Dear Responsible Project Official,

The National Wildlife Federation and New Mexico Wildlife Federation would like to thank the Forest Service for allowing the opportunity to comment on the Northern New Mexico Riparian, Aquatic, and Wetland Restoration Project. Land, water and wildlife are lifelines in New Mexico and taking steps to protect these valuable resources and landscapes will strengthen the ability for future generations to benefit from such values.

The Forest Service with the help of many collaborative partners have invested a considerable amount of time in developing the Draft Environmental Assessment. Based on the Draft EA we provide the following comments many similar to those provided throughout the Forest Plan Revision Process.

I. Habitat Connectivity

The NWF and NMWF along with many other stakeholder's have been actively involved in a large effort to prioritize, protect and promote habitat connectivity. The Northern New Mexico landscape faces many threats such as habitat fragmentation that can negatively impact habitat connectivity across the National Forest Service Lands' System as wells as other jurisdictions. We ask the Forest Service to properly address the effects such restoration efforts can have in maintaining and restoring habitat connectivity. In places like the southwest where water can be a scarce resource. Terrestrial, aquatic and migratory wildlife species all utilize the many of the waterways, wetlands and riparian areas in Northern New Mexico for various important ecological functions such as seasonal movement, calving and survival.

II. Beaver restoration to ensure watershed and riparian health

We applaud the Forest Service for including recognition of beaver restoration as an important part of its watershed and aquatics strategy; however, there are several areas of the planning document that could be improved to more fully comply with the 2012 National Forest Planning Rule's requirements for climate resiliency and ecological integrity, as well as to reflect current scientific research and practical experience. Accordingly, we recommend modification of the Plan to strengthen the attention given to the ecological and economical value[1] that beavers have on the SFNF ecosystem, as well as downstream users. Specifically, the Plan should more explicitly facilitate and prioritize restoration of beavers to unoccupied but suitable habitat.

The North American beaver (Castor canadensis) has immense influence over their environment—beavers' extensive instream structures create and enhance habitats for native fish, birds, amphibians and mammals by contributing to the ecological integrity, including connectivity, structure, and function of riparian zones and watersheds —while at the same time mediating the impacts of climate change on mountain snowpack and runoff. Resulting from these influences, beavers are referred to as "ecosystems engineers" and considered to be a "keystone species."[2] After European settlement of North America, beavers were nearly extirpated from their relatively ubiquitous distribution across the continent by the fur trade. While populations have recovered throughout North America, they remain absent in much of their historically occupied territory.[3] In the absence of these keystone species, overall ecological integrity

changes dramatically and ecosystem services are deeply impoverished: water runs off faster, streams become narrower and more channelized, and the water table drops—reducing the availability of water for fish, birds, amphibians, and other wildlife.[4] The impact has been aptly characterized as "an aquatic Dust Bowl."[5] NWF, NMWF focus on encouraging beaver restoration and reintroduction is grounded in these profound positive impacts of beavers on ecological integrity on our National Forests.

Restoring beavers—and the function of their activity through a variety of mimicry techniques—is an increasingly widespread restoration practice, especially in the American West. Ultimately, these mimicry dams can lure beavers back to suitable habitat.[6] Both non-government groups as well as government agencies have successfully employed this practice. The Big Hole Watershed Committee, based in Divide, Montana, has installed over 300 beaver mimicry structures on California Creek to return the creek to a perennial system.[7] The U.S. Forest Service has also embraced this approach in many locations, citing benefits to fisheries, water quality and climate resilience. We encourage the SFNF to also embrace this approach and reflect this in the planning and assessment documents.

a. Background on Regulatory Requirements

The 2012 Planning Rule requires an explicit focus on maintaining ecological integrity through restoration of natural resources and making National Forests more resilient, particularly in response to the impacts attributed to climate change. Specifically, the 2012 Planning Rule states: "[A] planning rule must. . . Emphasize restoration of natural resources to make our NFS lands more resilient to climate change, protect water resources, and improve forest health . . . ."[8] Ecological integrity is defined as the quality or condition of an ecosystem when its dominant ecological characteristics (for example, composition, structure, function, connectivity, and species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influences.[9]

The Federal Advisory Committee on the 2012 Planning Rule put forth a series of questions for the Forest Service to consider, determining whether revised forest plans meet the requirements and intent of the 2012 Planning Rule.[10] Regarding ecological integrity, the question is how well the plan provides for the maintenance and restoration of the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area, including structure, function, composition, and connectivity.

The 2012 Planning Rule further says the plan must provide for social, economic, and ecological sustainability within Forest Service authority. This includes plan components applicable to the plan area, such as standards or guidelines, to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area.[11]

The plan components must aim to "maintain or restore structure, function, composition and connectivity."[12] Key attributes of composition may be based on the presence and activity of a species, such as beaver, that provides essential structural or functional roles in the ecosystem (focal species).[13]

In addition to the 2012 Planning Rule, Forest Service guidance documents require managers to respond to climate change by taking proactive management actions to increase ecosystem adaptation and resiliency. The Forest Service Strategic Framework for Responding to Climate Change establishes a primary goal to increase ecosystem adaptation to climate change by "[e]nhanc[ing] the capacity of forests and grasslands to adapt to the environmental stresses of climate change and maintain ecosystem services."[14] A principal strategy to achieve this goal is through "facilitated adaptation," which takes "[a]nticipatory actions intended to prevent serious disruptions due to changing climate [which] may include…assisted migration of species to suitable habitat…or construction of new water storage facilities."[15] The Forest Service Manual also promotes ecological integrity and climate change resilience through collaborative, science-informed development, revision, or amendment of land management plans.[16] Between these three governing documents, it is abundantly clear that the Forest Service has a responsibility to manage National Forest lands so they are adaptive and resilient and have the ecological integrity necessary to ensure survival and essential ecosystems services.

b. The Role of Beavers

Overall, emphasizing beavers and beaver habitat where applicable serves to help the Forest Service meet its regulatory requirements by promoting and enhancing ecological integrity and increasing the climate resiliency of habitats. The extensive, positive ecological impacts of beavers, supported by a growing body of literature, create complex and diverse environments that are more resilient to disturbance and better able to adapt to impacts of climate change. The contributions of beavers will aid the Forest Service in meeting its obligations regarding ecological integrity and responding to climate change under the 2012 Planning Rule and Forest Service guidance documents.[17]

i. Ecological Integrity

By restoring beavers to suitable unoccupied habitat, ecological integrity will be restored to Northern New Mexico's identified riparian areas and watersheds. Some of the benefits include: "higher water tables; reconnected and expanded floodplains; more hyporheic exchange; more diversity and richness in the populations of plants, birds, fish, amphibians, reptiles, and mammals; and overall increased complexity of the riverine ecosystems."[18] Ultimately, the ecosystem engineering of beavers will result in higher levels of species diversity.[19]

Studies on beaver reintroduction conducted in the Custer-Gallatin National Forest have documented two decades of positive habitat changes attributable to the activity of this "ecosystem engineer" in the Absaroka-Beartooth Wilderness.[20] Twenty-four years of data following beaver reintroduction in the Absaroka-Beartooth Wilderness show that beaver habitat can contribute to channel recovery and floodplain function, among many other benefits.[21] The success of beaver reintroduction within the Absaroka-Beartooth Wilderness should serve as motivation for beaver restoration throughout the SFNF. This initiative will further increase ecological integrity and help Forest Service manage for the protection of at-risk species.

ii. Climate Change

As previously mentioned, beavers are a valuable tool for addressing the impacts of climate change on ecosystems. Beaver dams help offset climate change impacts on watersheds by:

1. reducing peak streamflows and "spread[ing] flows over longer time periods;"
2. improving drought resilience and water storage through increased water retention throughout the watershed, recharge of groundwater, and rehydration of degraded riparian ecosystems;
3. stabilizing water temperatures through "ex[and[ing] the presence of riparian plant communities and reduc[ing] sediment levels" and storing "groundwater that returns to streams," which contributes to water temperature stability; and
4. improving water quality through "sediment reduction and retention of water within a watershed as part of surface water or groundwater."[22]

As a result of climate change, snowmelt is occurring at higher rates in the Northern Rockies than ever before. Beaver dams are able to attenuate flood peaks by retaining water behind dams and in the subsurface, and can "reduce the magnitude of moderate flood events" and "help dissipate the energy of large flood events…"[23] Another important factor to the ecological health and resiliency of the project area and New Mexico's economy as climate change's impacts are increasingly felt is the beavers' potential role in helping to augment late summer flows of streams. Although the scientific literature on hydrologic impacts of beaver structures is limited, case studies documenting enhanced flows date back to 1938.[24] One reference described how beaver ponds, which "store about six acre-feet and are built about one hundred meters apart in appropriate habitat" can "bank significant amounts of water, thus evening seasonal stream flows [citations omitted]."[25]

Due to the numerous benefits, the interagency Climate Change Adaptation and Beaver Management Team has determined that the Forest Service should increase recognition of beavers in planning revisions because of the "climate change related benefits of expansion of beaver populations" and management units should "use beaver management practices and assessment tools in adapting to a changing climate…"[26] Lolo National Forest's Watershed Vulnerability Assessment identified beaver restoration as a strategy to address climate change impacts on water supply.[27] Specifically, the Assessment cited beaver reintroduction as a method to improve base flows, increase habitat diversity as a tool for bull trout conservation, and to further increase resiliency of ecosystems.[28]

In addition to mitigating climate change's impacts on water, beavers also help to mitigate climate change impacts of wildfires and heatwaves. Specifically for heatwaves, beavers are able to maintain refugia as their "deep persistent pools…buffer aquatic species like trout from extreme drought and effects of wildfire."[29] The expanded riparian area and wetlands due to beavers lower stream temperatures and the accompanied increase in vegetation also "offers shade that helps to lower stream and pond temperatures."[30] These pools and ponds resulting from beavers may even help act as firebreaks.[31] This is because "the mosaic of aspen and willow stands, meadows, ponds, and wetlands they maintain amid the flammable spruce forests" help to keep "fires smaller than they would be in homogeneous landscapes."[32]
Expansion of riparian areas and wetlands by beavers can increase humidity of drainages and, importantly, offer firefighters dispersed water storage while fighting wildland fires.[33] After a

fire occurs, beaver dams "help sequester sediment [and wildfire debris], very locally decrease seasonal stream temperatures, and enhance riparian revegetation."[34] Summer temperatures in New Mexico, "the sixth-fastest-warming state in the nation," are projected to increase resulting in greater frequencies of wildland fires and extreme heat events.[35] As such, beaver restoration is a vital tool for Forest Service managers that should be used to enhance the project area's resilience to wildland fire and extreme heat events.

Finally, we recognize that beaver are not always suitable for a given area and may present a nuisance or the potential for other human conflict. We recommend that Forest Service prioritize non-lethal strategies as a means of mitigating this potential conflict. With the restoration of beavers on the landscape, occasional conflict with human-built structures or activities is likely to occur. Therefore, a guideline addressing how land managers are to resolve conflict to sustain and protect ecological integrity is necessary. Due to the value of beavers and beaver habitat on the ecosystem, management options should prioritize non-lethal techniques, such as using pipes to reduce water levels, notching dams to restore streamflow, pond levelers, beaver deceivers, fencing and other non-lethal strategies including live-trapping and relocation. We recommend that the Forest Service adopt a guideline advising that lethal removal will only be considered after non-lethal strategy options have been exhausted.

I. **Conclusion**

We appreciate this opportunity to provide the Forest Service with our comments. Our intent here is to work cooperatively with the Forest Service and various agencies and community stakeholders to ensure that the project area is properly managed for the long-term public interest as well as for the benefit of New Mexico's land, water, and wildlife. We look forward to working with you as this process moves forward.

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References:

[1] For example of economic value, see ECONorthwest, The Economic Value of Beaver Ecosystem Services: Escalante River Basin, Utah, 49-51, Tables 22-24 (2011), https://www.pdx.edu/sustainability/sites/www.pdx.edu.sustainability/files/ECONorthwest_Publication_Escalante Beaver-Values_2011-10.pdf.
[2] *Id.* at 297. A keystone species is one that greatly influences the species composition and physical appearance of ecosystems (Paine 1969) and whose effects on ecosystem structure and function are both large overall and disproportionately large relative to its abundance (Power et al. 1996). An ecosystem engineer is a species that directly or indirectly controls resource availability by causing "physical state changes in biotic or abiotic materials" (Jones et al. 1997:1946). The beaver is a definitive example of both a keystone species and an ecosystem engineer.
[3] Baker, B. W. and E. P. Hill, Beaver (Castor canadensis). Wild Mammals of North America: Biology, Management, and Conservation. Second Edition. The Johns Hopkins University Press, 288-89 (2003), https://www.aphis.usda.gov/wildlife_damage/beaver_damage/downloads/Baker%20and%20Hill%20Beaver%20Chapter.pdf.
[4] See generally, U.S. Fish & Wildlife Service, The Beaver Restoration Guidebook 2.0, Working with Beaver to Restore Streams, Wetlands, and Floodplains, (2018), https://www.fws.gov/oregonfwo/Documents/2018BRGv.2.01.pdf.
[5] Ben Goldfarb, Eager: The Surprising, Secret Life Of Beavers And Why They Matter, Chelsea Green Publishing, 10 (2018)
[6] Peterson , Christine. "Beaver Mimicry Projects Could Be Key to Restoring Wetlands." The Nature Conservancy, (2019), www.nature.org/en-us/about-us/where-we-work/united-states/idaho/stories-in-idaho/beaver-mimicry-projects-could-be-key-to-restoring-wetlands/.
[7] Big Hole Watershed Committee. (2018). California Creek Restoration. Retrieved from http://www.bhwc.org/projects/california-creek-restoration/