Rio Grande National Forest – Assessments 1 and 3 Ecosystem Integrity, Systems Drivers & Stressors – Executive Summary

Introduction

This document is a brief summary of the first step in the forest planning process; our assessment, and public input we solicited; regarding the ecosystem integrity of terrestrial, aquatic, and riparian ecosystems on the Rio Grande National Forest. It also discusses the drivers, stressors, and threats to ecosystem integrity on the forest.

An ecosystem is composed of living organisms (plants, animals and microbes) and their nonliving environment (climate and soil for terrestrial ecosystems; aqueous environment and substrate in aquatic ecosystems). These components interact so that the system: captures and stores energy as biomass; has a trophic structure; circulates nutrients; and changes over time (ecological succession). Assessing ecosystem integrity is required by the Forest Service planning rule. Integrity is measured by whether or not the dominant characteristics of the ecosystem:

- are within the range of what would occur “naturally” (natural range of variability), and
- can stay within that range as each ecosystem is influenced by stressors such as climate change, as well as developments and uses of the forest.

Ecosystems described in this assessment include terrestrial ecosystems, riparian ecosystems, and aquatic ecosystems. Terrestrial ecosystems include forested areas, non-forested (rangelands) and alpine ecosystems. These are the "dry" areas outside of lakes, streams, and other wet areas. Riparian areas are the important ecosystems along streams, lakes, and other water bodies. Aquatic ecosystems are the streams, lakes, and other water bodies that support fish and other aquatic species.

Drivers and stressors to the ecosystems of the Rio Grande National Forest include succession, wildfire, insects and disease, climate change, management, livestock grazing in rangelands; weather-related events such as droughts and floods; other natural disturbances such as beaver activity, exotic invasion, and tree encroachment; water use, transportation, recreation, mineral extraction, urbanization, and others. These drivers and stressors vary for each particular ecosystem.

What We Asked

We held a total of nine meetings throughout the San Luis Valley to engage the public on three different sets of topics. These meetings were facilitated by the National Forest Foundation and Peak Facilitation.

Three meetings on vegetation, timber, fire, and fuels were held on April 27, 2015 in Alamosa, on May 11, 2015 in South Fork, and on May 21, 2015 in Crestone. Approximately 30 members of the public attended these meetings.

Three meetings on fish, wildlife, and rare plants were held on June 22, 2015 in South Fork, on July 16, 2015 in Saguache, and on July 21, 2015 in Conejos Canyon. Approximately 30 members of the public attended these meetings.

Three meetings on water and soil resources were held on March 16, 2015 in Creede, on April 7, 2015 in Alamosa, and on April 28, 2015 in Saguache. Approximately 65 members of the public attended these meetings. In addition to helping facilitate these meetings, the National Forest Foundation provided a web-based tool that allowed us to ask the same set of questions to those who could not be at the meetings.

We also participated in meetings hosted by other agencies and organizations: The San Luis Valley Ecosystem Council (March 11, 2015 in Monte Vista), San Luis Valley County Commissioners (March 23, 2015 in Alamosa), Trout Unlimited (March 31, 2015), the Rio Grande Watershed Emergency Action Coordination Team (April 13, 2015 in Del Norte), the San Luis Valley Weed Management District (April 14, 2015 in Monte Vista), the San Luis Valley Cattleman's Association (May 4, 2015 in Alamosa), Mineral County (June 24, 2015 in Creede), and Hinsdale County (July 9, 2015 at San Juan Ranch, Hinsdale County).

We asked the same questions at meetings and on-line to give us consistent input for the assessment process relevant to ecosystem integrity, drivers, and stressors. They cover topics such as healthy forests, sustainability, the impact of human activities, fire and fuels, wildlife, fish, and rare plants, and water and soil resources. Participants also discussed some relevant standard and guidelines in the current forest plan.

Forest Health and Sustainability

- What is the definition of a healthy forest?
- How does the definition of health apply to the Rio Grande National Forest?
- What is a sustainable use of the forest?

Impacts of Human Activities

- What human activities and influences are relevant to today's forest conditions?

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- What are impacts of human activities on the forest?

Fuels and Fire on the Forest

- How should the Forest Service handle standing dead timber on the Rio Grande National Forest?
- Should fire be used as a tool for management?

Wildlife, Fish, and Rare Plants

- What plant and animal species are unique to the Rio Grande National Forest and what is the habitat that supports them?
- What management concerns might influence the long-term health of these species? How can the future management of the forest address some of those concerns?

Water and Soil Quality

- What management activities on or off the forest threaten or impair water quality (surface or groundwater) or soil productivity?
- Are there places on the forest where water quality or soil quality/productivity are at risk or are not adequately protected? Where are they?
- Is high water quality and soil productivity being maintained on the Rio Grande National Forest? What factors are impacting water quality and soil productivity?

Watershed Health

- What management activities and infrastructure impact watershed health, water quality, and/or aquatic species?
- What historical land use patterns shaped the existing ecological condition for water resources and riparian areas?
- Are there places on the forest where watersheds or riparian ecosystems are functioning at risk or being degraded? If so, where are they?
- What natural processes are affecting watersheds, riparian areas or aquatic species?
- Are watersheds and riparian ecosystems on the Rio Grande National Forest and surrounding areas healthy and properly functioning? What factors are impacting watershed or riparian health?

What We Heard

Healthy forests are diverse, with a variety of vegetation types, age classes, and species. A variety of wildlife species are present and healthy. A healthy forest is one with its fundamental natural processes occurring as usual. These forests regenerate after disturbance, experience natural fire, and have good water quality. There are mixed feelings about whether or not insects and dead trees are part of a healthy forest.

Measuring Effects

Forest sustainability should be measured with meaningful metrics. We need to develop quantitative data to define long-term sustainable use.

The impacts of human activities depend on the scale on which they are done and the integrity of the practice. Impacts may be positive or negative.

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Monitoring and Adaptive Management

Monitoring is important, whether that is monitoring trends in particular species, areas prone to resource damage, water quality, grazing regulations, or other issues.

The standards and guidelines in the forest plan need to be flexible and adaptable to a variety of situations. We need to allow for adaptive management. Utilize the agency expertise on the latest science and appropriate recommendations on the standards and guidelines.

Enforcement

Enforcement is a key issue. There was an emphasis on increased enforcement in general to protect areas from improper harvesting, overgrazing, and other damaging activities. New or better reporting mechanisms for violations was one suggestion.

Effects to Riparian Areas

There was general concern about riparian areas and the effects of grazing, ATVs, moose, and long-term camping sites on the riparian areas.

Sediment Sources

There is large concern about dead trees accelerating runoff and sedimentation and degrading reservoirs and other water sources. There is also concern over post-fire erosion and flooding and other sources of sedimentation, such as ATV trails.

Management Tools

Management intensity needs to increase, in terms of the amount of timber harvested, amount of planting, and amount of prescribed fire and controlled burns.

Logging is less harmful to the ecosystem than fires. Removing standing dead timber is also less expensive and a better use of tax dollars than fighting fires.

There were mixed feeling about fire as a tool for management. Most thought that controlled burns and natural fire were effective, necessary, and should be done under favorable conditions. This wasn't universal though – some had concerns about the safety of fire in beetle-kill areas and near houses on the forest, and with a preference for thinning and logging instead.

There were also mixed feelings about grazing. Many folks were concerned about grazing impacts, especially in the riparian areas. Others thought that grazing impacts were well-managed and could be positive if done properly.

Citizen Engagement and Partnerships

We should emphasize citizen engagement and partnerships in the new forest plan and should involve the public more to get things done. Suggestions included training citizens on data collection, recruiting volunteers and working with volunteer groups, and creating an adopt-a-trail program.

What the Science Tells Us

Terrestrial Vegetation

The spruce-fir and aspen forests are, in particular, undergoing rapid change due to a recent, large outbreak of spruce beetle and large wildfires. High levels of mortality in mature Engelmann spruce in many areas

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have produced abundant open stands and dead standing and down wood. This, in turn, is allowing regeneration of aspen and an increasing trend in aspen forests.

It is difficult to determine whether the terrestrial ecosystems on the Rio Grande National Forest are within the range of what would occur naturally. Our modelling results indicate that the terrestrial ecosystems on the Rio Grande National Forest are, in general, moderately to substantially departed from what would occur naturally. However, determining the range of natural conditions is not an exact science and was quantified over only the last 100 years of simulations results. Our spruce beetle modelling did not include the rare, extreme spruce beetle outbreaks like the one we are currently experiencing, but more moderate outbreaks.

Over the long term (many decades to hundreds of years),our models project the recovery of most forested ecosystems towards the natural range. However, due to fire suppression, we may expect to see somewhat less aspen in the future than would likely exist naturally, as well as other changes in the structural composition of forests.

Across the entire Rio Grande National Forest, the effects of management are very small. This is not surprising, as the extent of our management treatments is extremely small, with <0.2 percent of the landscape treated each year.

Late successional habitats

Late successional habitats are an important part of a healthy ecosystem. They tend to have forest structure elements, such as large, older trees, large snags, and multiple canopy layers; that are important to some wildlife species, such as the Canada lynx (*Lynx canadensis*). Currently, only about 13 percent of the forest can be classified as late successional habitat. Under the 1996 forest plan direction, this is projected to increase to 27 percent in the next 20 to 50 years. This is still less than the amount of late successional habitat there should be under historic conditions based on our modeling.

Snags and Down Woody Material

Snags and down woody material are essential for ecological integrity. They serve a variety of purposes, such as providing valuable wildlife habitat and supporting nutrient cycling. At least 68 terrestrial vertebrate species of wildlife rely on snags in Colorado; and they are key for cavity nesting species such as woodpeckers, small forest owls, bats, and small mammals. Down woody material is important for water quality and reducing soil erosion. From our stand exam and Forest Inventory and Analysis plot data collected on the forest, the average number of large snags has increased 400 percent, primarily due to the spruce beetle outbreak, from about 10 to 15 per acre to 40 to 50 per acre. There is also a large volume of down woody material. On average, there is more than 40 tons per acre of down woody material 3 inches and larger in size based on our recent stand exam data. This varies heavily by forest type, with the spruce-fir forest type having the highest amount; averaging about 90 tons per acre; and other forest types having less.

To reiterate, as a result of the recent spruce beetle epidemic, we currently have a large number of snags and high volume of down woody material, particularly in the spruce-fir forest type. These snag patches will be important as we assess connectivity, species resilience, and future forest conditions. As snags fall and down woody material decays, these values will most likely decrease. How fast this happens will depend on the forest type and a variety of other factors. Still, given the slow nature of these processes, a large quantity of snags and down woody material will persist on the forest into the foreseeable future.

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Fire as an Ecological Process

Wildland fire is a component of many of the ecosystems on the Rio Grande National Forest, both as an ecological driver and as an ecological stressor, depending on the system. Some vegetative species have evolved traits, such as thick bark or prolific sprouting after fire, allowing it to persist in a frequent fire environment. Other systems like ponderosa pine require disturbances such as fire to maintain the stand health and stability. Historically, highly variable fires maintained patchy and diverse vegetation structure and composition. This patchiness is thought to provide varied and productive habitat for many different plant and animal species.

A natural fire regime refers to the overall pattern of fires in vegetation over time, without modern human mechanical intervention, that is characteristic of a natural region or ecosystem. The fire regime includes vegetation and fuels characteristics, fire frequency, fire intensity and behavior, and ecological effects. Under wildland fire management and suppression policies of the last 100 years, the fire regime in much of the west has been altered, sometimes significantly. Other activities contribute to conditions that are uncharacteristic of the natural fire environment as well. To help restore fire to its historical role in the ecosystems on the Rio Grande National Forest, we have been broadcast burning at an average rate of 860 acres per year (10-year annual average 2004-2014).

From 1994 to present, the Rio Grande National Forest has had an average of 10 to 20 wildland fires per year, with 94 percent contained at less than 10 acres. The majority are naturally ignited, with 76 percent of wildland fires caused by lightning. Management of naturally occurring ignitions to include ecological benefits has been approved Forest-wide, although site specific values at risk, or existing fuel, weather, and climate conditions may require our fire managers to consider full suppression actions. We cannot use natural ignition as a management tool in key vegetation habitat types such as late successional spruce-fir, pinyon pine, and Engelmann spruce forests because they are highly susceptible to wildland fire and are only sustainable through a strict full suppression strategy.

Riparian and Aquatic Ecosystems

Riparian ecosystems cover a small amount of the landscape, but they are key in maintaining a large variety of plant and animal species. Riparian areas also offer stream water quality, bank stability, protection against erosion, aesthetic and recreational value, and other ecosystem functions. As part of this assessment, we identified and delineated riparian areas. This is an important first step for riparian monitoring, planning, and preservation. Our delineation results identified about 6 percent (120,000 acres) of the Rio Grande National Forest as riparian areas. About 30 to 35 percent of these riparian areas are wetlands (39,400 acres).

In order to adequately manage and protect wetland resources on the Rio Grande National Forest, we need reliable on their location, extent and current condition. A pre-existing, multi-agency effort to map and assess the condition of wetlands throughout the Rio Grande Headwaters River Basin, which includes the Rio Grande National Forest, identified 42, 862 acres of wetlands and water bodies within the Rio Grande National Forest, of which lakes and rivers comprise 4,687 acres or 11 percent. This estimate for wetlands and water bodies represents approximately 2 percent of the total area in the Rio Grande National Forest.

In total, we surveyed 77 wetland sites across the Rio Grande National Forest, including 30 riparian shrublands, 27 wet meadows, 17 fens, 2 riparian woodlands, and 1 marsh. We identified nearly 500 plant taxa during the surveys, including 445 identified to species level. Of the 445 species identified, 420 (94 percent) are native species and 25 (6 percent) non-native species. Noxious weeds, an aggressive subset of non-natives, were present in only four plots.

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Condition measures indicate that wetlands on the Rio Grande National Forest are in excellent to good condition. Floristic quality assessment indices are high for most wetlands surveyed, although they vary by both elevation and wetland type. Multi-metric Integrity Assessment scores rate most wetlands with an A- or B-rank, indicating that wetlands are either in reference condition or deviate only slightly from reference condition. A handful of wetlands are C-ranks, due to stressors including grazing, hydrologic modifications, and surrounding land use.

Gaps

The modelling we did to look at the natural range of variability and ecosystem integrity did not specifically include climate change. Climate change and the associated gradual increase in temperature will alter growth rates and mortality. Habitats may move higher in elevation and more northward as a result. But most importantly, with a changing climate, we expect more extreme weather, climate conditions, and disturbances such as wildfires, insect and disease outbreaks, droughts, and floods. Therefore, some of the simulation results may not hold and there may be other unanticipated conditions due to climate change. A project is currently under way to develop bioclimate models for 13 tree species. This work will project how habitat suitability for these species may change under a changing climate and we will develop management recommendations for forest adaptation to climate change based on the results.

It is unclear how climate change, beetle-kill, and the past fire suppression strategy will impact our ability to allow fire to play its historic role as a disturbance agent. In addition, there is uncertainty about how allowing fire on the landscape with such high fuel loadings will impact the desired conditions in specific forest types.

Habitat connectivity is an indicator of ecosystem integrity. It can be assessed in a variety of ways and with a variety of metrics. We have not completed a comprehensive connectivity analysis on the Rio Grande National Forest, which would be helpful in assessing current habitat conditions.

Drivers and stressors on the riparian and aquatic ecosystems of the Rio Grande National Forest include water use, roads, trails, and other transportation, recreation, biological stressors such as beaver presence and pesticide use, mineral extraction, vegetation management, urbanization, and others. Some of these factors need further assessment and are currently a gap in our knowledge. Examples of some of these current knowledge gaps include the number of stream diversions, reservoirs, and spring developments, miles of roads and trails, number of stream crossings, off-road vehicle use statistics, and recreation use estimates, among others.

Where We're Headed

Based on information in our assessment and what we are hearing from the public, we need to revise this section of the forest plan. Twenty years have passed since we wrote the 1996 Forest Plan for the Rio Grande National Forest. The high mortality in the spruce-fir forest type, which dominates the forest, has led to a very different and unexpected forest in that time. As a result of this and other changes, we need to revisit all of the standards and guidelines and other plan components in the 1996 Forest Plan, and we may update them to better reflect the new state of the forest. As an example, much of our current timber harvesting is salvage of dead trees, and we need to make sure that the new forest plan components are clear about this management activity. We also need to ensure that the plan components aren't overly restrictive so that objectives such as encouraging aspen can be met. We need to better incorporate the role of naturally occurring fire, with clearer direction on when and how we can use fire as a tool to meet our

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ecosystem integrity objectives. We will also need to address climate change and its effects on the ecosystems of the Rio Grande National Forest.

To help ensure ecological integrity of the riparian and aquatic ecosystems on the forest, our new forest plan will incorporate some of the findings of the Forest Service's 2011 Watershed Condition Framework. This was a nationwide assessment of the functioning of every 6th level watershed within national forests according to 12 physical or biological indicators. Based on the assessment, we identified short-term (less than five years) priority watersheds for restoration. We will identify our longer-term priorities (fifteen years) in this forest planning process.

We need to update other general plan components as well. We need to revise the ecological concepts in the 1996 Forest Plan with more contemporary language. In addition, under the new Planning rule there are some required standards related to timber harvesting that we need to add or update in the new forest plan.

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