S. Crist, L. Shpritz, L. Fitton,

R. Saffouri, and R. Blair. 1995. Environmental and economic costs of soil erosion and conservation benefits. *Science*, *267*: 1117-1123.

Pomerantz, G.A., D.J. Decker, G.R. Goff, and K.G. Purdy. 1988. Assessing impact of recreation on wildlife: a classification scheme. *Wildlife Society Bulletin*, 16: 58-62.

Rasker, R. 2012. West is best how public lands in the west create a competitive economic advantage. *Headwaters Economics Report, Bozeman, MT, USA*.

Rasker, R. and A. Hansen. 2000. Natural amenities and population growth in the Greater Yellowstone Region. *Human Ecology Review*, 7: 30-40.

Reed, S.E. and A.M. Merenlender. 2011. Effects of management of domestic dogs and recreation on carnivores in protected areas in Northern California. *Conservation Biology*, 25: 504-513.

Reed, S.E. and A.M. Merenlender. 2008. Quiet, non-consumptive recreation reduces protected area effectiveness. *Conservation Letters*, 1: 146-154.

Regan, B. 2018. Inventory of Outdoor Recreation in the Greater Yellowstone Ecosystem. *Greater Yellowstone Coalition Report, Bozeman, MT, USA*.

Reimers, E., S. Eftestol, and J.E. Colman, 2003. Behavior responses of wild reindeer to direct provocation by a snowmobile or skier. *The Journal of Wildlife Management*, 67: 747-754.

Remacha, C., J.A. Delgado, M. Bulaic, and J. Perez-Tris. 2016. Human disturbance during early life impairs nestling growth in birds inhabiting a nature recreation area. *PloS one*, 11: pe0166748.

Rogala, J., M. Hebblewhite, J. Whittington, C. White, J. Coleshill, and M. Musiani. 2011. Human activity differentially redistributes large mammals in the Canadian Rockies National Parks. *Ecology and Society*, 16: 16.

Rosenberger, S. R., A.L. Bell, A.P. Champ, M. Eric, and E.M. White. 2013. Estimating the economic value of recreation losses in Rocky Mountain National Park due to a mountain pine beetle outbreak. In *Western Economics Forum, 12:*31-39..

Rosenberger, R.S., T.R. Bergerson, and J.D. Kline. 2009. Macro-linkages between health and outdoor recreation: the role of parks and recreation providers. *Journal of Parks and Recreation Administration*, 27: 8-20.

Sanderson, E.W., M. Jaiteh, M.A. Levy, K.H. Redford, A.V. Wannebo, and G. Woolmer. 2002. The human footprint and the last of the wild. *Bioscience*, 52: 891-904.

Sato, C.F., J.T. Wood, and D.B. Lindenmayer. 2013. The effects of winter recreation on alpine and subalpine fauna: a systematic review and metaanalysis. *PloS one*, 8: e64282.

Schwartz, C.C., M.A. Haroldson, and G.C. White. 2010. Hazards affecting grizzly bear survival in the Greater Yellowstone Ecosystem. *Journal of Wildlife Management*, 74: 654-667.

Shaw, W.D. and J.B. Loomis. 2008. Frameworks for analyzing the economic effects of climate change on outdoor recreation. *Climate Research*, 36: 259-269.

Smith, V. H., G.D. Tilman, and J.C. Nekola. 1999. Eutrophication: impacts of excess nutrient inputs on freshwater, marine, and terrestrial ecosystems. *Environmental pollution*, *100*: 179-196.

Stalmaster, M.V. and J.L. Kaiser. 1998. Effects of recreational activity on wintering bald eagles. *Wildlife Monographs*, 137: 3-46.

Stankowich, T. 2008. Ungulate flight responses to human disturbance: a review and meta-analysis. *Biological Conservation*, 141: 2159-2173.

Steven, R., C. Pickering, and J.G. Castley. 2011. A review of the impacts of nature based recreation on birds. *Journal of Environmental Management*, 92: 2287-2294.

Stohlgren, T.J. and D.J. Parsons. 1986. Vegetation and soil recovery in wilderness campsites closed to visitor use. *Environmental Management*, 10: 375-380.

Taylor, A.R. and R.L. Knight. 2003. Wildlife responses to recreation and associated visitor perceptions. *Ecological Applications*, 13: 951-963.

Thapa, B. 2010. The mediation effect of outdoor recreation participation on environmental attitude-behavior correspondence. *The Journal of Environmental Education*, 41: 133-150.

Thiel, D., S. Jenni-Eiermann, V. Braunisch, R. Palme, and L. Jenni. 2008. Ski tourism affects habitat use and evokes a physiological stress response in capercaillie Tetrao urogallus: a new methodological approach. *Journal of Applied Ecology*, 45: 845-853.

Törn, A., A. Tolvanen, Y. Norokorpi, R. Tervo and P. Siikamäki. 2009. Comparing the impacts of hiking, skiing and horse riding on trail and vegetation in different types of forest. *Journal of Environmental Management*, *90*: 1427-1434.

Turner, M.G. 1989. Landscape ecology: the effect of pattern on process. *Annual Review of Ecological Systems,* 20: 171-197.

Turton, S.M. 2005. Managing environmental impacts of recreation and tourism in rainforests of the wet tropics of Queensland World Heritage Area. *Geographical Research*, 43: 140-151.

United States Census Bureau. 2017, May 15. United States Census Bureau. https://www.census.gov/en.html

Wilson, J.P. and J.P. Seney. 1994. Erosional impact of hikers, horses, motorcycles, and off-road bicycles on mountain trails in Montana. *Mountain Research and Development*, 14: 77-88.

Wimpey, J. and J.L. Marion. 2011. A spatial exploration of informal trail networks within Great Falls Park, VA. *Journal of Environmental Management*, 92: 1012-1022.

Wisdom, M.J., A.A. Ager, H.K. Preisler, N.J. Cimon, and B.K. Johnson. 2004. Effects of off-road recreation on mule deer and elk. *Transactions of the 69th North American Wildlife and Natural Resources Conference*, 531-550.

Wittemyer, G., P. Elsen, W.T. Bean, A. Coleman, O. Burton, and J.S. Brashare. 2008. Accelerated human population growth at protected area edges. *Science*, 321: 123-125.

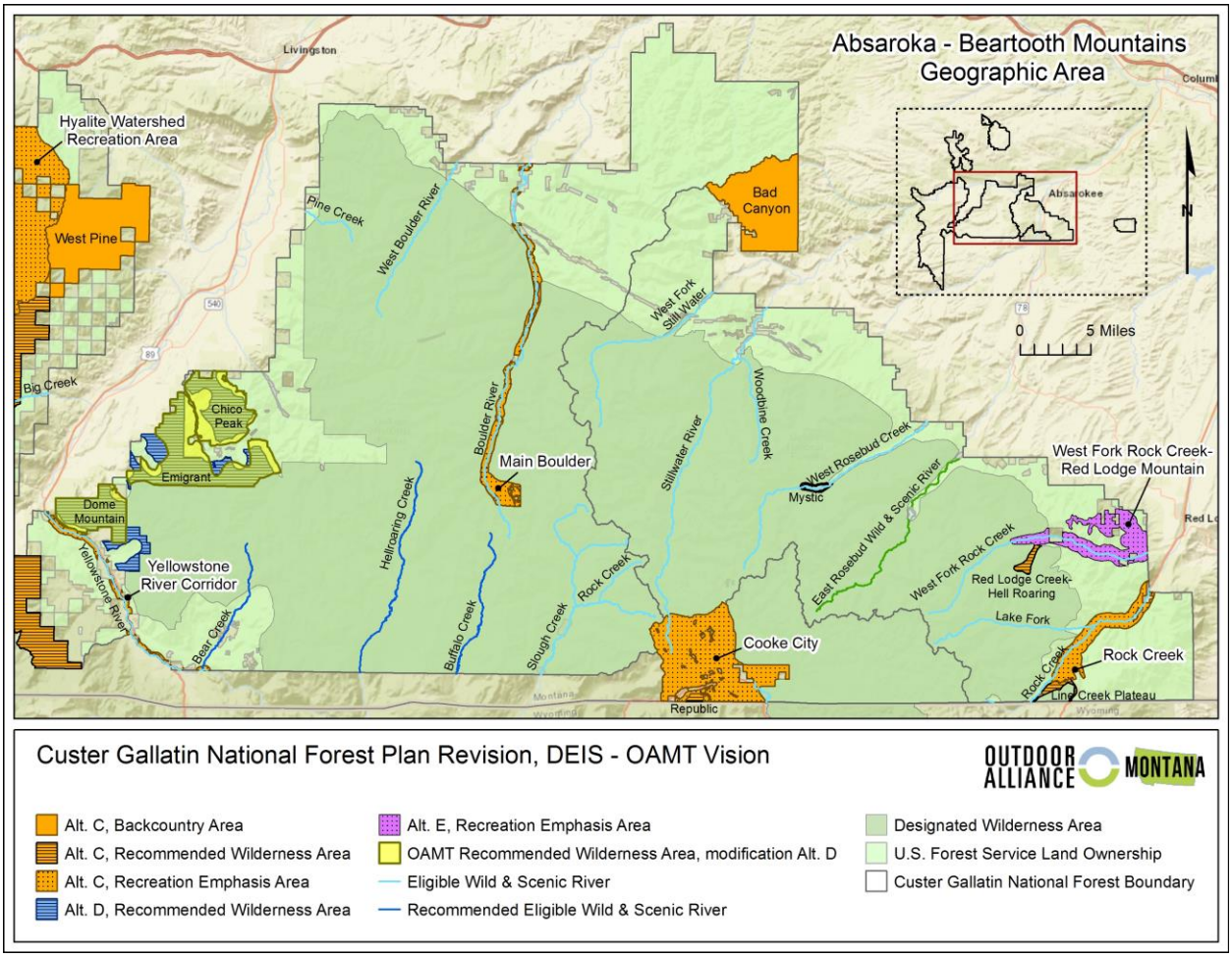
Wood, P. J. and P.D. Armitage. 1997. Biological effects of fine sediment in the lotic environment. *Environmental management*, *21*: 203-217.

Zaradic, P.A., O.R.W. Pergams, and P. Kareiva. 2009. The impact of nature experience on willingness to support conservation. *PloS one*, 4: e7367.

Zinn, H.C. and A.R. Graefe. 2007. Emerging adults and the future of wild nature. *International Journal of Wilderness*, 13: 16-22.

Appendix I:

Outdoor Alliance Montana – Mapping and Recommendations



Custer Gallatin National Forest Plan Revision, DEIS - OAMT Vision

OUTDOOR ALLIANCE MONTANA

- Alt. C, Backcountry Area
- Alt. C, Recommended Wilderness Area
- Alt. C, Recreation Emphasis Area
- Alt. D, Recommended Wilderness Area
- Alt. E, Recreation Emphasis Area
- OAMT Recommended Wilderness Area, modification Alt. D
- Eligible Wild & Scenic River
- Recommended Eligible Wild & Scenic River
- Designated Wilderness Area
- U.S. Forest Service Land Ownership
- Custer Gallatin National Forest Boundary