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Summary of Key Risk Findings from the Draft Assessment of Ecological/Social/Economic Sustainability Conditions and Trends

Carson National Forest
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Summary of Key Risk Findings

The Carson National Forest (NF) has completed a draft assessment report[1] of 15 resource topics, as required by the USDA Forest Service's 2012 Planning Rule (36 CFR 219). The assessment process is designed to rapidly evaluate readily available existing information about relevant ecological, economic, and social conditions, trends, and sustainability and their relationship to the current land and resource management plan (forest plan), within the context of the broader landscape. The assessment uses information that is currently available in a form useful for the planning process, without further data collection, modification, or validation. The assessment report is not a decision making document, but provides current information on planning topics (36 CFR 219.19).

The purpose of this document is to highlight the key risk findings identified from the draft assessment report. These are the resource areas on the Carson NF that are most at risk of not being sustainable. The key risk findings represent the results of assessing the Carson NF's current conditions and trends and their departure from reference condition.[2] The key risk findings in this document represent the results of assessing the Carson NF's current conditions and trends and their departure from reference condition. The resources that are most departed are also the most at risk of not being sustainable under current forest plan[3] management direction. The key risk findings from the assessment inform the need for changing management direction outlined in Carson NF's nearly 30-year old forest plan.

The draft assessment report evaluated and identified many other resources areas that are at moderate or low risk of not being sustainable under current forest plan management direction. These are resource areas for which current plan management direction is presently working as designed. The findings for these resource areas were not brought forth in this document. The reader is strongly encouraged to refer to the draft plan assessment report to learn more about how the resource areas were evaluated and how the key risk findings were identified.

Ecological Key Risk Findings

The assessment process requires the analysis of five ecological resource areas to determine the risk of being sustainable under current plan management direction. The forest evaluated terrestrial, aquatic, and riparian ecosystems; air, soils, watersheds; climate change; carbon stocks; and species of conservation concern. The resource areas most at risk of being sustainable are identified below. A discussion is included identifying the stressors or causes leading to the risk, how the forest is currently addressing the risk, and the limitations the forest faces to address the risk.

The assessment evaluates the risk to sustainability at three spatial scales. The goal of evaluating information about ecological integrity at a scale broader than the Carson NF is to understand the context of management for resources within the forest. An understanding of the environmental context extending beyond the Carson NF is necessary for determining opportunities or limitations for National Forest System (NFS) lands to contribute to the sustainability of the broader ecological systems, as well as the impacts of the broader landscape on the sustainability of

[1] The full draft assessment report can be found on the Carson National Forest's website.

[2] Reference condition is the spatial and temporal variation in key ecosystem characteristics under historic disturbance regimes over a reference period. The reference period is sufficiently long to include the full range of variation in key ecosystem characteristics produced by dominant natural disturbance regimes (e.g., fire and flooding), often several centuries, and includes short-term variation and cycles in climate. "Departure" or being "departed" means there is a deviation of current condition from reference condition.

[3] The Carson National Forest's Land and Resource Management Plan (forest plan) was initiated in 1986.

resources within the Carson NF. In some instances, a unique role of NFS lands may become apparent at this scale. The key risk findings are discussed at some or all of the spatial scales which are included below for reference:

- **Context scale** is needed to put the forest condition in context with the greater area, including lands beyond the forest boundary. The context scale informs the spatial niche of the forest in the greater landscape.
- **Plan scale** showcases current condition and trends as an average of conditions across the Carson National Forest (NF).
- **Local scale** is valuable for describing departure patterns for a given characteristic and identifying where particular issues may need attention and drive forest plan components. This scale is not as likely to drive ecological need for change, but may drive development of plan components. Ecological risks were summarized at the local scale in eight local zones on the Carson NF: Jicarilla (Ji), Cruces Basin (Cb), Rio Chama (Rc), Vallecitos (Vc), Rio Grande (Rg), Red River (Rr), Valle Vidal (Vv), and Camino Real (Cr).

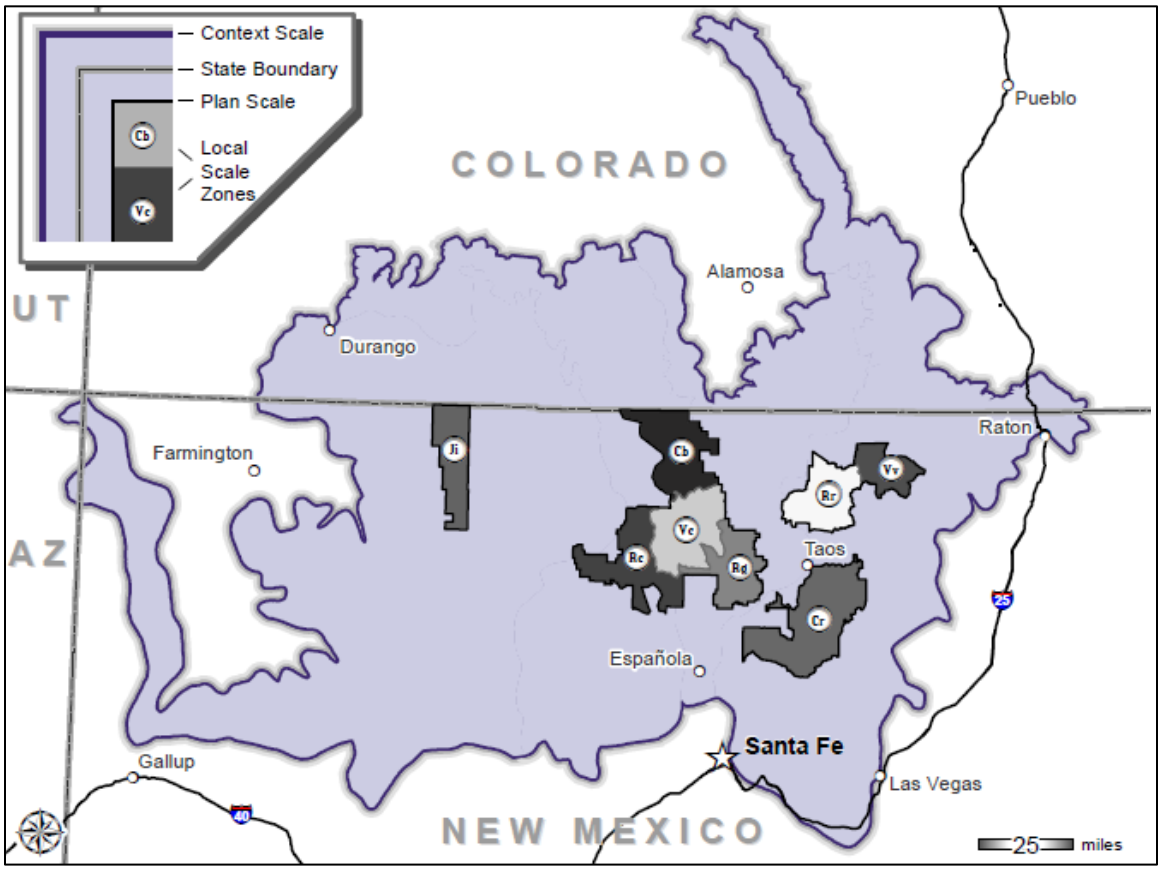

Figure 1. Context, plan, and local scales for terrestrial ecosystems

The following summarizes the key risk findings of ecological risk across all three scales (Figure 1).

Frequent Fire Ecosystems

Fire dependent ecosystem response units (ERUs)[1] are at high risk. Ponderosa pine forest (PPF) and Mixed Conifer, with Frequent Fire (MCD, also referred to as dry mixed conifer) are the ERUs most departed from a reference condition on the Carson NF, with stand structure and function that are no longer being maintained by frequent low intensity fire. Overgrazing during 19th and early 20th century removed fuel to carry fire; 20th century fire suppression limited fire spread; and timber harvesting removed many old, fire resistant trees. Patchy, multi-aged stands have been replaced by homogeneous, denser, younger ones that are prone to uncharacteristic, stand replacing wildfire. Current management does not adequately restore multi-aged, open stands that burn frequently. Treatments are limited by workforce capacity and current forest plan standards that are very prescriptive and set certain diameter limits in Mexican spotted owl and northern goshawk habitat. Acres burned are limited by smoke regulations, workforce capacity, and concerns over public safety and values at risk.

Risk at the context scale is similar to risk at the plan scale. Wildland urban interface is a greater concern off-forest and may further restrict management options at the context scale.

Encroachment and Infill

Encroachment and infill by woody species, lower grass cover, and reduced nutrient cycling, together increase risk in lower elevation ERUs. Much of this risk is driven by legacy or climatic influences, but is compounded by grazing. In the past, the Carson NF chained piñon pine and juniper trees followed by seeding to reestablish grass cover. Currently, prescribed fire and thinning treatments remove some encroaching or infilling trees, and sagebrush mowing restores some grasslands, but substantially more treatment would be required to restore historic conditions.

Piñon-juniper systems are slightly more departed at the plan scale than at the context scale, while the Sagebrush (SAGE) ERU is less departed (mainly due to less tree encroachment); however, sagebrush has invaded grasslands in large swaths of the context landscape. The sources of this variability are not clear, but most of the lower elevation areas on the forest are and have been inhabited by people, and have been impacted by wood gathering, roads, water diversion, and grazing. More remote areas in the context landscape are likely in better condition.

Grass Cover

The grass layer in many ERUs is less productive, partially due to legacy grazing,[2] induced shifts in species composition, and the continuation of combined wild and domestic ungulate grazing. However, the main cause of loss of grass cover is competition from overabundant woody species. The focus of many management actions is to increase available grass cover for livestock forage and soil protection, but the limitations on reducing tree densities described above also mean that openings that could support grass are not being created. Larger prescribed burns and mechanical or chemical sagebrush treatments have restored some grass systems, particularly in the Rio

[1] An ecosystem response unit (ERU) is defined as a unit of land that is homogenous in character such that similar units will respond in the same way to disturbance or manipulation.

[2] The lands that are now managed by the Carson NF were heavily grazed by cattle and sheep beginning in the late 1800s through the early 1900s. This overgrazing altered species composition, caused soil degradation, and reduced fuels to carry fire resulting in the establishment of woody species that would have otherwise been checked by frequuent burning.

Chama and Jicarilla zones. Adaptive range management has empowered the forest to work with permittees to adjust authorized livestock numbers and the season of use. Invasive and introduced plant species have the potential to out-compete native grasses, and in some areas they have become well established.

Risk to grass cover is probably similar at the context and plan scales, though current condition is influenced by proximity to towns and may therefore be more departed on the Carson NF where small land dependent communities are common.

Aspen

Aspen as a cover type is well represented; however, regeneration is limited due to infrequent fire and some recent mortality from chronic defoliation by western tent caterpillar and large aspen tortrix. The lack of maintenance or regenerative fire has resulted in few newly established stands and increasing dominance by understory conifers in old stands. Without sufficient disturbance, the current levels of ungulate browsing are further inhibiting regenerative success. As a secondary objective, many forest management activities seek to improve aspen stand conditions for wildlife habitat, water retention, fire hazard reduction, and visual quality. While SFF and MCW are at low risk, treatments in these ERUs that could stimulate aspen regeneration and mimic historic patch size are limited by an emphasis on uneven-aged treatment management.

In the Colorado portion of the context scale there may be more aspen disease and decline than what has so far been observed at the plan scale. Aspen is common at the plan scale and mortality is not as high as it has been in some areas of the western United States, suggesting the Carson NF may play an important role in maintaining functional aspen systems at the context scale.

Water

Surface water is at risk across much of the Carson NF, due to temperature, turbidity, and abundant spring development. Water quantity is largely outside the Carson NF's ability or authority to affect, as it is mainly influenced by climate and off-forest withdrawals. The Carson NF does affect water quality through road density, road condition, grazing, and overall watershed condition. The number and location of open roads is managed under travel management decisions made on the forest between 2010 and 2013 that prohibit driving any type of motor vehicle on closed roads and motorized cross-country travel. Enforcement capacity is limited and impacts from illegal vehicle use and unreclaimed closed or legacy roads are substantial in some locations. Grazing by livestock and wildlife degrades stream and riparian function in places, and contributes to water quality degradation. Wildlife populations are managed by the New Mexico Department of Game and Fish, not by the Carson NF, but big game populations especially, can have an impact on riparian vegetation at the plan scale. Improvements have been made to domestic livestock grazing practices, and multiple effective stream protection and restoration projects have been implemented across the Carson NF. Still, many streams do not meet state water quality standards. Watershed condition affects sedimentation, runoff, infiltration, stream channel shape and function, and threats that can have secondary impacts on water quality like severe wildfire. To the extent that the Carson NF influences the vegetation conditions already discussed, it in turn affects water quality.

Risk to waterbodies is a function of their natural or anthropogenically altered distribution, and human development in some cases may lead to greater abundance, and overall lower risk. However, tanks constructed for livestock and wildlife use also alter hydrology by impounding

and concentrating surface or subsurface flows and dewatering associated wetland areas in some cases. This alteration of waterbodies may also concentrate grazing pressure in these areas leading to water quality, soil, and vegetation impacts.

Water withdrawals from both surface water diversion and groundwater are not currently a widespread concern, but off-forest groundwater pumping may exceed recharge in the future. Surface water withdrawal is expected to remain steady as stream flows continue to decline. The Carson NF does not regulate withdrawal, but can manage watershed function to maintain and improve water retention and infiltration.

The Carson NF is a vital source of surface and groundwater at the context scale. The risks to water at the plan scale are similar or magnified at the context scale. Water use is concentrated off the forest, while snowpack and recharge occur mainly at higher elevations on the Carson NF. Because of the interconnectedness of the resource, risk at either scale effects condition at the other. Throughout the Southwest, the water resource is at high risk from climate change impacts and the increasing likelihood of drought.

Riparian and Aquatic Ecosystems

Despite departure in surface water quantity and timing, aquatic biota and riparian systems are able to maintain some of their function, though both are generally impaired. Riparian ERUs that occur in upper elevation watersheds are at less risk than those that occur downstream, where human impacts are greater. Impacts from livestock grazing are focused, historically and currently, at lower elevations closer to human settlements and where growing seasons are longer. Water is more abundant and less concentrated at higher elevations, and agriculture and other extractive uses occur mainly in lower, warmer valleys. Invasive and introduced species can impair riparian function and stream habitat. Restoration projects on the Carson NF include building exclosures and induced meanders, removing non-native fish species, and invasive species control.

Risks at the context scale are higher than risks at the plan scale, since they are compounded by additional human use near communities and on private land.

Soils

Soils at lower elevations are at greater risk than those at higher elevations, since lower soils have substantially reduced soil function from the combination of less effective vegetative groundcover and a shift from perennial to annual plants and shallow rooted grasses or tap-rooted woody species. Where they have become established, invasive and introduced plants generally provide less total cover, soil stability, and soil protection.

Overall risk is probably similar at the context scale, though some areas in the context landscape have been more impacted by development than any place on the Carson NF.

Species Habitat

The threats discussed above to ecosystems also threaten species associated with those ecosystems due to alteration of habitat features. Specific habitat features that were identified as being threatened include: tree features (cavities, snags, leaves, bark, downed logs, leaf or forest litter); rock features (canyons, cliffs, crevices, and outcrops); aquatic features (riparian areas, springs, and, permanent water); grassland features (alpine, tundra, meadows, small openings, other grassland); and soil features (soil type, soil permeability, and soil condition). Additional species

threats that are not linked to a particular ecosystem include harassment, invasive/ introduced species, disease, parasitism, obstruction, and predation.

The risk to species habitat is higher at the context scale overall than it is on the Carson NF. Ecosystems on the forest are managed to maintain habitat and to protect important habitat features, which is not necessarily the case in all parts of the context landscape.

Climate Change

Climate change is influenced by external factors, but will intensify the risk to ecosystem integrity in all systems. In response the Carson NF can implement adaptive management strategies; anticipate increased disturbance; maintain and restore resilient native ecosystems; increase water conservation and plan for reduced supply; and anticipate increased recreational use. Currently, monitoring for climate change resiliency is insufficient due to a lack of capacity and a focus on implementing projects.

The magnitude of climate change will be similar at the plan and context scales, though local impacts on ecosystem integrity will depend on the condition and resiliency of the particular ecosystem.

Social and Economic Key Risk Findings

The risks to ecological integrity for terrestrial, riparian, and aquatic ecosystems described above may impact the forest's ability to contribute too some of the social and economic benefits desired and enjoyed by the public. Three social and economic management focuses that are at risk have been identified as a direct result of ecological conditions: (1) the ability to provide forage for grazing; (2) water for consumption and other uses; and (3) hunting and wildlife viewing. Addressing these risks will require an emphasis on restoring and managing ecosystems, while balancing the management of these resources for public benefit. An additional three social and economic management focuses are at risk for non-ecological reasons: (1) recreation programs and use; (2) infrastructure; and (3) economic and social conditions.

The Carson NF is an integral part of the local cultures and communities it serves. Relationships with local communities and groups are vital in forest management and in providing services to local and visiting forest users. Poor or ineffective communication with the public and the inability to establish partnerships for completing work on the forest were two issues identified by the public, when the Forest Service held community meetings in June 2014. Given the future potential for declining budgets and workforce the Carson NF will need to engage other public and private entities to effectively manage the forest resources to continue to provide for the needs and desires of the public. The forest will need to be creative in identifying other work related to recreation, minor maintenance, and education programs. The challenge for the forest will be in developing the manpower and expertise to identify, plan, and manage new partners and volunteers. The new forest plan for the Carson NF will be successful, if the public and the Forest Service share ownership and implementation of the new forest plan.

Ability to Provide Forage for Livestock Grazing on the Carson National Forest

The ability for the Carson NF to provide adequate forage to contribute to opportunities for livestock grazing in northern New Mexico is at risk of being unsustainable. The departure of many forest ecosystems has reduced the size of forest openings and the quantity of available grasses that are necessary to provide sustainable forage. Ponderosa pine forest and mixed conifer, with frequent fire ecosystems have become denser and more even-aged, increasing the threat of stand replacing fire. Encroachment and infill by woody species, forage competition by other species, and reduced soil stability all contribute to the reduction in the availability of grass cover. Recent drought has contributed the decrease in quality and quantity of available forage. Water tanks for livestock and wildlife use have resulted in an alteration of hydrologic flow and may also concentrate grazing pressure, leading to water quality, soil, and vegetation impacts.

Recent drought, voluntary livestock reductions due to market conditions and changing social dynamics have resulted in the fluctuation of authorized (actual) livestock numbers in the last several years, while permitted numbers have remained constant. The forest has utilized adaptive management to work with permittees to adjust authorized livestock numbers to maintain and protect forage, which has been stressed from recent drought conditions. Vegetation management that focuses on the restoration and maintenance of ecological integrity is required to address this risk.

Water for Consumption and Other Uses

The ability for the Carson NF to supply sufficient surface water and groundwater systems to meet the water needs of local counties and communities is at risk of being unsustainable. The region has experienced drought conditions since 1996, decreasing snowpack and spring runoff necessary for groundwater recharge. Climate change is expected to continue or intensify drought conditions. The high risk of uncharacteristic wildfire in ponderosa pine forest and mixed conifer, with frequent fire forest ecosystems increases the chance of flooding, increased erosion and sedimentation, and reduced groundwater recharge. Riparian ecosystems are at risk, impacting water quality and recharge.

The Carson NF contributes the majority of the water to the Upper Rio Grande Sub-basin and a large portion in the Rio Chama Sub-basin. The forest contributes a smaller portion of water to six other sub-basins. The majority of the population in the assessment area resides within the two primary watersheds. The forest cannot control surface water or groundwater withdrawals once water leaves the forest. To reduce this risk to water availability and quality, the forest can improve the watershed health and function to maintain and recover water retention and infiltration. Vegetation management that focuses on the restoration and maintenance of ecological integrity of terrestrial and riparian ecosystems is required to address this risk.

Hunting, Fishing, and Wildlife Viewing

The ability for the Carson NF to sustain habitat for many game species (mule deer, black bear, bighorn sheep, pronghorn, small game species, and furbearers) and fish species is at risk of being unsustainable. Wildlife and fish habitat faces threats from uncharacteristic wildfire, woody species encroachment, drought, and invasive species. Loss of habitat could result in the migration of these species off the forest and a decrease in population numbers. Habitat and population loss will decrease hunting and wildlife viewing opportunities. Vegetation management that focuses on the restoration and maintenance of ecological integrity of terrestrial and riparian ecosystems is required to address this risk.

Recreation Programs and Use

The ability for the Carson NF to remain relevant and responsive to changing recreation user trends and demands is at risk of being unsustainable. Current forest recreation programs and opportunities do not adequately meet user needs and desires. The forest has many developed recreation facilities that are utilized below their capacity, are in poor condition, and/or do not meet the needs of today's public. The forest cannot adequately maintain all of its campgrounds to standard. Many of its campgrounds only have single-use occupancy campsites that experience low use, as more users desire group campsites. In some areas, the inability of the forest to meet the need for group campsites has resulted in increased impacts from dispersed camping. Half of the forest's vault toilets are in fair or poor condition. The maintenance backlog has continued to increase resulting in inadequately maintained recreation sites and a poorer recreational experience for users. Much of the forest's trail system is old and does not meet the needs of today's recreation enthusiast. Many trails are poorly designed and located, with limited intrinsic value for hikers looking for scenic beauty and challenging hikes. The forest has insufficient trail systems for an increased mountain biking demand. It does not have adequate or well-planned motorized trails. Most of the trails are in disrepair, not conveniently located for users, and/or provide an insufficient recreational experience. The lack of a good motorized trail system has resulted in

users creating unauthorized trails out of old logging roads that cause increased degradation to vegetation, wildlife, and aquatic systems.

The ability of the Carson NF to provide meaningful recreation opportunities and experiences is an important social and economic contribution to local communities and businesses. A sustainable recreation program may require closing underutilized recreation sites, the planning and development of new sites, and/or upgrading existing sites to meet user needs and desires. Many trail systems may need to be decommissioned or upgraded. New trails may need to be designed and built to meet current and future user needs and located where they will get the best utilization. A recreation plan that focuses on providing a sustainable recreation program and opportunities that meet the needs of current users, are economically feasible, and can be adapted to future changing recreation trends is required to address this risk.

Infrastructure

The ability of the Carson NF to maintain its current infrastructure is at risk of being unsustainable. Much of the infrastructure on the forest is old and in continual need of routine maintenance. The backlog of required large maintenance repairs has perpetually increased, and is currently valued at several million dollars. Funding levels have decreased in recent years, while the cost to perform maintenance has increased. The inability to adequately maintain existing infrastructure could result in negative impacts on the management of the forest resources. Closure of infrastructure (i.e., roads, administrative facilities, and campgrounds) could result in reduced access, recreation services, and enjoyment by the public. Deterioration of infrastructure (i.e., roads, dams, and utilities) could result in unsafe conditions for the public and the Forest Service workforce, as well as ecological damage to the forest. A Forest Service program that prioritizes maintenance opportunities, utilizes alternative funding sources, and seeks alternative methods and opportunities to repair and maintain its infrastructure is required to address the risk of not being able to provide a safe and properly maintained infrastructure and access to services and forest users.

Economic and Social Conditions

The ability of the Carson NF to continue contributing the social and economic benefits (e.g., recreation programs and use, infrastructure, ranching and grazing, and recreational hunting) desired by local communities, families, and the visiting public is at risk. These forest uses contribute to the many benefits for communities and families (i.e., local traditional uses, social and family traditional values) and the economic opportunity within the assessment area. Recreation and recreation related activities on the Carson NF contribute the largest economic impact to the local economy, more than all other forest uses combined. The ability to recreate on the forest provides intrinsic values, such as a connection to nature, family togetherness, and improved physical and mental health. Infrastructure provides the ability to access and use the forest. Without safe, available infrastructure forest users would be limited in their ability to maximize the many benefits the forest contributes. For some forest users grazing and ranching are their primary source of income, or an important supplement to their income. Grazing and ranching provide strong cultural and family connections for many communities and families around the forest. Hunting contributes to the economic opportunity for local sportsman, businesses, and outfitters. The State of New Mexico receives important revenue from taxes and licenses for hunting. Hunting provides a strong social and cultural connection for families, to each other and to the land.

The Carson NF is a forest surrounded by many small towns, communities, and peoples who rely upon forest to provide resources and uses important to their social and cultural traditions and way of life, and as a means of contributing economic opportunity. Forest management that focuses on contributing to these needs, while maintaining the ecological integrity of the forest, is required to address this risk.