May 23, 2017

Tonto National Forest
Tonto Plan Revision
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Submitted via mail and email.

Re: Comments on Notice of Intent for the Forest Plan Revisions on the Tonto National Forest Needs to Change

To the Forest Plan Revision Team:

These comments are provided in collaboration with the above mentioned conservation organizations. We have reviewed the Notice of Intent (NOI) and supporting materials available on the Tonto Plan website. We are providing comments on these documents. The Federal Register notice for this action (82 Fed. Reg. 16779, April 6, 2017) stated that comments "will be most valuable if submitted by May 23, 2017," making these comments timely.

Sierra Club's Grand Canyon Chapter and our more than 60,000 members and supporters in Arizona. Sierra Club's mission is "to explore, enjoy, and protect the wild places of the earth; to practice and promote the responsible use of the earth's ecosystems and resources; and to educate and enlist humanity to protect and restore the quality of the natural and human environments." Our members have a significant interest in and are directly affected by the Tonto National Forest Plan, as our members have long enjoyed and explored the Tonto and advocated for its protections. Sierra Club was involved in the previous Forest Plan process and has been engaged consistently since the Tonto reinitiated the planning process. Our members hike, backpack, camp, raft, kayak, watch wildlife, hunt, and fish, as well as many other recreational activities on the Tonto. Our members also consistently assist with service projects including assisting with invasive species removal, wildlife research, trail maintenance, trash cleanups, and numerous other activities to help steward the Tonto National Forest.

Wildlands Network is an international organization dedicated to reconnecting nature throughout North America. We provide the science and vision necessary to preserve large-scale ecosystems for species that need space to migrate, disperse, and adapt to climate change.

Arizona Wilderness Coalition (AWC) mission is to permanently protect and restore wildlands and waters in Arizona for the enjoyment of all citizens and to ensure that Arizona's native plants and animals have a

lasting home in wild nature. Our nearly 2,000 members and supporters enjoy a broad range of activities on the Tonto National Forest (TNF). Our membership includes hikers, hunters, fishing enthusiasts, photographers, equestrians, naturalists, educators, history buffs, and many other groups and individuals who value the special natural retreats afforded by wilderness and backcountry areas on the TNF. We also cooperate extensively with the TNF to complete stewardship and restoration projects with volunteers.

The **Center for Biological Diversity** is a national, nonprofit conservation organization with more than 1.3 million members and online activists dedicated to the protection of endangered species and wild places. The members and activists of the Center are concerned with the management of our federal public lands, including our national forests, especially as that management relates to the recovery and viability of native species and habitat. While we maintain members and supporters within the counties where ranger districts of the Tonto National Forest are located, our national public lands are to be managed for the benefit of all Americans, and we therefore speak for all our members and supporters throughout the United States.

Our intent in submitting these comments is to work in cooperation with the Forest Service and the larger public to ensure that the Tonto National Forest – as a public trust resource – is managed for the long-term public interest for the benefit of existing and future generations.

Please do not hesitate to contact us if you have any questions about the content or recommendations offered in this letter.

Regards,

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Introduction and Background

Now is the time for bold action in forest planning. Robust, science-based forest plan decisions will result in 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, …including 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).

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). Management components, goals, and approaches must be detailed, enforceable, and designed to protect and restore wild forest landscapes that are held in trust for all Americans, not just those with economic interests in our natural resources.

At this time, several national forests are at various stages in the process of revising their management plans

under the 2012 planning rule. Two forests have issued final plans under the rule. The Tonto National Forest (TNF) has much to gain from drawing lessons from "early adopter" and other forests at more advanced stages of planning. These comments, in part, share knowledge we have gained in participating in other planning processes.

The NEPA Process

The revised forest plan must tell the public how the Forest Service intends to manage the Tonto National Forest for the next 10-15 years (or more). The Environmental Impact Statement (EIS) for the revised forest plan must evaluate the effects of that in a way that will meaningfully inform decision-makers about likely outcomes. The EIS must determine the most likely future conditions, and related uncertainty, before it can use them as an assumption in its effects analysis.

The analysis must take into account the effects of the management activities necessary to achieve the desired conditions, as well as those that may interfere with achievement of desired conditions.
The proposed and possible actions required by 36 CFR § 7(f)(1)(iv) may be useful for effects analysis. The effects of standards, guidelines, and suitability on constraining harmful activities are especially important to determining effects on at-risk species. As measures that mitigate environmental effects, their effectiveness must also be considered. Track records for existing plan components may be helpful with this if they are retained.

It is important to recognize that the uncertainty created by the absence of binding components in the plan must be reflected in the effects analysis by showing a greater probability of adverse effects occurring. It was not the intent of the 2012 planning rule to build uncertainty into forest plans. It provides an adaptive management process through the planning framework (see 36 CFR § 219.5) using forest plan amendments. Flexibility may also be provided by ranges of values in plan components, which lead to ranges of effects. Vague or discretionary plan components necessarily mean greater uncertainty and risk about the effects, which will make it more difficult to evaluate them and to show compliance with NFMA diversity requirements or to establish regulatory mechanisms recognizable under the Endangered Species Act (ESA). We will be looking at this aspect of the analysis closely.

There also may be a need for alternatives that include changes in the language of forest-wide plan components (including additions or deletions). We would expect that alternatives that rely more heavily on standards than desired conditions would achieve more certain and desirable outcomes for at-risk species because of their mandatory nature.

It is important for the EIS analysis to recognize what is a plan component and what isn't, and it will be helpful to clarify that in the descriptions of alternatives. Only plan components have effects, and the sections of the plan document that contain plan components should be clearly identified and contain only plan components.

Additional information may be useful in the plan but may also be confusing or misleading.

The Forest Service has a responsibility to develop a wide range of alternatives to study within this plan revision process. The range of alternatives is "the heart of the environmental impact statement" (40 C.F.R. § 1503.4(a)). NEPA requires agencies to "rigorously explore and objectively evaluate" a range of alternatives (See 40 C.F.R. §§ 1502.14(a) and 1508.25(c)). This includes analyzing the direct, indirect, and cumulative impacts of each alternative and action considered (40 C.F.R. § 1502.16). NEPA requirements state that "no action concerning the proposal should be taken which would: (1) Have an adverse environmental impact; or (2) Limit the choice of reasonable alternatives" (40 C.F.R. § 1506.1(a)). *Catron County v. U.S Fish and Wildlife Service*, 75 F.2d 1429 (10th Cir. 1996) (partial NEPA compliance is not enough.) In addition, the law requires consideration of a range of mitigation measures. *See Kootenai Tribe of Idaho v. Veneman*, 313 F.3d 1094,1122-1123 (9th Cir. 2002) (and cases cited therein) (stating that agencies must develop and analyze environmentally protective alternatives in order to comply with NEPA).

The Forest Service must "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources" (42 U.S.C. § 4332(2)(C) and (E)). Of equal importance, the Forest Service must adequately "describe the environment of the areas to be affected or created by the alternatives under consideration" (40 C.F.R. §1502.15). Establishment of baseline conditions is a requirement of NEPA.[1]

Needs to Change Process (pg. 2-3)

- Page 2 Although connectivity is discussed on page 9, it is such an important issue that it qualifies as a theme statement. Add theme 12: Preserve and improve ecological connectivity between the TNF and adjoining public and private ownerships.
- First and foremost there is an overarching need to change the funding apparatus for Tonto National Forest. Budget cuts have crippled the agency's effectiveness both in the office and in the field. That being said, there is also an overarching need to change the staffing levels in District and Regional offices. Too many staffing positions go unfulfilled due to budget cuts. There is a need to change the way Tonto National Forest staff think about Tonto National Forest. Resource protection always needs to come before user access.

Plan Content (pg. 3-5)

Plan Components (pg. 3-4):

[1] In *Half Moon Bay Fisherman's Marketing Ass'n v.Carlucci*, 857 F.2d 505, 510 (9th Cir. 1988), the Ninth Circuit states that "without establishing . . . baseline conditions . . . there is simply no way to determine what effect [an action] will have on the environment, and consequently, no way to comply with NEPA." The court further held that, "The concept of a baseline against which to compare predictions of the effects of the proposed action and reasonable alternatives is critical to the NEPA process."

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? We appreciate that the TNF Need to Change (NTC) document has incorporated the definitions of plan components and other plan content up front.

Measurable Desired Conditions

Desired conditions must be "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. We recommend the TNF avoid subjective terms (e.g., adequate, sufficient, resilient, healthy, sustainable, typically, satisfactory …) when crafting desired condition statements. The less specific and ascertainable the desired conditions are, the more mandatory standards are needed to provide certainty that the Planning Rule's requirements are being met.

Need for Standards

We support the inclusion of management approaches that provide additional clarity and details to guide the implementation of plan components (e.g., NTC statements 5, 7, 8, and 9). We recommend that management approaches bolster plan components and that the plan avoid substituting management approaches for plan components when plan components are necessary to meet rule requirements.

The most reliable means of ensuring that harmful activities do not occur is to use mandatory standards and/or determinations that lands are not suitable for such activities. Additionally, standards must be written with sufficient specificity to clearly identify the constraint on projects and activities intended by the standard.

Management Decisions

There may be an allure 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 National Forest Management Act (NFMA) to conserve and restore our national forests and resident wildlife and plants. We have seen this approach arise in other draft plans and plan components. The planning rule requires that *plan components*—not project decisions—provide ecological conditions for at-risk species.

A plan that provides 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.

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.

Management Areas

In addition, for each such area having different management requirements the plan should include a map showing where these plan components apply (as was done for Recreation Opportunity System and scenic integrity) so they may be used in the effects analysis. The Ninth Circuit has held that it is important to know where important landscapes are located in order to consider how a forest plan affects them and to propose alternatives: "Without data on the location of the big game winter range, the public was severely limited in its ability to participate in the decision-making process" (WildEarth Guardians v. Montana Snowmobile Association, 2015). Note that the different desired conditions or other plan components for these areas will also require a unique analysis of timber suitability since that is based on compatibility with plan components.

Monitoring Program (pg. 4)

- Monitoring within a planning framework that does not provide for accountability undermines a legitimate adaptive management program. 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.

- The Forest Service should incorporate and follow the Best Available Scientific Information (BASI) in monitoring and adaptive management:
    - The 2012 planning rule dictates that the Forest Service create plans that incorporate "responsive planning," which in this case requires a detailed monitoring program (36 CFR 219.5). The BASI should guide a monitoring program. While the specifics of the monitoring program adopted by each forest are left to the discretion of the Forest Service, the general principle to be followed is to create a program that will result in the collection of information that "should enable the responsible official to determine if a change in plan components . . . may be needed" (36 CFR 219.12(a)). Given the ongoing research into best forest management practices, the range of potential impacts associated with climate change, and the amount of time this plan will provide management guidance, it is essential that the Tonto National Forest monitoring program be robust and scientifically-based. Under the planning rule, the monitoring program must include questions and associated indicators, which will operate by "testing relevant assumptions, tracking relevant changes, and measuring management effectiveness and progress toward achieving or maintaining the plan's desired conditions or objectives" (36 CFR 219.12(a)(2)).
    - As a general matter, if the Forest Service intends on adopting an adaptive management approach to forest planning, or for specific activities authorized by the Tonto National Forest plan, such adaptive management should follow science-based standards and include defined and specific trigger points that result in either identified changes in management strategy or the initiation of a public input process to revise management guidelines. The primary goal of the Forest Service in adopting this general management approach should be to manage forest resources to meet desired conditions for forest resources, including wildlife species and habitat, while allowing for changes in management if monitoring indicates that desired conditions are not being met, before conditions have deteriorated past the point at which the Forest Service can remedy the problem.

- The Forest Service should incorporate trigger points in adaptive management:
    - Science-based adaptive management involves "treating management interventions as experiments, the outcomes of which are monitored and fed back into management planning" (Gillson et al. 2013: 140). Essentially, as outlined by land management experts, an adaptive management approach to forest management should include the following (Nie and Schultz 2012):
        - Creation of management strategies (plan components/specific action alternatives in this case)

        - Implementation of those strategies/actions
        - Monitoring of the effects (under the monitoring framework developed as part of the planning process)
        - Predetermined triggers for changes in management based on the results of monitoring
    - Triggers may include decreases in species occurrence, loss of key habitat components, increases in invasive plants or animals, declines in focal species, or other identified negative outcomes. In some cases, it may be appropriate for the Forest Service to identify a range of management strategies for a specific forest use, such as livestock grazing, which could be used at different times based on relevant conditions and the results of monitoring. One potential way to facilitate this type of monitoring and adaptive management approach is through the use of control areas or experimental management zones, which would allow for evidence-based management changes and approaches. The range of management strategies and identification of trigger points for more project-specific actions may be developed later in time during project-specific NEPA, but this plan should call for such an approach as a general method of management.

- The use of listed species as focal species in monitoring progress towards achieving desired conditions
    - Planning rule section 219.12(a)(5) lists eight monitoring requirements which must be addressed in a monitoring program. Of particular concerns are requirements (iii) and (iv), addressing the status of focal species and ecological conditions that "contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern." Because neither the Assessment nor the Needs to Change documents make any mention of focal species, it's important that the EIS adequately review a range of potential plant and animal species "whose status permits inference to the integrity of the larger ecological system to which it belongs and provides 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). Because there is extensive and intensive historical and ongoing monitoring and study of federally listed species' populations and their habitats, we suggest the use of the following species as focal species for monitoring of plan effectiveness in the species associated ERU's: Chiricahua leopard frog, yellow-billed cuckoo, southwestern willow flycatcher, Mexican spotted owl, narrow-headed gartersnake, northern Mexican gartersnake. In addition, listed and non-listed native fish species and species of conservation concern list in Table 113 of the Final Assessment should be considered as focal species as well. Common, wide-ranging and generalist species should be avoided as focal species.
    - We suggest the use of northern goshawk as a focal species in assessing management effectiveness in achieving desired conditions in forested Ecological Reporting Units (ERUs). Whereas the Final Assessment (page 345) states that "more information is needed in order to

determine the current risk to the raptor in the planning area", despite the bird being a Bureau of Land Management (BLM) listed species, an Arizona Species of Greatest Conservation Need, a local conservation concern based on expert opinion, and on the Southwest Regional Foresters 2013 Sensitive Species List (Final Assessment, page 333), we consider designation as a focal species a timely opportunity for the Forest Service to gain a better understanding of management actions on the species. Northern goshawks use a variety of forest types, but nest primarily in ponderosa pine and Douglas fir forests (Boyce et al. 2006) and prefer mature forest structure with high canopy cover, large trees, and relatively high trees per acre (Greenwald et al. 2005). 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 1.6 km from nest sites and goshawks 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). Over 70 percent of the goshawk's prey species depend upon mid-aged forests or older for nesting, foraging or both, making their population levels and viability an excellent indicator for forest conditions generally, especially within ponderosa pine habitat. More science is needed to determine which management practices actually benefit the goshawk, and what its population trajectories are. This species should be closely monitored through the focal species monitoring program.

- An adaptive management monitoring framework is necessary at the project level.
    - The 2012 planning rule attempts to distinguish plan monitoring from project monitoring by stating that requirements for plan monitoring do not apply to projects (36 CFR 219.12(a)(7)), but in our opinion it is not entirely possible to separate them. Monitoring questions must address whether or not standards and guidelines are effective in achieving their purposes. Since standards and guidelines are directed at how projects are implemented, plan monitoring has to include monitoring of both compliance with project design requirements and the effects on the project that the plan component was intended to address. In this sense certain aspects of plan monitoring requires project monitoring. Essentially, the monitoring program should act as the backbone of the adaptive management strategy to be employed by the Forest Service at the project level. Therefore, we ask that the Forest Service integrate the plan level monitoring framework into project and/or activity design and analysis criteria, including but not limited to the development and application of Standards and *Guidelines* designed with the intent on meeting Desired Conditions.

Forest Wide Management

Collaboration and Partnerships (pg. 7):

- This Needs to Change section reflects many good elements that recognize the strong dependence of the Forest on partners to sustain and maintain Forest conditions. Given the acknowledgement of extensive unmet TNF maintenance needs (as noted in the Recreation and Infrastructure sections), the Collaboration and Partnerships section should include an additional Needs to Change:
    - Work with the TNF Partnerships Liaison and key partner groups to identify the obstacles to effective partner support of TNF maintenance and restoration needs, and implement actions to remove those obstacles. (Examples may include better coordination and communication between different units of the TNF when working with partners, continuity of planning for partner projects when there is TNF staff turnover, support in completing necessary partnership and volunteer agreements, and the like).

- It is recommended when establishing new relationships for collaboration that the Tonto seek partnerships with organizations possessing longstanding and thoughtful relationships with communities of color.

- Collaborative work and developing partnerships with Forest Service staff may be difficult when individual Ranger Districts are not staffed at appropriate (historical) levels. Volunteers may need training for a given task, but if a staff position is vacant, or if a staff person has been asked to wear too many hats, the volunteer's needs may not be met. This would apply to #7 on page 7.

Ecological Sustainability

Terrestrial Ecosystems (pg.8-9):

- There's no mention of livestock grazing as a major ecosystem stressor on page 8. Livestock is clearly a major stressor for these systems as has been well documented. The Tonto should address this as part of the Needs to Change. It is of even more concern and more necessary to acknowledge and reduce this stressor considering the overarching impacts of climate change.

- In response to Need #13, we request the Forest Service consider the following information to inform the development of plan components and reasonable alternatives:
    - Generally, forest plans should aspire to create a more resilient transportation network, given the significant negative effects roads and other routes have on ecosystem functionality, watershed conditions, and species persistence. Areas important for connectivity should be identified within forest plans.
    - The Santa Fe National Forest has proposed the following desired condition that emphasizes the role of connectivity in facilitating species migration and genetic exchange: Aquatic habitats are connected and free from alterations (e.g., temperature regime changes, lack of adequate

streamflow, barriers to aquatic organism passage) to allow for species migration, connectivity of fragmented populations and genetic exchange (USDA, 2017). This desired condition is relevant for the Tonto National Forest and would be supported by an objective to prioritize areas for restoration of connectivity and possibly standards or guidelines to constrain management actions that may impede achievement of the desired connected condition.
    - To improve aquatic ecosystem integrity and provide necessary habitat conditions for at-risk fish and other aquatic species, the Forest Service is embarking on a major effort to improve aquatic organism passage by removing or upgrading the thousands of culverts that fragment aquatic habitat on national forest lands. All forest plans will likely have plan components similar to this objective within the Flathead's Draft Revised Forest Plan: "Reconnect 10 to 20 miles of habitat in streams disconnected by roads or culverts where aquatic and riparian-associated species' migratory needs are limiting distribution of the species" (USDA, 2016a).
    - Please see Appendix A for a connectivity science and policy literature review for incorporation into the project record and consideration in development of plan components and reasonable alternatives.

- #12: The health and productivity of desert, scrub/shrub, woodland, forest, riparian and grassland ecosystems are severely impaired by invasion of exotic plant and animal species. Watershed function and user-experience suffers as a result. Management actions undertaken within the authority of this Forest Plan will undoubtedly affect the spread of invasive species. For example, livestock facilitate the spread of exotic species, particularly in combination with fire, and reduce the competitive and reproductive capacities of native species. Exotic plant species, once established, can displace native species, in part, because native grasses are not adapted to frequent and close grazing in combination with fire disturbance (Mack and Thompson 1982; Melgoza et al. 1990, Belsky and Gelbard 2000). Exotic plant spread is a potentially significant cumulative impact of projects developed under this plan. Treatments similar to the likely future proposed actions have left forest sites overrun with cheatgrass (*Bromus tectorum*) (McGlone et al. 2009). Exotic grass invasion is foreseeable and has important long-term implications for native plant communities in fire-adapted ecosystems and wildlife. Control of invasive species is essential for reducing the severity and frequency of wildfire, especially in fire-sensitive desert ERU's. Experimental design that determines the best available methodology for controlling alien weed species should be implemented.

- The Forest Plan should analyze the following factors in developing plan components related to "addressing the impacts of exotic and invasive species" on terrestrial, aquatic, and riparian ecosystems, range management, vegetation treatments, fire use, and designing an adaptive management program:
    - The effects of domestic livestock, feral horse and burro grazing on the distribution, spread, and desired conditions of exotic species. Control measures for feral livestock should also be

analyzed.

- The effects of likely forthcoming vegetation management systems on the distribution, spread, and desired conditions of exotic species.
- The effects of the timing and extent of prescribed and naturally ignited fires on the distribution, spread, and desired conditions of exotic species.
- The effects of roads, trails, and unmanaged off-road vehicle use on the distribution, spread, and desired conditions of exotic species.
- The effects of exotic species on native species communities, wildfire seasonality and severity, attainment of desired conditions in vegetation management treatments, on threatened and endangered species (TES) and Species of Conservation Concern (SCC), and on habitat quality and abundance.
- The definition of desired conditions for exotic species and definition of triggers for adaptive management should be established in the best available scientific literature.
- Plan components which set guidelines for pasture rest following disturbance.

Frequent Fire Ecosystems (pg. 9-10):

- Page 10 #19 includes a need to better understand post-disturbance recovery of desert species. This is an important phrase and emphasizes the need for reference plots that are free from the disturbances such as grazing and OHV use, so the Forest Service can see and evaluate the potential of the land for recovery without those additional stressors. The Plan Team should consider making this an additional need statement.

- Page 10 Add # 20: Control of invasive species is essential for reducing the severity and frequency of wildfire. Experimental project design (i.e adaptive management) that determines the best available methodology for controlling alien weed species should be implemented.

- It needs to be recognized that fire has been mismanaged on the forested and grassland areas of the Tonto National Forest for so long through historic fire suppression that in many areas the forest resource now has four paths forward: uncontrolled burns, prescribed/managed burns, mechanical thinning, or some combination of thinning and burning. Low intensity natural burns, which used to be the norm, have been almost completely replaced by unnatural stand replacement fires. Whether ignition sources are human-caused or natural in origin the likely result will be a fire outside of the natural range of variability. It needs to be recognized that attempts to restore the forest to pre-European settlement conditions through the use of fire may sometimes result in an imperfect outcome. Care must be taken through the use of the precautionary principle and not try and restore too large of an area at once as that may harm the many species that rely on these areas for habitat.

- There is a need for robust, science-based ecological restoration across the Tonto National Forest that is founded on restoring ecosystem processes, retaining and encouraging old growth forest and

woodland structure, and accounting for irreversible departures from perceived historic range of variability. The degraded conditions which are characteristic of many ERUs can be attributed to society's mismanagement of our collective public resources. The Forest Plan can and must change direction towards restoration and recovery.

- The following italicized heading areas provide background and recommendations relevant to the plan Needs to Change specific to management of terrestrial ecosystems.

The need for landscape scale ecological restoration

The need for ecological restoration of frequent-fire adapted forests, woodlands, grasslands and chaparral on the Tonto National Forest is clear. Management that followed European settlement in the mid-19th century made ecosystems less resilient to natural disturbance, as logging, grazing, fire suppression, drought and severe fire removed large trees that naturally resist fire injury, and promoted forest structure packed with small trees and brush that competes with other native plants for limited water and soil nutrients. Chronic drought and warming temperatures make it increasingly likely that extensive stand-replacing fires will compound these changes to ecosystem composition with vegetation type-conversions, biodiversity loss, and degradation of ecosystem services (Hurteau et al. 2014) as well as diminished prospects for successful regeneration (Savage et al. 2013) and declining growth rates leading to increased mortality (Williams et al. 2010). Without action to restore the fire regime and recover mature forest and woodland structure, the Forest Service manages for high-intensity fires that outrun suppression resources in extreme weather, creating unnecessary expense and unacceptable risk to human life and resource values. At lower elevations, in deserts, fire must be managed to minimize its harmful effects to desert scrub ERU's. Need #19 includes a need to better understand post-disturbance recovery of desert species. This is an important phrase and emphasizes the need for reference plots that are free from the disturbances such as grazing and OHV use so we can see the potential of the land for recovery without those additional stressors. The Planning Team should consider making this an additional need statement.

The era of commercial timber harvest in the Southwest on national forests has largely ended. Management has shifted to accommodate greater interest and desire for recreation and preservation and restoration of wildlife habitat and environmental values. The planning rule reflects this shift, requiring that plans ensure that forests "consist of ecosystems and watersheds with ecological integrity and diverse plant and animal communities," and provide ecological benefits including "habitat for fish, wildlife, and plant communities" (36 C.F.R. 219.1(c)). This approach requires the Forest Service to develop forest "plan components, including standards and guidelines, to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds," as well as the "the diversity of ecosystems and habitat types" (36 CFR 219.9).

This approach requires an emphasis on restoration, where needed, of ecosystem functions across the Tonto National Forest landscape. Studies of similar forests have shown that what is more important than restoring historical forest structure is restoring the process of fire (Collins and Stephens 2007). Restoring fire processes

throughout forests has resulted in increased resilience to natural stressors, such as drought and insect infestation, while creating conditions that scientists believe will increase resiliency to the impacts of climate change expected in the future (Collins and Stephens 2007). Given that historical climate and weather trends may not match those expected for the future, it will be increasingly important that management "emphasize ecological process, rather than structure and composition" (Millar et al. 2007). The Forest Plan should assess how mechanical treatments to restore structure and composition will be consistent with restoration of ecosystem processes.

An ecosystem processes-oriented approach should be integral in the formulation of desired conditions

Logging, livestock grazing, road building, predator control, and fire suppression created the conditions that now require ecological restoration (Covington and Moore 1994; Allen et al. 2002). As described above, climate change underlines the urgency of restoration (Seager and Vecchi 2010; Williams et al. 2010). To accomplish lasting and effective restoration in frequent-fire adapted forests and woodlands, an ecosystem processes-oriented approach must be followed, which includes the revival of dormant fire regimes (Allen et al. 2002; DellaSala et al. 2004; Falk et al. 2006; Noss et al. 2006). An approach based on re-creation of presumed pre-European settlement structural attributes may not yield desired results. The restorative benefits of regular, seasonally appropriate fire in both prescribed and naturally-ignited scenarios should be central to the attainment of desired conditions in this plan. A coherent restoration strategy will identify opportunities to use fire at landscape and watershed scales, and then prescribe site-specific vegetation treatments that support the strategy, which may include mechanical thinning (Peterson and Johnson 2007).

In nearly all cases, disruption of natural fire regimes is identified as a primary cause of departure from reference conditions for ERUs (Tonto NF Final Assessment). Ultimately, fire regimes and forest structure must be restored in an integrated way – balancing the management of existing natural disturbance regimes with site-specific intensive management. Historical records of fire behavior and ecosystem structure are inherently limited and cannot be uniformly applied over large landscapes or regions to elucidate reference conditions (Swetnam et al. 1999). Generalized conditions or assumptions about fire regimes and changes in fire regimes over these large regions should not serve as the basis for management decisions or plan components for the Tonto, especially when the science underlying these assumptions is increasingly being questioned and evolving. Such uncertainty and evolving knowledge is precisely why the Forest Service has created an adaptive management framework.

Natural fire process is centrally important to restoration of ponderosa pine and mixed conifer forests, which are the primary elements of southwestern forests (Allen et al. 2002, Cortina et al. 2006, Falk 2006). Increased frequency, extent and severity of wildland fires may attend climate warming and drought. The active function of natural fire process in the future can regulate ecosystem structure and composition to "re-establish a new dynamic equilibrium" and track climate effects on vegetation and landscape pattern in real time (Falk 2006). Thus, desired conditions should reflect this function and desire.

It is critical that the EIS include analysis of strategically planned process-oriented adaptive vegetation

management strategies that will allow for expanded use of prescribed and natural fires in both spatial and temporal scales in addition to or in combination with mechanical fuels treatments and/or restoration prescriptions (per Falk 2006; Peterson and Johnson 2007). We have repeatedly commented to the Forest Service in the context of planning and project analyses that it is necessary to inform proposed mechanical treatment actions with landscape-scale assessment of opportunities to manage unplanned natural ignitions for resource benefits. Vegetation treatments, which may include, thinning, burning, and a combination of the two, must be efficiently located and prioritized to support natural fire use in the long-term. We expect the Forest Service to develop specific plan components that identify how the location, timing, and intensity of proposed actions will support a coherent restoration strategy. As such, the plan should assess the use of fire as a management tool in the context of the cost of mechanical treatments, capacity of the logging workforce to meet the acreage goals or desired conditions, the low value of small diameter and/or undesirable wood, the distance to high capacity mills, operational constraints and other challenges inherent in landscape scale thinning projects in remote and rural areas. It is possible that analysis will determine that operational capacity is insufficient to achieve the mechanical treatment goals set by the agency. The EIS should assess the viability of, and prepare plan components wherein, restoration in a variety of ERUs can be accomplished with the use of fire alone, particularly in areas where infrastructure is least developed.

Desired conditions for fire regimes and heterogeneity of forest structure present measureable and quantifiable goals for the Forest Service to plan around. For ponderosa pine and dry mixed-conifer forests, this means focusing on the landscape-scale reintroduction of fire as the primary self-sustaining regulatory mechanism that will naturally promote adaptation and resilience to unplanned fires and the effects of climate change—and then scaling down to coordinated project-level actions that accomplish landscape-level objectives. In the case of grasslands and pinyon-juniper woodlands, fire should also be the primary restoration tool used. Areas restored with fire have far more productive understories and avoid a problem created by chaining or other intensive management strategies. Moving forward, the Forest Service should rely on natural disturbances to facilitate functioning ecosystems through the use of desired conditions, objectives, and plan direction.

Plan components should consider but not categorically abide by reference conditions

The Tonto Final Assessment comprehensively reviews reference conditions for each ERU, but only infrequently mentions the historic or natural range of variability. We anticipate that components of the Forest Plan and future proposed actions will consider both of these concepts in depth. These concepts have been central to the technical and philosophical debates in ecological restoration in southwestern fire-adapted ecosystems. The process-centered approach (per Falk, 2006) is an appropriate consideration in incorporating these concepts into plans and projects given the degree to which past forest management practices and climate change have moved contemporary ecosystems away from historic conditions and possibly made it such that returning to a historic range of variability or striving to recreate reference conditions is not achievable. The validity of reference conditions decreases as spatial and temporal distance increases from a specific ecosystem (Swetnam et al. 1999).

Climate warming and periodic, persistent drought will produce novel environmental conditions in the project area that have not been observed from dendrochronological records (Seager and Vecchi 2010; Williams et al. 2010). Projected future climate scenarios may be more consistent with periods of naturally occurring high severity fires documented elsewhere in the southwest during the middle-Holocene, occurring in several phases between 650 and 8,000 years ago. This pre-historical phenomenon of stand-replacing fire and attendant debris flows in mixed-conifer forests have been recorded at Kendrick Mountain on the Kaibab National Forest (Jenkins et al. 2011) and in the Sacramento Mountains of New Mexico (Meyer and Frechette 2010). Both studies indicate that fire behavior is highly sensitive to relatively modest climatic change and that it is important to include stand-replacing fire at centennial scales as a component of the natural range of variability.

Ecological restoration oriented to attainment of historical conditions is not necessarily sustainable (Millar and Woolfendon 1999; Noss et al. 2006; Swetnam et al. 1999). For example, invasion of annual grasses accelerated by forest and range management in the context of a changing climate will, in some instances, cause ecosystem structure, composition and dynamics to diverge from desired conditions (Bradley 2009; Brooks et al. 2004; McGlone et al. 2009). Therefore, it is reasonable to expect new biotic adaptations to climate change at multiple spatial and temporal scales (Malcolm et al. 2002; Millar and Woolfendon 1999; Reinhardt et al. 2008; Seager et al. 2007).

The possibility of high-severity fire occurring in areas should also not be used as a justification for intensive “restoration” actions, especially when those actions may or will result in the modification of crucial habitat components for at-risk or listed species, such as old-growth forest structure, woody debris, heterogeneous structure, and disturbed forest ecosystems. The costs of vegetation treatments (erosion, soil disturbance, road building, etc) should be weighed against potential benefits. More recent studies reviewing fire and vegetation data across the Western United States have found that mixed-severity fire shaped forest landscapes across the West, including in ponderosa pine and mixed-conifer forests in the Rocky Mountains and Southwest, which have previously been managed under the assumption that low/moderate-severity fire regimes represent historical reference conditions (Odion et al. 2014).

Johnson and Duncan (2007) propose a "future range of variability" to account for inevitable ecological change as disturbance regimes and vegetation patterns track climate trends. An active fire regime will regulate ecosystem structure and composition in equilibrium with climate (Falk, 2006). The EIS should consider climate effects, projected climate scenarios, current forest conditions, and local reference conditions in determining how and whether to strive for restoring to the historic range of variability, and if it may be more appropriate to manage for a “future range of variability”.

Old and large trees and old growth stand characteristics are uncommon and at-risk

Large trees are not abundant at any scale in the Southwestern Region (USDA 1999; USDA 2007a). Past timber management destroyed nearly all ponderosa pine and mixed conifer old growth forest in Arizona and New Mexico. Even-aged forest is now common and widespread on the Tonto National Forest and elsewhere

throughout the southwestern landscape (Covington and Moore 1994; Kaufmann 1998; Sesnie and Bailey 2003). Old growth forests differ functionally from younger forests in the habitat they offer to wildlife, carbon storage, water filtration and flow regulation, and nutrient cycling (Kaufmann et al. 1992). The ecological significance of old growth forest is amply documented, whereas a scientific basis for logging large trees in pursuit of forest health or fire management objectives is lacking (DellaSala et al. 2004; Friederici 2003).

Fire-adapted woodlands and ponderosa pine and mixed conifer forest are dominated by large trees with thick bark and insulated buds that resist heat injury (Arno 2000) and high branch structure that discourages torching fire behavior and crown scorch (Keeley and Zedler 1998). The persistence of large trees that survived past fires is a key barometer of ecological health and fire resilience in ponderosa pine and mixed conifer forests (Arno 2000). Shade provided by a closed canopy in large tree clumps and groups shields the ground surface from direct solar radiation, reduces ground temperature and horizontal wind speed, and increases ambient relative humidity as well as fuel moisture compared to relatively open stands (Countryman 1955). The existence of large tree structure enhances ecosystem fire resilience, particularly where fire effects to vegetation and soil are relatively severe (Arno 2000; Omi and Martinson 2002; Pollett and Omi 2002). Indeed, conservation of large trees is fundamentally important to restoration of fire-adapted forests (Brown et al. 2004; DellaSala et al. 2004). Removal of large trees by mechanical means often increases surface fuel load and promotes growth of "flashy" live fuels with little resistance to fire (Reinhardt et al. 2008). Large trees are the most difficult of all elements of forest structure to replace once lost, and their removal undermines fire resilience (Agee and Skinner 2005; Brown et al. 2004; DellaSala et al. 2004; Naficy et al. 2010).

A variety of factors other than logging threatens the persistence of large trees. For example, prescribed fire can injure exposed tree roots that have migrated into accumulated duff layers and cause high levels of post-treatment mortality among large trees (Sackett et al. 1996). Burning of pine stands with high surface fuel loading also can produce high fireline intensities and result in large tree mortality due to cambial injury by heat (Hunter et al. 2007). Prescribed fire also may render large trees susceptible to delayed bark beetle infestation (Wallin et al. 2003). Large standing dead trees ("snags") and downed logs may be destroyed by prescribed fire treatments (Hunter et al. 2007). Prescribed fire may create coarse woody habitat by killing live trees, but gains generally do not offset losses, as existing coarse wood is irretrievably destroyed (Randall-Parker and Miller 2002). Recruitment of large trees, snags and large woody debris will become more limiting over time as climate change imposes chronic drought, reduced tree growth rates, and more widespread tree mortality (Diggins et al. 2010; Savage et al. 1996; Seager et al. 2007; van Mantgem et al. 2009; Williams et al. 2010). We expect the Forest Service to describe how mature and old growth forest characteristics will be protected in plan-initiated programs that increase the use of fire as a management tool.

Protection and recruitment of old growth structure will benefit wildlife

Large and old trees are a principal component of old growth forests, although not all large trees are old, nor are all old trees large. Stands of old growth forests differ in structure and function from younger forests. Large trees supply critical habitat for a number of threatened, endangered, candidate, sensitive and indicator species.

They comprise preferred habitat of many sensitive wildlife species and provide a host of ecological services including watershed function, clean water, soil retention, and storage of greenhouse gases (Kaufmann et al. 1992; Luyssaert et al. 2008). Significant reductions of canopy cover in established mature forest groups are likely to adversely affect sensitive wildlife species associated with closed-canopy forest (Beier and Maschinski 2003; Keyes and O'Hara 2002; USDA 1996; USDA 2003; USDI 1995). Large tree removal reduces forest canopy and diminishes recruitment of large snags and downed logs, which in turn affects stand development and wildlife habitat suitability in the long-term (Quigley et al. 1996; Spies 2004; van Mantgem et al. 2009).

Old growth habitat consists of large trees with fire-resistant "plated" bark structure and tall canopies, snags with nesting cavities and broken tops valuable to wildlife, logs in varying stages of decay, as well as vertical and horizontal structural diversity within stands, including areas of dense, shade tolerant conifer regeneration. Most of the former old growth forests throughout the ponderosa pine and mixed conifer formations were destroyed by logging (Covington and Moore 1994). Indeed, numerous analyses by the Forest Service and others demonstrate that logging significantly affects long-term recruitment of coarse wood and the availability of old growth habitat (*e.g.*, Quigley et al. 1996; Spies 2004; van Mantgem et al. 2009).

Plan components specific to large and old trees and old-growth forest and woodlands are necessary

The Forest Plan should establish mature and old growth forest structure and interdependent ecosystem processes as a desired condition for forest and woodland ERU's. The Forest Plan needs to address how existing old growth and mature stands will be protected, and how future proposed actions will contribute to development of more old growth characteristics across the Forest. As these are the principal habitats for Mexican spotted owl, these analyses must be integrated into assessment of current MSO nest, roost, and foraging habitats and align with recovery strategies discussed in the Recovery Plan and relevant literature.

Old growth forest habitat already has been identified by the Forest Service in past planning efforts as a significant issue for comparison of alternatives in NEPA analysis. In this Forest Plan, the Forest should render a hard look at old growth forest and woodland with a scaled analysis of its current and projected structure, composition, extent and distribution in the planning area and throughout the Tonto National Forest. It should compare effects of management alternatives on Desired Conditions, Objectives, Standards, and Guidelines using this information. Again, we recommend a process-centered approach emphasizing restoration use of naturally-adapted fire disturbance where appropriate, rather than a purely structurally-oriented approach that presumes to replicate spatial patterns of old growth that may have existed at one time in history.

The protection and recruitment of old growth stand structure was extensively debated in the first phase of plan development of the Four Forests Restoration Initiative and resulted in language being added to the FEIS which specified that canopy cover would be retained in VSS 5 and 6 stands, among other changes[2]. The EIS

[2] See pages 14-15 in 4/10/2015 Regional Foresters Response to Center for Biological Diversity objection, ttps://www.fs.usda.gov/detail/4fri/planning/?cid=stelprdb5361003

should incorporate the conclusions of those negotiations, as well as consider these recommendations:

- The Forest Service should study, develop and describe action alternatives in detail that maximize retention of existing large trees (>16-inches diameter) outside of a wildland-urban interface ("WUI") zone that includes forest lands located one-quarter (¼) mile distant from established residential and other essential community infrastructure.
- The 1996 Plan Amendment for the Southwestern Region (USDA 1996) includes mandatory standards and guidelines for old growth habitat management. These standards and guidelines should not be abandoned in this planning process, as they were found to be both legally and ecologically necessary for the recovery and viability of Mexican spotted owl and northern goshawk. Any changes to these standards and guidelines must be analyzed thoroughly within the DEIS for this plan and the best available science to justify changes or removal of these standards must be disclosed.

Soils (pg. 10-11):

- This section reflects recognition of the factors and user activities that can impair soil conditions and degrade biological soil crusts. It will be important to carry this recognition forward in the Plan to manage ground-disturbing activities such as OHV use or concentrated visitor traffic to maintain and restore soil conditions in at-risk and ecologically sensitive areas.

Riparian Ecosystems, and Watersheds and Water Resources (pg. 11-12):

- Recreation can be a significant stressor along the Lower Salt River due to its close proximity to a large population center. Arizona has a limited number of bodies of water and visitors can be unfamiliar with the delicate nature of a riparian zone. One way to address the impact from high visitation would be to provide additional education on the fragile nature and value of riparian corridors at common access points. Additionally, it is necessary to evaluate the activities of the existing recreation permit holders and the impact their services are having on these fragile riparian zones.

- There is recognition of how "roads, grazing and recreational uses" can negatively affect riparian and wetland resources, including "roads in close proximity to stream channels." Given these acknowledged factors, these sections should include an additional Need to Change: There is a need to coordinate with Travel Management Planning to reform the road network to reduce the negative impacts of roads and user-created trails on riparian and wetland resources.

- The problem statements are accurate, but only indirectly mention the health of riparian ecosystems as they relate to the health of the watersheds. For example, poor health of the uplands is leading to much "flashier" riparian streams that cause loss of riparian soils, erosion of stream banks, and scouring of stream beds and riparian vegetation.
    - Need #21 is broadly stated and appropriate if the emphasis is on functionality and resilience.
    - Need #22 is concerning because it implies that the 'multiple uses' concept is appropriate for

management of riparian areas. Some uses are simply incompatible with healthy riparian areas and the impact of their use cannot be mitigated. For example, sand and gravel mining is an incompatible use. OHV use is another. Riparian grazing is arguably an incompatible use.

- The Needs to Change should recognize the harm (diminished flow) caused by previously approved water withdrawals from the forest.
- Desired conditions on Tonto National Forest for riparian areas are not being met due to a number of factors. There is a need for Tonto National Forest to use laws that are currently on the books, such as the Wild & Scenic Rivers Act of 1968 and the Wilderness Act of 1964 to improve riparian area ecosystems. There is a need to add statutory law along with standards and guidelines to #22.

- The Forest Service should develop riparian ecosystem plan components that protect sensitive riparian areas through the use of a firm buffer in which restoration is prioritized and damaging activities, such as motorized use or livestock grazing, are prohibited. These riparian buffer areas must have special management direction. Watersheds should also be identified in the plan and "key watersheds" that are found to be at-risk or degraded should be managed specifically for restoration and prevention of further degradation, which may require limitation on activities permitted within those areas.
- Actively prevent and mitigate impacts from existing recreational sites within riparian areas, while protecting species and habitat through the use of firm standards and guidelines for riparian resources forest-wide.
- The problem statements in the Needs to Change document are accurate, but only indirectly mention the health of riparian ecosystems as they relate to the health of the watersheds. For example, poor health of the uplands is leading to much "flashier" riparian streams that cause loss of riparian soils, erosion of stream banks, and scouring of streambeds and riparian vegetation. We would like to see an additional needs statement that links watershed health to riparian health.
- We would like to see an additional needs statement that promotes the consideration of management tools to restore soils and water to riparian areas. Specifically, there must be a needs statement that opens the possibility of reintroducing beaver to riparian ecosystems as a means of achieving riparian health and providing habitat to the federally threatened Chiricahua leopard frog and other listed species. Riparian and watershed planning should identify areas where beaver were eradicated and prioritize reintroduction in those areas. Lessons learned from adaptive management could be used to expand reintroduction efforts to all suitable habitats.

- The Needs to Change should reflect the extensive degradation livestock grazing can, and has had upon the Tonto's riparian areas, including negative impacts on riparian vegetation, introduction and spread of non-native invasive species, erosion and sedimentation, and negative impacts to water quality, including heightened e. Coli levels.

- There is no mention of the destruction that large scale mining can, and has had upon the Tonto's Riparian areas. Previous and ongoing mining have had a large impact on riparian areas. For example, both Pinto Creek and Queen Creek are impaired because of copper and other mining pollutants due to previous and ongoing mining. The Carlota and Pinto Creek mines have had a large impact on Pinto Creek and Haunted Canyons. Proposed mines would have potential devastating consequences for riparian area both directly, and from impacts of water drawdowns from water pumping for mines.

- We support an adaptive, comprehensive, and science-based approach to protecting and restoring riparian ecosystems and watersheds on the Tonto National Forest. The aforementioned Needs to Change are appropriate and timely given the urgent need to protect and restore functional watershed resources. Comments and recommendations in the Terrestrial Ecosystems portion of this letter are interconnected to and as such should also be considered relevant to aquatic, riparian, watershed and soil concerns. In the context of these broad statements on plan Needs to Change, it is critical that the Forest Service maintain an emphasis on functionality and resilience at site-specific to watershed scales. We recommend the Forest Service review Appendix B, which lays out a riparian protection and restoration strategy for inclusion as plan components and alternatives.

- Riparian areas in the Southwest are incredibly important for the maintenance of species diversity in the region, as riparian ecosystems are characterized by higher numbers of plant and animal species and highly dynamic conditions (Kuglerova et al. 2014). They are also incredibly rare and, unfortunately, have been and will continue to be severely impacted by climate change. The documented effects of climate change on riparian ecosystems include water losses, contraction in the size of riparian ecosystems, susceptibility to invasion by nonnative plants, and disruption of natural wildlife communities.

- The planning rule implicitly acknowledges the importance of these areas, requiring that forest plan components must "maintain or restore the ecological integrity of riparian areas . . . including plan components to maintain or restore structure, function, composition, and connectivity" (36 CFR 219.8(3)(i)). Plans must also establish "width(s) for riparian management zones . . . giving special attention to land and vegetation for approximately 100 feet from the edges of all perennial streams and lakes" (36 CFR 219.8(3)(ii)).

  In addition to the requirements for plant and animal diversity, plan components for ecological sustainability must prohibit management practices that would seriously and adversely affect water conditions or fish habitat (36 CFR 219.8(b)(3)(ii)(B)). They must also "ensure implementation of best management practices" for water quality (36 CFR219.8(b)(4)). Project plan components would be needed to meet these requirements for aquatic ecosystems.

- Under the planning rule, areas managed to benefit riparian resources are referred to as "riparian

management zones." They are required for ecological sustainability (36 CFR 219.8(a)(3)). Plan components—at both the landscape or project scale—must be included to maintain or restore the ecological integrity of riparian areas, including their structure, function, composition and connectivity.

- The benefits of plan components for riparian buffers in grazing management are numerous and include: "stabilization of streambanks, the filtering of runoff, the reduction of peak floods, and the enhancement of habitat by controlling water temperatures and providing shelter to wildlife" (Agouridis et al. 2005: 598). While many studies and researchers have questioned the effectiveness of fixed-width boundaries in achieving the most desired function and structure for riparian ecosystems, the general premise of maintaining vegetation and impact buffers for sensitive riparian areas remains grounded in science and the most easily achievable management strategy given budget limitations and uncertainties related to best management practices (Richardson et al. 2012; Kuglerova et al. 2014). We believe that management approaches, especially in areas with numerous imperiled species and that have a high-likelihood to be significantly affected by climate change, should be managed following the precautionary principle. In other words, the Forest Service should impose management buffers around all riparian areas (even intermittent streams or wetlands), while implementing an adaptive management and monitoring plan that measures key riparian functions and wildlife trends to determine future course of action and even more effective management strategies.

- Historical and predicted changes in precipitation, water use and demands, and climate are important to consider when evaluating current and potential management direction and conditions for water resources on the Tonto National Forest. Williams and others (2012) noted that while average winter precipitation totals in the Southwest have not been exceptionally low in the recent past, average summer-fall evaporative demand since 2000 is the highest in the past 1,000 years. Forest drought stress over much of the past 13 years, including in 2011 and 2012, matched or exceeded the recorded "megadroughts" of the 13th and 16th centuries. The only other 13-year periods when similar conditions occurred with such frequencies in the past 1,000 years were during the megadroughts themselves. Model projections indicate that megadrought-level stresses on water availability and vegetation production will be regularly exceeded by the mid-21st century, and even the wettest and coolest years of the late-21st century will be more severe than the driest, warmest years of the past millennium (Williams et al. 2012).

- Implement a Framework for an Riparian Conservation Strategy, as explained in Appendix B.
- Consider the following law and policy for Wild and Scenic Rivers:
    - Public Law 90-542, the Wild and Scenic Rivers Act of 1968, as amended and supplemented, establishes a national policy that certain selected rivers of the nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values, shall be preserved in their free-flowing condition and protected for the benefit and enjoyment of present and future generations. The

determination of whether a river area contains "outstandingly remarkable" values is a professional judgment on the part of the study team.

- The Wild and Scenic Rivers Act provides the most comprehensive legal protection available for the instream values of rivers (Gray 1988). It establishes a national system of wild and scenic rivers and provides for adding river segments to the system by two methods. The first method is by an act of Congress to designate a river directly or following a Congressionally mandated study and positive recommendation by a study team for designation. The second method is for the Secretary of the Interior, upon application of a governor, to add a state designated river to the National System (Final Revised Guidelines).
- Studies are initiated by the Congress under Section 5(a) of the Act, or by a federal land management agency as part of its ongoing land management planning process under Section 5(d).[3] Federal agencies are urged to review and evaluate all rivers on their lands. However, agencies are required to review the Nationwide Inventory Rivers. Agencies should also consider rivers identified in statewide river assessments.
- The Wild and Scenic Rivers Act is potentially as significant to the water resources as the Wilderness Act is to our land resources. The Wild and Scenic Rivers Act is a strong congressional directive that river areas designated pursuant to its authority be preserved in their natural, or at least existing, condition. This implies an adequate quantity of water, of acceptable quality, necessary to accomplish the purpose of preserving the free-flowing conditions of a designated river. Since an adequate supply of water obviously is necessary to accomplish the purpose of preserving the free-flowing condition of designated river, the Act stands as the clearest expression yet of Congress' intent to assert a federal right to water (Gray, p. 331).[4]

Watersheds and Water Resources

- There is no discussion or mention of the impacts that ongoing and proposed mining has/would have on watersheds and water resources.
- The Forest Service should address how ongoing and proposed mining impacts watersheds and water resources by:
  - Removing water from watersheds for mining purposes.
  - Creation of drawdown conditions for mining activities and possible long term drawdowns from formation of pit lakes and cones of depression.
  - The disruption of watersheds by the adding of massive quantities of tailings within watersheds,

[3] Section 5(d) In all planning for the use and development of water and related land resources, consideration shall be given by all Federal agencies involved to potential national wild, scenic and recreational river areas, and all river basin and project plan reports submitted to Congress shall consider and discuss any such potentials. The Secretary of the Interior and the Secretary of Agriculture shall make specific studies and investigations to determine which additional wild, scenic and recreational river areas within the United States shall be evaluated in planning reports by all Federal agencies as potential alternative uses of the water and related land resources involved.

[4] See Tarlock, Protection of Water Flows for National Parks. 22 *Land and Water Law Review* 29(1987); also Wilkinson, Water Rights and the Duties of the National Park Service: A Call for Action at a Critical Juncture, infra, Chapter 10

- The potential of water pollution from mining activities, including long term effect from potential perpetual treatment of water draining from tailings impoundments.

At-Risk Species (pg. 12):

- Please see Appendix C for information and policy related to Species of Conservation Concern (SCC) and focal species, for inclusion in the project record and consideration in the development of plan components, the final SCC and focal species lists, and reasonable alternatives. According to the State of North America Birds report (NABCI 2016) more than one-third of all North American birds are in need of urgent conservation action. The NABCI report included 28% of Arid-land species on their Watch List indicating that they are in risk of extinction without significant action. Unfortunately, the extensive analysis conducted by the USFS to determine Species of Conservation Concern (SCC) ignores a portion of these vulnerable species. This omission likely stems from the SCC inclusion criteria established in the USFS Assessment Report.
  - A portion of passerines utilizing the Tonto are neotropical migrants. These species conduct long distance trips between Canada, the United States, Mexico, Central and South America. Several laws including the Migratory Bird Treaty Act, the Neotropical Bird Conservation Act, and Executive Order # 13186, issued by President Bill Clinton in 2001, protect migratory bird species. Although migratory species are of great importance to the United States and neighboring countries, the Tonto National Forest has chosen to ignore most of these species because they only spend a portion of their lives on the Tonto.
  - Add:
    #28. All avifauna with significant population declines, should be listed as Species of Conservation Concern, regardless of the amount of time they spend utilizing the TNF.
    #29. Corridors utilized by migratory species should be identified, restored, and protected from disturbance.
    #30. Species should not be excluded as Species of Conservation Concern due to limited data. This includes the ocelot.

- The problem statements appropriately highlight the importance of having healthy riparian areas in order to reduce the risk to sensitive species. As stated in the Needs to Change document, 42 of 73 at-risk species are riparian associated, and 36 of 73 species are associated with aquatic features.

- We recommend an additional need statement that goes beyond just developing standards. There is need for both proven and promising approaches to conserve and restore at-risk species.

- A key Need to Change is for the Tonto to establish a Desired Condition for sustaining ecologically effective densities of strongly interactive species including but not limited to mountain lions, Mexican gray wolves, and beaver.

The Tonto must develop and maintain the ecological conditions necessary for ensuring population viability of these animals and include provisions in the Forest Plan for sustaining Mexican wolves. The Tonto provides important wolf habitat in its own right and could serve as a travel corridor for wolves to connect to wolf populations farther south, should wolves from Mexico also make their way into Arizona.

To help ensure population viability for wolves, the Tonto must also include a desired condition for removal of livestock carcasses. We support livestock owners taking responsibility to significantly reduce conflicts with wolves through the proper disposal of livestock carcasses (Forest Service 2008:25). This policy was instituted from the outset of the successful reintroduction of northern Rocky Mountain gray wolves to Yellowstone National Park and central Idaho. Removing or rendering inedible livestock carcasses unrelated to wolf predation is critical so that Mexican gray wolves do not associate livestock as a potential prey. A report of independent scientists strongly recommended adoption of this requirement (Paquet et al 2001:67), and, in June of 2007, the American Society of Mammalogists (ASM) urged "protect[ing] wolves from the consequences of scavenging on livestock carcasses."

- Need #27: There are a few gaps in the Needs to Change document that should be addressed in the proposed plan and DEIS to comply with the requirements of the planning rule. These include:
    - The need to designate Species of Conservation Concern (SCC) based on the BASI, in accordance with 36 CFR 219.9(c).
    - The need to develop species-specific plan components in accordance with 36 CFR 219.9(b)(1).
    - The need to maintain and restore "[r]are aquatic and terrestrial plant and animal communities" under 36 CFR 219.9(a)(2)(ii).
    - The need to consider rare or at risk unique habitat types in accordance with FSH 1909.12, ch. 20, 23.1

- We agree that there is a need to change plan direction from the 1987 forest plan that applies to the management of at-risk species: those species that are endangered, threatened, proposed, or candidate species under the ESA or SCC. This change is needed because there has not been satisfactory progress toward achieving long-term viability and eventual recovery of the listed species within the Tonto National Forest. However, the current need for change statement is vague and does not fully capture the nuance or urgency within which the Forest Service should be approaching planning for the various listed and at-risk species present on the planning landscape. The statement does not recognize that the ecosystem approach presented in the planning rule at § 219.9 may be insufficient to provide the necessary ecological conditions for at-risk species recovery and viability and that species-specific plan components may be necessary in some cases. Species-specific plan components need to be developed for both federally protected species and SCC. Furthermore, little-known species should not be excluded as Species of Conservation Concern due to limited data, for example, this includes the

ocelot.

- It is a common misconception that states represented by their wildlife agencies have ultimate management authority over wildlife. The courts have consistently upheld that the federal government has supremacy over its lands under Property Clause of the United States Constitution (Article IV, Section 3), which grants Congress the "Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States." In *Kleppe v. New Mexico* (426 U.S. 529: 541 (1976)), the Court stated, ''the 'complete power' that Congress has over public lands necessarily includes the power to regulate and protect the wildlife living there,'' and *Kleppe* clearly limited state powers, ''those powers exist only in so far as [their] exercise may be not incompatible with, or restrained by, the rights conveyed to the Federal government by the Constitution.'' (426 U.S. 529: 545 (1976)). While the Forest Service clearly has the authority to manage wildlife habitat it also has the power to manage species populations (Schultz 2012).

- We request that the following be considered in the drafting of the DEIS and draft plan:
    - The purpose and need assessment in the DEIS for the revised plan should include the need for species-specific plan components, where necessary, and present such components in the proposed action.
    - Because riparian ecosystems are disproportionately associated with at-risk species (as stated in the Needs to Change document, 42 of 73 at-risk species are riparian associated, and 36 of 73 species are associated with aquatic features), we ask that the Forest Service develop plan components that take very seriously the oversized importance of functioning riparian and aquatic ecosystems. We recommend an additional need statement that goes beyond just developing standards. There is need for both proven and promising approaches to conserve and restore at-risk species.
    - The Tonto National Forest has a role to play in continental scale wildlife conservation efforts. As such, all avifauna with significant population declines should be listed as Species of Conservation Concern, regardless of the amount of time they spend utilizing the Tonto. Also, corridors utilized by migratory species should be identified, restored, and protected from disturbance.

<u>Climate Change, Carbon Stocks (pg. 13):</u>

The following italicized heading areas provide background and recommendations relevant to the plan Needs to Change specific to climate change.

Monitoring for Climate Change

After the plan has been finalized, projects and activities will be implemented in order to achieve the plan's desired conditions and objectives; all projects and activities must be consistent with the plan components. The monitoring program must evaluate the plan's effectiveness, including the efficacy of the climate conservation

strategies. The monitoring program establishes monitoring questions and indicators to evaluate the effect of the plan on watershed conditions, key ecosystem characteristics, and ecological conditions for at-risk species.

Forest monitoring programs will also directly monitor changes in the condition of focal species, which will be selected to provide insight into the integrity of the ecosystem to which they belong. Forest plans should select focal species sensitive to climate impacts to evaluate whether strategies to maintain, restore or enhance ecosystem integrity are effective. Species that are known to play an important role in enhancing and maintaining ecological integrity, such as beavers, should be considered as focal species.

Focal species can be selected from the pool of at-risk species; if there is uncertainty over the relationship between an at-risk species and the conditions needed to support its persistence, the forest should consider direct monitoring of the species within the plan area, if monitoring methods are available and feasible. While the rule encourages the monitoring of the ecological conditions that support at-risk species, it should be noted that at-risk species vulnerable to climate effects can be directly monitored (i.e. distribution, occupancy, or demographic rates), even if not designated as focal species.

Forest-level monitoring programs will operate in conjunction with broader-scale monitoring strategies developed by the at the regional level; many climate change impacts will likely be most effectively monitored and evaluated at scales larger than individual national forests, and it is important that forest-level and broader-scale climate monitoring be well-coordinated.

There will be at least two primary areas of uncertainty associated with the climate conservation strategies that should be addressed and reduced through the monitoring program.

First, it is likely that some of the underlying assumptions behind the climate conservation strategy, such as predicted precipitation levels or changes in disturbance regimes, do not come to pass. The monitoring program must track actual climate-driven changes within the plan area so that the plan can be adjusted if necessary. Science-based partnerships and coordination with climate researchers will be fundamental in acquiring new information. New information and advances in best available science, outside of the forest monitoring program, can also illicit changes in the forest plan. For instance, science may reveal concerning vulnerabilities to fish or wildlife populations previously thought to be secure within the planning area.

Second, it is likely that some of the climate conservation actions assumed to improve ecosystem or wildlife population resiliency may in fact not have the desired effect, and will need to be adjusted in the forest plan. For instance, in some settings, the assumption that reductions in stand densities will create more resilient conditions to climate-driven wildfire disturbances may be contradicted by effectiveness monitoring. Or, monitoring may reveal that resiliency-building actions have unforeseen negative effects on other resources that were not considered during the development of the plan.

Given the uncertainty associated with climate change effects, as well as the high degree of uncertainty over the efficacy of climate conservation actions, a robust and well-funded adaptive monitoring program is an absolute necessity; it must not be an afterthought or abandoned, as has been the unfortunate case over the years in natural resource management (Lindenmayer and Likens, 2010). In addition, it is important to not equate uncertainty with flexibility; forest plans need to establish a range of measurable future conditions based on the best available science, as hypotheses for testing, as opposed to open-ended plans, which lack both accountability and the necessary direction for effective conservation.

- Page 13 Second paragraph, the sentence starting with "Additionally, …" : This seems like an important sentence, so please clarify what the "96 percent certainty" refers to. Certainty to become what?
- Page 13 Biomass - There's no mention of how livestock grazing has the negative effect of reducing vegetative carbon, not only through grazing, but by removing cattle from the range in order to send them to market after they've consumed the vegetation.
- Carbon Emissions - There' no mention of the fact that cattle are known to produce large amounts of methane gas, which is a greenhouse gas known to contribute significantly to climate change.
- There is a need to include plan components that consider potential climate change impacts (e.g., increases in storm events, uncharacteristic wildfire, drought, flooding, and other extreme weather) to ecosystems and natural resources.
- We also think there is more the Tonto must consider relative to climate change, however, including that it must take a more conservative approach relative to other permitted activities in order to reduce stresses on natural resources

The following information and sources should be incorporated into the project record and considered by the Forest Service to inform development of plan components related to climate change:

- Systematic conservation planning on national forests will be critical to support the conservation of wildlife habitat in the face of climate change. Due to their location, elevation, size and management focus, national forests provide distinctive and critical conservation and climate protection values. National forests will play a critical role in providing climate refugia for a significant number of climate and management-stressed wildlife populations. Climate refugia can be defined as habitat areas likely to experience less change than the surrounding landscape, and many national forests will need to provide these valuable climatic conditions. Conserving wildlife populations on national forests in the face of climate change will require science-driven, systematic and well-coordinated landscape-scale conservation planning efforts to assess and respond to climate-driven threats to habitat (Margules and Pressey, 2000).
- Management in the face of climate change is commonly referred to as climate change adaptation, defined by the
- Intergovernmental Panel on Climate Change (IPCC) as "the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits

beneficial opportunities" (McCarthy et al., 2001). The Intergovernmental Panel on Climate Change's (IPCC) assessment demonstrates that climate change – in particular as a result of anthropogenic drivers contributing to climate change – is a pressing issue that must be addressed by the world's communities.[5] Much focus is on mitigating and adapting to climate change by reducing greenhouse gas emissions. The IPCC assessed the "current scientific understanding of impacts of climate change on natural, managed and human systems, the capacity of these systems to adapt and their vulnerability."[6] Climate adaptation planning involves the development of forward-looking goals and strategies "specifically designed to prepare for and adjust to current and future climatic changes, and the associated impacts on natural systems and human communities" (Stein et al., 2014). The Forest Service can help ameliorate climate-driven and compounding anthropogenic impacts through strategic conservation planning and targeted action to increase the likelihood that ecosystems and species will persist over time.

- The planning rule's adaptive framework mirrors those proposed in other adaptation planning guidances (Cross et al., 2012; Stein et al. 2014), and reflects primary principles for adaptation planning, including the establishment of clear conservation goals, adaptive management, the use of vulnerability assessment, best available science and science-management partnerships (Joyce et al., 2009; Littell et al., 2012; Peterson et al., 2011).
- The 2012 Planning Rule explicitly pushes the Forest Service to address climate change impacts on wildlife populations during the forest planning process. For instance, one of the primary policy goals of the planning rule is to "emphasize restoration of natural resources to make our (national forest) lands more resilient to climate change" (Preamble, 21164). The rule itself states that one of its purposes is to allow "the Forest Service to adapt to changing conditions, including climate change…" (§219.5(a)). Forest plans developed under the 2012 Planning Rule will also reflect the conservation goals and objectives of the Forest Service' strategic plan, one of which is to "(f)oster resilient, adaptive ecosystems to mitigate climate change" (USDA, 2015c). The nation's public lands, and especially the national forests, play a critical role in providing habitat and protection for hundreds of fish and wildlife species. The vast majority of the public has repeatedly made clear that it places a high value on the use of National Forest System lands for fish and wildlife protection. With a growing and sprawling population, resulting in the continued fragmentation of private lands, along with the unprecedented uncertainty created by the current climate crisis, the Forest Service must address the issues of climate change relative to this proposed project.

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[5] IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, M. Tignor and H.L. Miller (Eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA (http://ipcc-wg1.ucar.edu/wg1/wg1-report.html).

[6] IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Groups III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, M. Tignor and H.L. Miller (Eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA (www.ipcc.ch/SPM13apr07.pdf) ("IPCC Report").

- The findings presented in the assessment are used to develop the forest plan, which will outline the strategies and actions necessary to maintain or restore ecosystems and wildlife habitats in the face of climate change. Because ecosystems and wildlife populations are generally not adapted to the rapid environmental change brought upon by climate change, it will be necessary to manage for their adaptation to those changing conditions.
- In cases where the assessment has indicated that an ecosystem characteristic or condition for an at-risk species is likely to persist in the face of likely climate effects, the forest plan should adopt a resistance-oriented strategy. Resistance-oriented (or maintenance) strategies are intended to build resistance to climate-related stresses, and often capitalize on opportunities to protect areas projected to have less exposure to climate change impacts.
- Forest plans should identify, designate and protect predicted climate refugia; these areas likely meet the rule's test of fulfilling a unique and special purpose on the forest. It is likely that forests will have to designate and protect areas outside of existing reserves to offer landscape-scale refugia networks for fish, wildlife and plants displaced from existing protected areas due to climate impacts; a new study estimates that only a fraction of existing protected areas will offer stable climatic habitat conditions in the future (Batllori et al., 2017). Importantly, in addition to designating landscape-scale climate-reserve networks, the forest plan will need to establish non-reserve – or matrix-based strategies – to constrain management actions that may degrade conditions outside of protected reserves (Lindenmayer and Franklin, 2002).
- In cases where the assessment has indicated that a characteristic or condition for an at-risk species is departed from future reference conditions, or is likely to be departed in the future, the forest plan should adopt a resilience-oriented strategy. Resilience-oriented (or restorative) strategies recognize the need to adapt to change, and are intended to minimize the severity of climate change impacts, reduce vulnerability, and improve the ability of ecosystems and species to "bounce back" from a climate-related stress. Many of these strategies will include restorative or resiliency-enhancing management that improve the functionality of an ecosystem by moving it towards the climate informed reference condition. Resiliency actions may focus on altering ecosystem structure and composition in order to prepare the system for climate-driven changes in disturbance regimes.
- For many at-risk wildlife populations, abating management threats and maintaining existing suitable habitat conditions may not be enough to ensure persistence. It will also be necessary to restore key conditions for which the species is adapted or more likely to adapt to.
- Finally, there may be cases, given the rapid or significant nature of the climate effects, where maintenance or restoration strategies are unlikely to sustain a specific fish or wildlife population. In these cases, transformation-oriented strategies may be necessary to manage systems so that they respond in new ways. For instance, a forest plan may need to facilitate a shift in the range of a climate-threatened fish, wildlife or plant population. When compared to the 20th century average, the western United States has experienced an increase in average temperature during a recent five-year

period that was 70 percent greater than the world as a whole.[7] Of special concern is that the increase in temperatures occurs more at higher elevations than lower elevations, affecting snow resources which supply much of the western United States' fresh water supply.[8] The IPCC projects that warming of the western climate will continue, making it imperative the Tonto National Forest consider the impacts of global warming on each proposed action, including travel management.

- Forest plans will guide climate conservation strategies through the development of plan components. Plan components must have clear geographic applicability, which means they can be applied to certain areas of the forest identified as being important to maintaining or restoring necessary climate conservation conditions for wildlife populations. One indication of climate change in the Southwest is that with increasing average temperatures, especially in summer, both the diversity and composition of flowering plant taxa are changing, particularly at higher elevations.[9] Rare and endemic species; species relatively "immobile" due to limited pollinators, seed dispersal, or reproduction; and species at higher elevations are particularly vulnerable to climate change.[10] Wetlands and high-elevation communities such as spruce forest face particularly serious threats in southwestern forests.
- Connectivity is a dimension of ecological integrity, as well as a condition necessary to support many at-risk species. Because well-distributed populations are more resilient than isolated ones, managing for connectivity is especially important for enabling adaptation to changing stressors, including climate change. In fact, a review of 22 years of recommendations for managing biodiversity in the face of climate change found improving landscape connectivity is the most frequently recommended strategy for allowing biodiversity to adapt to new conditions (Heller and Zaveleta, 2009). Connectivity should therefore play a prominent role in forest planning for climate conservation.

Desired Conditions for Climate Change & Carbon Stocks

For characteristics and conditions that are less vulnerable to climate effects, there will be a desire to maintain the condition; for example, for some forest ecosystems existing high-frequency and low-severity fire regimes may be predicted under likely future climate conditions, and the forest plan would encourage that continuation; however, it may be necessary to remove management stressors that prohibit maintaining the current condition.

In other cases, the assessment may indicate that in the future a characteristic or condition will be departed from climate-informed reference conditions. The desired condition in this case should reflect the expected range of future conditions, while acknowledging uncertainty, and subject to monitoring. Desired conditions that don't acknowledge likely climate changes, such as a shift to more frequent and severe fire regimes in some forest ecosystems, will not be effective; they will in essence ignore reality. Yet because many elements

[7] Saunders, Stephen, C. Montgomery, T. Easley, and T. Spencer. 2008. Hotter and Drier, 2: The West's Changed Climate. Arizona's New Mexico's average temperatures were 2.2 1.3 degrees Fahrenheit warmer in 2003-2007 than for the previous 100 years.
[8] *Id.* at 5.
[9] Breshears, et al., 2008; Crimmins, et al., 2008; Kelly and Goulden, 2008, Parmesan and Yohe, 2003.
[10] Morse et al., 1995.

of the ecosystem will not be adapted to those changing conditions, a combination of resistance, resiliency-building, and transformative strategies will need to be adopted to sustain resources into the future. Restoring the structure and composition of ecosystems so that they can withstand changes in dominant ecological processes is a logical approach to prepare for dramatic changes in disturbance; however, at some point those new disturbance regimes will need to be embraced, at least in some places. The plan should specify priority areas for maintenance and restoration.

Desired conditions can be applied across the forest, throughout an entire ecosystem type, or can be targeted to specific areas. The application of plan components within specific areas (e.g. management areas, geographic areas, or other areas designated to maintain unique and special characteristics) should be used to concentrate climate change response and climate conservation strategies within specific areas of the forest.

To be most effective in guiding climate conservation actions at the project-level, and to enable effective monitoring, it is critical that desired conditions be articulated for specific characteristics and conditions, and described in terms specific enough to allow progress toward their achievement to be objectively determined. We have found that many desired condition statements in current forest plan revisions are subjective and lack necessary specificity.

Desired conditions should articulate the actual measurable desirable reference conditions. This desired condition from the Flathead National Forest is good in that it ties the desired condition for watersheds to actual reference watersheds within the planning area (which should facilitate monitoring and adaptive management), but it could be improved with a fuller description of the desired reference condition for each of the key characteristics and habitat features:

Instream habitat conditions for managed watersheds move in concert with or towards those in *reference watersheds*. Aquatic habitats are diverse, with channel characteristics and water quality reflective of the climate, geology, and natural vegetation of the area. Stream habitat features across the forest, such as *large woody material, percent pools, residual pool depth, median particle size, and percent fines are within reference ranges* as defined by agency monitoring (USDA, 2016a, emphasis added).

In contrast, the Draft Revised Land Management Plan for the Sequoia National Forest included the following desired condition for fire regimes in the Upper Montane ecosystem, which is more measurable:

> At the landscape scale, fire is a key ecological process, restoring and maintaining patchy fuel loads and increasing heterogeneity and understory plant vigor. Fires occur irregularly, generally every 15 to 100 years, with frequency averaging about 40 years. Fires in this vegetation type burn with low, moderate or mixed severity, with minimal patches of very high severity (greater than 90 percent basal area mortality), rarely greater than 300 acres in size. The proportion of areas burned at high severity within a fire is generally less than 10 to 15 percent. Due to existing high levels of fuels and weather

> variability, greater proportions of areas of high severity burn (up to 50 percent) may be unavoidable during large landscape prescribed fires or wildfires managed to meet resource objectives. Some patches of high severity burn reach 1,000 acres in size (USDA, 2016b).

Desired conditions should reflect the forest's distinctive roles and contributions to conserving habitat in the face of climate change; for example, many forests will have desired conditions to maintain the resilient conditions of areas that are expected to provide future climate refugia conditions not found on the surrounding landscape. For example, the Flathead National Forest developed the following desired condition for connectivity between important areas, including habitat refugia:

Spatial connectivity exists within or between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, *and intact habitat refugia*. These network connections provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic, riparian-associated, and many upland species of plants and animals (USDA, 2015a, emphasis added).

Objectives for Climate Change & Carbon Stocks

Specific, climate-informed desired conditions establish the underlying purpose for climate conservation actions, but are not sufficient in and of themselves to ensure that conservation actions will occur. Other direction within forest plans is necessary to guide implementation.

The purpose of plan objectives is to ensure that progress is actually made toward the desired conditions. Objectives should be used to prioritize the most important climate conservation actions in the forest planning area, for example, those cases where the assessment documented clear vulnerability to climate change impacts and noted activities that could restore the characteristic or condition or alleviate threats that compound the magnitude of the climate impact.

The following is a typical objective supporting implementation of a desired condition to increase forest heterogeneity and restore species composition:

> Increase forest heterogeneity, reduce forest density and surface fuels, and restore species composition (i.e. increase black oak and pine) on 9,000 to 15,000 acres of the montane, upper montane, and portions of the foothill landscape, using mechanical treatment, often in combination with prescribed fire, within 10 to 15 years following plan approval (USDA, 2016b).

And here is a restoration objective from the Flathead National Forest to maintain or restore key characteristics of streams (note that there should be affiliated desired conditions for large woody debris, road networks, riparian vegetation composition and structure, and channel conditions):

> Enhance or restore 50 to 100 miles of stream habitat to maintain or restore structure, composition, and function of habitat for fisheries and other aquatic species. Activities include, but are not limited to, berm removal, large woody debris placement, road decommissioning or stormproofing, riparian planting, and channel reconstruction (USDA, 2016a).

The Planning Rule also requires that the forest plans identify priority watersheds for restoration. The identification of such watersheds is tiered to the Forest Service's *Watershed Condition Framework* (USDA, 2011), the objective of which is to improve watershed conditions including their ability to moderate the effects of climate change. Forest plans should therefore identify priority adaptation and conservation actions for these watersheds.

The Flathead National Forest's draft revised forest plan prioritized identified a subset of watersheds, called the *Conservation Watershed Network*, to prioritize conservation of bull trout and pure westslope cutthroat trout. These watersheds received a set of unique plan components to guide management. For example, there is an objective which states that "Conservation Watershed Network are the highest priority for restoration actions for native fish. Stormproof 15 to 30% of the roads in Conservation Watershed Network prioritized for restoration as funding allows to benefit aquatic species, e.g. bull trout" (USDA, 2016a).

Standards and Guidelines for Climate Change & Carbon Stocks

Because standards and guidelines are geared towards management actions, they will be used to address particular interacting management stressors that magnify climate effects. For instance, forest plans can use standards and guidelines to prohibit certain types of timber harvest in riparian areas in order to ensure that a key characteristic or condition is sustained.

For example, water howellia (*Howellia aquatilis*) is a plant species listed under the ESA that occurs on the Flathead National Forest; it is threatened by management activities (timber harvest, livestock use, invasion of non-native plants, and conversion of wetland habitat) and climate change, which is affecting wetland inundation processes. The Draft Revised Forest Plan for the Flathead National Forest included the following standard to avoid stresses to the plant's wetland habitat:

> Retain a buffer of a minimum width of 300 feet from the margins of ponds (occupied and unoccupied) that provide *Howellia aquatilis* habitat, for the purpose of maintaining or creating a favorable physical environment in and around the ponds, protecting against adverse hydrological changes, and maintaining the structural and floristic diversity of the vegetation (USDA, 2016a).

Air Quality (pg. 13):

The assessment of air quality conditions in the Tonto National Forest's Needs to Change Management Direction of Its Existing 1985 Forest Plan, pages 13-14, fail to recognize the poor air quality conditions in and near some parts of the Tonto National Forest and does not even mention the Class I Airsheds.

Specifically, the following information should be incorporated into the project record and considered by Forest Service staff to make decisions about plan management necessary to comply with state and federal air quality legal responsibilities and policies:

- The Tonto National Forest contains three particulate (PM_{10}) nonattainment areas, one PM_{10} maintenance area, and one ozone nonattainment area. There are also four Class I airsheds within the Tonto. Pursuant to Clean Air Act regulations, the Forest Service is prohibited from undertaking any activity in a nonattainment area that does not conform to an applicable state implementation plan ("SIP"). *See* 40 CFR § 93.150(a). This means the Forest Service must not increase the number of miles of roads in the Forest Plan, particularly unpaved roads, currently open to the public and that it must include in the plan a timetable and plan for decommissioning existing harmful, redundant, and unnecessary roads, especially user-created routes. The environmental effects of the unavoidable increases in fugitive dust and other air pollutants that result from these roads contribute to localized and regional negative air quality impacts and a General Conformity Determination is required.
- The National Environmental Policy Act (NEPA) requires that the USFS avoid or minimize adverse effects on the human environment (40 C.F.R. § 1500.2(f)) and evaluate reasonable alternatives that will avoid or minimize these effects (40 C.F.R. §§ 1500.2(e), 1502.14). Alternatives are particularly important to remedy unresolved conflicts regarding air pollution in this area. 42 U.S.C. § 4332(2)(E). NEPA also requires that the USFS assess impacts to human health. (*See* 36 C.F.R. § 220.7(b)(3)(iii) and 40 C.F.R. 1508.27(b)(2)). Addressing these impacts is necessary to ensure that there is not a substantial dispute regarding the size, nature, or effect of the proposed action and alternatives—whether at a local or broader, regional level—rendering the agency's actions highly controversial, and to address serious uncertainties and unknown risks regarding those actions. 40 C.F.R. §§1508.27(a), (b)(4), (b)(5).
- The National Ambient Air Quality Standards (NAAQS) set maximum allowable levels for six criteria air pollutants in order to protect human health and other secondary values, such as public safety. *See* 42 U.S.C.§ 7409(b). Particulate matter with an aerodynamic diameter less than 10 microns (PM_{10}) is a pollutant subject to the NAAQS. *See* 40 C.F.R. § 50.6 (establishing the NAAQS for PM_{10}).Both short-term and long-term exposure to PM_{10} can lead to increased premature mortality, increased hospital admissions and emergency room visits, and the development of chronic respiratory disease.[1] Fugitive emissions of PM_{10} from motorized travel on unpaved roads is of particular concern for the Tonto.
- Under NEPA and the Forest Planning requirements, the Tonto has an obligation to ensure compliance with the health-based NAAQS and to prevent significant deterioration of air quality and adverse impacts on air quality related values, such as visibility. (*See* 36 C.F.R. § 220.7(b)(3)(iii) and 40 C.F.R.

§ 1508.27(b)(10)). In order to meet its obligations under NEPA and to comply with this identified need to change, the alternatives developed by the Tonto should identify allowable levels of emissions from the proposed route changes that would not cause or contribute to violations of air quality standards in the ambient air and identify mitigation measures capable of preventing any such violations. The Draft Environmental Impact Statement (DEIS) "shall include discussions of: (h) [m]eans to mitigate adverse environmental impacts (if not fully covered under §1502.14(f))" where "[m]itigation includes: (a) avoiding the impact altogether by not taking a certain action or parts of the action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation." (40 C.F.R. § 1508.20). The Council on Environmental Quality (CEQ) further directs that: "[a]ll relevant, reasonable mitigation measures that could improve the project are to be identified, even if they are outside the jurisdiction of the lead agency or the cooperating agencies, and thus would not be committed as part of the RODs of these agencies. Sections 1502.16(h), 1505.2(c). This serves to [46 FR 18032] alert agencies or officials who can implement these extra measures, and will encourage them to do so."[2] The DEIS should identify and analyze an alternative that includes mitigation measures that clearly demonstrate compliance with NAAQS and Prevention of Serious Deterioration increments and assure there will be no adverse impacts on air quality related values.

- The DEIS should include a comprehensive analysis of cumulative effects, including effects of the proposed actions along with all past, present and reasonably foreseeable future actions on the affected environment. (36 C.F.R. § 220.4(f) and 40 C.F.R. §1508.7). The Tonto must fully justify any incomplete or unavailable information per the requirements of 40 C.F.R. § 1502.22. The DEIS should include a detailed dispersion modeling assessment of the impacts of the proposed action on compliance with the NAAQS, on whether there will be significant deterioration of air quality and on whether there will be significant visibility impacts, nor is there an acceptable explanation as to why this assessment was not completed. Specifically, the Tonto is required to consider impacts from the proposed action along with all other past, present, and reasonable foreseeable future actions on the affected environment. *See* 36 C.F.R. § 220.4(f). The cumulative analysis should be performed in accordance with the requirements of 40 C.F.R. § 1508.7, where:

  > *Cumulative impact* is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. 40 C.F.R. § 1508.7

  For the cumulative impact assessment, the Tonto must include all of the following existing and reasonably foreseeable sources that impact the same area impacted by motorized travel on the Tonto: (1) State- and Federal-permitted sources (including all sources recently permitted or which have recently submitted complete PSD permit applications but which are not yet operating); (2) state Oil and Gas Conservation Commission permitted wells (*e.g.*, Holbrook Basin); and (3) NEPA projects and Resource Management Plans in areas adjacent to the Tonto National Forest. Even a small, incremental impact can have a cumulatively significant impact. Indeed, that is the very reason NEPA requires

agencies to consider cumulative impacts. Failing to conduct this analysis of cumulative impacts by, effectively, considering the incremental impact of the agency's action, in isolation, precludes the agency's ability to justify determination that air quality impacts will be reduced under all alternatives.

- A cumulative impact analysis will aid in identifying the level of significance of those impacts on a particular resource and the appropriate type and level of mitigation that may be required to offset the current proposals' contribution to these impacts. The Tonto should perform a cumulative analysis of impacts, including all existing sources and reasonably foreseeable future sources of emissions that could impact the same area impacted by sources within the travel planning area. At a minimum, the analysis should consider cumulative impacts on the PM_{10}, $PM_{2.5}$ and NO_2 NAAQS and PSD increments. In order to complete a cumulative PSD increment analyses, an evaluation of all increment-consuming emissions from existing sources must be made, which would include all increases in emissions since the applicable minor source baseline date that have occurred at existing sources, as well as all new sources of emissions that came into existence after the applicable minor source baseline date and reasonably foreseeable future sources of emissions.[3] A separate emissions inventory must be developed to reflect those emission changes since the applicable baseline date, and those emissions changes must be modeled in order to demonstrate compliance with the PSD increments. In order to ensure all cumulative impacts are considered, the Tonto must also ensure and document that the proposed actions will not result in any adverse impacts to Class I PSD increments or air quality related values, such as visibility, in any potentially impacted Class I areas. The PSD increments are important and legally binding Clean Air Act requirements and the Tonto must provide for compliance with these requirements in the DEIS.
- Any modeling analysis used to determine cumulative far-field impacts should be based on three years of mesoscale meteorological data, pursuant to Section 9.3.1.2.d. of EPA's Guidelines on Air Quality Models at 40 C.F.R. Part 51, Appendix W. Background air monitoring data should be added to the results of the cumulative modeling analysis in determining compliance with the NAAQS. As discussed in EPA's Guideline on Air Quality Models, if the source being modeled is not isolated, as is the case in this modeling assessment, then modeling of existing sources is necessary to determine the potential contribution of background sources. *See* Section 9.2.1 of 40 C.F.R. Part 51, Appendix W. Thus, the TNF cannot use background monitoring data to reflect all existing sources in or affecting the region unless it can demonstrate that the impacts of the existing sources not modeled are reflected in the monitoring data, and show that the monitoring data are reflective of maximum concentrations in the area. The TNF must ensure that sources that may not be reflected in any monitored background concentrations used in the analysis are modeled as part of the cumulative impact assessment.
- In addition to the four Class I areas within the Tonto National Forest (Pine Mountain Wilderness, Mazatzal Wilderness, Sierra Ancha Wilderness, and Superstition Wilderness), the Tonto must also consider any potential air quality impacts from the proposed action and alternatives to air quality related values in the nearby Mount Baldy Wilderness (USFS), Petrified Forest National Park (National Park Service) and Galiuro Wilderness (USFS) Class I areas.

- Violations of NAAQS and the Clean Air Act will have significant impact on human health, and will impair visual quality in the TNF. It will also negatively impact wildlife and vegetation.
- The Air Quality analysis underestimates emissions by failing to include tire and brake wear, failing to account for an increase in vehicle miles traveled, failing to use area-specific information on vehicle use, and failing to include vehicle exhaust from 98 percent of the vehicles used in the Tonto.
- The Tonto must address the impact of fugitive dust on vegetation, including the disruption of photosynthetic and respiration processes, leading to reduced plant growth, reproduction, and survivorship. The Tonto should also evaluate the impact on species such as desert tortoises. Fugitive dust suspended in the air has the potential to impact more total area than any other impact of roads (paved or unpaved) and it can have significant effects on ecosystems and wildlife habitat.[4] Dust is created and raised into the air as motorized vehicles travel on unpaved roads and through proposed dispersed camping and big game retrieval areas and is then carried along traffic created wind currents and dispersed along roadsides. Once soil surfaces within dispersed camping areas and along Forest Service roads are disturbed, wind erosion may increase the amount of debris flow.[5] An example of fugitive dust plumes caused by OHV traffic is documented in 1973 satellite photos. These photos show six dust plumes in the Mojave Desert covering more than 1,700 km^2 (656.2 mi^2). These plumes were attributed to destabilization of soil surfaces resulting from OHV activities.[6] In a study prepared by Walker and Everett, along Alaskan roads heavily traveled by various types of vehicles, they found that dust had buried mosses and very low-statured vegetation in the 10-m-wide area adjacent to each side of the road; dust blankets measured up to 10 cm (3.9 in) deep.[7] Massive dust storms, sometimes called "haboobs," can reach up to 3,000 feet in height and can be 20 miles wide. Such dust storms are now an annual occurrence in the Phoenix area. The first haboob of 2014 occurred on July 3. Despite the fact that we provided this information to the TNF in our scoping comments, the air quality analysis did not adequately analyze fugitive dust and did not include any information on the proposed motorized dispersed camping and big game retrieval areas.
- In developing the forest plan, the Tonto should include information from Dr. Jane Belnap of the United States Geological Survey in a presentation she gave to the Colorado Water Conservancy District.[11] Dr. Belnap's presentation addressed the connection between increased temperature, disturbance, invasive species and dust. This presentation focused much attention on the impacts from OHVs and noted the cycle of increasing temperatures, which increases dust, which is exacerbated by OHVs, which increases the effects of climate change (temperature increases) and the key indicator of these problems being earlier snowmelts. Dr. Belnap also cited dust concerns in her testimony at congressional hearings on June 5, 2008. Of particular concern is the amount of dust that results from motorized routes, which settles upon snow pack and alters the melt rate which, in turn, alters the availability of warm season infusion of water into streams and lakes, when such water is critical to wildlife.

[11] PowerPoint presentation given September 18, 2009 at the Colorado River Water Conservancy District seminar, available online at http://www.crwcd.org/page_305).

- Laws, ordinances, and policies have been adopted across the Phoenix metropolitan area due to air quality concerns. Cities and towns have restricted the operation of motorized vehicles on unpaved roads and some communities have adopted ordinances addressing OHV use on private lands. Closures of State Trust Lands to off-road vehicle recreation has led to the displacement of OHV uses to TNF lands, often illegal and taking place in areas closed to OHV uses. We note that as early as 2008 the TNF was publicly stating it would comply with local laws regarding dust abatement and would consider the impacts of fugitive dust during travel management planning: "Tammy Pike, the forest's off-highway-vehicle and trails coordinator, said Tonto will take municipal dust-abatement rules as well as environmental impacts into account in deciding what trails will remain open." The Arizona Republic, *Off-roaders could be kicked off trust land: Dust issues spur plan to limit use of Valley trails*. July 30, 2008.
- The draft plan and DEIS should include plans for dust control considerations and develop a plan that satisfies all SIP requirements for the Maricopa County Serious PM_{10} Nonattainment Area and should base these plans on the required quantitative modeling analysis of air quality impacts. If the TNF quantitative air quality analysis shows significant, adverse impacts to air quality, then the subsequent DEIS should include specific and detailed mitigation measures to address the impacts, including: (1) modeled demonstrations that the mitigation measures will be effective; and (2) methods for ensuring compliance with any required measures. A significant, adverse impact to air quality may include contribution to predicted violations of a NAAQS. Any mitigation identified and analyzed by the agency should be mandated as part of the final decision to ensure that impacts are constrained within acceptable levels, including with a buffer to ensure that impacts are, in fact, acceptable. If mitigation is speculative, there are insufficient assurances that impacts will, in fact, be constrained within acceptable levels provided by substantive air quality protections or to prevent significant impacts pursuant to NEPA.
- In addition to being part of a PM_{10} nonattainment area, a portion of the TNF also lies within the Phoenix-Mesa Ozone Nonattainment Area. Numerous exceedances of the ozone standards continue to be reported in and around the Tonto National Forest[9]. Due to the ozone nonattainment status in the area and health implications of high ozone levels, the Tonto should not allow for *any* increase in emissions of ozone precursors (*i.e.*, NOx tailpipe emissions) that would contribute to continued exceedances of the ozone NAAQS. Because a regional-scale photochemical ozone modeling analysis is a significant undertaking, the TNF should consider simply not allowing any increase in ozone precursor emissions in the areas of the TNF that impact the ozone nonattainment area during potentially unhealthy days—*e.g.*, ozone alert days identified by ADEQ as high pollution advisory days for ozone.
- Current and proposed mines on and near the Tonto also have air quality implications, including dust. They are known to create problems with blowing dust due to many miles of dirt roads, and exposed and denuded surfaces such as tailings and waste rock piles. Some mines also have subsidence associated them that is quite likely to impact vegetation – without the vegetation, that means even more dust. This dust can contain a variety of toxic materials, and can cause exceedances of air quality

standards. The Forest Service must consider the impacts of the air pollution that would be generated by mines on or near the Tonto, including on the health of employees and area residents, region-wide visual impact on scenery and view sheds, and the impact on plant and animal life. Consideration of the impacts on recreational values and property values should be evaluated as well. The DEIS should study in detail the fugitive dust potential of all tailings designs and systems being considered, as well as study the site-specific impacts fugitive dust problems would have at any of the proposed tailings locations. Mitigating practices – particularly tailings cover design – should be fully assessed and specialists should be consulted regarding these potential practices.

- There are real and significant public health issues related to particulate emissions that must be considered in the draft EIS. When particulates ($PM_{2.5}$ and PM_{10}) are inhaled, they can affect the heart and lungs and increase respiratory symptoms, irritation of the airways, coughing, breathing difficulty, and more. The elderly, children, and those with respiratory or other health issues are at greatest risk relative to particulate pollution. A study released in 2008 by the Arizona Department of Environmental Quality (ADEQ) showed that when the levels of PM_{10} in Central Phoenix were high, there was a significant increase in asthma incidents in children.[10]There are also significant health impacts from the Hazardous Air Pollutants (HAPs) emitted by this proposed facility. Several of the HAPs are known or suspected carcinogens, affect development and reproduction, and our immune systems. Chemicals found in fugitive dust that are of significant concern include: Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Lead, Manganese, Mercury, Nickel, Selenium, and Antimony (page 35-36 MPO). The impacts of these emissions on public health and the environment, potential contamination of water, and other factors should be thoroughly evaluated in the draft EIS.

Social, Cultural, and Economic Sustainability

Social and Economic Conditions (pg. 14-15):

While this section reflects a good assessment of the interaction of Forest management and the social and economic health of local economies, several important factors appear missing from this discussion. The first factor is the role that "premium" public lands experiences play in attracting statewide, national and international tourism. These premium recreational experiences range from backcountry hunting and fishing to destination hiking, with many variations for geology buffs, birders, nature photographers, and equestrians. A good example on the TNF is the popularity of the Superstition Mountains and Superstition Wilderness as hiking destinations for visitors from around the globe. The area is featured in local, state and national travel magazines. The area thus has importance to local economies to draw tourism, however the area also has importance in providing a premium recreation experience to the larger national and international audience. This larger audience, and the larger significance of preserving "premium" recreation destinations, should be recognized and considered when determining management of this and other potential premium recreation areas on the TNF.

As a result, this section should include an additional Needs to Change:

- There is a need to incorporate recognition of the role of "premium" recreation areas on the TNF for national and international tourism, and the management needs to maintain and expand outstanding preserved areas to serve a national public.
- A second missing factor is the role that preserved public lands and scenic landscapes play in supporting local economies by attracting new residents, new businesses, and the investment and retirement income brought by retired or semi-retired residents. Studies have shown that preserved public lands provide an economic benefit to many western communities – see, for example "The Golden Rush" and "West is Best" economic reports (attached). As a result, Needs to Change #29 should add the phrase *"and the role of preserved landscapes in drawing new residents, new businesses and investment and retirement income to the area."*

Ecosystem Services (pg. 15-16):

- Page 15 The Water for Consumption section did not identify the problem that arises when water is authorized for domestic or industrial use purposes. Such authorized use can stimulate further population growth and undesired pressure on forest resources and can diminish the quality and value of impacted ecosystems.
- Page 16 #30 A water quality monitoring plan needs to be developed for the portion of the Lower Salt River that sees high-use due to tubing. Defecation from intoxicated tubers and wild horses pose a health threat to other users of the river. The plan needs to include both monitoring of the water as well as improvements to mitigate health concerns to visitors.

Timber and Forest Products (pg. 16):

- Timber production suitability determinations should be based on ecological restoration objectives.
    - As required by the National Forest Management Act, Forest Plans must assure suitability of lands where timber production is allowed (36 CFR 219.11). Planning for multiple uses necessarily means that not all lands are available for all uses. In addition to determining suitability for timber production on portions of the national forests, the Forest Service also must review its prior classification of lands as unsuitable for timber production. It is not sufficient under NFMA to list the lands that previously were deemed unsuitable and carry forward that designation without further analysis. This point is especially salient when considering the effects of large fires on forest loss and conversion to oak scrub/chaparral types in the Mazatzal Mountains, Mogollon Rim, and Sierra Ancha Mountains.
    - Under the heading "Timber and Forest Products" on page 16 in the Needs to Change document the Forest Service states that:

      #33 "There is a need for desired conditions that incorporate a wide range of silvicultural practices to promote forest health, resiliency, and sustainability".

      On the same page, the Needs to Change document also states that "increased emphasis in land

restoration projects should allow the continued ability to contribute to both timber and fuelwood demands." Silviculture and vegetation management are tools that can be used to achieve desired conditions. They should not be employed for their own sake. The plan Needs to Change points listed above represent a shift from a failed industrial-forestry paradigm to a promising ecologically-based approach. This is a change we wholeheartedly welcome, albeit with cautious optimism.

- In analyzing the suitability of land for producing timber and forest products, the use of commercial timber harvesting methods, and the proposed increase in forest restoration projects, the Tonto National Forest Plan should adhere to a progressive ecosystem based approach which in most cases is contradictory to a traditional commercial timber and forest products emphasis. The "wide range of silvicultural practices" deployed in vegetation management should be based on sound, scientifically proven methods for restoring ecosystem structure, function and composition.

- To inform analysis of timber suitability, we ask the Forest Service to consider and analyze the following criteria for designating lands as unsuitable for timber production: (specifically pursuant to 36 CFR 219.11 (a)(1)(iii, iv, and v), 36 CFR 219.11 (c), and 36 CFR 219.11 (d)(1, 2, and 3))
    - High or severe soil erosion hazard identified by Terrestrial Ecosystem Survey and Final Assessment
    - Steep slopes over 30 percent
    - Lands within one site-potential tree height of perennial or intermittent streams or wetlands
    - Critical habitat of threatened or endangered species
    - Occupied locations of endemic species with ranges limited to the national forest
    - Lands impacted by high-severity fire effects to vegetation or soil

  Regarding the last criterion listed above, long-term losses of soil productivity resulting from synergistic impacts of fire and mechanical disturbance (i.e., "salvage logging") must be considered and analyzed in the timber suitability determination. Severe fire effects on suitable timberlands are reasonably foreseeable. Therefore, we propose adding a caveat to the suitability designation stating that forests affected by severe fire will be managed for natural recovery rather than for economic production.

Rangeland Resources (pg. 17):

- Page 17 Add: Detrimental grazing by feral livestock including horses and burros has the potential to adversely affect native flora and fauna. Riparian zones along the Salt River are currently being degraded by feral horses.
- #34: The Needs to Change statement seems to imply that rangeland management – which we interpret as managed livestock grazing – is a predetermined use of the Forest. The Forest Service must analyze and identify the suitability of lands for livestock grazing as part of this plan revision process. The suitability of lands for grazing is based on the desired conditions identified for those lands (36 CFR

219.7(e)(1)(v)). In addition to identifying desired conditions, the Forest Service needs to present, discuss, and evaluate the method it uses to determine suitability and capability of rangelands for livestock grazing. This includes disclosing the decision criteria in determining whether, how much, and how long livestock grazing is compatible with sustaining the other resources and uses of the Forest. For a determination of livestock grazing capability to be legally sufficient it must meet NFMA, NEPA, and the Administrative Procedure Act by: (1) explaining the method used to change the capability determination from the old Plan; and (2) present information on which the capability determination is based. *See W. Watersheds Project v. United States Forest. Serv.*, CV-05-189-E-BLW (D. ID., Feb. 7, 2006). Additionally, management of wild horses and burros should be considered in the analyses of range management plan components.

- #36: Explore the possibility of utilizing grazing as a closely-monitored tool to reduce the abundance of invasive weed species in conjunction with habitat restoration.
- #37: Develop methodology and plan components for the control and monitoring of feral livestock.
- Page 17 We do not wish to see the Plan push livestock out of poorly compatible allotments or pastures onto areas that would be damaged by grazing. The healthy areas must not be degraded. Drought, fire, and overgrazing can significantly reduce the capacity of the forest to sustain livestock grazing. If AUM's must decrease to achieve a healthy range, then so be it.
- This section explains that since 2004 the Tonto's grazing permittees have had access to Environmental Quality Incentives Program (EQIP) grants to build new livestock waters and fences on public lands. Given the description that some forest ecosystems are obviously unsuited for grazing, there is a need for the TNF to designate these ecosystems as unsuitable for grazing. This type of analysis should be included in the DEIS.
- Consider the following best-available science in creating plan components to address the Needs for Change:
    - The ecological costs of livestock grazing exceed those of any other use of national forest land in the American Southwest. In this arid region subject to chronic and intensifying drought (Seager et al. 2007; Seager and Vecchi 2010; Williams et al. 2012), livestock grazing is the most widespread cause of species endangerment, lost soil productivity, and degradation of the human environment (Beschta et al. 2012; Fleischner 1994). Reduction of vegetation and ground cover by livestock reduces carbon and nitrogen stocks and holding capacity of public lands (Carter et al. 2011). Grazing destroys vegetation, displaces soil, and consumes enormous quantities of water to the detriment of native species and the ecosystems on which they depend (Belsky and Blumenthal 1997).
    - Livestock grazing decreases understory biomass and density, reducing competition with conifer seedlings and reducing the ability of the understory to carry low-intensity fire, contributing to dense forests with altered species composition (Belsky and Blumenthal 1997). Grazing significantly reduces water infiltration into the soil, and rest from grazing allows infiltration rates to recover. 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). 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 1990). A critical and often overlooked consideration in effective vegetation treatments is the necessity for resting a treated area from domestic livestock grazing to allow establishment of fine fuels such that low-intensity ground fire can be applied to the forest floor, and aligning allotment management plans such that future livestock grazing does not deplete the fine fuels that are required to maintain a prescribed fire schedule. The Ecological Restoration Institute reviewed the research and perspectives on resting from grazing, and concluded that: *"These research findings, although limited, suggest that federal agencies should be prepared to wait more than two years before allowing domestic grazing on restored allotments lest they jeopardize two important goals of restoration treatments—restoring the understory and returning low-intensity prescribed fire as an ecosystem process"* (Egan 2011: p. 6).

- The EIS should analyze the effects of livestock grazing on the sustainability and effectiveness of future likely proposed actions, and plan components should include resting treatment areas from grazing before allowing domestic livestock to return.
- Livestock grazing also degrades water quality by increasing water temperatures in several ways. It elevates water temperature via the loss and suppression of riparian vegetation that provides stream shade increases (Kondolf et al. 1996; Beschta et al. 2013). Livestock grazing also widens channels due to bank damage from trampling and sedimentation, which also contributes to water temperature increases (Kondolf et al. 1996; Beschta et al. 2013), even in the absence of shade loss (Rhodes et al.1994). This is a serious impact because elevated water temperature adversely affects numerous aquatic species.
- Grazing also has negative effects on songbirds, reptiles and other mammals especially if their habitat is close to the ground (Finch et al. 1997). Grazing of the most nutritious plants by livestock results in a loss of forage for native species, and can alter habitat or insect prey base (Donahue 1999; Kie et. al 1991). A decrease in prey base inevitably leads to a decrease in carnivores in the area, which are also eliminated by the government at the request of the livestock community (Brown 1992; Mech 1995). The DEIS must consider these effects where grazing is permitted.
- Recent studies into livestock grazing management have identified ways to reduce negative impacts, primarily through changes in agency management of forage resources and grazing to reflect BASI. Recommended management changes include: (1) eliminating areas with sensitive or high-erosion soils from capacity, suitability, or stocking rate calculations; (2) updating stocking rates based on conservative forage utilization rates (25-30 percent); (3) managing livestock by herding rather than fencing or water developments; (4) provide for rest, in some cases, several years, to allow for recovery of vegetation within allotments following vegetation treatments, fire or other disturbances; (5) closure of areas with degraded soil or plant

communities (Carter et al. 2011).
    - We acknowledge that the Forest Service operates under a multiple-use mandate and that livestock grazing is a legal use of public land. However, this does not mean that livestock grazing must take place on all lands of the Tonto National Forest, or that new and better restrictions on grazing practices cannot be implemented through this plan revision process. Given the significant impacts to grasslands, riparian ecosystems, and species from historical grazing and climate change, the Forest Service must re-evaluate its current approach to livestock grazing on the Tonto National Forest and implement plan components to protect species and habitat. Our intent is not to see decisions following the Forest Plan move livestock out of poorly compatible allotments or pastures onto areas that would be equally damaged by grazing. Existing properly functioning range must not be degraded. Drought, fire, invasive species and overgrazing can significantly reduce the capacity of the forest to sustain livestock grazing. If AUM's must decrease or allotment boundaries be redrawn to achieve a healthy range in the context of many stated Needs to Change towards ecosystem restoration, then so be it.
- Consider and analyze the following criteria for designating lands unsuitable for grazing:
    - High or severe soil erosion hazard identified by Terrestrial Ecosystem Survey and Final Assessment
    - Slopes steeper than 30 percent
    - Lands within 200 feet of perennial or intermittent streams or wetlands
    - Occupied and/or critical habitat of threatened or endangered species or species proposed for listing
    - Designated conservation or research natural areas
    - Occupied locations of endemic species or Species of Conservation Concern
    - Lands impacted by high-severity fire effects to vegetation or soil

Recreation (pg. 17-18):

The Tonto National Forest holds both the joy and the burden of managing and providing equitable access to a rich natural environment for outdoor recreation.The multi-use landscape of the Tonto N.F. will continue to see increased visitation but without proper management the user experience will continue to decline, as will the quality of the resources. The high-use areas of the forest are presently being managed for its current users and no strategies have been identified to create a more equitable and accessible recreation opportunity for underrepresented communities. The Tonto managers must expand their understanding of "access" in order to provide a safe and welcoming experience for people of color. The draft assessment issued in September 2016 attributed three barriers to the low representation of underrepresented visitors: language, socioeconomics, and cultural preferences. Lack of attention to these potential barriers leads to an inability for the Forest Service to carry out its principle of providing equal opportunity for participation.

- Page 14 Salt River Tubing and Recreation is not inclusive in its marketing of the experience it is offering. Please establish a method to evaluate whether concessionaires and outfitters are upholding the principles of the Forest Service, as a trustee of lands for all Americans, when granting permits. There needs to be an effort made to not just provide access but to provide equitable and inclusive access to all.
- Page 18 #39 When addressing user conflicts for water related recreation, there is a need to expand the definition of user conflicts to include users within the same group. For example, a conflict may arise between non-motorized watercraft user who disagree on what behaviors and activities are appropriate in nature. Both parties may enjoy the same type of outdoor recreation but fundamentally disagree on how they express that enjoyment. One may feel that the other has a negative impact on their experience. This may seem difficult to manage but this burden falls on the Forest Service to properly inventory recreation trends along with the quality of the user experience to create desired conditions.
- Page 18 The problem statement fails to mention the reduction and sometimes absence of law enforcement and patrols. There are various Recreation management tools that could be applied such as increased enforcement, ranger presence, user education, prohibition of destructive recreational uses, and application of fees based on the destructiveness of the use and the need to patrol it. Are these approaches wrapped into #36?
- Page 18. The problem statement fails to mention the impact on recreation and scenic value from existing and proposed mines. Those impacts include the direct loss of recreational opportunities and the diminished recreational experience that mining can and has caused.

<u>Specific needs to change: Trails and Signage</u>

- Tonto National Forest needs to change the very limited level of hiking trail maintenance that the Tonto National Forest now performs. While engaging more volunteer groups in assisting with this effort is important, the Tonto may need to participate more with these groups and take on some of the tougher trail maintenance tasks that may be beyond the scope of what volunteers groups can reasonably be expected to do. Labeling or signing trails as closed is not a viable option as long as these trails are shown on Tonto National Forests maps, both old and new. This would go to #36 and #37 on page 18 and #44 on page 20.
- There is a need to change the level of signage on Tonto National Forest lands. Hiking trail signs need to be replaced/repaired on a regular basis, especially after a large fire event has moved through a given area. Wilderness boundary signs need to also be replaced/repaired at regular intervals for the same reason. Roadside signs designating trail heads also need to replaced/repaired at regular intervals so Tonto National Forest users can more easily find their way around Tonto National Forest. Tonto National Forest needs to be cognizant of the need to change their liability exposure due to missing or damaged road signs.

<u>Specific needs to change: labeling of closed routes</u>

- There is a need to change the way that closed routes are actually managed. Simply designating

routes as closed and then placing a carsonite post in the middle of that route is inadequate. Physical barricades are the only real way to protect the Tonto National Forest resources from being severely damaged by indiscriminate OHV use. This would apply to #38 and #39 on page 18.

- There is a need to change the way user-created routes are managed. When user-created routes are detected there must be a plan in place to immediately go in and obliterate and re-vegetate the damaged resource -- a rapid response plan should be in place. Signs and barricades may also be necessary. Regular monitoring by Tonto National Forest staff or trained volunteers, especially on weekends, needs to be undertaken to insure that these user-created routes are not reopened. This would apply to #38 and #39 on page 18 and #6 on page 7.

Renewable and Nonrenewable Energy Resources, Mineral Resources, and Geologic Hazards (pg. 18 19)

- There is no mention in this section of the negative impacts from mining. The "needs" portion of this section should include desired conditions from existing mines, conditions proposed mines needs to meet, and desired conditions at, during, and after mine closure.
- There should be a discussion in this section on impacts to other features of the Tonto from mining.
- As a condition of closure or ongoing operations of existing or proposed mines, a desired condition should be added to emphasis the degrade conditions and infrastructure in place that could facilitate large solar/wind installations.
- We don't understand why the FS document downplays the potential for wind on the Tonto. While we understand that there can be significant problems from use of wind generation facilities, it seems to us to still have a place in the discussion of the mix of renewable energy generation on the Tonto.

Infrastructure (pg. 19-20):

- Pg. 19 - We are concerned that "higher maintenance level road conditions" (upgraded roads) would lead to increased land degradation and visitor usage. That must be addressed and only roads that absolutely need the upgrade should be addressed, especially in light of the Tonto's limited resources.
- The promotion of airstrip development aviation facilities is incompatible with the Tonto and most of the public's desire for serenity and scenery on the forest. The impacts on viewsheds, soundscapes, wilderness qualities and visitor experience from these activities must be fully analyzed within the DEIS. A range of alternatives, including alternatives that minimize and strictly limit the use of airstrips to defined locations and times, must be considered and analyzed to allow for the public to express their views on this issue.
- #44 is appropriate to the extent that roads can modulate recreational use on the forest. Modification of existing road infrastructure that is producing erosion and siltation of streams is appropriate, but in light of the limited budget for infrastructure we do not want to see new roads or increased forest recreational use unless it is sustainable in the long run.

Cultural and Historic Resources and Tribal Uses (pg. 21-21)

- #48 needs to be changed to add the danger to cultural resources and traditions from mining.

Land Ownership, Status, Use, and Access (pg. 21-22):

- Page 21 #51. See comments on #44. The way #51 is stated it fails to consider the negative consequences of increasing new public access points.

Designated Areas (pg. 22):

This discussion well recognizes the popularity of designated areas on the TNF, and the resultant impacts from high visitor use levels. The Designated Areas section should also clearly acknowledge that additional preserved, designated areas (such as wilderness) will be necessary to disperse visitor impact, and to preserve natural resources that are often the conservation target of designations. This section should also recognize the role that designated areas play in serving the goals of previous sections – preserving cultural resources, protecting riparian areas and wetlands, supporting more natural habitat for at-risk species, preserving soils, protecting air and water quality, supporting local economies and providing national-quality recreation resources. While we understand that the TNF needs to provide for a range of uses across the Forest, it appears clear that in the face of high visitorship and ever-expanding development in the Phoenix metropolitan area, more areas on the TNF require the higher levels of protection afforded by wilderness and similar designations. Needs to Change number 53 should consequently have a sentence added to say:

- Given popularity of designated areas, the need to disperse visitorship across designated areas, the loss of undeveloped lands generally in Central Arizona, and the potential benefits of designated areas to advance goals in the previous sections, there is a need to expand designated areas to continue to provide the many benefits thus far identified.

- Guidance for infrastructure and management needs in our designated wilderness areas and Wild and Scenic rivers may be obtained from a reading of the applicable laws that are currently on the books. High visitor use levels occurring in some wilderness areas and Wild and Scenic rivers is having an impact on ecological and wilderness values. A reading of the applicable laws will direct agency management in the spirit and intent of those laws so that proper decisions can be made for the resource protection of those area.

- Designated areas that have proven to be of scientific value in the past may prove to be of scientific value in the future. Thinking about how Tonto National Forest can better be used for the furtherance of peer reviewed, duplicatable science should be at the forefront of your thinking when it comes to all designated areas.

- Page 22 #53 In an attempt to ensure sustainable infrastructure the Forest Service needs to consider the

National Water Trail designation of the Lower Salt River. The Lower Salt River sees a large number of recreationists from late spring to late summer. This portion of the Salt River is a strong candidate for a special designation as a National Water Trail (NWT). The Secretary of Agriculture will be responsible for the designation of a NWT on National Forest Service lands. National Water Trails can act as a nearby nature retreat for local residents but will also serve as a more inviting and welcoming recreation spot for underrepresented communities. Currently, there are 16 water trails in the United States with this designation and Arizona has one...Colorado River/Black Canyon Water Trail. This designation will also allow the Forest Service to qualify for assistance in operating and maintaining the water trail. Within the forest plan, the TNF can identify this designation as feasible and recommended for management purposes, even though the designation itself cannot be achieved in the LRMP.

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Appendix A - Connectivity Policy and Science Literature Review

History and Background

Michael Soulé, considered the father of the science of conservation biology, described the three great challenges confronting nature: climate disruption, habitat degradation through fragmentation, and the extirpation of wide-ranging, strongly interactive species, namely top carnivores (Soulé 2010). Ecologists have long recognized that the loss of core habitat and habitat connectivity poses the greatest threat to species persistence and overall biodiversity (Soulé and Terborgh 1999; TWS 2012). If not connected, even the largest protected and ecologically intact areas are spatially inadequate to maintain full range of native species in natural patterns of abundance and distribution (Newmark 1995; Noss and Cooperrider 1994; Soule and Terborgh 1999). A review of 25 years of peer-reviewed articles reveals that the most frequently cited recommendation for protecting biodiversity is improved connectivity conservation to ensure species can move and adapt in response to climate-induced changes (Heller and Zavaleta 2009; Mawdsley et al. 2009; Hagerman and Satterfield 2014; IPPC 2014; Schmitz et al. 2015).

Fragmentation Threats

Fragmentation, the breaking up of habitat or cover type into smaller disconnected patches (Hilty et al. 2006), often results from natural or anthropogenic disturbances that introduce barriers to connectivity. In natural landscapes, patches that differ from the surrounding area would likely be areas disturbed by fire, flood, blowdown or other natural processes. In managed landscapes, habitat or cover can be fragmented by human caused disturbances such as road-building or removal of vegetation. In natural and managed fragmented landscapes, patches can be thought of as the remaining undisturbed areas. The greatest conservation needs are usually associated with maintaining or restoring connectivity among habitat patches (Ament et al. 2014; Defenders et al. 2015:4; Soulé and Terborgh 1999).

Connectivity Framework

Connectivity is defined as "the degree to which the landscape facilitates or impedes movement" (Taylor et al. 1993). Permeability is essentially synonymous with connectivity, referring to the degree to which regional landscapes, encompassing a variety of natural, semi-natural, and developed land cover types, are conducive to wildlife movement and to sustain ecological processes. There are two ways to increase connectivity: (*1) focus on conserving areas that facilitate movement, and (2) mitigate landscape features that impede movement, such as roads* (Ament et al. 2014; Belote et al. 2016). Both strategies together produce the most effective results (Soulé and Terborgh 1999).

Current protected areas are simply not large enough to encompass the variety of species, processes, and habitats necessary to fully conserve the native diversity of life sustaining the planet's natural unfolding of evolutionary processes essential for the survival, let alone flourishing, of all our planet's living inhabitants, humans included. (Wilson 2016; Newmark 1995; Noss and Cooperrider 1994; Soulé and Terborgh 1999). As a result, the distribution of many wildlife populations in the U.S. continues to shrink, in part because of habitat loss, degradation, and fragmentation. Keeping protected areas connected in a network is increasingly recognized as a conservation priority in the current era of rapid climate change to reduce the risk of extinction, and ultimately sustain native biodiversity (Belote et al. 2016). Wildlife species are becoming increasingly isolated in patches of habitat, surrounded by a human-dominated landscape (Ament et al. 2014:1).

A long history of ecological and conservation science has addressed questions of reserve design, extinction

risks from isolation, and the value of connectivity (Newmark 1995; Quammen 1996; Soulé and Terborgh 1999). The preponderance of relevant, peer-reviewed articles reveals that the most frequently cited recommendation for protecting biodiversity is protection and restoration of connectivity to allow species to move and adapt in response to habitat degradation and climate-induced changes (Soulé and Terborgh 1999; Heller and Zavaleta 2009; Mawdsley et al. 2009; Hagerman and Satterfield 2014; IPPC 2014; Schmitz et al. 2015). Conservation scientists emphasize the importance of maintaining a connected network of protected areas to prevent ecosystems and populations from becoming isolated, reduce the risk of extinction, and ultimately sustain biodiversity (Belote et al. 2016). Climate change further exacerbates the problem of isolation as fragmented landscapes are less resilient to ecological disturbances, to resisting native species loss, and to reducing emerging threats, such as disease. The combined threat of climate change and fragmentation is the most important conservation challenge we face (Ament et al. 2014:1). It follows that *creating, restoring, and maintaining large, connected networks of protected areas has emerged as one of the highest priorities for conservation in the age of climate change* (Heller and Zavaleta 2009; Hagerman and Satterfield 2014; IPPC 2014; Schmitz et al. 2015).

Researchers have concluded that wildlife corridors increase movement between habitat patches by approximately 50%, compared to patches that are not connected by corridors (Gilbert-Norton et al. 2010). Linking protected areas, such as national parks and wilderness areas, as well as other crucial habitats, ensures larger, cohesive landscapes of high biological integrity that allow for the migration, movement, and dispersal of wildlife and plants (Belote 2026). Improving connectivity is a strategically smart and proven method of allowing wildlife to move in response to environmental change (Soulé 2010: 350-351; Ament et al. 2014:1). Effective connectivity also facilitates maintenance and restoration of strongly interactive species, which, once ecologically effective populations are achieved, significantly contribute to sustaining ecological resilient habitats (Soulé 2010; Soulé and Noss 1998).

In addition, conservation areas will likely also gain new species equally in need of conservation (NFWPCAS 2013:55). While scientists cannot predict the precise responses of wildlife to climate change, still many studies do conclude that the habitat ranges of some species will change, indicating the need for a landscape that wildlife can easily traverse in order to adapt. While species composition changes may lag behind climatic shifts (Menendez et al. 2006), scientists predict large-scale shifts to higher latitudes and elevations (Hickling et al. 2006; Parmesan 2006; IPCC 2014) and movements along moisture gradients, and at smaller scales there are shifts in preferred microclimates and changes to the nature of the vegetation that constitutes ‘habitat’ (Thomas et al. 2001; Davies et al. 2006).

Structural and Functional Connectivity

It is useful to think of connectivity contributing to both the structure and function of ecosystems. Structural connectivity is the physical relationship between patches of habitat or other ecological units. The structure or pattern of an ecosystem or landscape can be defined as the arrangement, connectivity, composition, size and relative abundance of patches that occur within an area of land at a given time. Patches are surface areas that differ from their surroundings in nature or appearance (Turner et al. 2001). They can be characterized by vegetation type, seral stage, habitat type or other features relevant to a species and also by the types of surrounding lands, which can significantly affect the biological character of a habitat patch (Ament et al. 2014; Defenders et al. 2015:4)

Functional connectivity is the degree to which landscapes actually facilitate or impede the movement of

organisms and processes of ecosystems (Ament et al. 2014; Defenders et al. 2015:4).

Connectivity Assessments
Highly relevant connectivity assessments (e.g., Fields et al. 2010; Carroll et al. 2013; Belote et al. 2016) should be used in regional conservation strategies, administrative planning, or legislative or executive efforts (such as wilderness bills or national monument proclamations) that support significant linkages between protected areas.

For example, Carroll et al. (2013) integrate Population Viability Analysis (PVA), that is, a process of identifying the threats faced by a species and evaluating the likelihood that it will persist for a given time into the future, with connectivity models. Their efforts allow planners to develop such criteria with species-specific PVA and to identify location-specific management actions necessary to achieve recovery of self-sustaining populations. In addition, another recent connectivity assessment, Wild LifeLines™, is based on national dataset such as natural land cover, presence of roads, highway traffic volume, housing density, and other factors (Fields et al. 2010; Theobald 2010). Wild LifeLines™ then depicts potential movement pathways in the U.S. between the Mexican and Canadian borders that emphasize the least human modification and highest extant connectivity for wildlife. Belote et al. (2016) identified 2,084 protected national core areas whose connectivity values require long-term conservation efforts. These cores represent various ownerships, but over 82% of the core areas are managed by the four principal federal land agencies: U.S. Forest Service (33.9%), National Park Service (23.8%), Bureau of Land Management (14.5%), and Fish and Wildlife Service (10.1%) (Belote et al. 2016:3-4).

Wildlife use habitat corridors for different purposes, in different patterns, and at different scales, depending on the species (Ament 2014:2). One way to identify a corridor is by the species-specific needs and the movement function they provide; this is considered a *fine-filter approach*. An alternative *coarse-filter approach* is to define corridors based on integrity and continuity of landscape features or natural conditions, which requires the assumption that swaths of connected natural areas are likely to support movement of a variety of species (Brost and Beier 2012).

Landscape corridors represent the " wildest" or most " natural" lands that may provide broad-scale ecological linkages between large protected core areas (Sutherland et al. 2016; Fields et al. 2010; Carroll et al. 2013; Belote et al 2016). Maintaining or enhancing the relatively high degree of naturalness and low degree of human impact along these corridors should be a critical strategy to ensure that the large protected areas in the U.S. do not become isolated and are maintained in a connected network (Gaston et al. 2008; Soulé and Terborgh 1999; Soulé 2010: 350-351). Such continental-scale connectivity is a critical component to conserving ecosystems and biodiversity under a changing climate and accelerated land use change (Theobald 2013 and Ordonez et al. 2014). Maintaining relatively natural corridors between protected areas should allow mobile organisms short-term opportunities for movement, while providing more sessile organisms opportunities to move over generations. Corridors identified by scientists may be among the most significant areas on which to focus conservation efforts, including the elevation of their protective status through conservation designations (e.g., permanently limit human impacts of an area by increasing the level of land protection from an inventoried roadless area to recommended or legislated wilderness).

Land Use Planning and Collaborative Management
Federal lands comprise more than one quarter of land in the U.S. and it is the federal agencies' responsibility

is to manage these lands in a manner consistent with law and policy. Management direction is provided by landmark federal legislation including the National Environmental Policy Act (NEPA), Federal Land Policy and Management Act (FLPMA), National Forest Management Act (NFMA), the Endangered Species Act (ESA), and other national legislation and relevant regulation, policy and guidelines available on-line. Presidential proclamations and executive orders provide additional national guidance and agency priorities.

For example, the first goal of the President's *National Fish, Wildlife, and Plants Climate Adaptation Strategy* is to *build or maintain ecologically connected network of terrestrial, coastal, and marine conservation areas* that are likely to be resilient to climate change and support a broad range of fish, wildlife, and plants under changing conditions (Council 2014:19-20). Major reviews of climate change conservation management options generally identify increased habitat conservation and establishing or restoring habitat connectivity as the top, if not the top, options to pursue (Mawdsley et al. 2009, Heller and Zavaleta 2009). Identifying such priority areas also benefits wildfire management, mitigation investments, restoration efforts, and water and air quality.

More than one quarter (2.6-million km^2) of land in the U.S. is federally owned (Gorte et al., 2012) and federal land managers have the responsibility and obligation to manage these lands in a manner consistent with law and based on the best available science. Most federal lands lie in the West or Alaska. Despite its relatively vast open spaces, the expanding human footprint in the western U.S. threatens to further impact the few remaining large, intact, and ecologically important areas (Leu et al. 2008), most of which occur on public lands. In fact, public lands and waters in the west are critical to the conservation of biodiversity (Groves et al. 2000), withstanding or mitigating the impacts of climate disruption (West et al. 2009; Olander et al. 2012), and to maintenance key ecological processes, such as connectivity for wide-ranging species (Crist et al. 2005; Theobold et al. 2012).

Protected areas or ecological reserves (e.g., wilderness areas, national parks, wildlife refuges) form the foundation of conservation strategies to sustain biological diversity (Naughton-Treves et al. 2005). Established to reduce human impacts, protected areas are intended to maintain populations of species and ecological functions (Bruner et al. 2001; Gaston et al. 2008). Isolated protected areas, however, may not provide for species migration and dispersal or ecological flows of materials required to sustain genetic and species diversity, population recovery, and ecosystem processes (Haddad et al. 2015). Protected areas unconnected to a network may serve only as temporary insular ecosystems, vulnerable to population isolation or environmental change (Hilty et al. 2006; Hansen and DeFries 2007) and may be at greater risk of experiencing local species extirpations (Belote et al. 2016:1).

Many federally owned and managed lands of the United States (e.g., lands managed by the U.S. Forest Service, National Park Service, U.S. Fish and Wildlife Service, and Bureau of Land Management) are currently undergoing land-use planning. *Identifying regionally important corridors that may provide ecological connections between protected areas, as well as federal land units that fall along these corridors, can inform decisions regarding additional land protection or mitigating impacts of land use, including resource extraction, motorized recreation, and other activities* (e.g., Fields et al. 2010; Carroll et al. 2013; Belote et al. 2016). In some cases, land units are being considered as candidates for elevated levels of protection. For example, Forest Service Inventoried Roadless Areas (IRAs) or "potential wilderness areas, BLM Lands with Wilderness Characteristics (LWCs) and Wilderness Study Areas could be recommended for permanent protection, or alternatively for " release" for other uses. Quantifying the contribution of these

candidate land units for maintaining a connected network of large protected areas may help the public and land managers prioritize which units should receive elevated levels of protection (Belote et al. 2016:2).

Any comprehensive strategy for conserving biological diversity requires maintaining habitat across a variety of federal and state-managed lands, as well as cooperating private land owners. To put connectivity into a broader context, ecological networks result from the interaction of species and ecosystems at a large-landscape scale. Functional ecological networks that conserve biodiversity and provide for sustainable use of natural resources are often the goal of conservation and land management efforts. The ecological network concept embodies several key elements: (1) conservation core areas; (2) corridors and linkages; (3) buffer zones and sustainable use of non-conservation lands; and (4) the inclusion of human cultural and socioeconomic factors along with the consideration of wildlife needs, such as rural communities that coexist with wildlife. An ecological network is a coherent system of natural or semi-natural landscape elements configured and managed with the objective of maintaining or restoring ecological function as a means of conserving biodiversity while also providing appropriate opportunities for the sustainable use of natural resources (Bennett 2004).

Forest Service Regulation and Policy

To guide the management of each national forest, the Forest Service is required by law to prepare a land management plan (forest plan). Forest plans detail strategies to protect habitat and balance multiple uses to ensure the persistence of wildlife, including at-risk and federally protected species (Defenders et al. 2015:2).

In April 2012, the Forest Service finalized regulations implementing the National Forest Management Act (NFMA). These regulations, commonly referred to as the "2012 Planning Rule" established a process for developing and updating forest plans and set conservation requirements that forest plans must meet to sustain and restore the diversity of ecosystems, plant and animal communities and at-risk species found on these public lands (36 C.F.R. §§ 219._1-219; Defenders et al. 2015:2-3).

The forest planning rule *includes explicit requirements for managing for ecological connectivity on national forest lands and facilitating connectivity planning across land ownerships*—the first such requirements in the history of U. S. public land management. The pending revisions of most forest plans provide a significant opportunity to protect and enhance the diversity of habitat and wildlife on national forest lands by developing forest plans that promote the conservation and restoration of ecological connectivity (Defenders et al. 2015:3).

In January 2015, the Forest Service published Final Agency Directives for Implementation of the 2012 Planning Rule (FSM 1900 Planning, FSH 1909.12). While those directives may in some cases describe different approaches to implementing the connectivity dimensions of the planning rule, we believe the interpretations present by Defenders of Wildlife et al. (2015) are consistent with the planning rule and NFMA and hope the guide is viewed as a useful companion set of recommendations from the perspective of conservation organizations experienced in national forest planning, connectivity science and policy.

Defenders et al. 2015 (Page 3) summarizes the role of connectivity within the conservation framework of the rule and offers guidance and examples of how to conduct connectivity planning in the land management planning process. The guide is intended to add value to official agency policies developed to support implementation of the rule (Defenders et al. 2015:3).

Forest Connectivity

The 2012 Planning Rule defines connectivity as:

Ecological conditions that exist at several spatial and temporal scales that provide landscape linkages that permit the exchange of flow, sediments, and nutrients; the daily and seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long distance range shifts of species, such as in response to climate change (219.19).

The planning rule definition reflects both structural and functional aspects of connectivity. The rule's reference to spatial scales and "landscape linkages" suggests a structure of connected patches and ecosystems. Functional connectivity is also part of the definition: water flows, sediment exchange, nutrient cycling, animal movement/dispersal, species climate adaptation and genetic interchange are all ecological processes that are sustained by connectivity (Defenders et al. 2015 2015:5).

Connectivity plays a key role in the rule's conservation approach (see Table 2, (Defenders et al. 2015:8). As a key characteristic of ecosystems, connectivity may also be an "ecological condition" needed by individual species, and so forest plans may need to address connectivity at the species level. For example, a recent amendment to forest plans in Wyoming protects migration corridors between seasonal habitats for pronghorn (Ament et al. 2014).

Connectivity Coordination

There is an additional requirement in NFMA that is particularly important to developing plan components for connectivity. It is a procedural requirement that the planning process be "coordinated with the land and resource management planning processes of State and local governments and other Federal agencies" (16 USC § 1604(a)). One of the purposes of the planning rule was to "[e]nsure planning takes place in the context of the larger landscape by taking an 'all-lands approach'" (77 Fed. Reg. 21164).[12] To accomplish this, forest plans should consider how habitat is connected across ownership boundaries (Defenders et al. 2015:11).

The planning rule accounts for this type of "all lands" connectivity by (Defenders et al. 2015:11):

- Requiring assessments to evaluate conditions, trends and sustainability "in the context of the broader landscape" (219.5(a)(1))
- Recognizing that sustainability depends in part on how the plan area influences, and is influenced by, "the broader landscape" (219.8(a)(1)(ii), (iii)).
- Requiring coordination with other land managers with authority over lands relevant to populations of species of conservation concern (219.9(b)(2)(ii)).
- Requiring coordination with plans and land-use policies of other jurisdictions (219.4(b)).
- Requiring consideration of opportunities to coordinate with neighboring landowners to link open spaces and take joint management objectives into account (219.10(a)(4)).

[12] Compare with the NPS (2011) "big-picture" approach, replacing short-term, single species management with multi-species, long-term and large-scale approaches…[to] ensure not only the survival of species and scenic vistas, but also allow these systems to continuously evolve and change;" and the first goal of the President's *National Fish, Wildlife, and Plants Climate Adaptation Strategy*: to "build or maintain ecologically connected network of terrestrial, coastal, and marine conservation areas that are likely to be resilient to climate change and support a broad range of fish, wildlife, and plants under changing conditions" (Council 2014:19-20).

Achieving the broader scale "all-lands" goals of the planning rule requires partnerships and compatible management across landscapes among multiple landowners and jurisdictions. In particular, there is a need for a landscape-scale strategic approach to conserving connectivity. NFMA has established that the way to communicate a long-term and reliable management commitment for National Forest System lands is through forest plan decisions for specific areas.
There is a significant commitment to connectivity conservation within Forest Service policy and from many agency partners. Examples of coordinated multi-agency planning efforts that specifically address connectivity and can guide the Forest Service as it seeks to implement the new rule are summarized in Defenders et al. (2015:Appendix A).

Biological Diversity
NFMA requires that the Forest Service's planning regulations "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" (16 U.S.C. § 1604(g)(3)(B)). This diversity requirement has been interpreted by the agency in the NFMA planning regulations and by the courts (Defenders et al. 2015:7).

A pivotal piece of the diversity interpretation is the persistence of individual species on national forest lands. Maintaining viable populations of native species is the scientifically accepted method of achieving the conceptual goal of maintaining species diversity. According to a 1999 Committee of Scientists report commissioned for the purposes of forest planning, "[d]iversity is sustained only when individual species persist; the goals of ensuring species viability and providing for diversity are inseparable" (Committee of Scientists 1999: 38).

The federal judiciary's interpretation of the diversity requirement in the rule includes a ruling that the NFMA diversity mandate not only imposes a substantive standard on the Forest Service, it "confirms the Forest Service's duty to protect [all] wildlife**"** (*Seattle Audubon Society v. Moseley*, 1489). Courts have also recognized that the Forest Service's "statutory duty clearly requires protection of the entire biological community" (*Sierra Club v. Espy*, 364).

Aquatic Connectivity
In any landscape, rivers and streams are often considered the epitome of connectivity critical to a landscape's overall health (Pringle 2001; Wiens 2002; Barnes 2005:58). Their long, linear shapes and arterial patterns make them unique. By physically and ecologically connecting habitats, riparian areas can significantly influence ecological processes and functions on a landscape level and contribute immensely to the connectivity of Southwestern landscapes (Barnes 2005). Southwestern riparian communities' complex, multi-layered structure supports high species diversity, especially compared to arid uplands. They are anchors for biodiversity in the Southwest, including the watersheds of the San Pedro, Verde, and Gila Rivers (Barnes 2005:59-60).

Suggested Wildlife Corridor Objectives, Standards and Guidelines
Regardless of the management agency, we suggest that management plans include explicit, achievable goals and objectives that significantly contribute to wildlife connectivity.

1) General

- Designate wildlife corridors so they contain sufficient ecologically effective habitat to facilitate wildlife movement for daily, seasonal or long-term needs in a relatively safe manner (modified from BLM 2012:2-55).
- Maintain functioning wildlife habitats and migration and dispersal corridors that allow free movement and use of habitats (BLM 2008:2-45,47).
- Manage area to conserve crucial habitats and protect migration and movement routes for mule deer, other big game, and other wildlife, such as carnivores modified from BLM 2015:881; Section 4-49.2).
- Evaluate proposed activities, including recreational use, for their potential to adversely affect significant and relevant wildlife values in the area. Do not permit any activities that interfere with protection of those values (modified from BLM 2006:21).
- Activities currently authorized by the BLM in this management area shall coexist with wildlife movement, migration and dispersal, changes to current activities and infrastructure may be required if found incompatible with wildlife values.
- Close to renewable energy developments.

2) Retain Public Ownership

- Retain public land in federal ownership allowing for the protective management of crucial habitat and movement corridors for mule deer, other big game, and other wildlife, such as carnivores.
- Allow for the acquisition of non-federal lands within the management area through purchase from willing sellers, exchange, transfer or donation. Acquired lands are to be managed consistent with the management prescriptions of adjacent public lands, augmenting protection of additional acreage of crucial habitats for wildlife and their migration, movement and dispersal corridors (modified from BLM 2015:881; Section 4-49.2.1).

3) Right of Way

- Establish management area as an exclusion area for large-scale utility transmission and energy development and exploration. Preclude the granting of new Right-of-Ways (ROWS) for energy development that would negatively impact wildlife habitat and connectivity. Impact to be avoided by new access roads include fragmentation of habitats and an increase potential for vehicle-related wildlife injuries and mortalities (modified from BLM 2015:882; Section 4-49.2.1; BLM 2006:21).
- Establish and implement in a timely manner mitigation measures for fencing and structures to secure the safe movement of mule deer and other wildlife.

4) Mining

- Close the management area to fluid mineral leasing and to mineral materials sales (BLM 2015:882,883; Section 4-49.2.2).
- Close management to all locatable and leasable minerals exploration and development (including geothermal and sodium), and mineral material disposals.
- Withdraw the management area from location and entry under the Mining Law, subject to valid existing rights.
- Close to recreational placer mining outside of active mining claims.
- Prohibit surface occupancy and surface-disturbing activities.

5) Road Management

- Manage motorized vehicular use as Limited to Designated Roads and Trails.
- Establish road and motorized trail density standards within the management area to conform to the best scientific recommendations, generally less than one mile per square mile (Lyon 1979; Van Dyke et al. 1986a,b; Fox 1989. Trombulak and Frissell 2000; Reed et al. 1996; Strittholt and DellaSala 2001; Davidson et al. 1996). Ensure that there will be no net increases in road densities above a scientific credible threshold to maintain the security of core habitat areas (Forest Service 2012: unpaginated, Tables 16b-9 and 16b-10).
- Existing and/or designated roads and/or trails will be subject to closures if conflicts with wildlife cannot be mitigated (BLM 2012:2-55).
- Establish and implement in a timely manner mitigation standards for existing roads and primitive roads or highways crossing public land to facilitate movement of wildlife including a reduction in mortality of wildlife from vehicle collisions (modified from BLM 2012:2-55).
- Do not authorize new permanent roads within the corridor in order to maintain unfragmented habitat for wildlife migration and dispersal (BLM 2006:21).

6) Grazing
Evaluate any proposed changes in grazing, such as timing and intensity of use, for impacts on relevant wildlife values. Implement those changes that benefit wildlife (modified from BLM 2006:21).

7) Vegetation Treatments
Only allow vegetation treatments determined beneficial to native species and natural ecological processes by the best available science .

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Appendix B - Proposed Riparian Conservation Strategy

1- Riparian and Water Resource Buffers

As mentioned above, under the 2012 Planning Rule, areas managed to benefit riparian resources are referred to as "riparian management zones." They are required for ecological sustainability (36 CFR 219.8(a)(3)). This designation should extend to all riparian areas within the Tonto National Forest and be designed so that all riparian areas offer the highest quality aquatic habitat and where recovery of at-risk aquatic organisms would have the greatest likelihood of success. Riparian management areas have special management direction and are deemed generally unsuitable for timber production, mechanical thinning, minerals extraction, and motorized recreation. These management areas must extend no less than 100 feet from each side of a water source. We recommend creating a 300ft buffer, which is a widely accepted width for the purposes of protecting wildlife habitat, beyond the initial 100ft management zone. Activities which might be prohibited in the management zone, including logging, mechanical thinning, minerals extraction, and motorized recreation, might also be prohibited within the buffer zone, and specific standards and guidelines should be created to promote native species viability and recovery within the buffer zone. In cases where slopes or canyons are located immediately beyond the 100 or 300 foot corridors, additional specific management provisions should apply. In all these management zones, restoration activities should be non-mechanical and focused on removing barriers to wildlife movement and aquatic and terrestrial connectivity. In cases where thinning is required to prevent unnaturally severe fire occurrence, such thinning should be completed by hand.

At the landscape scale, a desired condition for aquatic and/or riparian resources could include a network of watersheds that would support viable populations of target species in functioning and restored habitats encompassing a subset of all of the riparian and adjacent upland ERU's. Such a network should be identified within the forest plan using existing species strongholds as a foundation and connecting and restoring adjacent and tributary watersheds. These networks—often referred to as key watersheds or priority watersheds—should be identified as management areas where maintenance and restoration of aquatic/riparian integrity is an important management emphasis (connectivity is also likely to be important). While the Forest Service chose not to require this kind of strategy for all national forest units (77 Fed. Reg. 21171), it is likely to be the most scientifically defensible approach for the conservation of many aquatic species.

2- Maintenance/Restoration of In-Stream Flows

When the United States reserved public lands for national forests, it also implicitly reserved sufficient water to satisfy the purposes for which the lands were reserved. See *Winters v. United States*, 207 U.S. 564 (1908); *Arizona v. California*, 373 U.S. 546 (1963). The date of priority for a reserved water right is the date the land was reserved. The reserved rights doctrine serves as a tool for protecting flows in rivers and streams on public lands. The Forest Service can and should protect flows in rivers and streams on public lands by asserting

rights under the reserved rights doctrine and recognizing that previously approved withdrawals are and have been damaging to aquatic, riparian, and watershed resources. The Forest Service must engage on the state level for the water rights to be recognized in each state's water rights system. However, reserved rights are not subject to the diversion and beneficial use requirements under state law and cannot be lost by non-use. The reserved rights are also limited by the "primary purpose" and "minimal needs" of the reserved lands.

Tracking, application for, and obtaining in-stream flow rights for the Tonto National Forest is an important and necessary management practice to ensure continued stream flows that support aquatic and riparian ecosystems. The Tonto National Forest should create substantive guidance on tracking streamflow and identifying streams requiring instream flow rights as an objective within the forest plan.

3- Maintenance and Restoration of Aquatic Connectivity

Maintaining and restoring connectivity between and among watercourses must be among desired conditions for aquatic ecosystems. Fish and aquatic obligate species in the Southwest, including in the Tonto National Forest, cannot be adequately protected without connectivity between water sources that allows for movement between distinct populations and maintenance of genetic diversity. Aquatic species are most resilient when connectivity is maintained and restored, because natural disturbances will inevitably impact water sources, and a functional ecosystem depends on long-term resiliency.

4- Conservation of Watershed and Riparian Function and Structure

4a -Removal and restoration of roads and motorized trails

Roads intrinsically bring a host of harms to water quality and wildlife habitat (e.g., Trombulak and Frissell 2000; Gucinski et al. 2001), hence reconfiguration of existing forest road networks has been long recognized by the Forest Service and the scientific community as absolutely central for restoration and recovery of a broad range of ecosystem values and species (Switalski et al. 2004).

4b-Allowing for natural disturbance

Disturbances of vegetation, soils, and hydrologic processes, whether they are expressed as fine-grained, smaller scale dynamics, or as coarse-grained influences at larger scales of the landscape, are known to be vital in contributing to and sustaining the long-term structural and functional complexity of physical and biological systems in riparian areas and streams (PRC 2012; Rhodes 2007; Bisson et al. 2003; Minshall et al. 1997). However, efforts should be made to prevent the spread or establishment of invasive species within riparian and aquatic corridors and management zones.

4c-Potential need for active restoration

Many if not all riparian and aquatic habitats are moderately to severely degraded by past multiple forest uses including grazing, mining, logging, roads, changes in wildlife and associated herbivory and trophic influences, and in some cases, fire suppression. Therefore "retention" of their present values and functions is

far from sufficient; management must be designed to passively and, where needed, actively *restore* these values and functions using non-mechanical means.

5- Long-term, Detailed Monitoring Plan

The scope and objectives of monitoring need to be identified relative to assuring that desired conditions are being attained and standards are being met, but it is equally important to identify triggering criteria that tie monitoring results to decisions on agency actions. The feedback loop from monitoring results to action decisions must essentially recognize the intrinsic time lags and potentially irreversible harms can result from some actions and conditions, and therefore they should be specifically structured to avoid the accrual of time-lagged and catchment-wide cumulative impacts.

6- Multi-stakeholder Collaborative Landscape-Level Riparian Network

Fremier et al. (2015) present a promising conservation strategy to protect riverine corridors concept called a Riparian Connectivity Network (RCN) as a contributor to a more resilient network of protected areas. There is ample scientific support for the conservation value of riparian areas, including their habitat, their potential to connect environments, and their ecosystem services.

Although riparian lands are not generally managed as a formal system [Wild and Scenic seems to be an exception], streams already have greater protection than upland areas (Fremier et al. 2015). Riparian areas are managed through various mechanisms, including protected lands management (e.g., wilderness, parks, and forests), measures taken in response to the requirements of regulatory programs (e.g., the Clean Water Act (CWA), the Endangered Species Act (ESA), and the state-level implementation programs), and through incentive-based programs, such as the USDA's Conservation Reserve Program (CRP) (NRC 2002). Administrative protection, of course, does not always mean functional protection, and a great need remains for restoration of degraded riparian areas, including in some areas a widening of protected riparian buffers (Kondolf et al. 1996).

Fremier et al. (2015) suggest the basis for operationalizing an RCN lies in a coordinated policy that could be realized through the integration of independent and loosely coordinated federal, state, tribal, local, and private actions into a coherent larger set of outcomes. Because 78% of all public lands are managed by only four federal agencies, promoting collaboration between these agencies provides a conceptual pathway toward integration for larger conservation resiliency. Further, coordinating with existing private conservation easements that already are spatially biased toward riparian areas could amplify progress toward a coherent conservation network. Finally, governing entities supporting the further development of an RCN could reach beyond biological conservation to support conservation goals to leverage other existing mechanisms for protection, such as flood management policies, water quality requirements, and recreation policies.

Fremier et al. (2015) argue that the seeds for an RCN are already in place geospatially as well as institutionally. The authors suggest implementation of their spatial analysis could connect protected areas and

have a higher rate of conservation management than terrestrial lands. In any event, the RCN concept provides a way to improve connectivity among currently protected areas. With focused attention, increased institutional collaboration, and improved incentives, these pieces could coalesce into a network of areas for biological conservation.

Appendix C - Species of Conservation Concern and Focal Species

Under the planning rule, the Forest Service need not finalize its Species of Conservation Concern (SCC) list at the time the DEIS is released. However, we do not see how it is possible to develop plan components aimed at maintaining viability of SCC species without a complete, BASI-based list of identified SCC. We believe the TNF has not considered some species that deserve consideration for SCC identification and has inappropriately rejected for retention as SCC others initially considered. We have made a science-based assessment of the Forest's selection process. We urge the TNF to consider or reconsider for SCC identification the species listed below, based on these justifications.

Additionally, we believe, in many cases, 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.

Determinations of Species Occurrence on the Forest

The guidance for SCC is clear that species may only be excluded from SCC consideration if they are "accidental" or "transient," or are "well outside the species' existing range" (FSH 1909.12, Ch. 10, 12.52c(1)). A species' range includes all areas where it regularly occurs even where that is seasonal or migratory use. The directives also acknowledge that a species range may include places where any of these uses are "becoming established" (FSH 1909.12, Ch. 10, 12.52c). In the context of the planning rule's acknowledgement of the need to plan for climate change this should be understood to include species predicted to occur in the plan area in the same "long-term" timeframe encompassed by the definition of SCC. If habitat exists (or is expected to exist) for the species, lack of recent (or any) documented occurrences should not by itself justify not identifying that species as a SCC.
The Forest Service is apparently misidentifying migratory bird species as "vagrants" and inappropriately not retaining migratory bird species as SCC.

Under 36 C.F.R. 219.9(b)(2) of the planning rule, "being migratory" is not a justifiable basis for not considering a species as an SCC or removing a species from consideration. A species can meet the criteria for SCC status and be, according to the responsible official, "beyond the authority of the Forest Service or not within the inherent capability of the plan area to maintain or restore the ecological conditions to maintain a viable population of a species of conservation concern in the plan area…" (36 C.F.R. 219.9(b)(2)). This is supported by the directives (FSH 1909.12, Ch. 20, 23.13c(2)(c), 23.13c(3), and 23.13c(4)). In such cases, the Forest Service is obligated to, "[i]nclude plan components, including standards or guidelines, to maintain or restore ecological conditions within the plan area to contribute to maintaining a viable population of the species within its range" (219.9(b)(2)(ii)).

The Forest Service has not availed itself of key authoritative sources—the BASI—to make species occurrence determination in its Assessment. The Forest Service has also used several sources inconsistently or improperly.

The Forest relies heavily on eBird (Sullivan et al. 2009; see also: http://ebird.org/content/ebird/) (Tonto NF Final Assessment: Table 111, p. 333-335). We do not reject the use of eBird as a source that, in some cases, can be the BASI, but this citizen-science based tool should not substitute for other authoritative sources, where available. For example, the U.S. Fish and Wildlife Service Information for Planning and Consultation (IPaC) tool indicates that several migratory species that the Forest Service either failed to consider or did not retain as SCC use the Tonto (see list below).

In some cases, the TNF has not used the sources selected to make SCC occurrence determinations in a consistent way or has used its sources selectively. For example, the BirdLife International (BirdLife International 2016) website is cited as a source, apparently, to support not retaining the Bendire's Thrasher as an SCC due to the rationale: "The Tonto National Forest does not appear to be a part of the species' native range" (Tonto NF Final Assessment: Table 112, p. 341) (We believe the BirdLife source is not being used accurately, see more on Bendire's Thrasher, below). However, the TNF has not made use of this source for other occurrence (or range) determinations. We believe Birdlife International is a legitimate (BASI) source to help indicate species' ranges, but we request that the TNF use this source in re-assessing some of the species listed below for potential SCC identification.

We contend the Forest Service has also used eBird (Sullivan et al. 2009) inappropriately to make assumptions about species abundance. This is not a tool that measures abundance and cannot be used to make assumptions about a species' population on the Forest. For example, the TNF has determined that Ferruginous Hawks are "rare" in the Forest based on eBird (Tonto NF Final Assessment: Table 112, p. 342). However, the Tonto is well within the range of the Ferruginous Hawk (see below). It may well be that sightings of the bird are rare because the species' persistence on the Tonto is in question and should be of concern. This may also be true for the following species and possibly others.

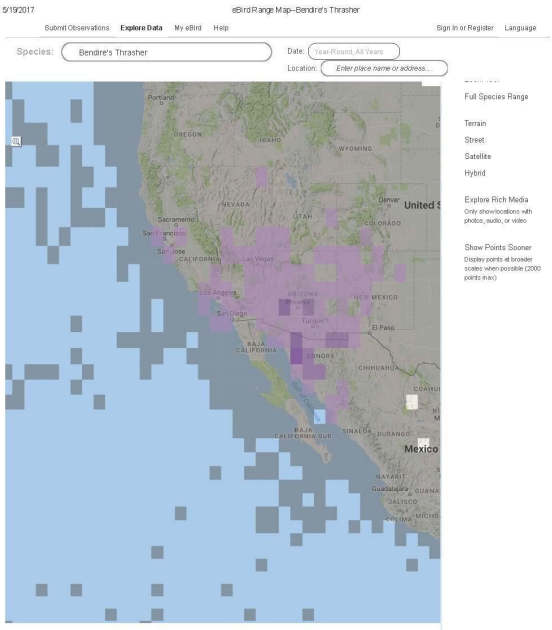
- Black-necked Stilt
- Grasshopper Sparrow
- Hooded Merganser
- Lawrence's Goldfinch
- Townsend's Warbler
- Wood Duck

In some cases, the Forest Service has rejected species based on the rationale that the species. range does not overlap the Tonto where authoritative sources indicate that the Forest is within a species' range. Again, this is true for the following species and possibly others.

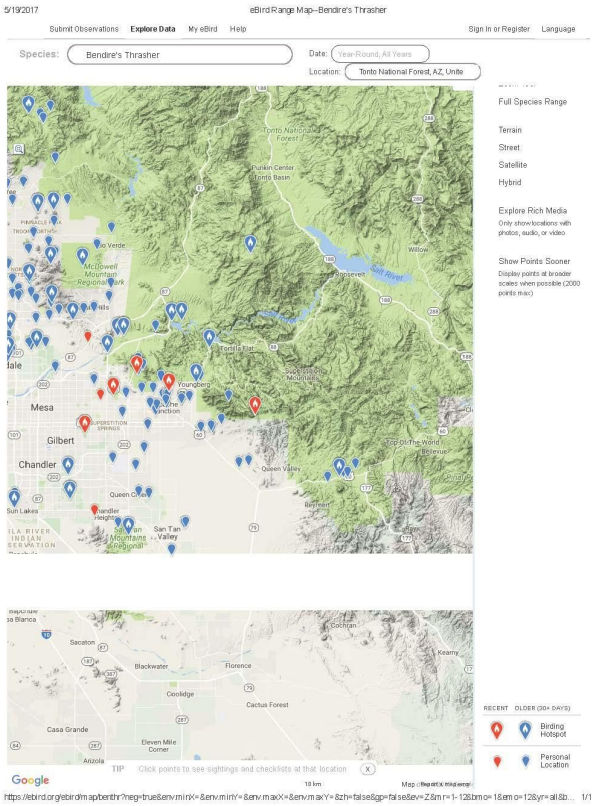
- Ferruginous Hawk. See: BirdLife International (2017, Buteo regalis)
- Bendire's Thrasher. See: example, below
- Bullock's Oriole. See: BirdLife International (2017, *Icterus bullockii*),
- Townsend's Warbler. See: BirdLife International (2017, *Setophaga townsendi*)

Bendire’s Thrasher Range and eBird Sightings Maps

Green=Native (Resident)
Yellow = Native (Breeding)
(Birdlife International 2017)



(eBird 2017)



(eBird 2017)

We believe the Forest Service has failed to consider or identify as potential SCC following species that deserve consideration for SCC identification or warrant identification as SCC.

The following species have been identified by the USFWS as migratory species for the Tonto National Forest (USFWS IPaC 2017) and should be considered (or re-considered) for SCC identification. These are all species the USFWS has designated as Bird of Conservation Concern.

- Bendire's Thrasher
- Black-chinned Sparrow
- Brewer's Sparrow
- Burrowing Owl
- Calliope Hummingbird
- Chestnut-collared Longspur
- Gilded Flicker
- Lark Bunting
- Lawrence's Goldfinch
- Le Conte's Thrasher
- Loggerhead Shrike
- Long-billed Curlew
- Peregrine Falcon
- Rufous Hummingbird
- Rufous-crowned Sparrow
- Short-eared Owl
- Sonoran Yellow Warbler
- Swainson's Hawk
- Virginia's Warbler
- Williamson's Sapsucker

Sources for Determinations

The TNF's justifications for not retaining species as SCC rely heavily on NatureServe rankings (Tonto NF Final Assessment, Table 112), often using these rankings as the only sources for making determinations when other more recent scientific sources exist, such as Arizona's State Wildlife Action Plan (AZDGF 2012). In its rationale for not retaining the Neotropic Cormorant, the assessment states,
"NatureServe has listed this species as S1 in the state of Arizona; however, this ranking was given in 1996 (NatureServe 2016)" (Tonto NF Final Assessment, Table 112, p. 344), indicating that the ranking is out of date. Yet, it is true for many species where NatureServe rankings are "dated" that more recent information exists that should be used to inform the SCC identification process. The assessment also makes heavy use of data collected prior to 2005 in Corman and Wise-Gervais (2005) when more recent data exist. In some cases,

the TNF has provided no BASI documentation for making determinations. This is true for the following species.

These species are Arizona state SGCN (AZDGF 2012).

- Abert's Towhee
- American Peregrine Falcon
- Arizona Bell's Vireo
- Bullock's Oriole
- Common Black Hawk
- Common Nighthawk
- Cordilleran Flycatcher
- Flammulated Owl
- Olive Warbler
- Phainopepla
- Prairie Falcon
- Snowy Egret
- Yellow Warbler
- Arizona Toad
- Pai striped Whiptail
- Sonoran Desert Tortoise
- Sonora Sucker
- Speckled Dace
- Desert Sucker
- Sierra Ancha Talussnail
- Yellow Warbler

The TNF has used insufficient documentation to remove the following species from consideration.

- American Peregrine Falcon. There are no sources cited to back up the claim that "Increases in man-made water sources has likely increased the prey base of falcons by creating additional habitat for waterfowl" (Tonto NF Final Assessment, p. 340).
- Bald Eagle. NatureServe considers the species imperiled in Arizona. The assessment cites no science to justify the claim that Bald Eagle "populations in the planning area have increased over time" (Tonto NF Final Assessment, p. 341).
- Flammulated Owl. Arizona state SGCN (AZDGF 2012). The TNF assessment cites no science to make its claim that this species' population is stable on the Forest (Tonto NF Final Assessment, p. 342).
- Sonora Sucker. The TNF assessment cites no science to make its claim that this species' population is

stable on the Forest (Tonto NF Final Assessment, p. 348).

- Speckled Dace. The TNF assessment cites no science to make its claim that this species' population is stable on the Forest (Tonto NF Final Assessment, p. 348).
- Desert Sucker. The TNF assessment cites no science to make its claim that this species' population is stable on the Forest (Tonto NF Final Assessment, p. 348).
- Toumy Groundsel. Arizona Rare Plant. The TNF assessment cites no science to make its claim that the species is "locally common at sites and occupies a relatively wide range of habitat types" (Tonto NF Final Assessment, p. 354).
- Mountain Hollyfern. Ranked S2 (imperiled) by NatureServe.

Retaining Regional Forester Sensitive Species

The Forest Service has failed to retain as SCC Regional Forester Sensitive Species (RFSS) that occur in the Tonto. An RFSS designation indicates a substantial concern about the ability for sensitive species to persist. A prior RFSS determination by the Forest Service creates an obligation for the Forest Service to refute the scientific arguments upon which the Region Forester *based the original decision*. The Forest Service provided an insufficient justification for removing the following RFSS from further consideration as SCC.

- Pale Townsend's Big-eared Bat. The species is an Arizona state SGCN (AZDGF 2012).
- Spotted Bat. The species is an Arizona state SGCN (AZDGF 2012) NatureServe ranked S2S3.
- Northern Goshawk. The species is an Arizona state SGCN (AZDGF 2012) and of local concern.
- Common Black Hawk. The trend data (Corman and Wise-Gervais 2005) that the Forest Service provided (Tonto NF Final Assessment, p. 342) as a justification for not retaining the Common Black Hawk is older than the Arizona Game and Fish designation of the species as a SGCN (AZDGF 2012). The species is also a USFWS Bird of Conservation Concern.
- Northern Beardless-tyrannulet. The species is an Arizona state SGCN (AZDGF 2012), and underwent a more recent assessment than the NatureServe rank assessment (1996) and Corman and Wise-Gervais (2005) cited in the assessment (Tonto NF Final Assessment, p. 345).
- American Peregrine Falcon. The Species is an Arizona state SGCN (AZDGF 2012)—a science-based designation. The TNF has cited not science in its assessment to justify the not retaining the species.
- Abert's Towhee. The Species is an Arizona state SGCN (AZDGF 2012). That the species may be "thriving in urban Phoenix," is not a sufficient justification for not identifying the species as an SCC (Tonto NF Final Assessment, p. 340).
- Gray Vireo. The Species is an Arizona state SGCN (AZDGF 2012) and of local concern. The TNF cites no science in its assessment to justify the claim that the species common on the Forest.
- Sonora Sucker. More recent information than the TNF cites in the assessment indicates substantial concern about the species' persistence; it is an Arizona state SGCN (AZDGF 2012).
- Desert Sucker. The TNF cites no science in its assessment to make the claim that "this species has a stable population within the plan area (Tonto NF Final Assessment, p. 348). The Species is an Arizona

state SGCN (AZDGF 2012).

- Sonoran Desert Tortoise. The Species is an Arizona state SGCN (AZDGF 2012).
- Pima Indian Mallow**.**
- Senator Mine Alumroot. The species is an Arizona Rare Plant. The TNF provides a reference to SEINet (2016) in its assessment (Tonto NF Final Assessment, p. 353) to make the claim that the plant is abundant, yet it is not valid to draw such conclusion about population from SEINet records alone. Moreover, the justification for not retaining the species as an SCC seems more of a justification for retaining it.
- Toumey Groundsel. The species is an Arizona Rare Plant. The TNF does not assess whether 20+ locations is sufficient to maintain viability for the population (Tonto NF Final Assessment, p. 354).
- Arizona Phlox. The species is an Arizona Rare Plant. The TNF cites no BASI in the assessment (Tonto NF Final Assessment, p. 349) to justify its rationale for not identifying the species as an SCC.

Sufficiency of information for identifying SCC

In several cases, the Forest Service rejected species due to a lack of information about persistence. It is not necessary to have complete information about a species' status on the Forest. Insufficient scientific information about likelihood of persistence in the plan area, may also be a reason to exclude species, but that is a difficult case to make where there is sufficient information at a broader scale to put the species in the categories to consider. The directives also include two criteria for not identifying SCC in FSH 1909.12, Ch. 10, 12.52b(4). None of these criteria for excluding species suggest that conditions in the plan area alone would be sufficient to exclude species already determined to have broader scale persistence concerns.

Information from authoritative sources including NatureServe rankings, Arizona's Species of Greatest Conservation Need list, or the Regional Forester Sensitive Species list, for example, provide indices of viability, at least at the broader state and regional scale. When such authoritative sources indicate a substantial concern about a species' viability, that information should be sufficient to retain the species as an SCC. We also believe species considered vulnerable at the state level (S3) by NatureServe should be considered for inclusion. While we recognize that the directives do not explicitly reference them as species to consider when identifying potential SCC, the vulnerable ranking is a science-based finding that those species are in fact of viability concern within the plan area. The Forest Service should accept this type of information as the BASI. The following species may have been inappropriately rejected based on the lack of information rationale.

- Northern Goshawk
- Western Purple Martin
- Fox Sparrow. Arizona state SGCN (AZDGF 2012).
- Northern Pygmy Owl
- Aravaipa Woodfern. Arizona Rare Plant. Its NatureServe rank is S2 (imperiled).
- Arizona Phlox. Arizona Rare Plant.

- Baboquivari threadleaf giant hyssop. NatureServe rank is (imperiled).
- Cleftleaf Scorpion-weed
- Mogollon Thistle
- Navajo Mountain Phlox. Part of the rationale given for removing this species seems like more of a rationale for including it.
- Pringle's Popcorn-flower. According the TNF assessment, there are only seven sites. There is no science cited in the assessment that evaluates threats (Tonto NF Final Assessment, p. 352).
- Showy Maiden Fern. Its NatureServe rank is S2 (imperiled).
- Toumey Agave. Arizona Rare Plant.
- Toumey Groundsel. Arizona Rare Plant. Its NatureServe rank is S2 (imperiled).
- Western Mousetail. Arizona Rare Plant. Its NatureServe rank is S2 (imperiled).
- Western Shield Fern. Its NatureServe rank is S2 (imperiled).

Use of population trend data

The Forest Service makes heavy use of species population trend data from sources such as NatureServe and seems to be removing from SCC consideration species for which population trends may be showing stability or increase. Yet, a positive population trend does not necessarily equate to population security; a population can be depressed and still at-risk. Species with vulnerable, imperiled, or critically imperiled ranks from NatureServe, species that are considered of greatest conservation need by the State of Arizona, Regional Forester Sensitive Species, and species for which other authoritative and local sources indicate significant concern still exists regarding species' persistence. The planning directives state that species with low population numbers should be considered for SCC status (FSH 1909.12, Ch. 10, 12.52d(3)). The following species may have been prematurely removed from further consideration based on this rationale.

- Golden Eagle. Arizona state SGCN (AZDGF 2012).
- Grace's Warbler. Arizona state SGCN (AZDGF 2012).
- Gray Vireo. Arizona state SGCN (AZDGF 2012).
- Long-eared Owl. Arizona state SGCN (AZDGF 2012).
- Lucy's Warbler. Arizona state SGCN (AZDGF 2012). The justification in the assessment is misleading; the NatureServe entry for Lucy's Warbler says nothing about breeding on the TNF.
- Magnificent Hummingbird. Arizona state SGCN (AZDGF 2012).
- Northern Beardless-tyrannulet. Arizona state SGCN (AZDGF 2012).
- Northern Goshawk. Arizona state SGCN (AZDGF 2012).
- Northern Pygmy Owl. Arizona state SGCN (AZDGF 2012).

Game species

The planning directives do not include "game species" as a criterion for excluding species from the SCC list. This seems to be a justification, at least in part, for not retaining the following species.

- Band-tailed Pigeon. The Species is an Arizona state SGCN (AZDGF 2012).
- Northern Shoveler. The Birdlife International (2017) range map for the species indicates that the bird is a year-round resident of the Forest plan area.

The planning rule is a federal regulation implementing NFMA. 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.

The revised forest plan must promote ecosystem diversity and the conservation and persistence of at-risk species. The EIS must recognize where the revised forest plan promotes continued activities that may be detrimental to ecological integrity and to some species. We therefore encourage a rigorous analysis in the NEPA process to evaluate the effects on integrity and at-risk species of the plan components that promote such activities. The EIS must analyze effects for each at-risk species because there are clearly concerns about how the plan would affect these species.

An especially thorough analysis of effects on at-risk species in the EIS will also be needed to demonstrate compliance with the substantive NFMA requirement that plan components must, "provide the ecological conditions necessary to: contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern within the plan area" (36 CFR § 219.9(b)(1)). We strongly recommend that listed species be evaluated in the same manner as SCC because once they are recovered they must in all probability be managed as SCC. The Ninth Circuit has developed a set of principles applicable to viability analysis (*The Lands Council v. McNair,* 537 F.3d 981 (2009)):

… the Forest Service must support its conclusions that a project meets the requirements of the NFMA and relevant Forest Plan with studies that the agency, in its expertise, deems reliable. The Forest Service must explain the conclusions it has drawn from its chosen methodology, and the reasons it considers the underlying evidence to be reliable.

… when the Forest Service decides, in its expertise, that habitat is a reliable proxy for species' viability in a particular case, the Forest Service nevertheless must both describe the quantity and quality of habitat that is necessary to sustain the viability of the species in question and explain its methodology for measuring this habitat.

The planning rule has authorized and encouraged the use of the "coarse filter approach," which uses habitat as a proxy for species viability. When relying on coarse filter plan components to maintain species viability, the assessment must determine necessary ecological conditions. The necessary conditions for species viability must be identified in the EIS along with the methodology. An important part of the methodology is establishing the relationship between a species and the ecological conditions being used as a proxy, based on the best available scientific information in accordance with 36 CFR § 219.3. While *Lands Council* involved viability at the project level, courts have cited it and other project level viability cases in litigation involving forest plan decisions (See e.g. *Native Ecosystems Council v. Weldon*, 848 F.Supp.2d 1207 (D. Montana 2012)).

The Planning Handbook (§12.13) requires that key ecosystem characteristics be identified in the assessment for use in the planning process. It includes the following as a criterion for key ecosystem characteristics: "The characteristic includes ecological conditions needed for threatened, endangered, proposed, candidate, or species of conservation concern …" (§12.13(4)(b)). We believe that these key characteristics should also be used to determine the effects of the plan on at-risk species in the EIS.

The effects analysis for at-risk species must be based on how the plan provides ecological conditions necessary for their persistence. For each at-risk species, we expect to see those conditions identified and projected into the future (quantitatively where possible) for each forest plan alternative. In completing an effects analysis it will be important to show how particular plan components affect ecosystem characteristics and species. In particular, where the assessment identifies threats to a species, the analysis should consider those threats relevant in the plan area and how they are addressed by plan components. Plan components with both adverse and beneficial effects must be considered.

Even where the "primary" stressors are beyond the control of the Forest Service, it will reduce the overall risk to species if the Forest Service addresses all of the factors that are within its control. Then for each of the characteristics, identify the plan components that could lead to adverse effects (typically desired conditions or objectives for development uses) and plan components that mitigate effects on those characteristics (standards or guidelines will have the greatest certainty). Note that suitability decisions for different uses can promote or limit impacts on at-risk species. Finally, the basis for the conclusion about effects should cite the best available scientific information that was used to support that conclusion.

Plan components that provide ecological conditions for species persistence can either be ecosystem components or species-specific components. The best available scientific information must demonstrate a strong relationship between the ecosystem characteristic and species persistence. The analysis of the effects of the plan must then project the likely occurrence of those characteristics into the foreseeable future. It must determine ecological integrity by comparing the projected future conditions to the natural range of variation (NRV), in accordance with 36 CFR §219.9(a) and the definition of ecological integrity. Where species are strongly associated with a particular habitat type, an ecological integrity analysis should be conducted for that

ecosystem.

Threatened and Endangered Species

The planning directives call for coordination between the US Fish and Wildlife Service (USFWS) and the Forest Service to make decisions about selecting relevant federally protected species for the purposes of planning (FSH 1909.12, Ch. 10, 12.51). The Final Assessment (p. 331) indicates that the TNF communicated with the USFWS about the potential SCC but does not indicate that the Forest Service has taken the step of coordinating with the USFWS regarding threatened and endangered species consultation (informal or formal).

The TNF has acknowledged its responsibility to meet the requirements of ESA Section 7(a)(2) in its Final Assessment. The Final Assessment (p. 327-328), NTC document, and scoping NOI make no mention of the Forest Service's obligations under Section 7(a)(1) of the ESA.

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[13] 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.[14]

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"

[13] "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."
[14] 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 …"

under ESA Section 7(a)(1).[15] 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.[16]

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 SCC 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.

[15] 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)
[16] The Consultation Handbook also encourages consultation at broader scales such as "ecosystem-based" consultations.