535 16th Street, Suite 310 | Denver, Colorado 80202 | tel 303.825.0918
www.defenders.org

October 28, 2016

Rio Grande National Forest
Supervisor's Office
1803 W. Highway 160
Monte Vista, Colorado 81144

Via email: *rgnf_forest_plan@fs.fed.us*

Dear Rio Grande National Forest Planning Team:

Please accept the following comments on the on formal scoping for the forest plan revision for the Rio Grande National Forest (RGNF). We have reviewed the Notice of Intent to Prepare an Environmental Impact Statement (NOI; 81 Fed Reg 62,706 et seq., September 12, 2016) and the Proposed Action document available on the RGNF's revision website. Thank you for the opportunity to review and provide feedback on the Proposed Action. We appreciate the time and effort required to assemble this document. We request that you consider the issues and information, outlined below, for consideration as you continue through the planning process and on to develop the Draft Environmental Impact Assessment.

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. We submit the following on behalf of our 1,200,000 members and supporters nationwide, including more than 21,000 in Colorado.

Feel free to contact Lauren McCain at lmccain@defenders.org or 720-943-0453 with any questions.

Sincerely,

Peter Nelson
Senior Policy Advisor, Federal Lands

Lauren McCain
Federal Lands Policy Analyst

Contents

1. Introduction

The Rio Grande National Forest (RGNF) supports an array of strongholds for vulnerable native flora and fauna. The Forest has an opportunity to contribute to the recovery of eight federally protected species, including the threatened Canada lynx and endangered Uncompahgre fritillary butterfly; conserve the North American wolverine, which is proposed for listing under the U.S. Endangered Species Act (ESA); and maintain the persistence of Species of Conservation Concern (SCC) through its management plan revision process.

Now is the time for bold action in forest planning; robust, science-based forest plan decisions will result in higher degrees of public confidence that the Forest Service is fulfilling its mission and conservation obligations and enabling integrated landscape-level decision making and more efficient project-level implementation. To that end, the purpose of National Forest System (NFS) land management planning is to develop plans that "guide management of NFS lands so that they are ecologically sustainable and contribute to social and economic sustainability; consist of ecosystems and watersheds with ecological integrity and diverse plant and animal communities; and have the capacity to provide people and communities with ecosystem services and multiple uses that provide a range of social, economic, and ecological benefits for the present and into the future, …includ[ing] clean air and water; habitat for fish, wildlife, and plant communities; and opportunities for recreational, spiritual, educational, and cultural benefits" (36 CFR 219.1(c)). These are the overall, broad-scale desired conditions set forth in the 2012 Planning Rule (36 CFR 219.1-219.19) (Planning Rule or rule).

To achieve these broad goals, a system has been developed to assess current conditions and trends, identify the need to change the forest plan based on the Assessment, develop a plan to meet desired conditions, and monitor conditions to test if the plan is working. Each element of the system is integral to the whole. The planning phase for forest plan revision begins with a "review of the relevant information from the Assessment and monitoring to identify a preliminary need to change the existing plan and to inform the development of plan components and other plan content" (219.7(c)(2)(i)). The planning process must also be driven by review, incorporation, and analysis of best available scientific information (BASI) (219.3).

The Planning Rule is a federal regulation implementing the National Forest Management Act (NFMA) (1600 U.S.C. § 1600 et seq.). NFMA was enacted in 1976 in large part to elevate the value of ecosystems, habitat and wildlife on our national forests to the same level as timber harvest and other uses. NFMA codified an important national priority to ensure forest management plans "provide for the diversity of plant and animal communities based on the suitability and capability of the specific land area" (16 U.S.C. § 1604(g)(3)(B) (2012)). NFMA established a process for integrating the needs of wildlife with other multiple uses in forest plans. Most important, the law set a substantive threshold Forest Service management actions must comply with for sustaining the diversity of ecosystems, habitats, plants and animals on national forests. These comments are primarily on the species diversity and ecological sustainability aspects of management planning.

Management goals and approaches must be detailed, enforceable, and designed to protect and restore wild forest landscapes that are held in trust for all American's, not just those with economic interests in our natural resources. There may be natural desire to postpone difficult analyses and decisions to the project-scale; however, this approach will only delay and reduce the effectiveness of efforts required by the NFMA to conserve and restore our national forests and resident fish,

wildlife, and plants. The Planning Rule requires that *plan components*—not project decisions—provide ecological conditions for at-risk species.

2. General Comments on the Proposed Action

We appreciate the effort to portray the Proposed Action as a "strategic framework". It is important to have a clear portrayal of the architecture that the Forest is proposing for the revised plan. It is our view that in forest planning, as in other disciplines, form should follow function. The forest plan therefore should be designed to meet the purpose and requirements of the Planning Rule. The purpose of forest plans is articulated in the Planning Rule in Section 219.1(c).[1] These purposes provide a framework for the structure of all forest plans, and can be tailored to meet the unique roles, contributions and contexts of individual national forests. Importantly, forests should not ignore or downplay any of the broad goals and purposes of the Planning Rule. Note that ecological integrity is the first stated purpose thus reinforcing the notion that maintaining and restoring the health of national forest lands and waters is central to the rule's fundamental principle of social, economic and ecological sustainability. Forest plans achieve these purposes by following the direction and fulfilling the requirements of the Planning Rule through the use of plan components and other plan direction. Plan components are the heart of the forest plan in that they enable rule purposes and requirements to be met. While the overall architecture of a plan is important, a plan will be evaluated on the degree that its plan components effectively meet the rule's purposes.

2.1. Responsiveness and Flexibility

At the outset it is important to appropriately frame the purpose of a forest plan under the Planning Rule. The Proposed Action states that the revised *forest plan* should be "adaptive and responsive to monitoring results, changing direction, changing technologies, and changing resource conditions" (p. 1). Elsewhere the Proposed Action states that "Resource management allows for flexibility and the ability to adapt…" (p. 16). It is true that the Planning Rule framework "creates a responsive *planning process*" that "allows the Forest Service to adapt to changing conditions" (36 CFR 219.6(a)) emphasis added). However, there is nothing in the Planning Rule that provides authority to establish a *flexible forest plan* by building uncertainty into the plan components themselves.

It's helpful to think of the eventual decision document supporting the forest plan at the outset of the process. That decision will require "An explanation of how the plan components meet the sustainability requirements of § 219.8, the diversity requirements of § 219.9, the multiple use requirements of § 219.10, and the timber requirements of § 219.11" (36 CFR 219.14(a)(2)). Every plan component developed at this stage of the planning process should be evaluated through the lens of that requirement: Does it allow the forest plan to meet the rule's requirements? There is an allure to postpone plan decisions to another time and place, whether it be under the auspices of "flexibility" "adaptive management" or some other reason. This will not work. A plan that provides

[1] The purpose of this part is to guide the collaborative and science-based development, amendment, and revision of land management plans that promote the ecological integrity of national forests and grasslands and other administrative units of the NFS. Plans will guide management of NFS lands so that they are ecologically sustainable and contribute to social and economic sustainability; consist of ecosystems and watersheds with ecological integrity and diverse plant and animal communities; and have the capacity to provide people and communities with ecosystem services and multiple uses that provide a range of social, economic, and ecological benefits for the e present and into the future. These benefits include clean air and water; habitat for fish, wildlife, and plant communities; and opportunities for recreational, spiritual, educational, and cultural benefits.

discretion for future decision-makers to adopt programmatic decisions on a project-by-project basis would provide the Forest with the ability to essentially change or create plan direction in the future without public involvement. This would be counter to the fundamental purpose of NFMA of providing integrated and strategic direction for future projects (NFMA Section 6(f)(1)). It would also bypass the substantive requirements of the Planning Rule, and its requirement for use of BASI, both of which explicitly do not apply to projects (36 CFR 219.2(c)). In the case of at-risk species, it would allow the Forest to avoid its statutory obligation for *forest plans* to provide for diversity of plant and animal communities.

The forest plan cannot simply be a blank check. Plan components must "guide the development of future projects and activities" (FSH 1909.12 Ch. 20, 22.1). It is important that this step of providing a longer-term and landscape-scale context for project decision-making be taken seriously. Where future determinations are necessary, failure to at least provide criteria for making those determinations amounts to including no plan components that would meet species-diversity requirements.

The Proposed Action does not provide meaningful plan components for at-risk species (i.e. providing certainty that necessary ecological conditions for *each* at-risk species will be achieved under the plan). We understand that those plan components are forthcoming, but it is worth noting at this stage that the Planning Rule clearly states that it is *plan components* that must provide the necessary ecological conditions for at-risk species (36 CFR 219.7(d)(3)). Plan components are limited to optional goals, and required desired conditions, objectives, standards, guidelines and suitability of lands. Monitoring programs are required, but are not plan components and cannot be used in lieu of plan components to meet diversity requirements. Information may be included in a plan about "management approaches or strategies (36 CFR 219.7(f)(2))," but these are not plan components and cannot be relied on to meet the diversity requirement.

2.2. Goals

The Proposed Action employs goals at the top of the strategic framework. Goals are an optional plan component considered to be "broad statements of intent, other than desired conditions, usually related to process or interaction with the public" (36 CFR 219.7(e)(2)). The Planning Rule does not suggest that goals are to "provide umbrella statements that all other direction would tier to" (p. 7). Plan direction tiers to the requirements of the Planning Rule. In fact, the three goals provided in the Proposed Action appear to be loose interpretations of Planning Rule requirements. For example, the goal to "protect and restore watershed health, water resources, and the systems that rely on them" is found in Section 219.8 of the Planning Rule. Specifically, there must be plan components (including standards or guidelines) for watershed integrity (219.8(a)) and water resources in the plan area (36 CFR 219.8(a)(2)(iv)).

Similarly, the goal to "maintain and restore sustainable, resilient ecosystems" essentially alludes to the Planning Rule's requirement to maintain or restore the ecological integrity of ecosystems (36 CFR 219.8). The restoration of natural fire regimes as drivers of ecological integrity and resiliency should be an overarching goal within the forest plan; this would be in line with the rule's emphasis on developing plan components for "Wildland fire and opportunities to restore fire adapted ecosystems" (36 CFR 219.8(a)(1)(v)). We note that the goal to "aggressively" diversify "age classes and structure, seral stage, and habitat classes" is not appropriate. First, goals should not be used in lieu of desired conditions (FSH 1909.12 Ch. 20, 22.16). Second, there needs to be specific plan

components for the particular ecosystems within the plan area; the proposed action appears to generalize conditions across ecosystems; ecosystems vary in their degree of integrity and each will have unique maintenance and restoration needs. If age class, structure, seral state, and habitat class refer to key ecosystem characteristics, there must be desired conditions for them based on the natural range of variation, as well as standards and guidelines to ensure that desired conditions are actually achieved. "Aggressive" diversification in not an appropriate term; objectives can be used to establish a rate of progress toward desired conditions for ecological integrity and would need to be compatible with other plan components for sustainability and plant and animal community diversity.

The goals do not meet the definition of plan components provided in the directives. For example, they essentially "repeat Agency policies applicable to all National Forest System units" and are not "written clearly and with clarity of purpose and without ambiguity so that a project's consistency" with them can be easily determined (FSM 1909.12 Ch. 20, 22.1). It may be appropriate to use goals to "organize plan components" (FSH 1909.12 Ch. 20, 22.16) and this could be the role the Forest envisioned for them in the Proposed Action. In this case we would recommend goal statements that meet the definition of plan components and that they be provided for all types of plan components, including the duty to provide ecological conditions for at-risk species. We also recommend that the Forest shape the goals using the direction provided in the directives, for example by describing a "state between current conditions and desired conditions" or "overall desired conditions of the plan area that are also dependent on conditions beyond the plan area or Forest Service authority."

2.3. Forest-wide Desired Conditions

The Proposed Action lists a number of forest-wide desired conditions (Strategic Domain p. 9). Here is where it may be useful to organize desired conditions with specific goal statements for specific resource requirements consistent with the Planning Rule. As mentioned, the framework should cover all of the Planning Rule's requirements, not just a subset: "The set of desired conditions for plan revision must cover ALL the requirements for a plan set out at 36 CFR 219.8 through 219.11 – to provide for sustainable ecosystems with ecological integrity, in the context of multiple-use management" (FSH 1909.12 Ch. 20, 22.11, emphasis in original).

So for example rather than "biological diversity" there would be a set of desired conditions for "ecological sustainability" (219.8). This would include desired conditions for key characteristics of ecological integrity for each terrestrial and aquatic ecosystem in the plan area, and watersheds. There will also be a set of desired conditions for ecological conditions necessary for at-risk species, which may overlap those provided for ecological integrity. The draft plan should list all desired conditions for integrity and those necessary for at-risk species so that it is clear how Planning Rule requirements are being met. Such a format also allows the reader to understand that the needs of at-risk species will be met through plan components for integrity or through species specific plan components.

As it stands the forest-wide desired conditions presented in the Proposed Action do not meet the Planning Rule's definitions and requirements. For example, there must be plan components for integrity for each of the ecosystems and watersheds in the plan area. It is not clear in the Proposed Action what the target ecosystems are for integrity management. The ecosystems discussed in the "Roles & Contributions" section (p. 4), along with those evaluated within the Assessment, should form the basis for plan components for ecosystem integrity.

Furthermore, the proposed desired conditions are not "described in terms that are specific enough to allow progress toward their achievement to be determined" (36 CFR 219.7(e)(1)(i)). Vague desired conditions provide nothing to judge whether they have been met except for the opinion of the Forest Service. The less specific and ascertainable the desired conditions are, the more mandatory standards and guidelines are needed to provide certainty that the Planning Rule's requirements are being met. For instance, the desired condition for "biological diversity" states that "habitat composition (including seral stage), structure, pattern (connectivity), and disturbance frequencies similar to those that result from natural disturbances (insects, disease, and fire) are maintained to the extent possible…" This is a start in identifying key ecosystem characteristics for integrity. However, it is necessary to actually describe the desired key characteristic (e.g. habitat composition, structure, pattern/connectivity, disturbance) conditions in specific terms for *each* target ecosystem. These characteristics and information on their integrity status should be carried forward from the Assessment, and we discuss this below.

We assume that the desired condition to "provide ecological conditions necessary to contribute to the recovery of Federally listed species, conservation of proposed and candidate species, and maintain viable populations of species of conservation concern in the plan area" is a placeholder because it simply repeats Planning Rule requirements. It would be helpful if the Forest would acknowledge this and make a concerted attempt to solicit comment on what those actual conditions are. We are somewhat surprised that the Forest is using a placeholder approach here given that the conditions necessary to meet the requirements for at-risk species should have been identified and documented during the Assessment (along with relevant information gaps that may be filled through inventories, plan monitoring, or research) (FSH 1909.12 Ch. 10, 12.53).

Similarly, we assume that the desired condition to protect, restore and enhance habitat for federally listed species is not meant to serve as a plan component but to solicit further input on the specification of those species and the definition of desired condition statements for each of those habitat types. Again this is information that is required to be provided in the Assessment so that generic plan components can be avoided for those that actually specify in measurable terms the conditions required by at-risk species.

There are a number of flaws throughout the set of forest-wide desired conditions; to mention a few:

Under "Timber Resources" the desired condition is that "some harvest operations are designed to mimic natural disturbance events or processes." This doesn't seem to be a desired condition. The desired condition is for stands/areas to have a condition that mimics natural disturbance. This is a good plan component for integrity, but it would also need to specify which ecosystem it applied to, and get further into the appropriate ecological scale. "Harvest operations" would then contribute to achieving the desired stand conditions. In that same section there is a desired condition that "vegetation structure…is capable of sustaining timber harvest…" It is appropriate and required to have plan components for timber harvest but the phrasing of the plan component suggests that the desired ecosystem structure is driven by a capability to sustain harvest. It would be more appropriate to define the desired structural conditions for ecosystems, patch areas and stands in the planning area, considering areas in suitable (production) and non-suitable (harvest for other purposes) designations to ensure that plan components for timber harvest are compatible or may assist in achieving desired conditions for integrity.

Under "Range" the desired condition states that "site specific desired conditions are fully described in the allotment management plan." Postponing the development of a desired condition is not a desired condition. The forest plan must define the conditions necessary to govern projects and activities implemented under the plan.

Under "Fire" there is a desired condition that "the role of fire in ecosystem dynamics is recognized and sponsored when and where it does not threaten human life and property." We don't grasp the meaning of the word "sponsored" in this sentence. Furthermore, this is not a desired condition in that it doesn't specify the role of fire in ecosystem dynamics nor discuss under what conditions (or when) it would be recognized. The forest plan is the place to define the role of fire. Effectively planning and managing for wildland fire is a central policy objective of the Planning Rule. The Assessment is to provide information on the role of wildland fire as a system driver (36 CFR 219.6(b)(3)), and plan direction for integrity should also stress desired conditions and other plan components for fire disturbance (36 CFR 219.8(a)(1)(iv)). Specific plan components to "restore fire adapted ecosystems" are expected (36 CFR 219.8(a)(1)(v)). Desired conditions for fire behavior should be developed based on the Assessment and BASI. The desired condition that "the amount, arrangement, and continuity of live and dead materials that contribute to fire spread are consistent with land uses and estimates of historic fire regimes" is problematic. We agree that there should be a desired condition for those structural conditions to meet ecosystem integrity requirements; to accomplish this the desired condition needs to describe the parameters of the historic fire regimes for each of the relevant ecosystems. We also agree that there may be additional plan components addressing other issues such as "land uses" but those must be developed so that they are compatible with the desired condition for the ecosystem. We note that ecological integrity need not be achieved "on every acre" but that the sum of the plan components for any given ecosystem must result in an ecosystem's integrity.

Plan components for "Water and Aquatic Resources" should reflect the requirements in Section 219.8 by actually articulating the desired condition. For example, the "dynamic equilibrium between extreme natural events" needs to be described, as does the meaning of a "near-reference-stream appearance"; "expected ranges", "acceptable limits" and levels of habitat (i.e. "adequate") need to be described so that they can be measured. Any time there is a reference to something not being "increased", or "maintained" or "improved", that baseline value needs to be expressed so that the condition can be measured. Words like "healthy" or "harmonious" should not necessarily be avoided, but must be qualified so that they can be consistently evaluated.

The only way to determine if "Mineral development is compatible with ecosystem capabilities and resource values" is to have plan components for ecosystem capabilities and resource values. The forest plan must provide the "stipulations, mitigation, and careful monitoring" that will ensure that ecosystem capabilities and resource values are being maintained (i.e. constraints on project or activity decisionmaking to help achieve the desired conditions for resource values).

More should be said on roads. The desired condition states that the "road system continues to serve as adequate access for the public". Does this mean that the current road system is adequate and will not change in nature? Does it mean that a different road system could be adequate? More specificity on the "areas" where road closure is emphasized is needed, as well as the desired conditions for these areas for wildlife habitat, soil, and water resources. Objectives will be required to make progress toward these conditions in these areas. Other plan components may be necessary

to avoid expansion of the road system in areas where roads pose a threat to necessary conditions for wildlife, soil and water resources.

2.4. Objectives

We appreciate the examples of potential Objectives and provide the following comments. Consider using objectives to prioritize areas. For example, actions to eliminate non-native invasive species may be prioritized in certain priority watersheds or other areas where the invasives pose a particularly acute threat to sustainability. Tier the objectives to specific desired conditions. An objective to "maintain, enhance, or improve conditions on three to five fen habitats" (or meadows, fish habitats, etc.) will not work unless there are specific plan components describing those conditions. The objective to "Use appropriate and authorized tools…to meet resources objectives" does not seem to be an objective. It seems more like a potential management approach. Obviously the "resource objectives" would have to be defined, as would the desired conditions for "vegetation build-up". Priority watersheds play an important role in the Planning Rule and could be the subject of focused restoration planning. We note that the priority watersheds need to be identified in the plan. Desired conditions for specific attributes of "condition class" may be useful in focusing restoration actions that will effectively improve watershed conditions.

2.5. Geographic Areas

The Planning Rule defines geographic areas as "spatially contiguous land areas." It is not clear that the proposed geographic areas are contiguous. The directives point out that geographic areas are "large areas" "based on place, while management areas are based on purpose" (FSH 1909.12 Ch. 20, 22.21). "General Forest" "Primitive Wilderness" and "Roadless" areas are not clearly characterized as spatially contiguous places; in fact, they occur throughout the Forest. The areas appear to be defined more by their purpose. Management direction for Wilderness and Roadless lands is fairly well established based on the purposes associated with the designation of these areas. And, for example, the General Forest Geographic Area is defined by its "multiple-use emphasis to achieve a variety of goals." This does not sound like a geographic place (i.e. a canyon, or a mountain area, or a specific watershed, as discussed in the directives); by definition it is a "general" area. It seems the point of the geographic area designation is to direct plan direction to a specific spatial area characterized by some sort of geographic logic; we question whether the Forest is appropriately using the Geographic Area designation tool in this case. The proposed plan direction does not imply a sense of place-based management in this case.

2.6. General Forest Area

As for the "desired conditions" for the General Forest area (the statements are not defined as such), they are problematic. For example, there is a statement that the "multiple-use emphasis" is used to "achieve a variety of goals." These goals need to be specified. In order to "balance" "resource use and management", plan components for those values would need to be expressed. Similarly, the "species-specific needs" that will form the basis for "rotation periods" need to be specified in the form of plan components. Clearly there will need to be plan components for "resiliency in the face of changing environmental conditions" so that it can be determined that "all vegetation management is sustainable."

Regarding the spruce-beetle outbreak, and the implications for management within the General Forest area, the Proposed Action states that it's "effects are highly variable and may be positive or negative." The Proposed Action seems to conclude that it is necessary to "restore" conditions following the disturbance, without clarifying its positive or negative effects. To reach a conclusion that conditions require restoration, the Forest must demonstrate that projected future conditions for selected key characteristics do not indicate ecological integrity (i.e. that future conditions will be outside of NRV considering future environmental change). Absent desired conditions for integrity for characteristics of the ecosystem affected by the spruce-beetle outbreak it is not possible to propose a vague "restoration" effort. Social and economic objectives such as to "capture the existing value of the dead trees" and increase the near term harvest volume *may* have validity, but only after it has been demonstrated that the system requires restoration of ecological integrity due to the outbreak and plan components have been established to guide such restoration. The statement that "For the upcoming decade, salvage harvest in the spruce-fir cover type will dominate the timber harvest program" is totally premature absent plan direction for ecological conditions in that forest type.

Regarding timber suitability, as it is discussed within the General Forest area of the Proposed Action, the lands that "may be suitable for timber production" are equal to the total NFS lands in the plan area minus the lands not suited for timber production due to legal or technical reasons (FSH 1909.12 Ch. 60 61 – Exhibit 01). It is not valid to project the estimate of what may be suitable until the lands not suited have been formally identified; the directives state that they may be identified in the Assessment or prior to the development of alternatives. Furthermore, it is not safe to assume that the "suitable base in the new plan will be similar" to the current plan without having plan components yet.

Regarding the desired condition for roads within the General Forest area, it will be necessary to specify what a "well-developed transportation system" consists of and evaluate the impacts of pursuing that condition on plan components for other resources.

It is interesting to read that ecosystems within the General Forest area "would be resilient to the impacts of wildfire" which implies wildfire behaving as a stressor rather than a driver of ecosystem integrity and resiliency. The thinking here needs to be clear. Uncharacteristic fire may act as a stressor (a threat to resiliency) in that it is behaving outside of its natural range. Therefore, in addition to defining the structural and compositional characteristics of a resilient system, there should be plan components for characteristic (functional) fire (as a driver of integrity). Desired conditions for ecosystem function are all too often overlooked in favor of structural or compositional attributes.

If there are characteristics of wildfire that are detrimental to ecosystem function (i.e. that are operating outside of NRV) it may be necessary to pursue improvements in resiliency conditions; these could be related to desired conditions for key structural, compositional, or functional characteristics. (In other words it may be necessary to change structural conditions to change fire behavior.) Once it has been established which characteristics are not resilient to wildfire, then desired conditions and supporting plan components can be established to guide restoration actions. The restoration of sustainable fire regimes (i.e. within NRV, informed by climate change impacts, and considering social impacts for some portions of some ecosystems) should be an overarching goal of the forest plan.

The statement that "Lands in this Geographic Area are maintained at a moderate to low risk with high potential benefit conditions relative to fire" needs to be more clearly explained. Risk of what? (The same construction is used in the Roadless Geographic Area, where it is necessary to explain the management implication.) "Acceptable conditions" for managing wildfires for resource benefit and prescribed fire need to be defined.

"Quality forage and cover" for wildlife need to be defined and measurable based on the demonstrated ecological needs of those species.

2.7. Fire Management Zones

The concept of fire management zoning is valid, given the realities of managing for fire within and adjacent to the Forest. However, the zoning approach must result in ecosystem integrity being achieved for the various Forest ecosystems. As mentioned earlier, integrity need not be achieved on "every acre" but must be met at the ecosystem scale of analysis within the plan area. There needs to be overarching plan direction for the affirmative role of fire in maintaining and restoring ecosystem conditions; management zones for fire can then tier to that framework.

The Proposed Action states that the Fire Management "zones are not a mapped feature" but applies the zones to the Geographic Areas and the Wildland Urban Interface, which are all mapped or mappable. So we are confused by that statement and believe that the zones meet the definition of a management area (i.e. an area "that has the same set of applicable plan components"). It appears that the intent is to provide unique plan components for the three types of fire zones. For example, it appears that "ecological maintenance" is one of the desired conditions in the FRB-M. It is equally if not more important at this stage to stress the desired conditions in the zones in addition to describing *how* that condition will be achieved. As mentioned earlier, the plan should have robust desired conditions and plan components for wildfire conditions as a driver of ecological integrity; those plan components could be forest wide (a goal for example) and tailored to geographic and management areas. It is not clear how the Fire Management Zones relate to the plan's approach to providing for the integrity of the various ecosystems in the plan area; what's missing at this stage is an understanding of the various ecosystems and their desired conditions for integrity.

Pivotal to this entire discussion is a definition and discussion of the "resources values" that are put at risk from wildfire. In Wilderness and Roadless areas there is low risk to resource values from fire, but in the General Forest area the "current conditions may put some natural resource values at varying degree of risk for damage from wildfire." What values are being discussed? Desired conditions and other plan components for these values must be expressed in order to understand the risks of not maintaining or achieving those conditions. The "specific resource objectives" mentioned throughout this section should be understood to be at minimum the ecological integrity of the ecosystems of interest; this is the primary driver of all other terrestrial and aquatic management directions. Only after establishing desired conditions for integrity of key characteristics for the ecosystems within the plan area can one make decisions about how to manage for integrity within those ecosystems. The Fire Management Zone concept implies that this logic is present: that generally backcountry areas will maintain "high integrity" conditions but that integrity may be compromised elsewhere due to other objectives and constraints. In concept this makes sense because an ecosystem can have integrity even if not every portion of that system is managed for that sole purpose. However, the forest plan will have to be crystal clear on how integrity is being provided and determined for each of the relevant ecosystems. The effects analysis will need to reveal

the impacts of all the plan direction on integrity and demonstrate that the rule's requirement is being met at the ecosystem scale of analysis.

2.8. Standards and Guidelines

The Proposed Action states that the "Forest Plan will present standards and guidelines prescribed in the 2012 Planning Rule" and recognizes that they are needed to achieve desired conditions (p. 35). It is somewhat difficult to provide comment on the desired conditions as stand-alone plan components, knowing that each will need to be supported by other plan components. However, at this stage it is important to point out that there are perils associated with relying too heavily on desired conditions. For example, the requirement for consistency with desired conditions is inherently much more flexible than for mandatory standards (36 CFR 219.15(d)(1)), and potentially allows no progress whatsoever to be made towards achieving them. Recognizing that such outcome-oriented plan components alone would not provide sufficient certainty, the Planning Rule indicates that mandatory standards and/or guidelines that act as constraints on projects be used where needed "to meet applicable legal requirements." Courts have held that only mandatory terms in forest plans can be considered regulatory mechanisms for the purpose of listing decisions under the Endangered Species Act. The NFMA diversity requirement requires a similar degree of certainty. There should be desired conditions for the ecological conditions needed by the at-risk species, and these need to be accompanied by standards and guidelines to ensure that those ecological conditions are achieved. It may be helpful to list all of the at-risk species, their necessary ecological conditions, and the set of plan components that apply to each, recognizing that plan components can meet the needs of more than one species. Structuring the plan components this way makes it much simpler to evaluate the effectiveness of the draft plan.

3. Use of Best Available Scientific Information and the Assessment

Based on our review of the Proposed Action, it is not clear how the Assessment and monitoring are being used in the planning decision process and will be used in the further development of plan components and other plan content in accordance with 36 CFR 219.7(c)(2)(i). We expected that the Proposed Action would demonstrate stronger linkages between assessment findings and various elements of the Proposed Action.

Defenders' comments on the draft assessment, particularly assessments 1, 3, and 5, pointed out some potential problems with assessment analyses and also use and documentation of science that we hoped the Forest Service would address in revisions of the Assessment documents. For example, we recommended that Assessment 1 and 3 (Terrestrial) provide an explanation regarding how inconsistencies between vegetation modeling results and relevant peer reviewed science would be resolved is a way that would guide management direction. We identified some areas where the Assessment indicated that additional changes may be necessary to make in the revised plan. In some places, the Proposed Action infers that there are gaps in the Assessment that need to be filled in order to make scientifically sound decisions. We will not restate all of our Assessment comments and concerns here, but have highlighted some places in the Proposed Action where we believe assessment deficiencies are leading to assumptions and decisions about forest management direction that are not based on the BASI. Additionally, where the Assessment does provide useful information, we believe there are cases where the Proposed Action did not capitalize on this information to develop proposed plan components, particularly desired conditions.

4. Ecological Integrity

We are interested in how the Forest Service is defining "resilience." Variants of the term are used throughout the Proposed Action and assessments 1 and 3. We want to be sure we understand the RGNF's conception of resilience. We encourage the RGNF to focus on "ecological integrity," which encompasses resilience and is defined in the Planning Rule 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 influence.* (36 C.F.R. 219.19, emphasis added)

4.1. Terrestrial Ecosystems

4.1.1. Ecosystem Resilience and Aggressive Diversification of Forested Ecosystems

Under Goal 2, "Maintain and restore sustainable, resilient ecosystems," the Forest Service includes the following assertion,

> Aggressively diversifying age classes and structure, seral stage, and habitat classes, where appropriate, in the next planning horizon would provide many benefits including but not limited to providing resilience to insect and disease outbreaks, responsiveness to anticipated changes in climate, ecosystem services, recreation, increased social and economic benefits, and more. (Proposed Action: 8)

We have discussed above our problems with this statement regarding its appropriateness in relation to the Planning Rule and have some additional questions, below, regarding how the Assessment and BASI support the statement.

First, what are the ecological conditions on the Forest that suggest a loss of ecological integrity and a need for "[a]ggressively diversifying age classes and structure, seral stage, and habitat classes" to restore integrity? The belief that aggressive diversification will result in ecological benefits depends, in part, on the assumption that forest conditions are departed from NRV. Vegetation modelling conducted as a part of Assessments 1 and 3 (Terrestrial) suggests that the spruce-fir forest mix and mixed conifer-wet ecosystem types are substantially departed from NRV (Assessments 1 and 3, Terrestrial: 17).

Assessments 1 and 3 acknowledge significant limitations in the modelling and inconsistencies with other research, including published literature. For example, despite clear direction in FSH 1909.12, Ch. 10 12.14c to assume "the influence of climate change…will continue, based on the best available scientific information" when assessing the status of ecosystems, the model did not incorporate climate change effects and projections, and the Assessment stated, "[t]herefore, some of the simulation results may not hold and there may be other unanticipated conditions due to the effects of climate change" (Assessments 1 and 3, Terrestrial: 18). The Assessment stated, "[a] recent mixed-conifer synthesis (Colorado Forest Restoration Institute 2010) suggests that it is unclear how departed from the natural range of variation these cool-moist mixed conifer forests are and that more information is needed" (Assessments 1 and 3, Terrestrial: 19).

Model results for the spruce-fir forest ecosystem are also inconsistent with peer-reviewed literature. The Assessment stated,

> The modelling of historic conditions included moderate spruce beetle outbreaks, but did not include the rare, extreme spruce beetle outbreaks like the one the Rio Grande National Forest is currently experiencing. Literature (Eager et al. 2012, Romme et al. 2009) indicates that in these spruce-fir forests, spruce beetles generally persist in low-level, widespread populations that have little effect on forest structure, but that they periodically have very large outbreaks, where the "beetles may kill millions of mature pine or spruce trees over areas of thousands of hectares." Since the modelling did not include these large, explosive outbreaks, the spruce-fir forests may not be nearly as departed from the natural range of variation as the modelling suggests. (Assessments 1 and 3, Terrestrial: 18)

We recognize that uncertainties and disagreements are inherent in scientific research. We agree that the spruce beetle outbreak has changed forest conditions. However, in the case of the Assessment model, the modelers omitted rare—but not necessarily anomalous—extreme beetle epidemic cycles that periodically do occur in this forest type. As the planning handbook states when directing methods for NRV analysis, "Some conditions may have occurred frequently, and others may have occurred rarely", but there is no justification for ignoring infrequent disturbances (FSH 1909.12 Ch. 10, 12.14a). This makes the model suspect. While we appreciate that the Forest Service has recognized conflicts between modelling results and other science, we question whether the modelling results represent the BASI for assessing ecological conditions on the Forest. The Assessment made no explicit determination about which scientific information represents the BASI. Assessments 1 and 3 (terrestrial) concludes with the following statement,

> It is difficult to determine whether the terrestrial ecosystems on the Rio Grande National Forest are within the range of what would occur naturally. 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, some model assumptions and results do not agree with published literature. We know that very large spruce beetle outbreaks happened historically, but we don't really know with any certainty whether this latest spruce beetle outbreak is a completely natural phenomenon or one influenced by climate change. The departure from the natural range of other types, such as mixed conifer, is uncertain as well.

Again, the proposal for aggressively diversifying age classes, etc. and a general indication that the RGNF plans to change forest management direction seems to be based on assumptions that forest conditions are departed from reference conditions and are not resilient to insects, disease, fire, or climate change. The BASI, as presented in the Assessment, does not support this perception.

The Assessment statement quoted above indicates confusion over how to make an integrity status determination. It's not either NRV or climate; the "ecological reference model," as described in the directives (FSH 1909.12 Ch. 10, 12.14c), should incorporate both past and likely future conditions. If these types of disturbance events are going to be more frequent in the future, then they should be considered future (trending) drivers and built into the desired conditions. If certain conservation targets are not likely to persist under those future conditions, and thus are vulnerable, then they require adaptation strategies (i.e. plan components to help them persist in the face of climate change).

Second, what is the BASI documented in the Assessment or elsewhere that supports the notion that aggressive diversification will contribute to ecological integrity? The Forest Service is apparently making the leap from the assumption that forest ecosystems, particularly spruce-fir and wet mixed-conifer, are substantially departed from NRV to the assumption that heavy management will more closely align these ecosystems with reference conditions. The key characteristics selected: age classes and, particularly, structure, seral stage, and habitat classes are not well-defined; without further description and explanation, they do not represent "important specific elements of an ecosystem" for evaluating or for sustaining "the long-term integrity of the ecosystems" (FSH 1909.12 Ch. 10, 12.13). They do not appear to be meaningful for developing plan components.

Even if the spruce-fir and wet mixed conifer forests are indeed significantly departed from NRV, it does not necessarily follow that a management program of diversification would lead to integrity and some of the other benefits touted in the Proposed Action. The Assessment does not demonstrate support for the assumption. The Proposed Action does not outline plan components that support the goal. The following desired condition from the Proposed Action does not meet the definition of desired condition under the Planning Rule.

> Habitat composition (including seral stage), structure, pattern (connectivity), and disturbance frequencies similar to those that result from natural disturbances (insects, disease, and fire) are maintained to the extent possible, given legal and policy limitations, and the desired condition for the area.

We are interpreting that the following excerpt from the Assessment means that modelling results should help forecast how management (and a lack of management) will likely shape forest conditions in relation to NRV.

> We also used this modelling to estimate how conditions may change into the future, with and without management. As a result, we can use these modelling results to evaluate the similarity or difference of current conditions to historical conditions (within the natural range of variability), and how that may change in the future as an indicator of ecological integrity. (Assessment 1 and 3, Terrestrial: 5-6)

If the modelling was intended to compare projected forest ecosystem conditions under a management scenario and under an unmanaged scenario, the Assessment failed to present such an analysis in a way that a reader could identify differences between scenarios. The Assessment follows a pattern of describing the extent of departed conditions for vegetation types based on modelled outcomes, comparing the modelled results to published literature, projecting future recovery, and listing various management treatments that have been applied to these ecosystems. It is not apparent that assessment projections are based on how the Forest is being managed under the current management plan. And, the Assessment does not differentiate between management and non-management in its projections or make a connection between management and future recovery. We use the spruce-fir forest ecosystem analysis to exemplify this point. The Assessment stated,

> Future projections for the spruce-fir forest ecosystem generally show a trajectory of recovery toward the natural range of variation conditions over time. The current overabundance of grass/shrub conditions largely disappears in the first 20 years of projections, and open conifer forests are mostly replaced by mid- and closed cover forests over the first century of projections. Aspen stands increased in short-term and mid-term projections. Longer-term

> projections, however, show a decline of aspen stands to levels roughly 10 percent lower than under the natural range of variation, mostly due to lower levels of wildfire under contemporary conditions due to fire suppression. (Assessment 1 and 3, Terrestrial: 18)

It is not clear from this paragraph whether the projected spruce-fir recovery is a response to management or not. (The passage does raise the question: how should plan direction regarding fire suppression change to address aspen vulnerability?) The next paragraph merely lists management activities.

> Management treatments in the spruce-fir ecosystem include broadcast burning, group selection, planting of trees, salvage harvest, shelterwood harvest, and stand clearcut. In total, these treatments represent roughly 0.1 percent of the area occupied by spruce-fir on the Rio Grande National Forest (1,277 acres per year). (Assessment 1 and 3, Terrestrial: 18-19)

The Assessment did not make the linkages—using BASI—that demonstrate how treatments can achieve ecosystem integrity.

Assessment 1 and 3 (terrestrial) concluded by stating, "[m]any opportunities exist to help us work towards reducing risk and adapting to climate change and the drivers and stressors of the various ecosystems," including, "[t]esting non-traditional restoration treatments that achieve heterogeneous conditions at a variety of scales (Underhill et al. 2014)" (Assessment 1 and 3, Terrestrial: 43). Underhill et al. (2014) presented the results of a fuels reduction program that involved thinning to create forest openings in ponderosa pine and dry mixed-conifer forest, which is not showing departure from NRV in the RGNF based on vegetation modelling. Furthermore, it is not clear from the Assessment that homogeneity is a problem for the major RGNF ecosystem types.

The Proposed Action does not describe what management methods it will use to achieve diversification. Salvage harvest is the only vegetation treatment mentioned, and we are not provided an explanation of how salvage will result in diversification.

Third, how will aggressive diversification contribute to the ecological conditions necessary to promote threatened and endangered species recovery, proposed species conservation, and species of conservation concern persistence? We have found one of the biggest weaknesses in the aggregated chapters of the Assessment and presentation of scientific information is the inadequate linkage made between current forest management, ecosystem conditions, and the ecological conditions necessary for the recovery and persistence of at-risk species. We raised the point in our comments on the Assessment and need for change documents that habitat requirements for at-risk species should be represented by key characteristics used to assess ecological conditions (see FSH 1909.12 Ch. 10, 12.14(4)(b)). The RGNF's draft wildlife Assessment 5 stated that the draft version of the Assessment was a "work in progress" (Assessment 5: 74). Assessment 5 has not been revised.

Fourth, what can the RGNF do to make well-supported, science-based management decisions under this environment of significant uncertainty as the planning process moves ahead? We are looking forward to a more complete explanation in future planning documents of how diversification provides "resilience to insect and disease outbreaks, responsiveness to anticipated changes in climate, ecosystem services, recreation, increased social and economic benefits, and more" (Proposed Action: 8) based on BASI. Additionally, we urge the Forest Service to avail itself of experts who conduct research on forests in the Southern Rocky Mountains. Several locally-based

scientists are co-authors of papers cited in Assessment 1 and 3 (terrestrial). We recommend the RGNF initiate a science review, as explained in the planning directives, to help provide advice on management direction in the face of scientific uncertainty. The implications of the spruce beetle outbreak on ecosystem integrity and management, and the questions surrounding historical and climate-driven disturbances are significant enough to warrant such a review. Making ill-informed management decisions on this issue poses "substantial risk to important resources in the plan area" (FSH 1909.12 Ch. Zero Code, 07.2).

4.1.2.Salvage Logging

Post-disturbance logging or salvage harvest is a long practiced yet scientifically unsupported method of forest management. The practice is upheld in the Proposed Action as a necessary management tool for aiding in forest restoration following a wildfire, insect outbreak, or disease. Salvage logging can and often does accomplish the opposite result by increasing the fire hazard, degrading water quality and soils, and impairing the habitat and ecological function of the forest (Beschta et al. 2004; Karr et al. 2004; Donato et al. 2006; Noss et al. 2006; Shatford et al. 2007; Thompson et al. 2007; Lindenmayer et al. 2004, 2008). Natural tree regeneration can be abundant after fire, and postfire logging may actually reduce regeneration by as much as 71 percent (Shatford et al. 2007). Salvage logging diminishes a forests ability to store and sequester carbon; burned forests with no salvage logging stored and sequestered carbon at a significantly higher level than salvage-logged forest areas (Powers et al. 2013).

Salvage logging simplifies stand structure and adversely affects native species abundance and diversity which is inconsistent with ecological integrity. In order to conclude that adequate amounts of complex early seral forest (i.e., unlogged burned forests) are being provided across the landscape and the plan meets the ecosystem diversity requirements outlined in the Planning Rule, the amount of high and moderate severity burn forest that will not be salvaged should be based on the NRV relative to the level of complex early seral forest occurring in the planning area. There must be desired conditions for complex early seral forest conditions and supporting plan components to achieve those ecologically important conditions.

Natural succession is an ecological process that often begins with disturbance, and proceeds through multiple stages of forest development (Franklin et al. 2002). Disruption of this process through salvage logging and planting results in simplified forests and reduced biodiversity (Lindenmayer and Franklin 2008). The rarity of naturally evolving early successional forests due to past management practices is now recognized by leading research scientists, for example, "Young forests growing within a matrix of unsalvaged snags and logs may be the most depleted forest habitat type in regional landscapes, particularly at low elevations" (Lindenmayer and Franklin 2002 in Brown et al. 2004); and "Currently, early-successional forests (naturally disturbed areas with a full array of legacies, i.e., not subject to post-fire logging) and forests experiencing natural regeneration (i.e., not seeded or planted), are among the most scarce habitat conditions in many regions" (Noss et al. 2006).

As such, plan components should be developed that define desired early seral conditions and prohibit salvage logging in areas that experience disturbance events within the NRV because these forests would not require any restoration or fuels treatments. In sum, the body of scientific literature finds that, overall, intensive salvage logging and reforestation produce greater adverse impacts on recovering ecosystems, rather than contributing to recovery (see Lindenmayer et al. 2008). To ensure

that the revised forest plans reached the goals for ecological integrity in the 2012 Planning Rule and Directives, the Proposed Action needs to reject all intensive salvage logging except as needed for public safety, infrastructure protection and science-based restricted fuel zones. Post disturbance management may be valid when needed to achieve desired conditions for ecological integrity.

4.2. Watersheds and Aquatic and Riparian Ecosystems

Goal 1 of the Proposed Action (p. 7) is, "Protect and restore watershed health, water resources, and the systems that rely on them." As we discussed above, the goal is a modification of Planning Rule language found in Section 219.8. The desired conditions pertaining to water resources, restated in the Proposed Action from current management plan, must be revised to fit new requirements and definition for "desired conditions" in the rule; they must be written to be measurable in a way that monitoring can discern trends. Assessment 1 and 3 (Aquatic/Riparian) and Assessment 2 provide information about ecological conditions that can help shape desired conditions to comply with the Planning Rule.

It is crucial to have scientifically sound set of plan components to direct the maintenance and restoration of watershed, aquatic, and riparian integrity. Humans depend on them as do a range of at-risk species of the Forest. Assessment 5 describes habitat requirements for federally protected and SCCs under consideration. High water quality (e.g., low sediment load; low pollution from roads, agriculture, pesticide use, fire retardant and foaming agents; and very low salinity) is necessary for the boreal toad, Northern leopard frog, Rio Grande chub, Rio Grande sucker, river otter, Whitebristle cottongrass, slender cottongrass, spiny-spore quillwort, Colorado woodrush, and sphagnum (Assessment 5: 69). The presence of competing and predatory non-native fish and amphibians in waterbodies can be a limiting factor for the boreal toad, Northern leopard frog, Rio Grande cutthroat trout, Rio Grande chub, and Rio Grande sucker (Assessment 5: 69). Several species depend on riparian vegetation for cover and for foraging, for example, as well as for stabilizing streambanks. Species that require willow thickets and cottonwood galleries include Rio Grande sucker, Southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Canada lynx, western bumblebee, Colorado woodrush, silkyleaf cinquefoil, veery, stream orchid, and Colorado woodrush (Assessment 5: 70). Species that require cover from bank vegetation that overhangs waterways include Northern leopard frog, Rio Grande cutthroat trout, Rio Grande sucker, and river otter (Assessment 5: 70).

The Assessment indicated needs for change to plan direction regarding Forest water resources. Assessment 1 and 3 (Aquatic/Riparian) provided a summary of these needs,

> Based on information in this section of the assessment, there is a need to revise and update the aquatic habitat section of the Forest Plan. For the purposes of forest planning, considerations for aquatic habitats and species are combined with soil and water resources. However, the information in this assessment for riparian and aquatic ecosystem integrity, highlights some specific needs with aquatic habitats and species on the forest, especially in regards to the unique aquatic endemics to the upper Rio Grande Basin. Examples include the need for additional management direction addressing the importance of stream connectivity and aquatic organism passage programs and their relationship to aquatic habitat resiliency, and incorporating the Aquatic Nuisance Species Plan for the Rio Grande National Forest into plan revision components. Potential mitigation strategies for chytrid fungus and local amphibian species are part of this recommendation. We need additional updates

> regarding restoration opportunities for native aquatic species and for managing low-elevation riparian systems, seeps and springs; including hummocking and pugging guidelines. Updates should also increase awareness regarding the ecological drivers for local aquatic habitats including glaciation, stream gradient, and geological factors associated with aquatic habitat productivity. (Assessment 1 and 3, Aquatic/Riparian: 32)
>
> We need to update the existing Forest Plan with current information related to aquatic habitats and potential vulnerabilities associated with climate change. Central to this update is the need to maintain cold water systems and side channel refugia for aquatic species. We need to acknowledge the connection between current human stressors and a potential increase in vulnerability to aquatic integrity as related to climate change. Thus, while our standards and guidelines for aquatic systems should be adaptable and flexible they should also be well defined, firm and measurable. (Assessment 1 and 3, Aquatic/Riparian: 32)
>
> We should manage keystone species such as beaver, which restore streams to more natural flow rates and water table levels, to maintain stream function and store water naturally on the landscape. (Assessment 1 and 3, Aquatic/Riparian: 42)

These are not reflected in the Proposed Action.

The Assessment, lists 10 key characteristics used to assess riparian and aquatic ecosystem conditions (Assessment 1 and 3, Aquatic/Riparian: 3-4). The Assessment acknowledges,

> The reference models or conditions we use for describing the natural range of variation for the various riparian and aquatic ecosystems on the Rio Grande National Forest and elsewhere are not well defined. In our 1996 Forest Plan, we used reference streams to monitor and inform stream health, but did not address many of the other various aquatic systems on the Rio Grande National Forest, nor the ecological components that maintain them. However, the reference stream information we have suggests that most streams and riparian systems on the Rio Grande National Forest are in good to excellent condition. (Assessment 1 and 3, Aquatic/Riparian: 14)

Yet, the Assessment provides some data about current conditions to inform the development of plan components—baselines from which to monitor trends in conditions. (Information gaps (*italicized*) indicate a need for monitoring.) For example:

- … almost one-half of the watersheds on the forest are functioning at-risk due to rangeland vegetation condition concerns and four watersheds have impaired function due to rangeland vegetation condition concerns. (See Assessment 2). (Assessment 1 and 3, Aquatic/Riparian: 14)

- There are 303(d) listed impaired waterbodies within three watersheds on the RGNF (Assessment 2: 78)

- There are approximately 680 miles of rivers and streams on the Rio Grande National Forest that sustain populations of nonnative trout. … Approximately 78 percent of the subwatersheds on the Forest received a poor watershed condition framework ranking in regards to secure presence of native species. (Assessment 1 and 3, Aquatic/Riparian: 12)

- monitoring across the Forest by Forest Service staff suggests historical grazing, and in some allotments, current ungulate grazing is negatively affecting stream physical function. (Assessment 2: 77)

- The multi-metric ecological integrity assessment utilized by the Colorado Natural Heritage Program during the 2012 wetlands assessment provides a sound alternative approach to assessing whether the integrity of an ecosystem is being maintained (Lemly 2012). Using this method, A ranks indicate reference conditions (no or minimal human impact), B ranks indicate slight deviation from reference, C ranks indicate moderate deviation from reference, and D ranks indicate significant or severe deviation from reference. … Of the 77 various wetlands surveyed, 41 were A-ranked, 32 were B-ranked, and 4 were C-ranked. A-ranked systems occurred primarily in the alpine and subalpine zones, with lower elevation sites more likely to receive B-ranks. However, a few wetlands are ranked C due to stressors including grazing, hydrologic modifications, and surrounding land use activities. Riparian shrublands, wet meadows, and fens were most of the A- and B-ranks, with riparian woodlands and marsh slightly lower ranks. *It is also important to note that some riparian ecosystem types, such as those associated with man-made reservoirs or low-elevation riparian woodlands, are not well-represented in the sites sampled for the ecological integrity assessment index.* (Assessment 1 and 3, Aquatic/Riparian: 14)

- Low-elevation seeps and springs frequently used for livestock and/or wildlife troughs were not included in the Colorado Natural Heritage Program assessment. *Although condition data is lacking for these types of systems*, we consider their ecosystem integrity low due to water diversions, trampling, and other impacts. (Assessments 1 and 3, Aquatic/Riparian: 4)

- Pugging in saturated soil areas is readily observable in some montane springs and meadow areas where livestock and native ungulates congregate. Heavy cattle use in palustrine systems can alter the hydrology by damaging soils. Soil compaction and pugging of the peat layer will change surface water flow. Heavy cattle use can also alter the successional processes within the sedge- dominated area of a fen. Cattle hoof action can lead to pugging and hummocking, creating microsites where shrubs can become established, changing the sedge-dominated meadow to carr shrubland. (Assessments 1 and 3, Aquatic/Riparian: 4-5)

- For the most part, current influences of livestock grazing are localized and are limited on a landscape basis. However, certain aquatic, riparian, and wetland areas continue to show impacts. Frequently these are the lower gradient areas both with historical carry-over effects and/or current influences from other human activities (recreation, forest management, road management, big game, invasive species, and so forth). (Assessment 1 and 3, Aquatic/Riparian: 29)

- Existing barriers to ecological connectivity for aquatic organisms do exist and have been noted in other sections of this report. These primarily involve road crossing and culverts, although some natural barriers also exist. Some barriers are desirable to discourage interactions with non-native fish species. In some cases, human impacts are contributing to stream impacts. (Assessment 1 and 3, Aquatic/Riparian: 15)

Plan direction should be developed to address each of these important issues.

4.3. Connectivity

Defenders has published a report on connectivity planning within the forest planning process. We recommend that the Rio Grande planning team take a look at that report; it provides some information on how to effectively consider connectivity in the forest planning process (www.defenders.org/publication/planning-connectivity).

As noted in the ecosystem Assessment 1 and 3 (Terrestrial), "Connectivity of habitat is an indicator of ecosystem integrity" (p. 2) and was selected as a key ecosystem characteristic, along with landscape pattern. Therefore, it will be necessary to have plan components for connectivity/fragmentation and pattern for ecosystems within the plan area. These could be termed plan components for landscape structure in that they are not driven by the needs of individual species (more on that below).

The Proposed Action only makes a vague reference to connectivity in one of the three desired conditions for biological diversity (p. 9), stating that, "Habitat…pattern (connectivity)…similar to those that result from natural disturbances…are maintained to the extent possible…" Note that the statement makes no reference to the *restoration* of connectivity, as directed by the Planning Rule; the statement implies that existing pattern and connectivity are within the NRV and thus only need to be "maintained." There is no backing evidence to support the implication that existing Forest ecosystem connectivity only needs to be maintained (in fact, the Assessment indicates a need to restore connectivity conditions across the Forest).

It does not appear that much information from the Assessment was applied to the Proposed Action for landscape connectivity/pattern. Part of the problem may be that the Assessment did not present clear information on the status of connectivity within the Forest. Specifically (as directed by FSH 1909.12 Ch. 10, 12.14c):

- Whether or not existing connectivity conditions are contributing to the long-term integrity of ecosystems in the plan area and species adaptation to a changing climate (and are expected to do so under existing plan direction or need to be addressed in the revised plan)?
- Whether there are existing and reasonably foreseeable barriers to ecological connectivity for terrestrial and aquatic organisms?
- Whether connectivity conditions are vulnerable to climate change?
- If projects or activities would be necessary to maintain or restore connectivity?
- How the existing role or contribution of the Forest affects connectivity relevant to the broader landscape?
- The influence on connectivity from existing conditions, threats, or stressors (within or beyond the plan area)?

The Assessment suggests a reference condition for landscape structure, but it is difficult to draw out the particulars, and therefore difficult to establish clear plan direction for connectivity. For example, in discussing the role of mixed-severity fire in shaping landscape structural conditions it states: "Historically, highly variable, mixed-severity fires maintained patchy and diverse vegetation structure and composition. This patchiness provides varied and productive habitat for many different plant and animal species" (Assessment 1 and 3, Terrestrial: 25). There should be desired conditions for "patchiness" for specific ecosystems within the plan area based on characteristic disturbance

regimes, informed by climate change information. It appears that some information on patch size was presented in Assessment 1 and 3 (Terrestrial) (Figures 10 and 11) but it is not apparent how that information is applicable to desired conditions for landscape connectivity/pattern.

In addition to providing for connectivity within ecosystems for integrity, the plan should provide connectivity where it is a necessary ecological condition for an at-risk species. Therefore, for example the plan will have to provide direction to allow for "connectivity among suitable patches" for Mexican spotted owl; cited as a key habitat variable to fulfill the owl's life history requirements (Assessment 5: 23). Similarly, there will need to be plan direction to provide for contiguous habitat/connectivity for New Mexico meadow jumping mouse, as noted in Assessment 5 (p. 57).

The plan will have to address habitat fragmentation in a meaningful way (the antithesis of connectivity). The Assessment 1 and 3 (Terrestrial) notes that most of the Forest's ecosystems are vulnerable to fragmentation (based on the analysis that shows only four ecosystem types have more than 50% of their acreage in a "protected" status, Table 8). The Assessment implies that this degree of fragmentation "is associated with decreased ecosystem function and biodiversity" and therefore not contributing to ecological integrity. Plan components to address fragmentation (i.e. restore connectivity) will therefore likely be necessary to comply with the Planning Rule. Clear plan direction should be granted to the most vulnerable ecosystems/communities referenced in the Assessment such as pinyon and Arizona and Thurber fescue. Similarly, the forest plan should affirmatively address those ecosystems most heavily impacted by roads and other fragmenting infrastructure (Table 9) including the five land type associations that have more than 15 percent of their area impacted by roads, railroads and private in-holdings. Priority watersheds should be highlighted for restoration of aquatic and terrestrial ecosystem connectivity (due for example to roads and barriers to aquatic organism passage). We would expect "aggressive" objectives to address terrestrial and aquatic ecosystem fragmentation and restoration of functional connectivity for at-risk fish, wildlife and plants.

The forest plan will also have to specifically address the many individual species where fragmentation is documented as a threat to their necessary ecological condition, including boreal toad, Northern leopard frog, Rio Grande chub, Rio Grande sucker, Western bumblebee, Canada lynx and Gunnison sage-grouse, to name several documented in Assessment 5.

5. At-risk Species

    5.1. Threatened and Endangered Species

At a meeting between RGNF members of the planning team and members of the public held on October 4, 2016, we were pleased to learn that the Forest has begun engaging with the U.S. Fish and Wildlife Service (USFWS) regarding consultation under Section 7 of the U.S. Endangered Species Act (ESA). We were also happy to hear that the Forest Service would include a Section 7(a)(1) analysis as part of this process with USFWS. Section 7(a)(1) can be a forgotten aspect of the consultation process and is often not given the attention it deserves in conserving listed species.

Federally recognized species (endangered, threatened, proposed, candidate) must be identified through the coordination with ESA consulting agencies, in this case USFWS. We have been

recommending early engagement with the USFWS, which complies with the Planning Rule.[2] Early contributions to a forest plan by the consulting agencies can help streamline the Section 7(a)(2) consultation process for the plan and increase the likelihood of contributing to recovery of listed species and avoiding listing of proposed and candidate species under Section 7(a)(1) of the ESA (16 U.S.C. §§ 1536(a)(1)-(2)). Federally recognized species must be addressed by plan components if they "may be present" in the plan area (50 C.F.R. 402.12(c)(1), (d)) or if they are not present but would be expected to occur there to contribute to recovery. They should be included as target species. The RGNF has recognized eight target threatened and endangered species in its Proposed Action (p. 5).

The ESA requires the Forest Service and other federal agencies to, "in consultation with and with the assistance of the Secretary (listing agencies), utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation[3] of (listed species)" (16 U.S.C. §§ 1536(a)(1)). Therefore the ESA requires that the Forest Service must use its authorities, including NFMA and its planning process and resulting plans, in furtherance of recovery of listed species.[4]

The Planning Rule establishes an affirmative regulatory obligation that forest plans "provide the ecological conditions necessary to: contribute to the recovery of federally listed threatened or endangered species" (36 C.F.R. § 219.9(b)(1)). The provision supports the "diversity requirement" of NFMA (16 U.S.C. § 1604(g)(3)(B)). Moreover, the preamble to the Planning Rule specifically links this requirement to its responsibility under the ESA for recovery of listed species, stating, "[t]hese requirements will further the purposes of Section 7(a)(1) of the ESA, by actively contributing to threatened and endangered species recovery and maintaining or restoring the ecosystems upon which they depend" (77 Fed. Reg. 21215).

Forest plans make conservation decisions and are vehicles to demonstrate compliance with NFMA, as well as the ESA. One key mechanism for implementing the affirmative conservation program is the ESA Section 7(a)(1) conservation review. The conservation review process provides a mechanism to determine compliance with Section 7(a)(1) in that it would compel the Services to make a determination that the forest plan met affirmative recovery obligations. There is an existing process for interagency coordination that should be used to answer the question that the Planning Rule poses: does a forest plan contribute to recovery of listed species? The Consultation Handbook used by the listing agencies describes "proactive conservation reviews" under ESA Section 7(a)(1).[5] According to this Handbook, such reviews are appropriate for major national programs, and they are also "appropriate for Federal agency planning." They would be especially helpful in confirming that the plan has included the ecological conditions necessary for recovery of listed species.[6] We hope the RGNF's recognition of its Section 7(a)(1) responsibilities means that the planning team will

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[2] 36 C.F.R. § 219.4(a)(1) directs the responsible official to "engage the public—including" … "Federal agencies"… "early and throughout the planning process where feasible and appropriate." Under 219.6(a)(2), the regional forester should coordinate with and provide opportunities for government agencies "to provide existing information for the Assessment."

[3] "Conservation" is defined by the ESA to mean "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary."

[4] 36 C.F.R. § 219.9(b)(1) requires that each forest plan include plan components that "provide the ecological conditions necessary to contribute to the recovery of threatened and endangered species …"

[5] Endangered Species Consultation Handbook 1998. U.S. Fish & Wildlife Service and National Marine Fisheries Service, Section 5.1. (https://www.fws.gov/ENDANGERED/esa-library/pdf/esa_section7_handbook.pdf)

[6] The Consultation Handbook also encourages consultation at broader scales such as "ecosystem-based" consultations.

be working with the USFWS to conduct threatened and endangered species' conservation reviews for the RGNF forest plan revision.

We make some specific recommendations regarding the management of threatened and endangered species and their habitats below.

Black-footed ferret (*Mustela nigripes*)

We recognize that black-footed ferrets do not currently inhabit the RGNF and that the Forest may not have sufficient numbers of Gunnison's prairie dog (*Cynomys gunnisoni*) to support a viable population of this endangered species. Black-footed ferrets are prairie dog obligates; ferret diets consist of around 90 percent prairie dog and the mustelids shelter in prairie dog burrows. The key to recovering the species is to recover prairie dog habitat and boost prairie dog numbers. Black-footed ferrets are currently on "life-support," and their survival in the wild is completely dependent on several reintroduction sites within the range of the four prairie dog species in the United States. Most reintroduction sites require regular supplements of animals from captive-breeding programs.

According to RGNF's Assessment 5 (p. 8), black-footed ferrets have been observed on the Forest, though not since 1930. According to the black-footed ferret habitat map in Assessment 5 (p. 10), suitable habitat exists on the RGNF.

The Forest can take management actions to improve habitat conditions for prairie dogs that would enable colony expansion and increased populations. Actions that could serve as the basis for plan components include: prohibiting prairie dog recreational shooting, prohibiting lethal control of prairie dogs, working with Colorado Parks and Wildlife (CPW) to prevent sylvatic plague epizootics and translocate prairie dogs from places where they are unwanted and lethal control of colonies is imminent.

Refer to the Gunnison's prairie dog section below.

Canada Lynx (*Lynx canadensis*)

The RGNF is the most important public land unit for recovering Canada lynx in the Southern Rockies. The Forest served as the primary receiving site for lynx reintroduced by CPW. Yet with spruce bark beetle outbreaks continuing to result in significant changes to the spruce component of the spruce-fir ecosystem, the habitat of lynx and their primary prey, snowshoe hare, and their secondary prey, red squirrel, is in flux. Despite the changed and changing forest structural conditions on the RGNF, an ongoing study led by John Squires of the Forest Service's Rocky Mountain Research Station is revealing that lynx are continuing to use and breed in beetle-affected spruce-fir forest (Learn 2016).

Lynx habitat on the RGNF is currently governed by the 2008 Southern Rockies Lynx Amendment (SRLA) to the Forest's management plan and to the plans of other forests in Region 2 of the Forest Service. Under the SRLA, the RGNF is permitted to revisit lynx management direction during management plan revision. Given the beetle-induced changes, we believe now is not the time to radically change management direction and that the SRLA plan components—including all standards and guidelines—should be retained in the revised forest plan. The Forest Service must also determine whether additional provisions may be necessary for the RGNF to maintain ecological

conditions that are contributing to lynx recovery. We raise some questions for consideration and make some recommendations below.

Results from the research project should inform any changes in the lynx direction, and direction may need to be adapted based on the research results. For example, the research is showing that lynx on-the-ground are using habitat that no longer fits the existing policy definition of suitable habitat. We are concerned that forest stands no longer meeting the SRLA definition of suitable habitat may be open to timber activities that could be detrimental to habitat hares and lynx are continuing to use and den in. Without careful consideration, logging projects could disturb den sites, establish roads that fragment habitat, remove important vegetative cover for snowshoe hares, and create clearings with too few trees (dead or alive) that lynx might avoid. We are concerned there may be a disconnect between existing policy and the new science.

More specifically, there has been uncertainty as to whether lynx would use areas transitioning and transitioned out of multi-story, late successional conditions as trees die and fall. This mature forest condition has been considered by experts to be the highest quality winter snowshoe hare habitat, and thus, lynx habitat. Standard VEG S6 was implemented to protect multi-story stands. This state is becoming less prevalent in beetle-affected areas, and significant areas that were once in this state may no longer be meeting the SRLA policy definition for this high-quality habitat. However, rapid regeneration occurring in "formerly" high-quality, suitable habitat may be providing conditions—dense vegetation from re-growth—that are conducive to hare persistence. It is quite possible, but yet unknown, hares thrive under these conditions in the Southern Rockies. A mammal study by Ivan (2015) has found that snowshoe hares are continuing to occupy such areas. But even if they do not provide preferred habitat, it may be that regenerating stands provide sufficient habitat that lynx can adapt to and persist in while trees grow toward maturity. Lynx may need more habitat if it is suboptimal.

In this situation, the Forest Service must carefully consider—along with the USFWS—whether the framework and definitions in SRLA remain conducive to lynx recovery. Definitions may need to be adjusted in the revised plan to reflect the BASI. Stands that have transitioned out of the defined habitat under Standard VEG S6 may require additional provisions to protect habitat. Are exceptions and exemptions to vegetation standards VEG S6 (as well as VEG S1) still appropriate and applicable?

We are concerned that the Forest's proposal to ramp up salvage logging and manage to "aggressively diversify" forest characteristics stated in the Proposed Action may contra-indicated by Objective VEG O1,

> Objective VEG O1. Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.

Why artificially try to manage to mimic natural disturbance and succession when these processes are happening naturally?

If increased salvage logging and other timber and vegetation management are likely to occur under the revised management plan, additional direction may be needed to protect denning habitat and known den sites during the denning period.

We are also concerned about the implications of the beetle kill to how SRLA vegetation standards and guidelines are applied to different types of lynx habitat, especially given existing exceptions and exemptions. We are concerned that baseline conditions have changed since the 2011 habitat and Lynx Analysis Unit (LAU) mapping (Ghormley 2011) to the extent that there is a shaky basis for making judgements about appropriate types and levels of commercial timber harvesting and other vegetation treatments in lynx habitat within the parameters of SRLA. For example, can Forest staff determine when an LAU has reached the 30 percent unsuitable threshold when applying Standard VEG S1 (see below)?

> Standard VEG S1. Unless a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages limit disturbance in each LAU as follows: If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.

Again, application of BASI is key. The Forest Service has indicated that it is planning to remap the LAUs and vegetation. We recommend that this work be conducted in time to inform the plan revision process.

An assessment of whether the connectivity Standard ALL S1 can be met in the changed forest with the current vegetation standards and guidelines should be considered and addressed during plan revision. We recommend the Forest establish protected corridors between LAUs. We also recommend the Forest Service designate the proposed Spruce Hole/Osier/Toltec Landscape Connectivity Zoological Area and Wolf Creek Pass Linkage Landscape Zoological Area to promote lynx habitat connectivity at the landscape scale.

Gunnison Sage-grouse (*Centrocerus minimus*)

As Assessment 5 points out, Gunnison sage-grouse have had a tenuous existence on the Rio Grande National Forest. The Poncha Pass area is within the species' historic range (see 79 Fed. Reg. 69192: 69194, 2014), though habitat conditions must be improved to support a viable population (79 Fed. Reg. 69313, 2014). Higher elevation sagebrush steppe like Poncha Pass may be key to the species' persistence as climate change continues to affect lower elevation habitat elsewhere (TNC et al. 2011; Coop 2015). Including lands managed by the Bureau of Land Management (48%), the Forest Service (26%), private parties (24%), and the Colorado State Land Board (2%), GSRCS (2005) estimated the range of the population to be 20,400 acres.

A more detailed evaluation of how human uses in the area have affected sagebrush habitat and sage-grouse is warranted. Assessment 5 (pp. 20-21) states, "[t]here is some threat from cumulative physical disturbances associated with recreation in the area." Gunnison sage-grouse are highly sensitive to human disturbance, including those from recreational activities.

We also recommend the following science-based prescriptions for contributing to ecological conditions that will help recover Gunnison sage-grouse on the forest. Federal agencies have long accepted that information on life history and habitat needs for greater sage-grouse is applicable to Gunnison sage-grouse (see, e.g., 79 Fed. Reg. 69193; 75 Fed. Reg. 59805).The measures listed below are considered the minimum required to conserve sage-grouse species. New research may demonstrate that additional measures are needed. Given the difficulty and expense of restoring

sagebrush steppe, conservation strategies on public lands should preserve all remaining habitat. This precautionary approach, combined with additional proactive measures to manage public lands and resources, will help support federal, state and local management goals for Gunnison sage-grouse.

Sage-Grouse Essential Habitat:

- Identify and conserve essential sage-grouse habitat (Connelly et al. 2011; Manier et al. 2013; COT 2013; Aldridge et al. 2008).
- Manage or restore essential habitat so that at least 70 percent of the land cover is sagebrush steppe sufficient to support sage-grouse (SGNTT 2011: 6, citing Aldridge et al. 2008, Doherty et al. 2010, Wisdom et al. 2011; also SGNTT 2011: 7; Karl and Sadowski 2005; Doherty 2008; Connelly et al. 2000: 977, Table 3; Knick et al. 2013: 5-6.) with 15 to 40 percent sagebrush canopy cover (Connelly et al. 2000; SGNTT 2011: 26, citing Connelly et al. 2000, Hagen et al. 2007).
- Identify and protect sage-grouse wintering areas (SGNTT 2011: 21; Braun et al. 2005, citing Connelly et al. 2000 and others; Moynahan et al. 2007).
- Identify and protect habitat connectivity corridors to prevent or redress population isolation (SGNTT 2011: 5, 7).

Development Impacts:

- Restrict development to one site per section in priority habitat (SGNTT 2011: 21, 24; Holloran 2005; Doherty et al. 2010; Doherty 2008).
- Limit surface disturbance to less than 3 percent per section in priority habitat (SGNTT 2011: 21, 24; Holloran 2005; Doherty et al. 2010; Doherty 2008).
- Prohibit noise levels associated with any anthropogenic activity to not exceed 10 dBA above scientifically established natural ambient noise levels at the periphery of sage grouse mating, foraging, nesting, brood-rearing and winter habitat during each season of use by sage-grouse (Patricelli et al. 2013; Patricelli et al. 2012 (report); SGNTT 2011: 64, citing Patricelli et al. 2010).[7]

Mineral Development:

- Close and recommend for immediate withdrawal lands from location, leasing or sale (including coal) under the mineral laws for the maximum period allowed under law (SGNTT 2011: 22, 24-25, 26).
- Require conditions of approval for existing fluid minerals leases as outlined in the National Technical Team (NTT) report, including 4-mile no-surface-occupancy lek buffers (SGNTT 2011: 22-24). Larger buffers may be required to conserve the species.[8]
- Limit geophysical exploration on existing fluid minerals leases to helicopter-portable methods or vehicles confined to existing roads in priority habitat, and in accordance with seasonal and other applicable restrictions (SGNTT 2011: 21, 22).
- Prohibit surface storage of wastewater generated from fluid minerals development (SGNTT

[7] Patricelli et al. (2012) recommend measuring compliance with noise objectives at the edge of areas critical for foraging, nesting and brood-rearing rather than at the edge of the lek.

[8] A 4-mile lek buffer may include an average of 80 percent of nesting females (SGNTT 2011: 21); larger buffers may be recommended to conserve the species (6.2 miles, Aldridge and Boyce 2007; 6.2 miles, Doherty et al. 2010; 5.3 miles, Holloran and Anderson 2005; 4.6 miles, Coates et al. 2013).

2011: 64); breach and eliminate existing wastewater reservoirs (SGNTT 2011: 64).

Renewable Energy:

- Exclude renewable energy development (SGNTT 2011: 13).

Rights-of-Way:

- Exclude new rights-of-way (SGNTT 2011: 12).
- Develop valid existing rights-of-way in accordance with NTT report prescriptions (SGNTT 2011: 13).
- Bury existing transmission lines, where possible (SGNTT 2011: 13).

Livestock Grazing:

- Require that grazing strategies maintain at least 7 inches average grass height in nesting and brood-rearing habitat (Connelly et al. 2000).
- Restrict grazing until the completion of sage grouse breeding and nesting period, and seasonally remove livestock from late brood-rearing habitat to allow sufficient regrowth of native grasses to ensure adequate residual height. Limited winter grazing may be appropriate, as long as it leaves sufficient residual grass height prior to the next breeding season (W. Watersheds Project v. Salazar, 843 F.Supp.2d 1105, 1115 (D. Idaho 2012), citing Braun (2006, unpublished); W. Watersheds Project v. Dyer, 2009 WL 484438, at * 21 (D. Idaho 2009)).
- Control grazing to avoid contributing to the spread of cheatgrass in sage-grouse habitat (Reisner et al. 2013; Chambers 2008; Reisner 2010 (dissertation)).
- Manage riparian and wetlands to meet properly functioning condition; manage wet meadows to maintain native species diversity and cover to support sage grouse brood-rearing (Connelly et al. 2000).
- Avoid new structural range and livestock water developments; institute best management practices to prevent or limit and mitigate the potential spread of West Nile virus (SGNTT 2011: 17).

Vegetation Management:

- Prohibit prescribed fire in sagebrush steppe with less than 12 inches annual precipitation (SGNTT 2011: 26, citing Connelly et al. 2000, Hagen et al. 2007, Beck et al. 2009) or areas with moderate or high potential for cheatgrass incursion (Miller et al. 2011).
- Prohibit vegetation treatments that reduce sagebrush canopy cover to less than 15 percent (SGNTT 2011: 26, citing Connelly et al. 2000, Hagen et al. 2007).[9]
- In areas of pinyon/juniper, avoid treating old-growth or persistent woodlands. In areas where sagebrush is prevalent or where cheatgrass is a concern, utilize mechanical methods rather than prescribed fire.
- Restore non-native seedings with native vegetation where it would benefit sage grouse (SGNTT 2011: 16-17).
- Prohibit herbicide application within 1 mile of sage grouse habitats during season of use;

[9] Vegetation treatments may not be advised within 2 - 2.7 miles of sage grouse leks (Beck and Mitchell 1997; Heath et al. 1997) or where sagebrush canopy cover is less than 20 percent (Beck and Mitchell 1997) or in sage grouse winter habitat (Connelly et al. 2000; Eng and Schladweiler 1972).

prohibit use of insecticides (Blus et al. 1989).

Travel Management and Infrastructure:

- Limit motorized travel to designated routes trails in priority habitat (SGNTT 2011: 11). Implement appropriate seasonal restrictions on motorized travel to avoid disrupting sage grouse during season of use (Holloran 2005; Aldridge et al. 2012.
- Close existing trails and roads to achieve an open road and trail density not greater than 1 km/1km^2 (.6 mi/.6 mi^2) (Knick et al. 2013).
- Where valid existing rights-of-way are developed, restrict road construction within 1.9 miles of sage grouse leks (Holloran 2005).
- Limit the construction of tall facilities and fences to the minimum number and amount needed in essential habitat.
- Install anti-perching devices on transmission poles and towers (SGNTT 2011: 64, citing Lammers and Collopy 2007). Dismantle unnecessary infrastructure.

Habitat Designation:

- The Forest Service should also consider protecting sage-grouse habitat as Zoological Areas (Forest Service Manual 2372) to support long-term conservation of sage-grouse and other sagebrush-dependent species. The agency could apply additional measures to conserve the grouse beyond those prescribed for essential habitat, including prioritizing the areas for land acquisition, habitat restoration, and retirement of lease rights and grazing privileges.

Mexican Spotted Owl (*Strix occidentalis lucida*)

Assessment 5 states,

> There are no known occurrences within the planning area. The Rio Grande National Forest modeled habitat in 2006 in an attempt to describe potential habitat and focus survey efforts as needed (Figure 4). Based on the query developed, this model identified 14,103 acres of potential Mexican spotted owl habitat. Given the extensive surveys conducted throughout this habitat with no positive Mexican spotted owl occurrences resulting, this model likely substantially over-estimates potential Mexican spotted owl habitat in the planning area.

Though the Forest Service concluded that Mexican spotted owls are not likely to occur on the RGNF, we recommend that the Forest follow the recommendations in the Mexican Spotted Owl Recovery Plan (USFWS 2012). The RGNF is within historic range of the species (USFWS 2012), and some suitable habitat occurs on the Forest.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

The southwestern willow flycatcher is an obligate riparian species that nests in willows, cottonwood and tamarisk vegetation (Stoleson and Finch 2000). Typically, the species builds nests and lays eggs in mid-May to early June and fledges young in mid-July (USFWS 2002).

Assessment 5 states that a Southwestern willow flycatcher was observed on the RGNF in 2008. The Assessment did not evaluate habitat conditions on the Forest but conveyed that 1,762 acres of suitable habitat occurs on the Forest with another 947 acres of potential habitat.

All grazing poses a threat to riparian areas in the region, and in turn, to the habitat of the flycatcher. Removal of livestock grazing pressure from riparian areas has been found to have a positive effect on growth, distribution, and vigor of riparian vegetation (Schulz and Leininger 1991). Grazing poses a current threat to the southwestern willow flycatcher habitat. Plan components should limit grazing effects on vegetation in suitable and potential habitat areas. The Forest Service should be taking actions outlined in the Southwestern Willow Flycatcher Final Recovery Plan (SWFRT 2002).

Uncompahgre Fritillary Butterfly (*Boloria acrocnema*)

Assessment 5 provides an account (p. 6-7) of the federally endangered Uncompahgre fritillary butterfly, which is dependent on large snow willow patches for persistence. Assessment 5 account includes a recent history of known Uncompahgre fritillary populations on the forest, including possible extirpated populations, and a summary of threats and risk factors, such as livestock grazing, trampling by humans, and climate change. The Assessment also conveyed the importance of the RGNF to the species; five of 11 known colonies occur on the Forest. Assessments 1 and 3 (Terrestrial) (p. 4) does not evaluate the conditions of snow willow habitat but highlights the threat of climate change to the species:

> We think some ecosystems are particularly susceptible to climate change-related impacts. Plant and animal species in high-elevation alpine ecosystems, such as the Uncompahgre Fritillary Butterfly, may be pushed to extinction if warming temperatures reduce their habitat (Alexander and Keck 2015).

The USFWS Uncompahgre Fritillary Butterfly Recovery Team finalized a recovery plan for the species in 1994 (UBRT 1994). The recovery plan lists a set of responsibilities assigned to the Forest Service for contributing to the species' recovery (UBRT 1994: 16-18). Assigned actions to the Forest Service include (UBRT 1994: 16-18):

- Enforce prohibition on collection
- Determine search locations
- Organize searchers
- Search for colonies
- Monitor population levels
- Determine oviposition sites
- Determine larval life history
- Record snow, rain, and air temp. levels
- Determine soil moist. and temp.
- Determine elev., slope, aspect, of new colony sites
- Monitor morphologic phenology of snow willow
- Monitor phenology of nectar sources
- Conduct recovery team activities
- Contract administration
- Determine disease, parasitism, predation threats
- Determine livestock threats
- Determine recreation threats
- Reintroduce butterflies

- Transplant to other suitable sites
- Erect signs

The Assessment is not clear regarding how the Forest Service is meeting these recovery plan obligations.

We believe these plan components need to change to meet the planning rule requirements. That some colonies on the forest may have been extirpated indicates that standards and guidelines may be inadequate, and if so, should change. Wildlife – Standard 13 (RGNF 1996: III-28) states,

> No ground-disturbing activity shall be allowed in potential Uncompahgre fritillary butterfly habitat unless a survey is conducted to determine the existence of the species. Ground-disturbing activities include trail building, livestock driveways, or domestic sheep bedding grounds. The usual grazing associated with livestock in the area is not considered ground disturbing. Potential habitat definitions and survey protocols are found in the *Uncompahgre Fritillary Butterfly Recovery Plan.*

However if ground disturbing activities are allowed to occur in unoccupied potential habitat, this may precluded the restoration and recolonization of potential habitat and hinder the butterfly's recovery. Wildlife – Standard 14 (RGNF LRMP 1996: III-28) states, "[i]f any new Uncompahgre fritillary butterfly populations are discovered, a "No Butterfly Collecting" regulation shall be imposed on the area." It follows that "ground-disturbing activity" restrictions should apply to the habitat of newly discovered populations not solely collection restrictions.

The USFWS has emphasized a continued need to maintain regulatory mechanisms and recommended the following action: "[d]evelop a management plan with the USFS and BLM to ensure grazing, collecting, recreation, and other on-the-ground threats remain low or are eliminated" (USFWS 2009: 16).

Given the USFWS directive and the vulnerability of the species and the potential for disturbance under the current LRMP, we recommend the following standards:

- Close Uncompahgre fritillary colony sites and potential recovery areas to recreation, including hiking and trail building.
- Close Uncompahgre fritillary colony sites and potential recovery areas to grazing.

We are proposing the designation of the Pole Creek Mountain – Sheep Mountain as recommended wilderness to help protect a population of the Uncompahgre fritillary butterfly.

Yellow-billed Cuckoo (*Coccyzus americanus*)

The yellow-billed cuckoo is a threatened species and an obligate riparian. Like the flycatcher, the yellow- billed cuckoo would benefit from an increase in suitable riparian habitat in the area. Yellow-billed cuckoo nest in willow, cottonwood and non-native tamarisk (Seachrist et al. 2013). The preferred habitat of the yellow-billed cuckoo includes an overstory of native canopy with mixed seral-stage understory comprised of native vegetation (Seachrist et al. 2013). One recent study found a high concentration of yellow-billed cuckoo along a long stretch the Middle Rio Grande where there was an absence of anthropogenic activity (Seachrist et al. 2013). Plan components should

preserve large riparian areas without disturbances to contribute to the recovery of the yellow-billed cuckoo.

USDA research has found that excluding cattle from a landscape for five growing seasons "significantly increased: (1) total vegetative cover, (2) native perennial forb cover, (3) grass stature, (4) grass flowering stem density, and (5) the cover of some shrub species and functional groups" (Kerns et al. 2011). All of these results would benefit the cuckoo and support recovery of this species.

The Forest Service correctly notes that non-native tamarisk have contributed to the decline of the cuckoo's native habitat. However, the cuckoo has been known to nest in these non-native tamarisk (Seachrist et al. 2013). Therefore, before tamarisk is removed under any management strategy, the Forest Service should first complete surveys for cuckoo and assess whether ecological conditions exist to support native riparian vegetation.

5.2. Proposed and Candidate Species

Under Planning Rule Section 219.9(b)(1), the revised plan must provide for ecological conditions that will conserve the North American wolverine (*Gulo gulo luscus*), which is proposed for listing under the ESA. Wolverine conservation status in the lower-48 is currently in some flux. In April 2016, a federal judge's decision rejected the 2014 decision by the USFWS to not list the distinct population segment (DPS) of the wolverine under the ESA. As the USFWS reconsiders protections for wolverines, they are now again a 'proposed' species under ESA and may raise questions over how the Forest Service including the RGNF will treat wolverine in ongoing and forthcoming forest plan revisions. Because the wolverine is a proposed species, the RGNF land management plan should provide plan components that will "protect, preserve, manage, or restore natural environments and ecological communities to potentially avoid federally listing" of wolverine (36 CFR 219.19).

In addition, given the uncertainty in the conservation status of wolverines, we believe wolverine should also be treated as a potential SCC, though not eligible for designation—at least not yet. This would ensure that future plan components would be sufficient to meet any applicable regulatory requirements. Furthermore, it is our belief that Planning Rule requirements for federally listed, proposed and candidate species are *in addition* to the baseline requirements for SCC. In other words, the RGNF should identify the ecological conditions necessary for wolverine persistence in the plan area, or those necessary to contribute to wolverine persistence across the species range, so that plan components can be developed for wolverine as a proposed or SCC species.

However, maintaining ecological conditions alone will probably not be sufficient to help ensure wolverine recovery and viability across its range on national forest lands. Therefore, plan components, including standards and guidelines, for wolverine will likely be necessary, as required by 36 CFR 219.9(b)(1). For example, limitations on snowmobile use in some alpine areas where denning could occur may be necessary for protection and recovery of wolverine. Importantly, the RGNF should review and incorporate the preliminary findings, and expected final report, from the

Wolverine Winter Recreation Research Project that recently concluded the field study component of the project.[10]

Additionally, because of the uncertainty surrounding the wolverine's listing status and the importance of the species, the RGNF revised plan should include a mechanism whereby wolverine is automatically added to the SCC list in the event that the U.S. Fish and Wildlife Service once again determines that wolverine do not merit listing under the ESA. Given the expected life-span of the revised plan, this is very important to ensure that the plan can anticipate potential actions by other federal agencies in the future, but during the life of the revised plan.

5.3. Species of Conservation Concern

5.3.1. Species of Conservation Concern Selection

In previous comments to the RGNF, we pointed out potential problems with the SCC selection process, particularly with the documentation of BASI to support not selecting species under consideration. We have three documents from the Forest Service that pertain to SCC identification and selection justifications; these are Assessment 5, a letter (August 17, 2016) from the Rocky Mountain Region office to the RGNF Forest entitled "List of Species of Conservation Concern for the Rio Grande National Forest," and an Excel spreadsheet with the filename: RGNF_Step2a_RefinedSppList_21July2016. If there are additional documents pertaining to the SCC selection and justification, we ask that these be uploaded to the RGNF or Region 2 website. We will not repeat our comments here in full, but summarize them and ask that the Forest Service consider them as the planning process continues. We also request that the Forest Service reconsider species for which justifications are inadequate for removing them from the SCC list under consideration.

We are concerned that the Forest Service is not using and properly documenting BASI for SCC selection as required by the Planning Rule and directives (36 C.F.R. § 219.3; FSH 1909.12, Ch. 10, 12.53b(3 and 4)). We may agree with the Forest Service's decisions to remove some species from consideration, but cannot do so without reviewing appropriate documentation.

We are not sure if "not documented" on the forest in Assessment 5 (p. 5: 32-34, Table 2) means that documentation exists to support the contention that the species does not occur on the forest or that there is a lack of information about a species occurrence. This applies to the following:

- Monarch butterfly
- Theano alpine
- Colorado blue (butterfly)
- Gold-edge gem moth
- Great Basin silverspot
- Grasshopper sparrow
- Burrowing owl
- Ferruginous hawk

[10] All reports and maps are available at: http://www.roundriver.org/wolverine/wolverine-maps-reports-and-publications/.

- Mountain plover
- Northern harrier
- Dwarf shrew
- Botta's pocket gopher
- Violet milkvetch
- Missouri milkvetch
- Narrowleaf grapefern
- Winding mariposa lily
- Brandegee's buckwheat
- Manyflowered ipomopsis (or many-flowered gilia, many-flower standing cypress)
- Ice cold buttercup
- Aztec milkvetch
- Lesser tussock sedge
- Lesser yellow lady's-slipper
- Wahatoya Creek larkspur
- Heil's tansy mustard
- Lesser bladderwort

It is not clear if "[n]o known substantial conservation concern on the Rio Grande National Forest" means there is BASI that supports a determination of no substantial concern or if this indicates a lack of information.

- Alberta Arctic
- White-veined Arctic
- Juniper titmouse
- Cassin's finch
- Prairie falcon
- Pinyon jay
- Virginia's warbler
- Brown-capped rosy finch
- American pika
- Little brown bat
- Southern red-backed vole
- Abert's squirrel

The directives make an important distinction between species of broader-scale concern and those where there is local conservation concern. 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*. In Assessment 5, a "basis" is provided for each species "not carried forward for analysis as SCC" that addresses both regulatory criteria for each species. However, the criteria listed for "determining 'substantial concern" are only the criteria designated in the directives to be used for species of "local concern" (FSH 1909.12 Ch. 10, 12.52d(3)(f)) (See Appendix A: Evaluation of Species of Conservation Concern Identification Process, by Defenders of Wildlife). Thirty-seven species were considered but not carried forward.

Age of occurrence records should not be a justification for ignoring a species in the planning process without demonstrating that the likelihood of future occurrence is remote. Where occurrence records are old, this could substantiate the decline of the species and suggest potential recovery and restoration needs. This applies to:

- Alberta Arctic
- Northern leopard frog
- Veery

Infrequent presence or limited habitat in the plan area, and lack of threats from national forest management activities are insufficient to demonstrate that species vulnerable at a broader scale are secure in the plan area. Limited habitat might suggest the opposite. If a species is "known to occur" in a plan area, the apparent absence of habitat is not a relevant justification. This applies to:

- Sage sparrow
- Pinyon jay
- Loggerhead shrike
- Band-tailed pigeon
- Lewis' woodpecker
- Big free-tailed bat

The directives specifically recognize climate change as an example of a threat to a species that might warrant identifying it as a SCC even though it is beyond the control of national forest management actions (FSH 1909.12 Ch.10, 12.52d). A June 2016 letter from the Deputy Chief to the Regional Foresters further clarified that, "Species should not be eliminated from inclusion as an SCC based upon…threats to persistence beyond the authority of the Agency or not within the capability of the plan area, such as climate change." However, the sage sparrow was not identified as a SCC because of "very limited ability to influence species through management actions of Rio Grande National Forest." The American pika is another species where climate change is a threat. American pikas live among high-elevation talus fields and are vulnerable to warming temperatures (Beever et al. 2003). American pikas are experiencing declines across most of their range (Wilkening et al. 2015). Calkins et al. (2012) predicted that pika habitat will shrink at even slightly warmer temperatures. The species occurs in the RGNF.

5.3.1.1. Response to Additional Recommendations

The Regional Office letter (p. 6) noted that Defenders' had recommended an additional six species for consideration as SCC.

- Silky pocket mouse (*Perognathus flavus*), NatureServe: G5, S1
- Brazilian free-tailed bat (*Tadarida brasiliensis*), NatureServe: G5, S1
- Xanthus Skipper (*Pyrgus xanthus*), NatureServe: G3G4, S3
- Three-toed woodpecker (*Picoides tridactylus*), NatureServe: G3G4, S3S4B (vulnerable)
- Dwarf hawksbeard (*Askellia nana*), NatureServe: G5, S2
- Pale moonwort (*Botrychium pallidum*), NatureServe: G3, S2

We see that *Askellia nana* is now on the SCC list under consideration. We assume the other five were rejected. We have not found documentation online or in requests to the Forest Service to understand why these species were not identified as SCC. We provide additional justification as to why we believe the following three species warrant identification as SCCs.

- Brazilian Free-tailed Bat (*Tadarida brasiliensis*). NatureServe (2015) ranks the Brazilian free-tailed bat as critically imperiled in Colorado. The species' range overlaps with the RGNF, and the forest includes several important habitats including caves (or mines), riparian, and mixed conifer forest.

- Silky Pocket Mouse (*Perognathus flavus*). According the NatureServe, the silky pocket mouse is imperiled in Colorado (NatureServe 2015). Based on a Forest Service Region 2 evaluations form, the species is known to occur on the RGNF (Forest Service 2001). Additionally, a small mammal survey conducted by Colorado Natural Heritage Program found occurrences on the RGNF (CNHP 2015). See also CNHP (Rocchio et al. 2000).

- Pale Moonwort (*Botrychium pallidum*). Pale moonwort is ranked as imperiled in Colorado by NatureServe (2015). It is a Colorado Rare Plant (CNHP 1997) and Forest Service Region 2 Sensitive Species. It has been found in Rio Grande and/or Conejos counties (Kettler et al. 2000). The Draft Environmental Impact Statement for the RGNF 1996 land and resource management plan indicates the plant occurs on the forest (p. 3-94).

5.3.1.2. Additional request for consideration

We also recommend that the red squirrel (*Tamiasciurus hudsonicus*) be considered as SCCs given recent information about them. Based on a study by Colorado Parks and Wildlife and others (CPW undated), red squirrels may be having a negative response moderate and severe spruce beetle outbreak conditions. The assumption is that the loss of cone crop, a key food resource for the squirrels, is the key factor. They are residents of the RGNF and serve as an important secondary food source for Canada lynx

5.3.2.Species of Conservation Concern Recommendations

We make management recommendations and recommend management documents to begin developing species-focused plan components based on BASI for the following faunal SCCs currently under consideration by the Forest Service.

Boreal Toad (*Anaxyrvs boreas*)

In 2001, the Boreal Toad Recovery Team believed that Boreal Toads occupied less than one percent of their historic breeding areas in the Southern Rocky Mountains (Loeffler 2001). Though the primary cause of Boreal Toad decline is the chytrid fungus (*Batrachochytrium dendrobatidis*) (Bd), there are several management actions the RGNF could take to improve protection, conditions, and outcomes for the species. The Forest Service's Region 2 Boreal Toad (*Bufo boreas boreas*): A Technical Conservation Assessment (Keinath and McGee 2005: 41-43) recommended the following management actions for managing disease, determining population status, monitoring known populations, delineating important habitat, and protecting suitable habitat.

Disease management:

- If newly evolved environmental stressors (e.g., increased UV radiation, chemical contamination, decreased water quality, human disturbance) facilitate infection, then management should focus on eliminating those stressors from boreal toad habitats, thus enabling the remaining boreal toads to recover and repopulate their former range.
- If certain habitat characteristics (e.g., elevation, water temperature, vegetative cover) mitigate the rate of infection or the mortality rate of those infected, then sites with those characteristics should be given conservation priority. Further, habitat manipulation that promotes those characteristics could be implemented in other sites, especially those that have not already been infected.
- If some toads exhibit natural resistance to infection, then those animals should be the focal point of captive breeding and reintroduction programs.

Monitor known populations:

- Known breeding populations must be monitored to track changes in abundance and behavior and to evaluate impacts of management actions (see "Inventory and monitoring" section).

Delineate important habitat:

- Managers should identify important terrestrial habitats (i.e., foraging areas, over-wintering sites, and movement corridors) and aquatic habitats (i.e., permanent ponds and river and stream habitats within 2.5 km of known breeding ponds). Managers should then assign priorities for protecting and monitoring boreal toad habitats, wherein the healthiest populations receive greater priority.

Protect suitable habitat:

- To insure population persistence, important habitat must be protected from natural and human-caused disturbances that could potentially threaten the survival of boreal toads at the local, population, and/or landscape scale. This includes not only the breeding sites, but also the network of upland habitat and migration corridors. Habitats with BD-free populations should receive high priority for protection.

Keinath, D. and M. McGee (2005: 43-45) recommended a set of tools and practices to guide population and habitat management, summarized below.

Pre-management surveys:

- Habitats that may be suitable for breeding, foraging, over-wintering, or migration by boreal toads should be surveyed prior to any management activity that could impact the toads or their habitat. If the loss or deterioration of boreal toad habitat is inevitable, then mitigation measures should be implemented.

Timber harvest:

- Timber harvests that create uneven-age stands result in fewer disturbances to the understory and ground, which is preferred in boreal toad habitat.
- Fire and heavy equipment use can cause toad mortality, so post-sale treatments (e.g., scarification or fire) should be limited.
- Vehicle use of roads and skid trails in boreal toad habitat should be planned to avoid times of peak boreal toad activity, thus reducing road-kill mortality.
- Boreal toads disperse considerable distances (2.5 km) from breeding to upland forest sites (Bartelt 2000). Therefore, timber harvest within 2.5 km of known breeding sites should be limited during and immediately following the breeding season.
- Timber harvest can alter hydrologic patterns, and thus impact boreal toad breeding sites that may not be within the harvest boundaries. Therefore, managers should plan harvest activities designed to maintain water quality and quantity, and hydrologic functioning in proximate wetlands.

Livestock grazing:

- Maintain riparian areas and wetlands in proper functioning condition by conserving adequate vegetation, landform, or debris to:
    - dissipate energy associated with stream flow, wind, and wave action
    - filter sediment, capture bedload, and aid floodplain development
    - improve flood-water retention and groundwater discharge
    - develop root masses that stabilize stream banks against current action
    - develop diverse pond characteristics to provide habitat, water depth, duration, and temperature to support diverse aquatic life (USDI Bureau of Land Management 1993).
- Maintain water quality and quantity at Clean Water Act standards as a minimum.
- Maintain vegetative cover requirements necessary to meet the recovery needs of boreal toads (see "Habitat" section).
- Locate toad movement corridors and protect them from the impacts of livestock grazing.
- Minimize incidences of trampling by livestock by fencing critical habitat areas.

Fire management:

- In areas where there are known boreal toad breeding sites, burning prescriptions should buffer habitats within 2.5 miles of the site and/or should be restricted to late fall through early spring, when boreal toads are less active. If prescribed fires cannot be avoided at these times and locations, then minimizing the rate of spread may allow toads to escape the flames. The use of fire retardants in or near boreal toad habitats, especially breeding sites or other aquatic habitats, should be avoided.

Pesticides, herbicides, and environmental contaminants:

- Residue from pesticide, herbicide, or fertilizer application can contain compounds detrimental to toads (see "Extrinsic threats" section). Until the lethal and sublethal impacts of these commonly used chemicals are examined for all life history stages of the boreal toads, they should not be applied within at least 100 meters of wetlands.

Non-indigenous species:

- To protect boreal toad populations from the other potential threats posed by the presence of non-indigenous species, introductions of native and non-native fish and amphibians into occupied or suitable unoccupied boreal toad breeding habitats should be discouraged
- Managers should keep the potential implications of nonnative species in mind when developing management or conservation strategies for mountain lakes and streams, and consider removal of these species where their presence is deemed detrimental to boreal toad populations or the larger native amphibian community.

Habitat development and fragmentation:

- Water projects. Wetlands in occupied boreal toad habitat and suitable but unoccupied boreal toad habitats should not be drained or filled. If this is unavoidable, lost wetlands should be replaced at a minimum 2:1 ratio (i.e., two hectares of wetland should be created for each hectare lost). Development within at least 300 ft. (100 m) of known occupied and suitable but unoccupied boreal toad habitats should be avoided.
- Roads. Existing roads in occupied boreal toad habitats should be examined to determine whether they are a barrier to toad movement. Roads that represent a barrier to safe movement by toads between essential habitats (e.g., between ponds and uplands, or between neighboring ponds) should be modified, possibly by installing culverts or similar structures that allow toads to pass unhindered. Bridges and seasonal road closures may also be used to provide mitigation. Roads could be moved to avoid impact altogether. New roads should avoid suitable toad habitat and contain appropriate features to eliminate barriers to water flow and toad movement. Roads leading to sensitive wetlands may be seasonally or permanently closed to reduce use of those areas. Interpretive signs explaining modifications of travel should be posted in any area where modifications alter public access.
- Recreation. Campsites in or near occupied breeding ponds should be closed seasonally to protect breeding adults, egg masses, tadpoles, and toadlets. In unrestricted camping areas, fencing and signs should be used to seasonally restrict camping within at least 100 ft. (34 m) of riparian areas. As with roads, interpretive signs explaining changes should be posted to improve the public's acceptance and compliance with these restrictions. The impacts from trail use should be evaluated annually in areas where they cross boreal toad breeding habitat. Trails that lead to or pass near occupied breeding sites should be closed seasonally, or permanently rerouted to avoid these areas. Newly constructed trails should avoid directing users to occupied breeding sites, and a buffer at least 100 ft. (34 m) should be placed between new trails and occupied breeding sites. Off-road vehicle use should be managed to avoid riparian and wetland habitats.

Western Bumblebee (*Bombus occidentalis*)

Hatfield et al. (2012) described the following threats to North America bumble bees: habitat fragmentation, livestock grazing, insecticide and herbicide use, loss of genetic diversity, pests and disease, competition with honey bees, and climate change. An additional threat includes fire suppression (Defenders of Wildlife 2015). For a more detailed description of threats to help guide management, see: "A Petition to list the Western Bumble Bee (Bombus occidentalis) as an Endangered, or Alternatively as a Threatened, Species Pursuant to the Endangered Species Act and

for the Designation of Critical Habitat for this Species," by Defenders of Wildlife (2015). The following management recommendations are adapted from the Forest Service's own recommendations in *Conservation and Management of North American Bumble Bees* (Schweitzer et al. 2012) and the Xerces Society's Conserving Bumble Bees: Guidelines for Creating and Managing Habitat for America's Declining Pollinators (Hatfield et al. 2012).

Promote ecological integrity of bumblebee habitat and promote habitat connectivity:

- Provide habitat for nesting and overwintering sites. (Schweitzer et al. 2012: 3)
- When nesting sites are limited, consider providing artificial nest boxes. (Schweitzer et al. 2012: 3)
- Assure continuity of nectar and pollen resources when bumble bees are active from spring to late summer. (Schweitzer et al. 2012: 3)
- Increase abundance and diversity of native wild flowers to improve bee density and diversity. (Schweitzer et al. 2012: 3)
- Ensure that nesting habitat is in close proximity (500-800 m; 0.3-0.5 mi) to foraging habitat. (Schweitzer et al. 2012: 3)

Pesticides and herbicides:

- Minimize exposure to pesticides. (Schweitzer et al. 2012: 3)
- When spraying is necessary, do so under conditions that promote rapid breakdown of toxins and avoid drift. (Schweitzer et al. 2012: 3)
- Use the least toxic and least concentrated application possible. (Hatfield et al. 2012: 15-16)
- Apply when bumble bees are not active: at night and in late fall or winter. (Hatfield et al. 2012: 16)
- Do not apply when plants are in bloom.

Fire:

- Stagger the timing of prescribed burns to enable a continuous food supply. (Schweitzer et al. 2012: 3)
- Only burn a specific area once every 3-6 years. (Hatfield et al. 2012: 13)
- Burn from October through February. (Hatfield et al. 2012: 13)
- No more than one-third of the land area should be burned each year. (Hatfield et al. 2012: 14)
- Avoid high intensity fires. (Hatfield et al. 2012: 14)

Livestock Grazing:

- Grazing on a site should occur for a short period of time, giving an extended period of recovery. (Hatfield et al. 2012: 14)
- Grazing on a site should only occur on approximately one-third of the land each year.

Rio Grande Chub (*Gila pandora*)

- See Rees et al. 2005, Rio Grande Chub: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5200374.pdf

Rio Grande Cut-throat Trout (*Oncorhynchus clarkfa virginafis*)

- See Pritchard et al. 2006, Rio Grande Cutthroat Trout: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5206803.pdf

Rio Grande Sucker (*Catostomus plebeuis*)

- See Rees and Miller 2005, Rio Grande Sucker: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5206797.pdf

Boreal Owl (*Aegolius funerus*)

In Colorado, Boreal Owls typically occur above 9,500 feet (2,900 meters) (Ryder et al. 1987), largely in spruce-fir forest (Hayward 1994b). They require at least 386 mi^2 (1,000 km^2) of suitable habitat (Hayward 1989; Hayward 1994a), given large home ranges and low populations densities (NatureServe 2015, *Aegolius funereus*). In Colorado, male home ranges have been recorded up to 618 mi^2 (1,600 km^2) (Hayward 1994b, citing Palmer 1986). Given that Boreal Owls are secondary cavity nesters, the presence of primary cavity nesters (particularly woodpeckers) is essential for the owl. In Colorado, Boreal Owls tend to occur in mature, older, multilayered spruce-fir forest with trees of large diameter and high basal area (Hayward 1994a; NatureServe 2015, *Aegolius funereus*). Natural disturbance processes, such as fire and tree mortality due to insects and disease, help create forest heterogeneity preferred by Boreal Owls. A mosaic forest pattern tends to support a diversity of prey, particularly small mammals. Boreal Owls likely assort in a metapopulation structure (Hayward 1994b). While long-distance dispersing juveniles and emigrating adult owls are believed to be nomadic and can travel long distances, environmental changes may threaten species viability if they inhibit linkage between populations and reduce the size of habitat islands (Hayward 1994a).

The RGNF 1996 LRMP contains several plan components that could be modified in accordance with the 2012 planning rule requirements and new BASI. Relevant objectives include Forestwide Objectives: 2, 2.1, 2.2, 2.3, 2.4, 2.7, 2.9, 2.10, and 3.3. Biodiversity Standards 1 and 3 and Guideline 1 should be considered for retention with appropriate modifications. Silviculture Guidelines 1, 4, 5, 6 and 16 should be modified and retained and also be considered as standards. Several experts have recommended the following management practices.

Timber Harvest:

- Silvicultural prescriptions must provide for large diameter trees well dispersed over space and time. The roosting, nesting, and foraging ecology of boreal owls in the western United States also suggests that mature and older forest must be well represented in the landscape to support a productive boreal owl population. (Hayward 1994b)
- Maintain existing habitats and accelerate development of subalpine forest conditions within stands that are currently in mid-seral structural stages. (Wisdom et al. 2000)
- Avoid extensive use of clearcuts, which may reduce habitat quality for 100 to 200 years. Small patch cuts implemented on long rotations may be compatible with maintenance of

habitat quality for boreal owls. Thinning from below may provide for development of nest structures. (Wisdom et al. 2000)
- Retain large-diameter snags in suitable habitat areas and provide for snag replacement over time. (Wisdom et al. 2000)
- Determine potential snag densities for suitable and restoration habitats by conducting surveys. Use these baseline data to determine whether snags are below potential in other areas. Provide measures for snag protection and recruitment in all timber harvest plans. (Wisdom et al. 2000)

Provide for Connectivity:

- Provide or develop linkages among subpopulations. Evaluate linkages among subpopulations and use that information to identify areas that are highest priority for retention and restoration of habitat. This is of particular concern, where reduction in the extent of source habitats has increased the isolation of remaining habitat patches. (Wisdom et al. 2000)

Other:

- Include boreal owl conservation within a larger, ecosystem context that addresses management of primary cavity nesters, small mammals, and forest structural components (Hayward 1994a).

Brewer's Sparrow (*Spizella breweri*)

- See Holmes and Johnson 2005, http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5182051.pdf

Flammulated Owl (*Otus flamineolus*)

Flammulated owls prefer Ponderosa pine forest. They are secondary cavity nesters and need a high density of large snags. They may prefer snags >25 in dbh, and the low threshold may be 2-8 snags/ac at >13 in dbh (Manley et al. 2004). Nelson et al. (2009) found that a minimum threshold for snag dbh may be 12 in but average at 20 in dbh. Given a decline of large ponderosa pine trees range-wide, available snags may be a limiting factor for flammulated owl persistence and recovery. Post-disturbance salvage logging may not be a management practice that supports sufficient snag retention and density for a variety of snag-dependent species (Hutto 2006; Hutto et al. 2016).

Northern Goshawk (*Accipter gentiles*)

- See Kennedy 2003: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5182005.pdf

Olive-sided Flycatcher (*Contopus cooperi*)

- See Kotliar 2007: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5182039.pdf

Peregrine Falcon (*Falco peregrinus anatum*)

- See Craig and Enderson 2004: http://cpw.state.co.us/documents/wildlifespecies/profiles/peregrine.pdf

Southern White-tailed Ptarmigan (*Lagopus leucerus altipetens*)

- See Hoffman 2006: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5182070.pdf

American Marten (*Martes americana*)

- See Buskirk 2002: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5226875.pdf

Fringed Myotis (*Myotis thysanodes*)

- See Keinath 2004: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5181913.pdf

Gunnison's Prairie Dog (*Cynomys gunnisoni*)

Stressors and threats to Gunnison's prairie dogs include shooting, poor range condition, energy and mineral development, plague and tularemia, poisoning, poor habitat connectivity, and destruction of habitat through motorized use and other activities (Sheffield 1997; Seglund and Schnurr 2010). Several of these cannot be addressed with coarse-filter, ecosystem plan components. Thus, it is important to incorporate fine-filter plan components to maintain and restore viable populations of prairie dogs and well-distributed prairie dog colonies to promote grassland integrity on the Cibola.

Preservation of prairie dog colonies and associated ecological benefits, however, cannot be limited to merely protection of existing colonies. Studies of population dynamics of prairie dog towns have resulted in the following management recommendation: creation and preservation of "a network of native prairie reserves strategically located across the historical range of this species," which would include "clusters ('complexes') of large towns, as well as large, but isolated prairie dog towns" (Lomolino and Smith 2003). This approach necessitates a landscape-level approach to grassland conservation and habitat, including the elimination of barriers to prairie dog movement and expansion that may exist. Gunnison's prairie dogs are not only indicators of grassland integrity but grassland restoration management tools and should be considered as focal species for monitoring. Burrowing owls can also serve as focal species (Sheffield 1997; Alverson and Dinsmore 2014).

We recommend the following plan components as a starting point (see also Seglund and Schurr 2010).

Desired Conditions:

- At least one desired condition should be developed that is specific to maintaining and restoring occupied prairie dog colonies. It should include, at a minimum, providing for viable populations of prairie dogs and an increasing trend in populations; maintaining and restoring colonies that are well-distributed throughout the Cibola's grasslands; establishing sufficient prairie dog numbers and colonies to enable the persistence of obligate prairie dog

species including burrowing owls, ferruginous hawks, and mountain plovers, with the goal of creating the capacity to support a self-sustaining population of black-footed ferrets; and enabling connectivity between colonies and complexes to maintain genetic diversity. Set a specific goal for increasing occupied acreage on the Forest within this desired condition that will be monitored.

Cooperative Management:

- Work with other public land agencies and stakeholders to identify management emphasis areas where intensive management can focus on landscape scale conservation for the entire prairie dog ecosystem. (adapted from Seglund and Schnurr 2010)
- Work with CPW or other entities to reintroduce and translocate prairie dogs to augment the Forest's populations.

Reduce Target Killing:

- Prohibit recreational shooting of prairie dogs.
- Prohibit lethal control of prairie dogs.

Prevent Disease:

- Prevent plague by implementing a plague management and reduction programs that includes the use of dusting and vaccination. (see Seglund and Schnurr 2010)
- Develop a plague surveillance program to enable immediate management of plague outbreaks (adapted from Seglund and Schnurr 2010)

Habitat Protection:

- Close and obliterate roads and motorized activity in and around prairie dog colonies and re-introduction sites.
- Minimize impacts of energy and/or mineral development on prairie dogs. (adapted from Seglund and Schnurr 2010)

Connectivity:

- Manage grassland ecosystems at the landscape-level, restoring habitat connectivity, both structurally and functionally.
- Eliminate or reduce human pressures on grassland ecosystems, including motorized activity, recreational shooting, and impacts from livestock operations infrastructure.
- Identify and implement feasible and effective techniques to assist in prairie dog population recovery following plague epizootic events. (adapted from Seglund and Schnurr 2010)

Monitoring:

- Designate the Gunnison's prairie dogs as a focal species for grassland integrity.
- Conduct prairie dog population monitoring.

River Otter (*Lontra canadensis*)

- See Boyle 2006: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5210168.pdf

Rocky Mountain Bighorn Sheep (*Ovis canadensis canadensis*)

- See Beecham et al. 2007: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5181936.pdf

Townsend's big-eared Bat (*Corynorhinus townsendii townsendii*)

Townsend's big-eared bats depend on caves, mines, abandon buildings or the underside of bridges for general roosting, maternal roosting, and hibernation. Species persistence will depend on enabling continued access to caves, mines, and other roosting sites—both known, existing sites and potential habitable sites to promote the species' recovery. The Townsend big-eared bat has specialized habitat requirements that cannot be restored or maintained with ecosystem-focused, coarse-filter components alone. It is essential that management plan components protect roosting sites from human disturbance and minimize other threats and stressors. The RGNF 1996 LRMP includes a wildlife standard regarding the protection of caves and mines,

> Manage human disturbance at caves and abandoned mines where bat populations exist. When closing mines or caves for safety or protection reasons, reduce disturbance of residing bat populations and ensure bat access.

We recommend that this or a similar standard be retained in the revised management plan. The following recommendations have been adapted largely from the Forest Service's Region 2 Townsend's *Big-eared Bat (Corynorhinus townsendii): A Technical Conservation Assessment* (Gruver and Keinath 2006) and Colorado Parks and Wildlife State Wildlife Action Plan (CPW 2015).

Roost Protection:

- Manage to eliminate or limit disturbance, such as from mining and recreation, of known and potential roost sites, especially to roost sites, maternity colonies, and hibernacula; human activity in and near roosts must be minimized or eliminated, particularly during reproductive and hibernal periods. (Gruver and Keinath 2006; CPW 2015)

- Assess of patterns of roost use and movement to better understand patterns of roost use and fidelity to adequately protect roosting habitat through time and to adequately assess population trends. (Gruver and Keinath 2006)

- Employ appropriate site-specific and/or species-specific techniques for closures and safety enhancements (CPW 2015: 224), such as, by using gates to enable bats access to caves while keeping people out. However, research has shown that gates can negatively affect Townsend's Big-eared Bats but that they may be adaptable in the long-term (Diamond and Diamond 2014). It is important when installing gates that the best available science be used to identify bat-compatible gates.

Prevent Disease Spread:

- Manage recreation, research, management, and other human disturbances to control the spread of pathogens (CPW 2015: 224), i.e., to prevent white nose syndrome.

Timber:

- Timber harvest regimes, prescribed burns, and other vegetation management actions should maintain a mosaic of mature forest canopy that can be perpetuated through time. (Gruver and Keinath 2006)

Chemicals:

- Elimination of exposure to toxins by remediating indirect sources of exposure to toxins and eliminate direct exposure will benefit this and other species of wildlife. (Gruver and Keinath 2006)

- Reduce or eliminate herbicide and pesticide use, such as forestry effluents, to prevent the reduction in prey from spraying or runoff. (CPW 2015: 224)

6. Climate Change

The 2012 Planning Rule adopts an intentional approach to planning for climate change. In fact, the rule was explicitly designed to be a vehicle for adaptation planning and the implementation of strategies to make national forests more resilient to the stresses of climate change (77 Fed. Reg. 21164). The Planning Rule states that the intent of the rule is to allow "the Forest Service to adapt to changing conditions, including climate change…" (36 CFR 219.5(a)).

The Planning Rule establishes adaptation to climate change as a primary consideration within the three phases of planning (assessment, planning and implementation/monitoring).

- The forest plan assessment will identify and evaluate existing information relevant to the forest plan on climate change as a system driver and a stressor, and evaluate information regarding "the ability of terrestrial and aquatic ecosystems on the plan area to adapt to change."
- During the planning phase, the forest plan must develop plan components (i.e. strategies) for ecological sustainability and diversity of plant and animal communities which take climate change into account, based on the best available scientific information, provided in the Assessment.
- The forest plan monitoring program must evaluate the effectiveness of the adaptation strategies and contain one or more monitoring questions and associated indicators on "measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area."

Climate change, including adaptation to climate change effects, does not receive much overt attention in the Proposed Action (it is conceivable that climate considerations can be "built into" plan components, and thus not readily apparent within them. But we do not believe that to be the case in this instance.). There in only one meaningful reference under Goal 2: To aggressively diversify "age classes and structure, seral stage and habitat classes" for the purposes of providing "responsiveness to *anticipated changes in climate*" (emphasis added). It is also suggested in other plan

components for example the desire to maintain habitat, structure, pattern and disturbance frequencies (conditions) *similar to those that result from natural disturbances*. Those natural disturbance conditions used for emulation should be informed by climate change information. Similarly, ecological conditions necessary for at-risk species need to be informed by climate change information. Because there are no actual desired conditions for at-risk species, there are clearly no adaptation strategies for them either.

Whether or not the forest plan can provide for the persistence of species, ecosystems and their key characteristics in the face of climate change depends on how effectively BASI is applied to the planning process, and how effectively climate change was incorporated into the Assessment, which is required to "assess system drivers, stressors, including risks related to climate change" (FSH 1909.12 Ch. 10, 12.3). It is important to note that even if the Assessment fails to consider and document the range of BASI on an important topic such as climate, the BASI should be continuously considered and provided as the planning process proceeds.

Climate change effects are considered a system driver as well as a stressor, when coupled with other processes affected by climate change, such as increases in the spread of invasive species. The Assessment must also come to a status determination for ecological integrity which includes factoring in "the influence of climate change" (12.14c). Not factoring climate into the integrity analysis may result in plan components that do not account for climate trends and will thus be ineffective in providing for integrity; in other words, it will not be possible to provide conditions that *anticipate changes in climate*.

The absence of a climate analysis for planning may also affect at-risk species, both in the failure to provide climate adaptation strategies at the ecosystem-level, but in the absence of climate informed plan components for individual species as well. Climate threats are to be considered when considering species to select as SCC (FSH 1909 Ch. 10, 12.52d), and when determining the status of at-risk species (FSH 1909 Ch. 10, 12.55). This enables the development of adaptation-based plan components for ecological conditions for at-risk species.

It does appear that climate threats were incorporated to some degree into the decisionmaking process for SCC and other at-risk species. For example, the Black swift was included on the SCC list due to susceptibility to "climate related stressors" (at-risk species Assessment p. 37). Specific plan components that address climate threats, coupled with other stressors (e.g. water diversion), will be necessary for this and other species with recognized climate concerns.

The Rio Grande ecosystem Assessment states that the modelling which occurred for NRV and ecosystem integrity "did not specifically include climate change" (Assessments 1 and 3, p. 1). This is worrisome in that it indicates that plan components will not be designed to provide for the conservation of resources in the face of climate change. The Assessment notes that, "The current Rio Grande Forest Plan does not include any guidance related to climate change" (p. 2) but that "We recommend addressing climate change in our revised Forest Plan" (p. 5). How the plan will do this absent climate information is a key question at this stage of the planning process. This is not an insignificant problem, and we are surprised that the Assessment did not use existing climate change adaptation and vulnerability information for resources, lands and waters in Colorado (see below).

Despite these deficiencies, the Assessment does suggest where climate change related plan components may be needed to address vulnerabilities. For instance, plan components will be

necessary to reduce manageable stresses on the Uncompahgre Fritillary Butterfly and other numerous climate stressed species dependent on high-elevation alpine ecosystems identified in the at-risk species Assessment. Climate threats are cited in the butterfly's recovery plan, operating in concert with other manageable threats such as habitat trampling caused by "Increasing recreational traffic, including extensive off-trail use (and) domestic livestock grazing…" (At-risk species Assessment, p. 7). In order to "contribute to the recovery" of the butterfly, the forest plan must constrain the manageable threats to the butterfly's recovery. In addition, the plan monitoring plan should include a specific question to evaluate climate impacts on the endangered butterfly, as recommended in the at-risk species Assessment (p. 7). Similarly, the White-tailed ptarmigan is another alpine species threatened by climate change and additionally stressed by grazing, recreational use and mining (at-risk species Assessment p.55). There must be plan components directed at those threats.

The Assessment also notes that, "Research suggests that we should be building off of *the parts of the ecosystems that improve resilience and resistance to climate change*, including unique ecological attributes such as fens, riparian zones (Seavey et al. 2009) and the parts of the spruce fir forest that resisted, or were unaffected by the spruce beetle outbreak" (p. 5, emphasis added). As a general matter these resistant and resilient "parts" of the ecosystem should be selected as key characteristics for planning, management and monitoring, particularly if those "parts" are found to be vulnerable to climate impacts. For example, there should be plan direction to preserve cold water refugia. There should also be specific plan components directed at the protection and restoration of all late successional habitat given the estimated deficits and estimated effects of climate driven changes in disturbance regimes. Specific plan components to conserve these recognized features should be developed. We recommend desired condition statements for each, coupled with any necessary constraints (standards and guidelines) to avoid impacts from additional stressors.

Low elevation riparian areas, seeps and springs should also receive special attention in the plan components and monitoring, based on their climate vulnerabilities noted in the Assessment (p. 5 and 43). The Assessment notes that the effects of grazing, roads and travel management on climate vulnerable low elevation riparian areas are of concern and need to be rigorously evaluated; it even suggests the modification of existing standards and guidelines "to ensure the continued protection of these areas from sedimentation and erosion" and "monitoring and regulation of livestock grazing" (p. 43). Plan components should reflect this strongly stated concern and the effects of the forest plan on these vulnerable resources should be rigorously analyzed within the DEIS. The draft plan should consider an alternative to reintroduce beaver as an adaptation strategy, as suggested by the Assessment (p. 43). In addition, there needs to be strong plan direction for the conservation of wetlands, which are noted in the at-risk species Assessment as providing necessary ecological conditions for several at-risk species (boreal toad, Northern leopard frog, New Mexico meadow jumping mouse) that are threatened by climate change (at-risk species Assessment p 53). Plan components to protect and restore the ecological condition of meadows could be either "coarse" or "fine-filtered", but either way need to provide the necessary condition for these at-risk species, and account for climate driven threats, coupled with others that can be addressed directly by the forest plan (e.g. decreased water quality, water development, timber harvest, livestock grazing, habitat fragmentation, non-native species).

The ecosystem Assessment suggests climate adaptation strategies on p. 43. These should be reflected in the draft plan.

Notably that section of the Assessment calls for the restoration of fire "to its historical role on the forest" (p. 43). To accomplish this the Forest will need to develop desired conditions for wildfire for specific ecosystems associated with frequency and severity and other relevant factors. It is defensible to introduce the concept of "fire management zones" but it will be essential to have clear plan components for fire in these areas so that integrity can be determined for each ecosystem.

There must also be desired conditions and other plan components for rare communities and special habitats, as noted in the Assessment, due to their vulnerability to climate change effects.

Plan components for "heterogeneous conditions at a variety of scales" (p. 43) should also be considered in the draft plan, which will need to clearly describe the desired heterogeneity, features and ecosystems to which the desired condition applies.

The Assessment also notes a significant degree of uncertainty in how climate change effects will manifest on the Forest. The Proposed Action states that, "The intent of the monitoring is to provide the Responsible Official with sufficient information to inform key management decisions about the success of the plan" which is true but the monitoring plan should also test "relevant assumptions", including those surrounding climate change effects on resources governed by the plan. The monitoring plan should be coordinated with the Rocky Mountain Research Station and with the broader-scale monitoring strategy (36 CFR 219.12). Many climate-based questions concerning changes in ecosystem conditions and the effectiveness of adaptation strategies for at-risk species will transcend individual forests. The Assessment calls for monitoring of management practices such as timber harvest, salvage, grazing and others to understand how the possible stress of these effects interact with other climate driven stressors. Seeing pointed monitoring questions to this effect in the monitoring plan is recommended.

Additional information resources:

- The Colorado Climate Change Plan, 2015 (http://cwcb.state.co.us/environment/climate-change/Pages/main.aspx)
- Colorado Wildlife Action Plan Enhancement: Climate Change Vulnerability Assessment (http://www.cnhp.colostate.edu/download/documents/2014/CO_SWAP_Enhancement_CCVA.pdf)
- U.S. Forest Service Rocky Mountain Research Station, Climate Change Vulnerability Assessments and Related Literature for Aquatic Ecosystems (http://www.fs.fed.us/rmrs/climate-change-vulnerability-assessments-and-related-literature-aquatic-ecosystems-colorado)

7. Monitoring

7.1. General Comments

It is important not to think of monitoring as an afterthought to the planning process. In fact, monitoring should be foremost in mind when developing the plan. For example, when drafting a desired condition, it is useful to think: How will we measure this? Most of the plan components in the Proposed Action would not meet this test. For example, how would the monitoring plan address the "status of a select set of the ecological conditions required…to maintain a viable population of

each" SCC. As it stands in the Proposed Action, that monitoring requirement could not be met because the necessary plan direction does not exist.

"Monitoring information should enable the responsible official to determine if a change in plan components" may be needed (36 CFR 219.12(a)). The suggestion that forest plans should be constructed such that they never require amendment undercuts the intention of the rule to use plan components to effectively meet Planning Rule requirements. Monitoring within a planning framework that does not provide for accountability undermines a legitimate adaptive management program. We refer back to our comments on "Responsiveness and Flexibility" earlier support this point.

Much thought should be given to the "select set of ecological conditions." Those ecological conditions that are most heavily dependent on assumptions should be prioritized for monitoring, in that they carry the most risk for at-risk species; cases where that risk of uncertainty is compounded by management effects are highest priority. This question can be answered by asking: "We think the species needs this, but we are not sure…"

We recommend that the Forest refer to "Applying the 2012 Planning Rule to Conserve Species: A Practitioner's Reference" when developing a monitoring approach (and other approaches) to at-risk species (see p. 43). The report correctly points out that monitoring of ecological conditions alone "is less useful when habitat and population dynamics are poorly linked…" (p. 45). Monitoring ecological conditions alone carries some risk for those types of species and thus the authors point out that "the Rule nor the Directives explicitly preclude measuring the occurrence, distribution, abundance, or other population parameters of at-risk species as an indicator of plan effectiveness" (p. 46). The Forest should consider cases where it may be necessary to directly measure population parameters of specific species where collection of ecological condition information alone poses a risk to the conservation of such species. Fiscal realities must be considered as well, and priority for population monitoring should be given to cases of high risk.

7.2. Recommended Focal Species

The Planning Rule addresses focal species in conjunction with the plan monitoring program developed by the responsible official (36 CFR § 219.12(a)(5)(iii)). The purposes of focal species are to permit "inference to the integrity of the larger ecological system to which it belongs" and provide "meaningful information regarding the effectiveness of the plan in maintaining or restoring the ecological conditions to maintain the diversity of plant and animal communities in the plan area" (36 CFR. § 219.19). The 2012 rule also includes requirements for focal species. Focal species are employed in the plan monitoring program to evaluate the effectiveness of the forest plan in meeting the diversity requirements (36 C.F.R. § 219.12(a)(5)(iii)). Effective monitoring may require that some SCCs be selected as focal species. The Forest should track the status of focal species throughout the life of the management plan. Species that are either known or hypothesized to be particularly sensitive to climate disruptions should be strongly considered. We recommend the following focal species.

Beaver (*Castor canadensis*)

Beavers are considered keystone, or strongly interacting, species. A technical conservation assessment of beavers prepared for the Rocky Mountain Region (Region 2) acknowledged the

interactive role of the rodents in riparian systems (Boyle and Owens 2007). Studies have demonstrated the negative consequences of beaver losses as well as the ecosystem services beavers provide through their dam building (Naiman et al. 1994; Gurnell 1998; Wright et al. 2002; Butler and Malanson 2005; Westbrook et al. 2006; Stevens et al. 2007; Bartel et al. 2010; Westbrook et al. 2011). Miller et al. 2003: 188, citing Naiman et al. (1988) and Gurnell (1998), presented a long list of documented ecological impacts of beaver engineering,

> stabilization of stream flows; increased wetted surface area (i.e. benthic habitat); elevation of water tables causing changes in floodplain plant communities; creation of forest openings; creation of conditions favoring wildlife that depend upon ponds, pond edges, dead trees, or other new habitats created by beavers; enhancement or degradation of conditions for various species of fish; replacement of lotic invertebrate taxa (e.g., shredders and scrapers) by lentic forms (e.g., collectors and predators); increased invertebrate biomass; increased plankton productivity; reduced stream turbidity; increased nutrient availability; increased carbon turnover time; increased nitrogen fixation by microbes; increased aerobic respiration; increased methane production; reduced spring and summer oxygen levels in beaver ponds; and increased ecosystem resistance to perturbations.

Additionally, the presence of beaver dams and the functional populations of beaver in suitable habitats contribute to resilience in the face of climate change (Bird et al. 2011).

Beaver ponds provide winter habitat for Rio Grande cutthroat trout (Pritchard and Cowley 2006) and breeding habitat for boreal toads (Keinath and McGee 2005), two Region Two sensitive species that occur in the Forest, and species the RGNF has proposed as species of conservation concern.

Canada Lynx (*Lynx canadensis*)

The presence and persistence of lynx populations can help indicate the integrity of old growth montane forests and the integrity of movement corridors. Lynx prefer high-elevation habitats characterized by forests at a variety of succession stages that result from natural disturbance regimes, such as fire (Miller et al. 2003). In the Southern Rockies, habitat includes vegetative communities typified by Engelmann spruce (Picea engelmannii), lodgepole pine (Pinus contorta), aspen (Populus tremuloides), and subalpine fir (Abies lasiocarpa) (Koehler and Aubry 1994). Lynx primarily prey primarily on snowshoe hares and red squirrels (Tamiasciurus hudsonicus). Lynx populations need extensive patches of high quality habitat, given their large home ranges. Two lynx require about 40 square miles (McKelvey et al. 1999). Carroll et al. (2001) recommend including carnivores as focal species in "regional-scale monitoring programs" and specifically included Canada lynx in their recommendations.

Rio Grande Cutthroat Trout (*Oncorhynchus clarkii virginalis*)

Cutthroat trout are indicators of mountain stream quality (Behnke 2002). They require cold, clear streams with stable temperatures and well-vegetated banks (Hickman and Raleigh 1982; Raleigh and Duff 1981; Miller et al. 2003) as well as distinctive habitats for spawning, juvenile rearing, and overwintering. They are vulnerable to threats such as over-fishing; habitat loss and degradation from logging, mining, and livestock grazing; the introduction of non-native fish; disease, and roads. The Rio Grande cutthroat trout was a former a Management Indicator Species for Region 2.

Brown creeper (*Certhia americana*)

Brown creepers are indicators of sustainable management of late-seral forests (Aubry and Raley 2002; Hejl et al. 2002; Poulin et al. 2008; Poulin et al. 2010). They inhabit mixed conifer subalpine forests and require snags or dying trees where they nest under peeling bark (Hejl et al. 2002). Scientists commonly employ brown creepers as focal species to study forest disturbance (see Imbeau et al. 2000; Farris et al. 2010; Poulin et al. 2010; Vogeler et al. 2013). Because they have large territories, Poulin et al. (2010) suggested they serve as umbrellas species for other mature old-growth specialists.

Hairy woodpecker (*Picoides vallosus*)

Hairy woodpeckers are associated with unlogged burned habitats with high snag densities; they avoid areas with low snag densities (Haggard and Gaines 2001; Saab et al. 2009). Woodpeckers are indicators for snag densities, sizes, and decay rates (Hilty and Merenlender 2000; Haggard and Gaines 2001; Bate et al. 2008; Nappi et al. 2015). Woodpeckers are keystone species in conifer-dominated forests as primary cavity excavators that benefit a range of secondary cavity-using wildlife (Tarbill et al. 2015).

Northern Goshawk (*Accipiter gentilis*)

Northern goshawks use a variety of forest types, but nest primarily in ponderosa pine and Douglas fir forests (Boyce et al. 2006). They are indicators of the integrity of mature, old growth forest structure and composition and a sufficient forest prey base of small mammals and birds and have been recommended as indicator species in several studies (Hilty and Merenlender 2000). Threats include timber harvesting, in particular, and severe fires as well as fuel treatments. Home range size is estimated to be 2,000-3,000 ha (Boyce et al. 2006). Territories average being within a 1.6 km from nest sites, and they have strong nest site fidelity. Long distance movements should be considered in scale consideration for management (Graham et al. 1999) and the need for large areas of connected habitat. The Forest Service has a monitoring guide for the Northern goshawk (Woodbridge and Hargis 2006). We believe the goshawk makes a particularly good focal species because tracking and monitoring protocols for this species are already well-established.

8. Designated Area Recommendations

We recommend the attached proposed areas be recommended for Wilderness designation (See Appendix B).

We recommend the attached proposed areas be designated by the Forest Service as special areas (See Appendix C).

We recommend the attached proposed Decker Creek Gunnison Sage Grouse Protection Area be designated as a zoological area by the Forest Service (See Appendix D).

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