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Via Web

June 5, 2014

USDA Forest Service
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Notice of Appeal: Kaibab National Forest Land and Resource Management Plan

Pursuant to 36 CFR 219.35 Appendix A (2012), this notice of appeal regarding the Record of Decision ("ROD") and Final Environmental Impact Statement ("FEIS") for the Kaibab National Forest Land and Resource Management Plan ("Forest Plan") is filed by the Center for Biological Diversity, Grand Canyon Wildlands Council and Sierra Club Grand Canyon Chapter (collectively, "appellants") under the optional appeal procedures available during the planning rule transition period (the former 36 CFR 217 appeal procedures in effect prior to November 9, 2000).

Legal notice of the ROD appeared in the Flagstaff, Arizona, *Daily Sun* newspaper on March 7, 2014, making this appeal timely. Appellants supplied the Forest Service with timely, specific written comment at various stages of the Forest Plan revision process and may appeal.

DECISION DOCUMENT: *Record of Decision for the Kaibab National Forest Land and Resource Management Plan*.

DATE DECISION SIGNED: February 3, 2014.

RESPONSIBLE OFFICIAL: Calvin N. Joyner, Southwestern Regional Forester.

DATE DECISION PUBLISHED: March 7, 2014.

PUBLICATION VENUE: *Arizona Daily Sun*, Flagstaff, Arizona.

LOCATION: The Kaibab National Forest covers approximately 1.6 million acres in northern Arizona and is located mostly within Coconino County, with small portions in Yavapai and Mojave counties.

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APPELLANTS' INTERESTS

The Center for Biological Diversity ("Center") is a non-profit, public interest organization headquartered in Tucson, Arizona, with a field office located in Flagstaff, Arizona. Its mission is to conserve and recover imperiled fauna and flora and their habitats through science, education, policy and law. The Center has over 775,000 members and supports, many of whom live in Arizona and maintain long-standing interests in management of the Kaibab National Forest. Its members and activists regularly use and enjoy, and will continue to use and enjoy the forests, grasslands and riparian environments found in the Kaibab National Forest for observation, research, aesthetic enjoyment and other recreational, scientific and educational activities. Members and activists of the Center have and shall continue to research, study, observe and seek protection for at-risk species occurring in their natural habitats for scientific, recreational, conservation and aesthetic benefits including appreciation of the existence of a full complement of native biological diversity found in the wild places of northern Arizona. Forest Service violations of law and policy in revision of the Kaibab Forest Plan may indirectly or cumulatively cause significant adverse impacts to endangered, threatened, sensitive and/or indicator species, and contribute to the degradation of native vegetation and the habitats, food resources and populations of species whose viability the Forest Service is obligated to maintain. Effects to the environment that will result under direction of the revised Forest Plan will harm the interests of the Center, its members and activists in the conservation of nature and the recovery of imperiled biota. The Center demonstrated specific interest in the Forest Plan with specific written comment at every opportunity in the planning process. Therefore, the Center may appeal.

The Grand Canyon Wildlands Council ("Council") is a regional conservation organization consisting of 500 supporters dedicated to protecting and preserving wild nature on the Colorado Plateau. The Council has a long history on involvement with the Kaibab National Forest planning process, and consistently advocates protection and restoration of the old growth ponderosa pine ecosystem its full spectrum of native species in natural patterns of abundance and

distribution. The North Kaibab Ranger District, in particular, is central to the Council's interests because it contains the Southwest's largest remaining old growth ponderosa pine forest outside of Grand Canyon National Park and other wilderness areas. The Council's supporters and staff routinely visit, and will continue to visit, the Kaibab National Forest in pursuit of their aesthetic, recreational and scientific interest in these forest resources. The Council supplied the Forest Service with numerous specific written comments on this forest plan revision and may appeal.

The Sierra Club is one of the nation's oldest and most influential grassroots organizations whose 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." The Sierra Club has more than 2.4 million members and supporters with 35,000 in Arizona as part of the Grand Canyon (Arizona) Chapter. Our members have long been committed to protecting and enjoying our national forests, including the Kaibab National Forest, through various types of recreation including hiking, backpacking, wildlife viewing and more. Our staff and members have a substantial interest in continuing to use the forest, and are adversely affected and aggrieved by the Forest Service failure to protect the land and comply with the law. The Sierra Club offered specific written comment on this plan revision and may appeal.

REASONS

I. The Forest Service violated NEPA and NFMA by failing to explore or adequately respond to the reasonable "no regrets" alternative proposed by Appellants.

Under the National Environmental Policy Act ("NEPA"), the Forest Service is required to "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)(E) (2012). Therefore, within the FEIS for the revised Forest Plan, the agency was obligated to "[r]igorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." 40 C.F.R. § 1502.14(a) (2013).

The National Forest Management Act ("NFMA"), as interpreted by the 1982 Planning Rule, requires the consideration of alternatives during the NEPA process that are "distributed between the minimum resource potential and the maximum resource potential to reflect . . . the full range of . . . environmental resource uses and values." 36 C.F.R. § 219.2(f)(1). The alternatives considered must also "facilitate analysis of opportunity costs and of resource use and environmental trade-offs among alternatives." *Id.*

Agency compliance with the requirements of NEPA and NFMA is reviewed under the standards of the Administrative Procedures Act ("APA"). *Southeast Alaska Conservation Council v. Fed. Highway Admin.*, 649 F.3d 1050,1056 (9th Cir. 2011). An agency's decision may be set aside only if it is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A). Whether an agency action was arbitrary and capricious is based on "a consideration of the relevant factors and whether there has been a clear error of judgment." *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 416 (1971).

On December 13, 2010, the Center commented on page 7 of its letter responding to the notice of intent that the Forest Service should "consider and fully analyze" an alternative "that errs on the side of ecological caution (a 'no regrets strategy') by managing the Kaibab National Forest as a safe harbor and refuge for fish and wildlife, even at the expense of competing multiple use activities, such as programmed livestock grazing, timber production, or motorized recreation." The Center summarized this alternative as one that "should provide a substantial increase in protection for plant and animal species that exist on national forest lands responding to uncertainty regarding the magnitude of climate change impacts on habitat and water availability." The Forest Service did not respond to the Center's proposed alternative in the Draft Environmental Impact Statement ("DEIS"). Rather, it only considered but eliminated from detailed study one "Alternative that Would Reduce Grazing," making no mention of the issues raised by the Center. DEIS at 18.

On July 18, 2012, the Center responded to the DEIS with further comment reiterating its proposed "no regrets" alternative on page 10. The Forest Service never considered the alternative. *See* FEIS at 20 (alternatives considered but eliminated). Instead, it supplied in the FEIS only a cursory response that mischaracterized the Center's comment:

> **Comment:** The Forest Service should consider and fully analyze an action alternative that responds to changes in global and regional climate. There should be at least one reasonable alternative that provides increased protection to plant and animal species that responds to the scientific uncertainty regarding climate change impacts to habitat and water availability. (CBD-11, CBD-12)
>
> ***Response:*** *The proposed action and alternatives were developed to address potential changes to the environment attributable to climatic change. The action alternatives respond to this issue to varying degrees by increasing plant community resilience and addressing uncertainties associated with climate change impacts to habitat and water availability. Climate change is addressed indirectly throughout the proposed plan with desired conditions in the form of functional ecosystems and resilient landscapes. Climate change is addressed directly in management approaches and monitoring plan implementation where appropriate. Plan appendix D provides a more detailed explanation of the strategy the Kaibab NF is using to address climate change.*

FEIS at 328 (response to comments). The Forest Service response to the Center's proposed "no regrets" alternative is arbitrary and capricious because it does not provide a rational explanation for why this alternative was eliminated from further consideration. *Compare* FEIS at 20 (alternatives considered but eliminated). The Forest Service dismissed the alternative citing "management approaches" considered in other alternatives without explaining how the Center's proposed alternative is duplicative. While "NEPA does not require federal agencies to consider alternatives that are substantially similar to other alternatives," *Native Ecosystems Council v. U.S. Forest Serv.*, 313 F.3d 1233, 1249 (9th Cir. 2005), the proposed "no regrets" alternative is substantively distinct from the other alternatives that were considered in detail. The Forest Service admits as much where it acknowledges that the alternatives considered would address climate change "to varying degrees." The Center's proposed alternative would lead to the

creation of a forest plan specifically modeled to address climate change with a maximum of ecological caution. Its emphasis on animal and plant species viability "at the expense" of other activities, including motorized uses of the forest, was not considered in any meaningful way by the Forest Service, rendering the EIS deficient under NEPA and NFMA.

The Forest Service's failure to consider the proposed "no-regrets" alternative is also not in accordance with law because it violates the substantive provisions of NEPA and NFMA that require analysis of all reasonable alternatives that analyze potential environmental trade-offs, including those that would result in minimum resource potential. If an alternative meets the purpose and need of a project, it is reasonable, and therefore must be considered. *Native Ecosystems Council*, 428 F.3d at 1247-48 ("In judging whether the Forest Service considered appropriate and reasonable alternatives, [the] focus [is] on the stated purpose [of the action]"); *also see* 40 C.F.R. § 1502.14(a). The Center's proposed alternative is reasonable because it provides a framework for management that would meet the purpose and need for the plan revision while prioritizing increased protection of species and habitat, thereby establishing a alternative of minimal resource potential to be used for comparison of environmental trade-offs in the other considered alternatives.

The purpose of the plan revision is to "(1) meet the legal requirements of NFMA and the provisions of the 1982 Planning Rule, (2) guide natural resource management activities on the forest for the next 10 to 15 years, and (3) address the needed changes in management direction." FEIS at 4. The needs for this plan revision were identified as (1)"Modify stand structure and density of forest ecosystems toward reference conditions and restore historic fire regimes," (2) "Protect and regenerate aspen," (3) "Protect natural waters," and (4) "Restore grasslands by reducing tree encroachments in grasslands and meadows." *Id*. 4-5. The Forest Service never made an effort to show that the Center's proposed "no regrets" alternative would fail to meet the purpose and need, rendering its failure to consider the alternative arbitrary and capricious.

The Center's "no regrets" alternative meets the purposes and need for revision of the forest plan. First, under NFMA, a forest plan must "provide for multiple use and sustained yield of the products and services" in the forest. 16 U.S.C. § 1604(e)(1). Providing for multiple use and sustained yield includes administering the national forests for "wildlife and fish." 16 U.S.C. § 528. The 1982 Planning Rule also requires that forest plans provide for the diversity and viability of animal and plant species, as well as adequate habitat. *See* 36 C.F.R. §§ 219.9, 219.26, 219.27. Additionally, detailed consideration of the alternative would facilitate informed comparison of plan components across the spectrum of resource potential within the Forest Service's mandate to manage national forests for multiple uses, as called for in the 1982 Planning Rule. The proposed alternative would also meet the needs for change identified during the plan revision process because prioritizing species and habitat would, *by definition*, require plan components with the goal of restoring forest ecosystems to reference conditions, including fire regimes, aspen stands, natural waters and grasslands. Therefore, a "no-regrets" alternative that emphasizes protection of plant and animal species is a reasonable alternative for achieving the identified purposes and needs. The Forest Service violated NEPA and NFMA by failing to adequately respond to or evaluate the Center's reasonable proposed "no regrets" alternative.

Relief Sought: The Forest Service should withdraw the ROD and remand the FEIS for full development and detailed consideration an action alternative based on a "no regrets" strategy that prioritizes the protection of animal and plant species at the expense of other forest activities given significant uncertainty regarding effects of climate change on the Kaibab National Forest.

II. The Forest Service violated NEPA and NFMA by failing to provide adequate plan components for riparian ecosystems and failing to identify reasons for change of its management approach.

The 1982 Planning Rule establishes "minimum specific requirements to be met" within forest plans. 36 C.F.R. § 219.27. One of the minimum requirements is, "Special attention shall be given to land and vegetation for approximately 100 feet from the edges of all perennial streams, lakes, and other bodies of water," otherwise known as riparian areas. *Id*. § 219.27(e). In order to establish management practices within riparian areas, the Forest Service must consider "[t]opography, vegetation type, soil, [and] climatic conditions." *Id.* Another key requirement of the 1982 Planning Rule is that management prescriptions "preserve and enhance the diversity of plant and animal communities." *Id*. § 219.27(g). Additionally, the Forest Service must meet "[m]onitoring and evaluation requirements that will provide a basis for periodic determination and evaluation of the effects of management practices." *Id*. § 219.11(d).

The record establishes that the Kaibab National Forest is one of the driest in the nation, and riparian areas are uniquely important as ecologically critical areas for maintaining species diversity and viability. Planning guidance for the Southwestern Region, also in the record, states foreseeable effects of climate change to riparian areas including diminished water supply, contraction in the size of riparian ecosystems, susceptibility to invasion by nonnative plants and disruption of wildlife communities. "This information is to be used to develop social, economic, and ecological goals and desired conditions that reflect potential impacts while considering climate change," according to regional guidance on forest planning and climate change.

The Forest Plan does not contain management guidance or monitoring questions for riparian areas that meet the requirements of NFMA or reflect regional guidance regarding climate change. For example, the "Cottonwood-Willow Riparian Forest" section of the Forest Plan contains no decision components other than vaguely-worded desired conditions that are not expected to be met while the Forest Plan is in effect. Further, none of the desired conditions respond to threats of climate change identified by the Southwestern Region. The only acknowledgement of the importance of these ecosystems is the following statement describing management approach: "The Kaibab NF recognizes the importance of riparian areas during project planning and implementation, and emphasizes their protection while managing them within multiple-use guidelines." This statement is not sufficient to meet the high standard of "special attention," nor does it provide for maintenance or protection of diversity and viability of species associated with riparian areas.

Similarly, the Forest Plan section titled "Natural Waters" provides no substantive plan components for riparian areas. Instead, a desired condition states that riparian species should be "self-sustaining and occur in natural patterns of abundance and distribution." Forest Plan at 46. No standards, guidelines, objectives or management approaches are provided for natural waters.

In contrast, the 1988 Kaibab National Forest Land and Resource Management Plan ("1988 Plan"), now repealed, contained a number of binding standards and guidelines giving special attention to riparian areas, in accordance with NFMA implementing regulations. For example:

- Emphasize maintenance and restoration of healthy riparian ecosystems through conformance with forest plan riparian standards and guidelines. Management strategies should move degraded riparian vegetation toward good condition as soon as possible. Damage to riparian vegetation, stream banks, and channels should be prevented.

- Implement forest plan forage utilization standards and guidelines to . . . maintain and restore riparian ecosystems.

- Maintain not less than three age classes of woody riparian species with ten percent of the woody plant cover in sprouts, suckers, seedlings, and saplings.

- Maintain not less than 90 percent of the potential stream shading from May to September along all perennial cold or cool water streams. Provide shade with tree and other vegetational cover.

- Maintain not less than 90 percent of the potential shrub cover in riparian areas.

- Maintain not less than 90 percent of total linear streambank in stable condition.

- Woody riparian communities in addition to riparian communities which are dominated by shrub and herbaceous species are rated in satisfactory or better condition.

- Select riparian areas for treatment based on relative scorecard condition rating with the lowest rating assigned to first treatment.

- Manage livestock use in riparian areas to meet riparian area objectives. This normally will be by providing adequate rest. Fence to exclude livestock from riparian areas when alternative means are not feasible. In sheep allotments, sheep will be herded and may use riparian areas on a once through lightly basis (less than 20 percent of available forage) unless the permittee is instructed to not use an area; riparian areas will not be grazed more than one time during the grazing season

1988 Plan at 29, 42, 78. The revised Forest Plan does not carry forward any of the standards or guidelines quoted above, and the agency supplies no rationale for this change in management direction or reason for excluding riparian-related standards and guidelines from the 1988 Plan.

Even in the case of livestock grazing, which is a causal factor in the decline of riparian ecosystems (Beschta and others 2012), the Forest Plan contains no standards or guidelines that constrain grazing in riparian areas. The lack of "special attention" to riparian areas in the plan violates NFMA.

Both the lack of plan components (*i.e.*, standards and guidelines) for riparian areas and the absence of reason for a change in management approach are arbitrary and capricious. The Ninth Circuit has held that an agency decision is arbitrary and capricious under the APA if it "entirely failed to consider an important aspect of [a] problem." *Lands Council v. McNair*, 537 F.3d 981, 987 (9th Cir. 2008). In formulating the revised Forest Plan and the FEIS, the Forest Service failed to consider foreseeable effects to riparian areas from climate change, as laid out in regional guidance; failed to give "special attention" to riparian areas through plan components as required by NFMA; and failed to incorporate any standards and guidelines for riparian areas, thereby providing no direction to "preserve or enhance" the species diversity of these areas, as also required by NFMA. Further, "when an agency provides no explanation at all for a change in policy," it is reason for holding that an agency action was arbitrary and capricious. *Lands Council v. Martin*¸ 529 F.3d 1219, 1225 (9th Cir. 2008). Nowhere in the planning record does the Forest Service provide a rationale for eliminating the standards and guidelines for riparian areas contained in the 1988 Plan. Therefore, the Forest Service's action here is arbitrary and capricious and in violation of NEPA and NFMA.

Finally, the revised Forest Plan fails to include properties of riparian areas within its monitoring plan, thereby failing to provide any way to measure whether vague desired conditions for riparian areas every will be met. This gap in the monitoring plan violates the requirements of the 1982 Planning Rule, NFMA and NEPA.

Relief Sought: The Forest Service should withdraw the ROD and remand the FEIS for detailed consideration of plan components (*i.e.*, standards and guidelines) giving requisite "special attention" to riparian areas that will protect the ecological values of these areas, as well as species diversity and viability.[1] On remand, the Forest Service also should develop meaningful monitoring questions and protocols for riparian areas, especially as it relates to management activities that take place in or near riparian areas.

III. The Forest Service violated NEPA and NFMA by failing to provide adequate plan components for species viability and failing to identify reasons for change of its management approach.

Providing for multiple use and sustained yield on national forest lands includes provisions for "wildlife and fish." 16 U.S.C. § 528. The NFMA commands, "The Secretary "shall … incorporate the standards and guidelines required by this section in plans for units of the National Forest System…" *Id*. § 1604(c). Plan standards must include provision for timber and transportation management as well as for public participation in forest management. *See id*. §§§ 1604(m); 1608(c); 1612(a). The 1982 Planning Rule governing this plan revision further

[1] This approach is consistent with the "no regrets" plan alternative proposed by the appellants but dismissed by the Forest Service, as discussed *supra*.

requires, "Plans guide all natural resource management activities and establish management standards and guidelines for the National Forest System. They determine resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management." 36 C.F.R. § 219.1(b) (1982). Standards and guidelines in forest plans must be "qualitative and quantitative." *Id*. at § 219.1(b)(12). Forest plans must establish "standards and requirements by which planning and management activities will be monitored and evaluated." *Id*. § 219.5(a)(7); *also see* § 219.11(d) (citing "[m]onitoring and evaluation requirements that will provide a basis for periodic determination and evaluation of the effects of management practices"). Forest plans must define reasons for management practices chosen for each vegetation type and circumstance. *See id*. § 219.15. The planning rule also requires that forest plans provide for the diversity and viability of animal and plant species, as well as adequate habitat. *See id*. §§ 219.9; 219.26; 219.27. As one court has explained,

> The Ninth Circuit has emphasized that "NFMA imposes substantive duties on the Forest Service, one of which is the duty to provide for diversity of plant and animal communities." *Inland Empire Pub. Lands Council v. United States Forest Serv.,* 88 F.3d 754, 759 (quoting 16 U.S.C. § 1604(g)(3)(B)). The Ninth Circuit has also highlighted that, pursuant to NFMA regulations, the FS has a "duty to ensure viable, or self-sustaining, populations," a duty that "applies with special force to sensitive species" . . . and therefore presumably applies with equal force to endangered and threatened species such as the northern spotted owl. *Id*. This duty regarding species viability arises from former 36 C.F.R. § 219.19.

Environmental Prot. Info. Ctr. v. Blackwell, 389 F. Supp.2d 1174, 1205-06 (N.D. Cal. 2004).

The Forest Service violated NFMA and NEPA in the Forest Plan by: (1) failing to enact qualitative and quantitative standards and guidelines for wildlife and fish; (2) failing to enact requirements for monitoring and evaluation of management effects to species whose viability the Forest Service is obligated to maintain; and (3) failing to explain reasons for change to management direction from the 1988 Plan affecting wildlife and fish.

The Forest Plan repeals virtually all standards previously contained in the 1988 Plan for wildlife and fish on the Kaibab National Forest. It replaces prior standards with vaguely-worded desired conditions and certain guidelines that appear designed to maximize Forest Service discretion and evade accountability in management activities affecting species that are endangered, threatened or sensitive. The agency is not revising its plan on a blank slate. Rather, it significantly weakened protections for wildlife and fish that have been in effect for many years. "[A]n agency changing its course must supply a reasoned analysis." *Motor Vehicles Manufacturers Assoc. v. State Farm*, 463 U.S. 29, 57 (1983). The Forest Service has failed to provide reasoned justification for its change in course by deleting or weakening standards and guidelines, and disclose how those changes will impact the environment. This improperly analyzed move from standards to unchecked discretion is exact reason that the 2005 and 2008 forest planning rules were struck down by the Ninth Circuit and its district courts. *See Citizens for Better Forestry v. U.S. Dep't of Agric. (, 341 F.3d 961, 965 (9th Cir. 2003)* (*"Citizens I"); Citizens for Better Forestry v. U.S. Dep't of Agriculture*, 632 F.Supp. 2d 968, 980-81 (N.D. Cal. 2009) (*"Citizens III"*).

The Forest Service admits that standards in the 1988 Plan required protection of wildlife and ensured viability of federally-listed and sensitive populations, in compliance with NFMA. "The current land management plan has numerous standards and guidelines that require the evaluation and protection of federally listed and regional sensitive species." FEIS at 95 (*emphasis supplied*).

> Mexican spotted owl (federally threatened) and its designated critical habitat is protected by the standards and guidelines that were included in the 1996 plan amendment (KNF 1988, as amended). The forest recognizes that projects and program activities implemented under the current plan may occur near or within Mexican spotted owl protected activity centers (PACs) and within critical habitat. While the standards and guidelines provide protection for the owl and maintain their viability on the forest, activities may be permitted, authorized, or funded which may negatively affect individuals or affect designated critical habitat.

Id. 96; *also see id.* 97 ("Sensitive species that depend on ponderosa pine and mixed conifer habitat would be affected by the 1996 plan amendment. The standards and guidelines for the goshawk and Mexican spotted owl would provide for the goshawk, bald eagle, Allen's lappet-browed bat, Kaibab least chipmunk, Kaibab tree squirrel, Merriam's shrew, and Kaibab northern pocket gopher"); 98 ("Based on the risk to viability rating and the amount of habitat provided for each of the above species, viability would be maintained for each of these species dependent on conifer habitat under the no action alternative. While individual animals could be impacted by the actions under this alternative, the alternative would not lead toward Federal listing of the above sensitive species" (*emph. supplied*)).

In contrast, the revised Forest Plan contains no forest-wide management standards for wildlife or habitat. *See* Forest Plan at 49-53 (wildlife; threatened, endangered and sensitive species; rare and narrow endemic species). As shown in Tables 1 and 2 at the bottom of this notice of appeal, it repeals standards of the 1988 Plan, as amended, and replaces them with non-binding "desired conditions" and "guidelines," which the Forest Service may disregard in project-level decisions at its sole discretion. *See* FEIS at 94 ("Most of the standards and guidelines that have the potential to benefit wildlife in the current plan are also found in the action alternatives in the form of desired conditions, guidelines, or management approaches"); 5 ("Desired conditions, goals, and objectives express an aspiration and form the basis for projects, activities, and uses that occur under the forest plan"); 332 ("The plan provides the desired conditions and objectives, but does not prescribe how criteria should be established or implementation should be accomplished. Those types of decisions are typically made at the project level"); *also see* Forest Plan at 5 (stating that desired conditions and goals "are not commitments," and "may only be achievable over hundreds of years"); *id*. ("A guideline allows for departure from its terms, so long as the intent of the guideline is met").

According to the Forest Service, standards are the only plan components that "must be followed when an action is being taken to make progress toward desired conditions." Forest Plan at 5. "Standards differ from guidelines in that standards do not allow for any deviation without a plan amendment." *Id*. In other words, standards containing the word "will" or "shall"

are binding on forest management activities, whereas guidelines containing the word "should" and other plan components do not constrain project-level decisions. *See Norton v. Southern Utah Wilderness Ass'n*, 542 U.S. 55, 72 (plan decisions are not enforceable unless "language in the plan itself creates a commitment binding on the agency"). The problem with this approach is that it contradicts the mandates of NFMA and its 1982 regulations, and makes informed analysis of environmental consequences under NEPA impossible.

The Forest Service enjoys substantial deference in its interpretation of the intent of forest plan guidelines. "Agencies are entitled to deference to their interpretation of their own regulations, including forest plans." *Hapner v. Tidwell*, 621 F.3d 1239, 1251 (9th Cir. 2010) (internal quotation omitted). Every one of the guidelines in the revised Forest Plan affecting wildlife contains the discretionary word "should," not mandatory terms such as "will" or "shall." *See U.S. v. UPS Customhouse Brokerage, Inc.*, 575 F.3d 1376, 1382 (Fed. Cir. 2009) ("'Will' is a mandatory term, not a discretionary one"); *New England Tank Indus. of N.H., Inc. v. United States*, 861 F.2d 685, 694 (Fed. Cir. 1988) (distinguishing mandatory term "will" from discretionary term "should"). The Ninth Circuit recognizes that certain forest plan components may be planning guides but not mandatory standards. In *Lands Council v. McNair*, 629 F.3d 1070, 1078 (9th Cir. 2010), the Court accepted that forest plan language stating old-growth stands "should" be at least 25 acres in size functioned as "a guide for planning purposes, but does not prohibit counting stands less than 25-acres as old growth." *Id.* Similarly, in *Ecology Center v. Castaneda*, 574 F.3d 652, 660-61 (9th Cir. 2009), the Court deemed that the language of guidelines incorporated into a forest plan did not "create a mandatory standard." Instead, the guidelines were not enforceable under NFMA because they were cast in "suggestive" language using the word "should," and "merely recommended" a particular practice "when possible." *Id.* at 661 (internal quotation omitted).

In short, the Forest Service enjoys considerable deference in the implementation and application of forest plan guidelines, things that it "should" or "should not" do. In this plan revision, the Forest Service overreached. By consigning virtually every aspect of forest management to aspirational goals and guidelines, the agency has abdicated its basic responsibilities under NFMA and its 1982 planning rules. Moreover, it has not disclosed clearly the effects of this change (and, logically, it cannot disclose effects) when the range of potential concrete outcomes is so broad as to be effectively unknowable, violating NEPA.

The revised Forest Plan contains the following three "Guidelines for Wildlife," which apply throughout the Kaibab National Forest:

- Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of wildlife, particularly for raptors.

- Project activities and special uses should incorporate recommended measures for golden eagle management such as temporary closures to limit human disturbance in the vicinity of golden eagle nests.

- Potentially disturbing project-related activities should be restricted within 300 yards of active raptor nest sites between April 1 and August 15.

Forest Plan at 49. Clearly, the primary intent of those three guidelines for "wildlife" applies to birds of prey. Only one of them, citing "refugia and critical life cycle needs of wildlife," applies more broadly to other species and it is cast in discretionary language permitting deviation so long as the Forest Service unilaterally deems that its "intent" is satisfied in project-level decisions.

In addition, the revised Forest Plan offers the following six "Guidelines for Threatened, Endangered, and Sensitive Species," which also apply forest-wide:

- Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.

- Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species.

- Activities occurring near areas used by bald eagles should follow recommendations identified in the National Bald Eagle Management Guidelines and Arizona Conservation Assessment and Strategy for the Bald Eagle.

- A minimum of six goshawk nest areas (known and replacement) should be located per territory. Nest and replacement nest areas should generally be located in drainages, at the base of slopes, and on northerly (NW to NE) aspects. Nest areas should generally be 25 to 30 acres in size.

- Goshawk PFAs (post-fledging family areas) of approximately 420 acres in size should be designated surrounding the nest sites.

- Potentially disturbing project-related activities should be minimized in occupied goshawk nest areas during nesting season of March 1 through September 30.

Id. 51-52 (*emph. supplied*). The only guideline applicable to federally-listed species in the Kaibab National Forest (*e.g.*, Mexican spotted owl) states that the Forest Service "should" apply "approved recovery plans." That guideline, just like every other wildlife-related guideline in the plan, is discretionary, lacks mandatory language, and therefore it is unenforceable. Sole reliance on project-by-project discretion fails to achieve the NFMA requirement of ensuring viable wildlife populations, fails to allow for informed analysis under NEPA, and violates the Forest Service's obligations under the Endangered Species Act ("ESA" – 16 U.S.C. § 1536(a)).

The revised Forest Plan and the FEIS sweep under the rug the 1996 biological opinion of the U.S. Fish and Wildlife Service ("FWS") concluding that management discretion unconstrained by mandatory standards in forest plans jeopardized the continued existence of Mexican spotted owl:

> The Service finds that continued implementation of the existing forest plans will jeopardize the continued existence of the Mexican spotted owl and will adversely modify

> the species' critical habitat. This biological opinion is based on the results of our analyses of the effects of continued implementation of the management direction contained in the existing forest plans for the National Forests of the Forest Service's Southwestern Region. The Service believes that aspects of the existing forest plans do not provide for the physical and biological requirements of the Mexican spotted owl or its critical habitat. Additionally, the Service recognizes that much discretion exists on the part of forest managers at the project level in the implementation of forest plan guidance and direction. The broad range of effects that could result from the implementation of the management direction of the existing forest plans is suggested by the discretion forest managers use in their implementation of plan-level direction. As can be seen in the attached list of forest projects (Appendix A), the existing forest plans lack the management direction to prevent the development of forest project-level activities that are likely to adversely affect the Mexican spotted owl.

(USDI 1996a: 39). Notably, Appendix A of that biological opinion included a variety of site-specific actions affecting Mexican spotted owl including trail maintenance and uneven-aged partial cuts, not just even-aged shelterwood harvests. The FWS also stated in the same biological opinion that implementation of a "reasonable and prudent alternative," in the form of non-discretionary standards and guidelines amending forest plans in the Southwestern Region (USDA 1996), and the 1995 Mexican Spotted Owl Recovery Plan (USDI 1995) *taken together* form a basis to "remove jeopardy" and "avoid adverse modification" of critical habitat.

> The definition of standards and guidelines as given in the [1996] FEIS is assumed for this analysis. That definition states that standards and guidelines are, "the bounds or constraints within which all management activities are to be carried out in achieving forest plan objectives." In the future, all forest activities carried out under the existing forest plans will be reviewed by the Service pursuant to Section 7 of the Endangered Species Act in terms of their conformity with these elements.

USDI (1996a: 39). After the Forest Service formally amended forest plans in the Southwestern Region and adopted specific standards and guidelines affecting management of Mexican spotted owl, the FWS stated,

> Implementation of the forest plans, as amended by the new Standards and Guidelines of Alternative G in the [1996] FEIS, is not likely to jeopardize the continued existence of the Mexican spotted owl or result in the destruction or adverse modification of the species' critical habitat. Project-level actions and activities planned and implemented under these standards and guidelines, taken together, should promote the recovery of the owl.

USDI (1996b: 29). The latter biological opinion reinforced the importance of plan-level standards and guidelines to limit management discretion:

> Although Alternative G covers the essential features of the Recovery Plan's management recommendations, interpretations of the standards and guidelines can vary. It is crucial that resource managers and biologists on the ground refer to the Recovery Plan in order

> to correctly interpret the standards and guidelines. The Service believes that activities designed within the bounds and constraints of the amendments for the protection of the owl will promote the recovery of the owl. This is particularly the case for protected and restricted areas. Guidelines for other forest and woodland types are much more general. These other types may be of value to owls for foraging and possibly for dispersing and wintering. Existing and planned management for these types will maintain or improve habitat for these needs of the owl. Continuation of such management in conformity with the guidelines for other forest and woodland types, along with the special protections provided for protected and restricted areas and old growth, would promote the recovery of the owl.

USDI (1996b: 29).

To be clear, the revised Forest Plan repeals standards and guidelines for Mexican spotted owl that were contained in the 1988 Plan, as amended. Those standards and guidelines (USDA 1996: 87-91):

- Required survey of suitable habitat prior to disturbance of suitable habitat.
- Compelled designation of 100-acre nest cores surrounded by 600-acre protected activity centers ("PAC") wherever nesting behavior was detected by surveys.
- Prohibited vegetation management in nest cores and allowed only limited treatments in PAC.
- Required selection of an equal number of PAC as untreated control areas when vegetation treatments were done within them
- Prohibited harvest of trees larger than 9-inches diameter in PAC
- Maintained "target/threshold" habitat suitable for nesting and roosting outside of PAC featuring at least 150-170 ft²/acre basal area and 20 trees/acre larger than 18-inches diameter at breast height.
- Retained trees larger than 24-inches diameter at breast height in suitable nesting and roosting habitat outside of PAC.
- Required monitoring of habitat and population trends.

The FEIS improperly fails to disclose the adverse environmental consequences of eliminating these standards, in violation of NEPA. *See* FEIS 93-97 (discussing effects on Mexican spotted owl without disclosing consequences of eliminating project-specific standards).

On July 18, 2012, the Center commented, "The DEIS contains no explanation why a return to the era of unlimited management discretion that pre-existed the current [amended]

forest plan will avoid jeopardizing the owl or maintain the viability of sensitive animal populations." The only Forest Service response to this issue in the record cast aside the problem raised by the FWS and Appellants regarding effects of discretionary management to federally-listed species and critical habitat, and dismissed it as an issue leading to development of alternatives:

> **Already decided by law, regulation, or policy:**
> The lack of direction for threatened and endangered species could result in adverse effects to threatened and endangered species, as well as their habitat.
>
> ***Rationale**: The forest follows the recommendations in recovery plans and works closely with the U.S. Fish and Wildlife Service for species recovery in accordance with the Endangered Species Act. The plan does not reiterate existing law, regulation, or policy.*

FEIS 10. The Forest Service's rationale quoted above fails to address or even acknowledge the problem that Appellants raised in its comments. While the Forest Plan may aspire to implement recovery plan actions, it nevertheless fails to address potential jeopardy to federally-listed species or adverse modification of critical habitat that may result because the plan lacks binding management direction to prevent adverse effects. It also overlooks the discretionary nature of the sole guideline contained in the Forest Plan suggesting that managers "should integrate" applicable recovery plans into project design and decision-making. *See* Forest Plan at 51. The critical issue of Mexican spotted owl conservation and recovery is not, in fact, "already decided by law, regulation, or policy," where the Forest Plan makes compliance with the policy optional.

Furthermore, past projects clearly demonstrate that the Forest Service does not always "follow[]the recommendations in recovery plans…" FEIS at 10. In 2007, the Kaibab National Forest proposed a tree removal project in within Mexican spotted owl habitat. Consulting under ESA § 7, the FWS delivered a biological opinion stating that removal of fire-killed trees on 864 acres of Restricted Habitat in the Warm Fire Hazard Tree Removal Project on the North Kaibab Ranger District was "likely to adversely affect" Mexican spotted owl ("MSO") and its critical habitat (USDI 2007). "For roads that were affected by wildfire/suppression, all trees within an identified treatment area will be removed. The width of the treatment area for roads selected for hazard tree removal will be defined as a 200 foot-wide buffer area centered on the centerline of the road" (USDI 2007: 3) (*emph. supplied*). The FWS described direct adverse effects of that action to MSO critical habitat:

> The large snag component of the MSO habitat will be reduced by the project. Complete removal of the trees will also affect the recovery of the large down log component of that MSO habitat in the future. Combined with the fire effects, hazard tree removal will result in even-aged stand conditions over a large area until trees age enough to develop mixed-species and uneven-aged conditions. Roadside areas are key zones to protect visitors and allow speedy access into remote areas for future fire suppression. Therefore, these roadside areas will likely not contribute to long-rotation periods and uneven-aged conditions (Sanders 2007), reducing the amount of MSO habitat that can be recovered in the project area.

(USDI 2007: 10). The Warm Project was directly contrary to recommendations for post-fire salvage logging stated on pages 88-89 of the applicable recovery plan (USDI 1995):

> The Recovery Team advocates the general philosophy of Beschta et al. (1995) for the use of salvage logging. In particular: (1) no management activities should be undertaken that do not protect soil integrity; (2) actions should not be done that impede natural recovery of disturbed systems; and (3) salvage activities should maintain and enhance native species and natural recovery processes. Further, any salvage should leave residual snags and logs at levels and size distributions that emulate those following pre-settlement, stand-replacing fires. Scientific information applicable to local conditions should be the basis for determining those levels.

Despite the documented adverse effects to primary constituent elements of MSO critical habitat resulting from the Warm Project, in contradiction of the applicable recovery plan, the Forest Service asserts in the FEIS that it "follows" species recovery plans generally. The agency failed to address or acknowledge the problem raised by the FWS and Appellants regarding potential jeopardy and adverse modification resulting from a lack of enforceable standards in the Forest Plan, in violation of NEPA. Failure to respond to comment is ground for reversal of agency action if it reveals that the agency's decision was not based on consideration of the relevant factors. *See American Mining Congress v. EPA*, 965 F.2d 759, 771 (9th Cir. 1992) (citing *Thompson v. Clark*, 239 App. D.C. 179, 741 F.2d 401, 409 (D.C. Cir. 1984)). "Agencies are nonetheless obliged to provide a "meaningful reference" to all responsible opposing viewpoints concerning the agency's proposed decision. 40 C.F.R. § 1510(a) (1977), *38 Fed. Reg. 20,550, 20,555 (1973)* **[**53]** (superceded 1978); *Committee for Nuclear Responsibility, Inc., 463 F.2d at 787*. This standard requires the agency to identify opposing views found in the comments such that "differences in opinion are readily apparent." *Warm Springs Dam Task Force, 565 F.2d at 554*; *Committee for Nuclear Responsibility, Inc., 463 F.2d at 787*. Moreover, "there must be good faith, reasoned analysis in response." *Silva v. Lynn, 482 F.2d 1282, 1285 (1st Cir. 1973).*" *California v. Block,* 690 F.2d 753, 773 (9th Cir. 1982).

Reliance on non-binding aspirational statements of desired conditions and one guideline to address recovery plans for federally-listed species violates NFMA, NEPA, and the APA by: (1) failing to enact qualitative and quantitative standards; (2) failing to enact requirements for monitoring and evaluation of management effects; and (3) failing to explain reasons for change to management direction affecting listed species.

Removal of standards and guidelines affecting federally-listed species is an adverse effect of the revised Forest Plan that will result in actual physical effects to the environment. *See Citizens for Better Forestry v. U.S. Dept. Agric.*, 341 F.3d 961, 973, 975 (9th Cir. 2003) (reducing or repealing forest planning standards results in lesser or no environmental standards at the site-specific level). Federal courts invalidated the 2005 and 2008 planning rules for essentially this very reason.[2] *See Citizens III*, 632 F. Supp.2d at 980-81. The lack of enforceable standards in

[2] The Forest Plan equates "desired conditions" with "goals," which it defines as "the aspirational picture for the future of the [Kaibab National Forest] ... They are aspirations and are not commitments or final

the revised Forest Plan affecting management of federally-listed species contradicts NFMA and the 1982 planning regulations.[3] *See* 16 U.S.C. §§ 1604(c) and (g); 36 C.F.R. §§§§ 219.1(b), 219.11(c), 219.12(f)(9)(iii), 219.15.

Furthermore, the revised Forest Plan repeals or weakens standards and guidelines contained in the 1988 Plan, as amended, for sensitive northern goshawk, which quantified structural attributes of habitat essential to viability of goshawk and 14 vertebrate prey species. The Forest Service previously based action alternatives in two environmental impact statements on those standards and guidelines (USDA 1995, 2006). In doing so, it established a habitat-proxy relation of ponderosa pine forest structure to goshawk viability, and a proxy-on-proxy relation of goshawk habitat to viability of 14 prey species that reflected the best available science and was sufficient to meet the NFMA requirements.

Once again, the Forest Plan relies upon discretionary plan components in the form of desired conditions, objectives and guidelines that fall short of the management direction previously established to assure viability of goshawk and its prey. *See* FEIS at 97-98 (no-action alternative maintained viability of goshawk and prey, and avoided trend toward federal listing of sensitive species). In particular, the Forest Plan contains three guidelines for northern goshawk, which are quoted above. *See* Forest Plan at 51-52. Those guidelines state that the Forest Service "should" locate goshawk nest areas, designate family areas, and minimize noise in occupied nest areas. Plan components in the revised Forest Plan affecting goshawk are discretionary, lack mandatory language, and are not enforceable under the NFMA. Indeed, the new guidelines are identical to those proposed by other Southwestern Region national forests in draft plan revisions, indicating a regionally-orchestrated agenda to undermine environmental protection, maximize agency discretion and evade public accountability at the expense of species viability.

Desired conditions for ponderosa pine forest, if implemented forest-wide, could result in significantly less old forest structure and canopy cover in goshawk nest, family and forage areas than was established by the habitat-proxy analysis of prior impact statements ensuring viability (USDA 1995, 2006). The revised Forest Plan describes "Fine-scale (10 acres or less) Desired Conditions for Ponderosa Pine" including:

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decisions approving projects and activities and may only be achievable over a long time period." The NFMA implementing regulations applicable to this plan revision define a "goal" as, "A concise statement that describes a desired condition to be achieved sometime in the future. It is normally expressed in broad, general terms and is timeless in that it has no specific date by which it is to be completed. Goal statements form the principal basis from which objectives are developed." 36 C.F.R. § 219.3 (1982). The regulations further define "objective" as, "A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals." *Id*.

[3] Standards in the revised Forest Plan only constrain management of dispersed camping, off-road vehicles, energy transmission and unplanned human-ignited wildfires. The scope, placement, duration and effects of all other management activities on the forest, including road construction, timber harvest, fuel management and livestock grazing, would be discretionary.

- Tree groups are made up of clumps of various age classes and size classes that typically occur in areas less than one acre, but may be larger, such as on north-facing slopes.

- Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking and consist of approximately 2 to 40 trees per group.

- The interspaces between groups are variably shaped, are comprised of a native grass/forb/shrub mix, and may contain individual trees or snags. Regeneration openings occur as a mosaic and are similar in size to nearby groups.

Forest Plan at 17. Notably, the only mention of "mid-aged to old" forest isolates it to small groups ("2 to 40 trees per group") generally one acre or less in area. The desired condition for "interlocking or nearly interlocking" tree crowns occurs within small groups of trees surrounded by open "interspaces" consisting of "a native grass/forb/shrub mix" (*i.e.*, early-seral vegetation). The desired condition does not specify whether the ponderosa forest type should be dominated by tree groups or by interspace, or what spatial spread of vegetation stages might be considered appropriate. There is no requirement for retention of existing old forest, nor is any level of canopy cover desired in ponderosa forest under the revised Forest Plan. In contrast to the 1988 Plan, as amended, the new plan omits any requirement – let alone an objective – to survey for goshawk presence prior to habitat disturbance, monitor populations, or retain forest structure (*e.g.*, canopy cover) previously deemed by the Forest Service essential to nesting and fledging behaviors of sensitive species. Forest managers are invited but not required to consider locating nest areas and family areas – with no particular expectation of management within them other than desired conditions that are common to each area, and may not be achieved for decades or centuries – and "minimize" noise in the nesting season. The revised Forest Plan is a significant retraction of previously established standards and guidelines, and requires explanation for such a drastic change of management approach in ponderosa pine forest.

The Arizona Game and Fish Department expressed concern to the Forest Service that management of uneven-aged ponderosa pine forest structure, including canopy cover, at small tree "group" scales instead of at larger (10-40 acre) stand scales has the potential to significantly reduce the amount of forest cover compared to standards and guidelines of the 1988 Plan, as amended, with potentially negative consequences for goshawk and its 14 prey species.[4] For example, assuming a residual canopy cover of 50 percent within groups (<1 acre), and if such

[4] See notes of Arizona Game and Fish Department Region II Commission Briefing, July 27, 2007, attached to these comments for convenience. In it, the Department explains, "the Management Recommendations for the Northern Goshawk in the Southwestern United States (GTR-RM-217) defines northern goshawk habitat through the structural habitat attributes of 14 of the hawk's prey species. The canopy cover data described for these prey species, and for the northern goshawk, were measured at the stand level – not the tree group level. By changing the canopy cover targets from the stand level to the group level, the Department is concerned that the Forest Service may not be meeting the habitat requirements for those 14 wildlife species, and also may not be meeting the habitat requirements for the northern goshawk per the 1996 Forest Plan Amendment."

groups occupy 50 percent of a stand, canopy cover at the stand scale will be 25 percent or less. To prevent this outcome, which clearly would harm some of the species previously considered by the Forest Service (USDA 1995, 2006), Reynolds and others (1992) recommended maintenance of canopy cover canopy cover in mid- to old-aged stands that host goshawk nesting and fledging habitat. The Forest Service is required by NFMA and NEPA to address changes in management direction affecting sensitive species and effects to the environment.

Relief Sought: The Forest Service should withdraw the ROD and remand the FEIS for detailed consideration of plan components (*i.e.*, standards and guidelines) that ensure species viability.[5] On remand, the Forest Service also should develop meaningful monitoring questions and protocols for federally-listed and sensitive species whose viability may be affected by management under the Forest Plan.

IV. The Forest Service violated NEPA with an arbitrary and capricious livestock grazing capability determination.

In forest planning, "the suitability and potential capability of National Forest System lands for producing forage for grazing animals and for providing habitat for management indicator species shall be determined." 36 C.F.R. § 219.20 (1982). In particular:

> Lands suitable for grazing and browsing shall be identified and their condition and trend shall be determined. The present and potential supply of forage for livestock, wild and free-roaming horses and burros, and the capability of these lands to produce suitable food and cover for selected wildlife species shall be estimated. The use of forage by grazing and browsing animals will be estimated. Lands in less than satisfactory condition shall be identified and appropriate action planned for their restoration.

Id. § 219.20(a). The Forest Service must consider, among other things, "possible conflict or beneficial interactions among livestock, wild free-roaming horses and burros and wild animal populations, and […] direction for rehabilitation of ranges in unsatisfactory condition…" *Id*. § 219.20(b) (1982).

One of the "needs for change" in this forest plan revision is "a need for clearer direction related to livestock grazing…" ROD at 4. The "designation of lands suitable for grazing and browsing" states:

> Approximately 96 percent of the Kaibab National Forest is suitable for livestock grazing. The areas designated unsuitable for grazing were either closed to grazing in the 1988 Plan or have been closed to grazing based on site-specific NEPA decisions for grazing allotments. Since the 1988 Plan was approved, every active allotment on the Kaibab NF has received site-specific environmental review for the authorization of grazing. Chapter 4 of the revised Plan and Appendix D of the FEIS contain more information about the grazing suitability and capability determinations on the Forest.

[5] This approach is consistent with the "no regrets" plan alternative proposed by the Center but dismissed by the Forest Service, as discussed *supra*.

Id. 12. Chapter 4 of the Forest Plan and FEIS Appendix D supply the informational basis for the grazing suitability determination quoted above. Both documents contain the same language – verbatim – explaining the difference between "suitability" and "capability":

> The 1982 Planning Rule requires that the suitability of rangelands on NFS lands and their capability for producing forage for grazing animals be determined in forest planning. Capability is the potential of an area of land to produce resources and supply goods and services. Capability depends upon conditions such as climate, slope, landform, soils, and geology. Suitability is the appropriateness of applying certain resource management practices to a particular area of land in consideration of the relevant social, economic, and ecological factors. Lands within the plan area are not suitable if livestock grazing would be incompatible with the desired conditions or result in substantial and permanent impairment of the land.

Forest Plan at 110; FEIS at 471 (same). Elaborating on the capability determination, those documents further state – in identical language:

> Capability to produce forage for grazing animals was determined for the original forest plan (USDA 1988). Most landscape-scale conditions that influence capability have not changed significantly since the initial evaluation. However, the data and analysis tools used in the initial determination were not as accurate or precise as what is available today. Capability for this plan was reassessed using the corporate GIS data. Table 2 displays the results of this analysis. The area capable for livestock grazing has about 12 percent fewer acres than the original forest plan. More detail about the process and rationale behind these calculations are documented in the white paper "Grazing Capability Calculations for the Kaibab NF," which is filed in the project record.

Id. Therefore, the basis of the revised Forest Plan's determination of suitability and capability for livestock grazing is the 1988 Plan. However, the new plan introduces a reassessment of forest-wide grazing *capability* "using the corporate GIS data" that resulted in 12 percent fewer acres designated as "capable" compared to the older plan.

The determination of livestock grazing capability violates NFMA, NEPA, and the APA because it: (1) fails to explain the method used to change the capability determination from the 1988 Plan; and (2) fails to 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) (Forest Service violated NEPA because it never explained capability criteria or method used to calculate capability); *also see Ecology Center, Inc. v. Austin,* 430 F.3d 1057, 1067 (9th Cir. 2005) (agency must reveal in EIS how it conducted its "hard look," including the data relied upon and how it analyzed data, so the public can make an informed comparison of alternatives). NEPA imposes procedures designed to force agencies to take a "hard look" at the environmental consequences of a proposed action. *Earth Island Institute v. United States*, 351 F.3d 1291, 1300 (9th Cir. 2003). The "hard look" requirement is violated in this instance because the Forest Service reports a change of capability calculation from the 1988 Plan based on undisclosed methodology and data. By not revealing crucial data, the Forest Service violated its duty under

NEPA to prepare an EIS that would "foster both informed decision-making and informed public participation." *Native Ecosystems Council v. United States*, 418 F.3d 953, 960 (9th Cir. 2005).

The "white paper" (Leonard 2014) cited by the Forest Plan and the FEIS, above, is equally cursory and opaque, and fails to cure defects of disclosure.[6] It explains only that the Kaibab National Forest applied two capability criteria: slope and forage production. "Lands with slopes less than 40 percent that have the potential to produce more than 100 pounds of forage per acre are considered to be capable of producing forage for grazing animals" (Leonard 2014: 1). The white paper further states that the capability determination is "coarse in nature," and "does not authorize grazing on specific pieces of land."

The record taken as a whole contains no information about the methods or data used by the Forest Service to arrive at the adjusted grazing capability calculation for the Kaibab National Forest. This is the same defect that led the District Court of Idaho to invalidate four Sawtooth National Forest grazing decisions in 2006 – hidden data and methodology permit neither the agency decision-maker nor the public to take the informed "hard look" required by NEPA. *See W. Watersheds Project*, *op. cit.* ("Although the Forest Service used the GIS data to create maps identifying the capable and incapable lands for its internal use, it did not share the GIS data and maps in the Plan").

The grazing capability determination in the Forest Plan is unlawful for three reasons: (1) it lacks an informed basis that is available and understandable to the public, and is therefore arbitrary and capricious and in violation of NEPA; (2) it fails to present "a rational connection between the facts found and the conclusions made," *Native Ecosystems*, 418 F.3d at 961, indeed failing to disclose even what those underlying facts are, in violation of the APA; and (3) it fails to meet the requirement of 36 C.F.R. § 219.20 (1982) that the Forest Service determine capability and suitability of lands for grazing, by offering a conclusory determination without any basis in fact or disclosure of methods, in violation of NFMA and the APA.

Relief Sought: The Forest Service should withdraw the ROD and remand the FEIS for detailed consideration and public disclosure of grazing capability calculations underlying the Forest Plan. On remand, the Forest Service also should develop meaningful monitoring questions and protocols to ensure successful adaptive management on lands deemed suitable and/or capable of sustaining forage grazing by domestic livestock.

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[6] On April 29, 2014, the undersigned contacted the Forest Service with a request for the white paper referenced here, stating, "I looked through the KNF website to find the white paper referenced on page 110 of the new Forest Plan entitled, "Grazing Capability Calculations for the Kaibab NF," but didn't find it there." On the same date, the Forest Service replied, "It isn't on the web because it is in 'draft' form. It is a pretty basic explanation of the capability calculation process. I will get with our range specialist to get it finalized and posted to the web. I'll let you know as soon as it is up. I should be able to get it reviewed and posted within the week." On May 6, 2014, the Forest Service supplied the undersigned with the white paper stating, "I have attached a courtesy copy of the Range Capability. Our web person said it should post to the Forest Plan page today, but that it sometimes takes a few hours to refresh. Also, the Range Specialist Report does exist as a stand-alone document, it just doesn't have any additional information or analysis." The electronic mails of April 29 and May 6, 2014, are attached to this appeal.

V. The Forest Service violated federal law by failing to ban lead ammunition to protect viability of California condor.

Appellants stated in comments throughout the plan revision process that the Forest Service should ban, or at least limit, use of lead ammunition on the Kaibab National Forest due to ongoing and recurrent poisoning of California condors from lead ammunition that prevents recovery of the federally-listed species. The Forest Service responded that it does have authority to prohibit actions for the purposes of protecting endangered species, and that such a ban is "outside the scope" of the plan revision process. FEIS at 9. The agency further opined,

> [A]dditional protections for the condor are not needed for the purposes of the forest plan. Under all plan alternatives, the viability of the California condor is maintained while implementing forest management activities, as documented in the viability analysis in chapter 3.

Id. The Forest Plan violates federal law because: (1) The Forest Service does, in fact, have the authority to address lead ammunition in this planning process; (2) it incorrectly determined that the California condor will remain viable under the selected alternative; and (3) its findings are not supported by available science.

A. Authority.

The position of the Forest Service regarding a prohibition or limit on use of lead ammunition in the Kaibab National Forest is based partly on an unsupported conclusion that it is "outside of the scope of the plan revision EIS analysis." FEIS at 9. This conclusion dismisses the clear authorities supplied by the NFMA and the 1982 Planning Rule to maintain species viability on national forest lands and to accomplish de-listing of threatened and endangered species, and it is arbitrary and capricious. *See* 16 U.S.C. § 1604(g)(3)(B) (forest plans "provide for diversity of plant and animal communities" on national forest lands); 36 C.F.R. § 219.9(a)(7) (requiring management of national forest lands "to maintain viable populations of existing native [] species in the planning area"); *id*. ("Objectives shall be determined for threatened and endangered species that shall provide for, where possible, there removal from listing").

Next, the Forest Service asserted in the record that enacting a lead ammunition prohibition or limit "would require following the rule making procedures established in 5 U.S.C. 553," and that such "[r]ule making would require additional analysis and documentation for compliance with the National Environmental Policy Act." FEIS at 9. Overlooking for the sake of argument the obvious fact that this *is* a NEPA process, making the latter assertion quoted above *non-sequitur*, lead ammunition already has been identified by Appellants as a significant issue for management planning on the Kaibab National Forest. It falls squarely within the agency's discretion to manage that particular forest to ensure species viability and recovery, and to regulate visitor uses, similar to campfires or motorized vehicles. *See* 36 C.F.R. § 261.70 ("Pursuant to 7 CFR 2.60, the Chief, and each Regional Forester, to whom the Chief has delegated authority, may issue regulations prohibiting acts or omissions within all or any part of the area over which he has jurisdiction"); *id*. § 261.70(a)(4) (Forest Service may prohibit public uses of national forest lands for purposes including "Protection of threatened, endangered, rare,

unique, or vanishing species of plants, animals, birds or fish, or special biological communities"); *id*. § 261.70(c)-(e) (even if formal rulemaking is required for prohibitions that are regional or national in scope, management decisions affecting individual national forests are not subject to formal rulemaking procedures other than NEPA process); *id*. § 219.19(a) (1982) (requiring forest plans to maintain viable populations of native and desired non-native vertebrate species, prescribe "measures to mitigate adverse effects," and consider "[a]ccess and dispersal problems of hunting, fishing, and other visitor uses"). The Forest Service has authority to consider this significant issue in forest plan revision, and its misplaced arguments to the contrary are errant, arbitrary and capricious.

Again for the sake of argument, even if the Forest Service's erroneous interpretation of 7 C.F.R. § 260 were correct and rulemaking is required for a complete ban on lead ammunition in the Kaibab National Forest, its failure to consider limits on use of lead shot is arbitrary and capricious. First, the fact that additional rulemaking may be required does not necessarily render an alternative infeasible or unreasonable, where, as here, it is plainly within the agency's statutory authority and the purpose and scope of the decision at hand. Second, even short of a complete ban, the Forest Service retains, in the course of its wildlife management decisions within the forest plan revision process, authority to impose conditions on activities it authorizes. The Forest Service attempts to sidestep its obligation to maintain the viability of California condor by claiming that because it "only provides access for hunting, and does not manage harvest of game animals, there is little influence from forest management." FEIS at 96. As the Forest Service acknowledged, it has the authority to prohibit the use of lead ammunition on national forest land subject to rulemaking procedures. Accordingly, any claim that Forest Service actions, or failure to act, with respect to the use of lead ammunition would have "little influence" is clearly inconsistent with the facts and the law. Under the law, the Forest Service can have the ultimate decision over condors' exposure to lead ammunition – it has the authority to enact a ban on lead ammunition in the Kaibab National Forest.

Further, the Forest Service's claim that it "only provides access for hunting" is inaccurate. FEIS at 96. The agency issues Special Use Permits for commercial hunting on national forest lands. Those commercial permits **do not require** use of non-lead ammunition. Through Special Use permitting, the Forest Service does, in fact, manage the harvest of game animals. Even if the agency only provided access to the Kaibab National Forest for hunting with lead ammunition, it would have a clear duty under the NFMA to consider a lead ammunition prohibition to ensure condor viability.

B. Viability.

The Forest Service has failed to apply the correct standard in determining species viability within the FEIS, thereby allowing it to reach an incorrect conclusion that undermines its statutory duties under NEPA. Viability under the 1982 Planning Rule is defined as a population "which has the estimated numbers and distribution of *reproductive* individuals to insure its continued existence is well distributed in the planning area." 36 C.F.R. § 219.19 (*emphasis added*). The Forest Service has a mandatory duty to ensure that "[f]ish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area." *Id*.

The Forest Service concluded that under every proposed alternative analyzed in the FEIS, the California condor would have "low to moderate viability risk." FEIS at 93. Because viability is determined using reproductive individuals, the Forest Service cannot reasonably conclude that the condor population on the Kaibab National Forest is or would be viable under any of the alternatives considered. In the DEIS viability analysis, the Forest Service acknowledged that the condor population in Arizona is non-breeding. DEIS at 65 (ranking condors as "FN," which indicates "non-breeding population"). The FWS Biological Assessment also states on page 18 that "nesting still appears to be limited to the Grand Canyon NP area." Therefore, according to all information in the planning record, the California condor population on the Kaibab National Forest contains no reproducing individuals, and therefore cannot be found to be viable under the 1982 Planning Rule definition.

Additionally, in the FEIS, the Forest Service changed the condor's ranking to "F2" – indicating that this species is "very rare on the forest." FEIS at 68. This change was made without explanation and was not supported by any additional information or documentation of the condor population on the Kaibab National Forest.

Under the definition used in the 1982 rule the condor population has clearly not reached viability. Therefore, both the Forest Service's finding of species viability under all alternatives and its reclassification of the species in the FEIS are arbitrary and capricious under the APA and in violation of NFMA.

C. Science.

The Forest Service's erroneous conclusion in the FEIS that the California condor population would remain viable under all alternatives is also contradicted by overwhelming scientific evidence demonstrating that the condor population in Arizona currently is not viable and will not be viable so long as hunting with lead ammunition continues on the Kaibab National Forest.

The viability of condors and this species' only realistic chance of achieving self-sustaining recovery are both dependent on banning lead ammunition. Viability will not be achieved by continuing current hunting practices, which allow the use of lead ammunition, because maintaining the condor population with chelation treatments, a painful and expensive treatment that removes lead from the blood stream, is not a long-term solution. The fact that these intensive efforts are necessary to sustain the wild condor population demonstrates that without ongoing extensive human intervention and treatment, the condor population could not even maintain its current levels.

The most recent comprehensive study of the California condor population demonstrates that only with the intensive ongoing management will the species current population be

maintained.[7] More importantly, this study verifies that banning lead ammunition is essential and provides the only real chance for the viability and recovery of condor population. *Id.*

Finkelstein and others (2012) determined what the impact to the condor population would be if management actions to prevent lead-related deaths (such as chelations) were abandoned. Annual population growth rates for the condor declined between 2 percent and 12 percent, which is significantly below the level needed for a stable population. Based on the condor population in 2010, without the ongoing intensive efforts to limit lead poisoning, the population growth rate decline would result in a wild population of only 22 condors.[8] This number is particularly startling because it is the exact number of condors that in 1982 prompted the species complete capture and subsequent captive breeding program. Without continuing current management to limit lead-related deaths the wild condor population would once again face a substantial threat of extinction in the upcoming decades. *Id*. 5.

The study of Finkelstein and others (2002 – *op. cit*.) is the latest in a long line of scientific reports and peer-reviewed published studies that establish ingestion of lead as the leading source of condor mortality. There is widespread scientific consensus that the most significant and immediate threat to the California condor is exposure to lead ammunition in the form of lead shot or fragments of lead bullets left behind in offal or "gut piles" and in carcasses of shot but not retrieved animals on which condors feed. While this is true for the entire California condor population, in Arizona, the Southwest Condor Recovery Team ("SCRT") has specifically documented an association between deer hunting seasons in the Kaibab National Forest and elevated levels of lead in blood of condors known to forage there. Further, data collected by The Peregrine Fund linked blood lead levels in condors to hunting on the Kaibab Plateau.[9]

Moreover, the FWS stated on page 19, "[w]ithout eliminating or substantially reducing the amount of lead ammunition used within the California condor's range . . . it is unlikely that the recovery program in northern Arizona will succeed at achieving a self-sustaining condor population." This finding, along with the scientific data presented above is contained within the project record and represents the best available science on the matter. Despite all this clear and convincing scientific evidence, the FEIS minimizes the threat to condors of ingestion of lead ammunition by erroneously grouping it with power line collisions as the primary threats to

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[7] Finkelstein, et al. Lead poisoning and the deceptive recovery of the critically endangered California condor, *PNAS Early Edition* (2012*). Available at* http://www.pnas.org/cgi/doi/10.1073/pnas.1203141109

[8] This study comports with the Southwest Condor Recovery Team's conclusion that "significantly more [condor] deaths would have occurred [in Arizona] had [they] not performed some 89 chelations" in the period between reintroduction in 1996 and 2006. *See* 2007 Southwest Condor Recovery Team 5-Year Status Report at 18.

[9] 2007 Southwest Condor Recovery Team 5---Year Status Report at 20---21. The report concluded that "lead contamination is a major factor that may hinder the success of the program" and "[i]f the program is to succeed in the establishment of a self---sufficient population of condors, the effects of lead contamination must be reduced or eliminated." Id. at 59---60.

condors. *See* FEIS at 96. The Forest Service has failed to take into account the available scientific evidence contained within the project record, thereby rendering its finding and conclusions related to viability, impacts of proposed alternatives, and rationale for not considering a ban or limit on lead ammunition arbitrary and capricious and in violation of federal law.

Relief Sought: The Forest Service should withdraw the ROD and remand the FEIS for consideration and analysis of plan components or action alternatives that would limit or ban the use of lead ammunition on the Kaibab National Forest in compliance with the NFMA and NEPA.

VI. The Forest Service violated federal law with an inadequate recommendation for proposed wilderness areas.

The Kaibab National Forest manages and/or co-manages four wilderness areas (174,657 acres) comprising approximately ten percent of the entire forest: Kanab Creek Wilderness (68,474 acres), Saddle Mountain Wilderness (41,115 acres), Kendrick Mountain Wilderness (6,660 acres), and Sycamore Canyon Wilderness (58,408 acres) (Forest Service 2014a: 228).

The revised Forest Plan and the FEIS recommend four Potential Wilderness Areas (PWAs) (Kanab Creek Addition, Saddle Mountain Addition, Grassy/Quaking Aspen Canyons, and Jacks Canyon), totaling about 6,394 acres, for wilderness designation would be managed under the "Recommended Wilderness Management Area" in the proposed plan (Forest Service 2013). All areas are on the North Kaibab Ranger District. Alternatives C and D recommend the PWAs in the proposed action, plus six additional wilderness areas (totaling about 37,000 acres): Burro Canyon, Coconino Rim, Seegmiller, South Canyon Point, Sycamore Canyon addition, and Willis Canyon (Forest Service 2013).

In comments on the DEIS, Appellants strongly advocated establishing the recommended potential wilderness additions to existing wilderness areas as presented in the proposed action (6,238 acres) and, in addition, five new potential wilderness areas (37,888 acres) as provided in Alternative C, for a total of 44,126 acres (GCWC 2012). These include: Burro Canyon (10,735 acres); Coconino Rim (7,750 acres); Willis Canyon (6,418 acres); Seegmiller (6,168 acres); South Canyon Point (5,829 acres); Kanab Creek Addition (4,710); Saddle Mountain Addition (1,296 acres); Sycamore Canyon Addition (988 acres); and Grassy/Quaking Aspen Canyons (232 acres). We also urge the Kaibab National Forest to establish Red Point IRA (7,136 acres) as a potential wilderness. Earlier, conservationists presented to the planning staff a detailed North Kaibab wilderness proposal including a comprehensive rationale for wilderness designation for Burro Canyon, Willis Canyon, Big Ridge, and Red Point (Grand Canyon Wildlands 2009). In that document we presented a detailed critique of the Forest Service's potential wilderness evaluation process.

The areas recommended for wilderness in the plan decision would be managed under the Recommended Wilderness Management Area. The focus of this management area would be to manage these areas to protect wilderness characteristics pending legislation and designation, and

to provide for existing uses where compatible with protecting wilderness character (Forest Service 2014a: 236).

Ecologists (Noss et al. 1995; Noss and Peters 1995) have determined that old growth ponderosa pine forests constitute one of America's most endangered ecosystems. They report that old-growth ponderosa pine has suffered an estimated 85-98% area loss due to destruction, conversion to other uses, and significant degradation in structure, function, and composition. While faring better than most forested areas, the North Kaibab has endured loss of most of its original old growth ponderosa pine. Logging, which continues to this day, is one of the principal causes of this decline.

With its emphasis on protecting and restoring all natural processes, wilderness designation provides the highest level of protection for the full range of native species (Hendee and Mattson 2002). Although administratively designated roadless areas (e.g., wildlife habitat areas and inventoried roadless areas) provide some ecological protection of wildlife habitat, the agency historically has sacrificed roadless areas and wildlife protection in favor of resource extraction and motorized recreation (Forest Service 2000; Crist and Wilmer 2002; Concerned Scientists 2004; DellaSala and Frost 2001; DeVelice and Martin; Heilman et al 2002; Loucks et al. 2003; Noss and Cooperidder 1994; Noon et al. 2003; Strittholt and DellaSalla 2001). The passage of the 1964 Wilderness Act was Congress's response to federal land management agencies' failure to protect these values (Frome 1997). The proposed wilderness additional would protect critical wildlife linkages and important core refugia essential to "*afford perpetual protection to the native fauna and flora,*" as apparently required by the Grand Canyon National Game Preserve designation (U.S. Congress 1905).

As pointed would be permitted, although the agency incorrectly states that vegetation management activities would not be allowed in PWAs to achieve healthy forest conditions or wildlife, recreation, and scenery management objectives (Forest Service 2014a:236). The Wilderness Act (Section 4d1) provides adequate exceptions regarding management actions required to control fire. While management options regarding use of mechanized equipment in PWAs is generally prohibited, as noted in the FEIS (page 236), exceptions may be considered under a credible minimum tool requirement.

The North Kaibab is the gateway to the North Rim of Grand Canyon National Park, a major regional destination area that annually receives around 290,000 visitors (NPS 2010). Most visitors (56 percent) to the Kaibab National Forest's three ranger districts enjoy viewing natural features (National Forest Service 2009a:18; 2010c:13). 36 percent indicate that relaxation is part of their experience and about 46 percent engaged in viewing wildlife. On the Kaibab National Forest, nearly 50 percent of visitors engage in hiking and walking. Nationally, recreation on National Forests also contributes to the overall health of those who visit with nearly 100 million visitors (over 57 percent) coming primarily to engage in physically active pursuits (Forest Service 2010c:13). The Outdoor Industry Foundation (OIF) reports that twenty-four percent (1,098,000)of Arizonans enjoy bird watching and other wildlife watching (OIF 2010). In Utah, the OIF reports similar findings with 43 percent of the state's population (714,000) engaging in hiking, backpacking, rock climbing and trail running (OIF 2010a). Thirty-two percent enjoy bird and other wildlife watching. About five percent of visitors to the Kaibab National Forest listed

hunting as a primary activity. The OIF reports that ten percent of Utahns, and three percent of Arizonians, hunt (OIF 2010; 2010a). All of these activities are compatible with wilderness.

Off-road vehicle (ORV) use on the Kaibab National Forest accounts for less than four percent of recreation on the forest with less than two percent indicating this activity as their primary activity (Forest Service 2009a:18). This figure is nearly identical with ORV recreational activities on other National Forests (Forest Service 2010c:14).

Several additional studies have shown the importance and value people place on these passive use benefits of wilderness (Cordell et al. 1999). These values or needs are reflected in the National Survey on Recreation and the Environment finding that roughly 70 percent of those surveyed agreed or strongly agreed to the question, "How do you feel about designating more Federal lands in your state as wilderness?" Over 96 percent agreed or strongly agreed with the statement, "I enjoy knowing that future generations will be able to visit and experience wilderness areas" (Forest Service 2014a:229).

The agency's rationale for recommending a substantially reduced acreage for additional wilderness (Alternative C and D) is that "wilderness is more restrictive than nonwilderness [and] therefore, alternatives C and D provide fewer opportunities for future recreation development of options than the selected alternative(Forest Service 2014a:235). The Forest Service asserts that group size limits would also be established in the PWAs subject to the wilderness group size limit established in the forest plan, and that those desiring semiprimitive type recreation with the ability to have rustic facilities and no group size limits may be displaced to other SPNM settings on the forest.

As pointed out earlier, the KNF manages only a limited opportunity for primitive and unconfined type of recreation, approximately10 percent of the forest. The agency provides no evidence that proposed PWA would significantly reduce the options for semi-primitive recreation options.

The agency concludes, "wilderness designation, with its associated benefits and limitations, engenders passionate debate in the American public [and that] on the Kaibab NF, the public has been divided on this subject" (Forest Service 2014a: 229). No additional information is provided regarding percentages or numbers of supporters or detractors of wilderness.

In summary, the agency's PWA recommendation fails to provide adequate interim protection of the Kaibab National Forest's significant but endangered de facto wilderness, nor does it reflect the public desire to protect this vanishing resource.

CONCLUSION

This concludes our notice of appeal. Contact information for all Appellants is listed on page two above. Communication regarding this notice of appeal may be directed to the undersigned lead appellant.

Sincerely,

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Table 1. Components of 1988 and 2014 Forest Plans for Mexican Spotted Owl.

	1988 Plan (amended)		2014 Plan	
	Standards	Guidelines	Standards	Guidelines
MSO	Survey	Protocol		"Should apply recovery plan"
	Monitor	Protocol Report		
	Protected (PAC, slope >40%)	Designate 600 ac PAC Treat < 10% by decade Cut trees < 9" dbh Seasonal noise		
	Restricted (suitable unoccupied)	10-15% nest quality Retain > 150 ft^2 BA Cut trees < 24" dbh		
	Basis of 1996 no-jeopardy opinion			

Table 2. Components of 1988 and 2014 Forest Plans for Northern Goshawk.

	1988 Plan (amended)		2014 Plan	
	Standards	Guidelines	Standards	Guidelines
NOGO	Survey	Protocol		
	Nest	Designate 30-40 ac Retain canopy > 60% Cut trees > 18" dbh		30 ac nest where known
	Family	Designate 420 ac Retain canopy > 50% * Cut trees < 24" dbh		420 ac family where known
	Prey	Openings < 4 ac Retain canopy > 40% * Coarse woody debris		

* Mid-to-old age forest (VSS 4-6)

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Adapting to Climate Change on Western Public Lands: Addressing the Ecological Effects of Domestic, Wild, and Feral Ungulates

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Abstract Climate change affects public land ecosystems and services throughout the American West and these effects are projected to intensify. Even if greenhouse gas emissions are reduced, adaptation strategies for public lands are needed to reduce anthropogenic stressors of terrestrial and aquatic ecosystems and to help native species and ecosystems survive in an altered environment. Historical and contemporary livestock production—the most widespread and long-running commercial use of public lands—can alter vegetation, soils, hydrology, and wildlife species composition and abundances in ways that exacerbate the effects of climate change on these resources. Excess abundance of native ungulates (e.g., deer or elk) and feral horses and burros add to these impacts. Although many of these consequences have been studied for decades, the ongoing and impending effects of ungulates in a changing climate require new management strategies for limiting their threats to the long-term supply of ecosystem services on public lands. Removing or reducing livestock across large areas of public land would alleviate a widely recognized and long-term stressor and make these lands less susceptible to the effects of climate change. Where livestock use continues, or where significant densities of wild or feral ungulates occur, management should carefully document the ecological, social, and economic consequences (both costs and benefits) to better ensure management that minimizes ungulate impacts to plant and animal communities, soils, and water resources. Reestablishing apex predators in large, contiguous areas of public land may help mitigate any adverse ecological effects of wild ungulates.

Keywords Ungulates · Climate change · Ecosystems · Public lands · Biodiversity · Restoration

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Introduction

During the 20th century, the average global surface temperature increased at a rate greater than in any of the previous nine centuries; future increases in the United States (US) are likely to exceed the global average (IPCC 2007a; Karl and others 2009). In the western US, where most public lands are found, climate change is predicted to

intensify even if greenhouse gas emissions are reduced dramatically (IPCC 2007b). Climate-related changes can not only affect public-land ecosystems directly, but may exacerbate the aggregate effects of non-climatic stressors, such as habitat modification and pollution caused by logging, mining, grazing, roads, water diversions, and recreation (Root and others 2003; CEQ 2010; Barnosky and others 2012).

One effective means of ameliorating the effects of climate change on ecosystems is to reduce environmental stressors under management control, such as land and water uses (Julius and others 2008; Heller and Zavaleta 2009; Prato 2011). Public lands in the American West provide important opportunities to implement such a strategy for three reasons: (1) despite a history of degradation, public lands still offer the best available opportunities for ecosystem restoration (CWWR 1996; FS and BLM 1997; Karr 2004); (2) two-thirds of the runoff in the West originates on public lands (Coggins and others 2007); and (3) ecosystem protection and restoration are consistent with laws governing public lands. To be effective, restoration measures should address management practices that prevent public lands from providing the full array of ecosystem services and/or are likely to accentuate the effects of climate change (Hunter and others 2010). Although federal land managers have recently begun considering how to adapt to and mitigate potential climate-related impacts (e.g., GAO 2007; Furniss and others 2009; CEQ 2010; Peterson and others 2011), they have not addressed the combined effects of climate change and ungulates (hooved mammals) on ecosystems.

Climate change and ungulates, singly and in concert, influence ecosystems at the most fundamental levels by affecting soils and hydrologic processes. These effects, in turn, influence many other ecosystem components and processes—nutrient and energy cycles; reproduction, survival, and abundance of terrestrial and aquatic species; and community structure and composition. Moreover, by altering so many factors crucial to ecosystem functioning, the combined effects of a changing climate and ungulate use can affect biodiversity at scales ranging from species to ecosystems (FS 2007) and limit the capability of large areas to supply ecosystem services (Christensen and others 1996; MEA 2005b).

In this paper, we explore the likely ecological consequences of climate change and ungulate use, individually and in combination, on public lands in the American West. Three general categories of large herbivores are considered: livestock (largely cattle [*Bos taurus*] and sheep [*Ovis aries*]), native ungulates (deer [*Odocoileus* spp.] and elk [*Cervus* spp.]), and feral ungulates (horses [*Equus caballus*] and burros [*E. asinus*]). Based on this assessment, we propose first-order recommendations to decrease these consequences by reducing ungulate effects that can be directly managed.

Climate Change in the Western US

Anticipated changes in atmospheric carbon dioxide (CO_2), temperature, and precipitation (IPCC 2007a) are likely to have major repercussions for upland plant communities in western ecosystems (e.g., Backlund and others 2008), eventually affecting the distribution of major vegetation types. Deserts in the southwestern US, for example, will expand to the north and east, and in elevation (Karl and others 2009). Studies in southeastern Arizona have already attributed dramatic shifts in species composition and plant and animal populations to climate-driven changes (Brown and others 1997). Thus, climate-induced changes are already accelerating the ongoing loss of biodiversity in the American West (Thomas and others 2004).

Future decreases in soil moisture and vegetative cover due to elevated temperatures will reduce soil stability (Karl and others 2009). Wind erosion is likely to increase dramatically in some ecosystems such as the Colorado Plateau (Munson and others 2011) because biological soil crusts—a complex mosaic of algae, lichens, mosses, microfungi, cyanobacteria, and other bacteria—may be less drought tolerant than many desert vascular plant species (Belnap and others 2006). Higher air temperatures may also lead to elevated surface-level concentrations of ozone (Karl and others 2009), which can reduce the capacity of vegetation to grow under elevated CO_2 levels and sequester carbon (Karnosky and others 2003).

Air temperature increases and altered precipitation regimes will affect wildfire behavior and interact with insect outbreaks (Joyce and others 2009). In recent decades, climate change appears to have increased the length of the fire season and the area annually burned in some western forest types (Westerling and others 2006; ITF 2011). Climate induced increases in wildfire occurrence may aggravate the expansion of cheatgrass (*Bromus tectorum*), an exotic annual that has invaded millions of hectares of sagebrush (*Artemisia* spp.) steppe, a widespread yet threatened ecosystem. In turn, elevated wildfire occurrence facilitates the conversion of sagebrush and other native shrub-perennial grass communities to those dominated by alien grasses (D'Antonio and Vitousek 1992; Brooks 2008), resulting in habitat loss for imperiled greater sage-grouse (*Centrocercus urophasianus*) and other sagebrush-dependent species (Welch 2005). The US Fish and Wildlife Service (FWS 2010) recently concluded climate change effects can exacerbate many of the multiple threats to sagebrush habitats, including wildfire, invasive plants, and heavy ungulate use. In addition, the combined effects

of increased air temperatures, more frequent fires, and elevated CO_2 levels apparently provide some invasive species with a competitive advantage (Karl and others 2009).

By the mid-21st century, Bates and others (2008) indicate that warming in western mountains is very likely to cause large decreases in snowpack, earlier snowmelt, more winter rain events, increased peak winter flows and flooding, and reduced summer flows. Annual runoff is predicted to decrease by 10–30 % in mid-latitude western North America by 2050 (Milly and others 2005) and up to 40 % in Arizona (Milly and others 2008; ITF 2011). Drought periods are expected to become more frequent and longer throughout the West (Bates and others 2008). Summertime decreases in streamflow (Luce and Holden 2009) and increased water temperatures already have been documented for some western rivers (Kaushal and others 2010; Isaak and others 2012).

Snowmelt supplies about 60–80 % of the water in major western river basins (the Columbia, Missouri, and Colorado Rivers) and is the primary water supply for about 70 million people (Pederson and others 2011). Contemporary and future declines in snow accumulations and runoff (Mote and others 2005; Pederson and others 2011) are an important concern because current water supplies, particularly during low-flow periods, are already inadequate to satisfy demands over much of the western US (Piechota and others 2004; Bates and others 2008).

High water temperatures, acknowledged as one of the most prevalent water quality problems in the West, will likely be further elevated and may render one-third of the current coldwater fish habitat in the Pacific Northwest unsuitable by this century's end (Karl and others 2009). Resulting impacts on salmonids include increases in virulence of disease, loss of suitable habitat, and mortality as well as increased competition and predation by warmwater species (EPA 1999). Increased water temperatures and changes in snowmelt timing can also affect amphibians adversely (Field and others 2007). In sum, climate change will have increasingly significant effects on public-land terrestrial and aquatic ecosystems, including plant and animal communities, soils, hydrologic processes, and water quality.

Ungulate Effects and Climate Change Synergies

Climate change in the western US is expected to amplify "combinations of biotic and abiotic stresses that compromise the vigor of ecosystems—leading to increased extent and severity of disturbances" (Joyce and others 2008, p. 16). Of the various land management stressors affecting western public lands, ungulate use is the most widespread (Fig. 1). Domestic livestock annually utilize over 70 % of lands managed by the Bureau of Land Management (BLM) and US Forest Service (FS). Many public lands are also used by wild ungulates and/or feral horses and burros, which are at high densities in some areas. Because ungulate groups can have different effects, we discuss them individually.

Livestock

History and Current Status

Livestock were introduced to North America in the mid-sixteenth century, with a massive influx from the mid-1800s through early 1900s (Worster 1992). The deleterious effects of livestock—including herbivory of both herbaceous and woody plants and trampling of vegetation, soils, and streambanks—prompted federal regulation of grazing on western national forests beginning in the 1890s (Fleischner 2010). Later, the 1934 Taylor Grazing Act was enacted "to stop injury to the public grazing lands by preventing overgrazing and soil deterioration" on lands subsequently administered by the BLM.

Total livestock use of federal lands in eleven contiguous western states today is nearly 9 million animal unit months (AUMs, where one AUM represents forage use by a cow and calf pair, one horse, or five sheep for one month) (Fig. 2a). Permitted livestock use occurs on nearly one million square kilometers of public land annually, including 560,000 km^2 managed by the BLM, 370,000 km^2 by the FS, 6,000 km^2 by the National Park Service (NPS), and 3,000 km^2 by the US Fish and Wildlife Service (FWS).

Livestock use affects a far greater proportion of BLM and FS lands than do roads, timber harvest, and wildfires combined (Fig. 3). Yet attempts to mitigate the pervasive effects of livestock have been minor compared with those aimed at reducing threats to ecosystem diversity and productivity that these other land uses pose. For example, much effort is often directed at preventing and controlling wildfires since they can cause significant property damage and social impacts. On an annual basis, however, wildfires affect a much smaller portion of public land than livestock grazing (Fig. 3) and they can also result in ecosystem benefits (Rhodes and Baker 2008; Swanson and others 2011).

The site-specific impacts of livestock use vary as a function of many factors (e.g., livestock species and density, periods of rest or non-use, local plant communities, soil conditions). Nevertheless, extensive reviews of published research generally indicate that livestock have had numerous and widespread negative effects to western ecosystems (Love 1959; Blackburn 1984; Fleischner 1994; Belsky and others 1999; Kauffman and Pyke 2001; Asner

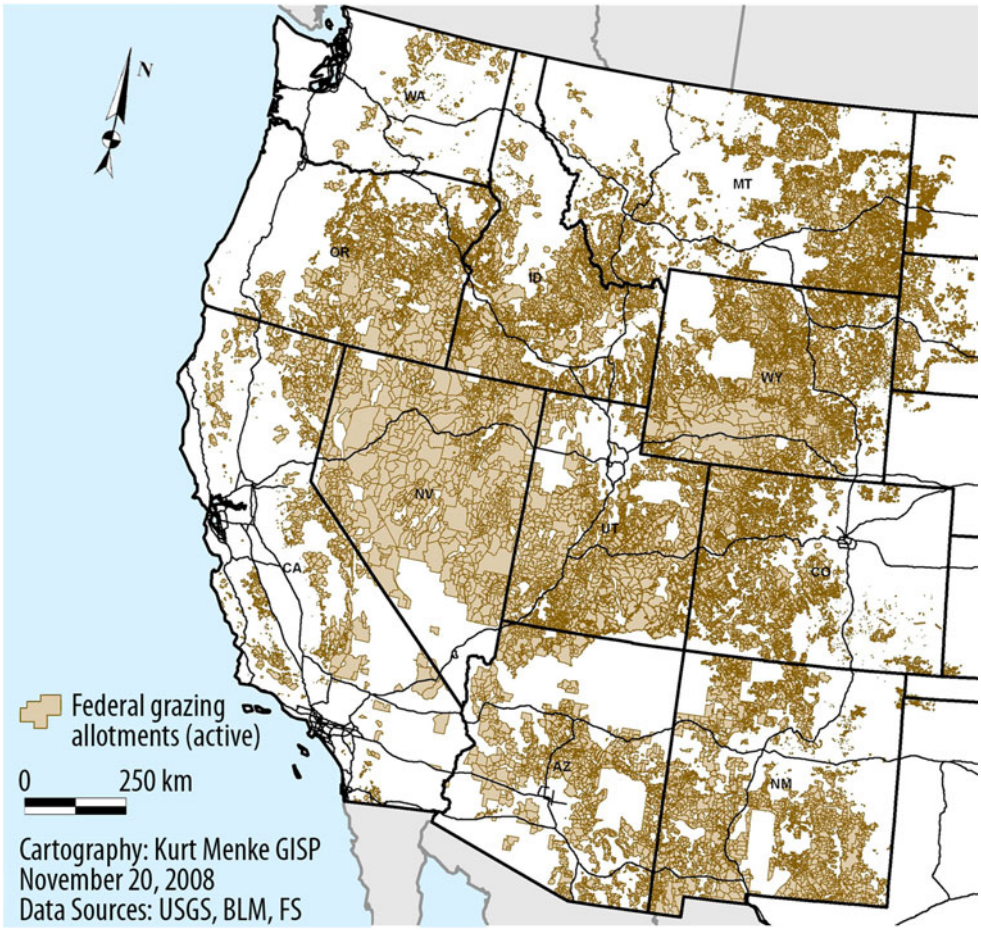

Fig. 1 Areas of public-lands livestock grazing managed by federal agencies in the western US (adapted from Salvo 2009)

and others 2004; Steinfeld and others 2006; Thornton and Herrero 2010). Moreover, public-land range conditions have generally worsened in recent decades (CWWR 1996, Donahue 2007), perhaps due to the reduced productivity of these lands caused by past grazing in conjunction with a changing climate (FWS 2010, p. 13,941, citing Knick and Hanser 2011).

Plant and Animal Communities

Livestock use effects, exacerbated by climate change, often have severe impacts on upland plant communities. For example, many former grasslands in the Southwest are now dominated by one or a few woody shrub species, such as creosote bush (*Larrea tridentata*) and mesquite (*Prosopis glandulosa*), with little herbaceous cover (Grover and Musick 1990; Asner and others 2004; but see Allington and Valone 2010). Other areas severely affected include the northern Great Basin and interior Columbia River Basin (Middleton and Thomas 1997). Livestock effects have also contributed to severe degradation of sagebrush-grass ecosystems (Connelly and others 2004; FWS 2010) and widespread desertification, particularly in the Southwest (Asner and others 2004; Karl and others 2009). Even absent desertification, light to moderate grazing intensities can promote woody species encroachment in semiarid and mesic environments (Asner and others 2004, p. 287). Nearly two decades ago, many public-land ecosystems, including native shrub steppe in Oregon and Washington, sagebrush steppe in the Intermountain West, and riparian plant communities, were considered threatened, endangered, or critically endangered (Noss and others 1995).

Simplified plant communities combine with loss of vegetation mosaics across landscapes to affect pollinators, birds, small mammals, amphibians, wild ungulates, and other native wildlife (Bock and others 1993; Fleischner 1994; Saab and others 1995; Ohmart 1996). Ohmart and Anderson (1986) suggested that livestock grazing may be the major factor negatively affecting wildlife in eleven western states. Such effects will compound the problems of adaptation of these ecosystems to the dynamics of climate change (Joyce and others 2008, 2009). Currently, the widespread and ongoing declines of many North American bird populations that use grassland and grass–shrub habitats affected by grazing are "on track to become a prominent wildlife conservation crisis of the 21st century" (Brennan and Kuvlesky 2005, p. 1).

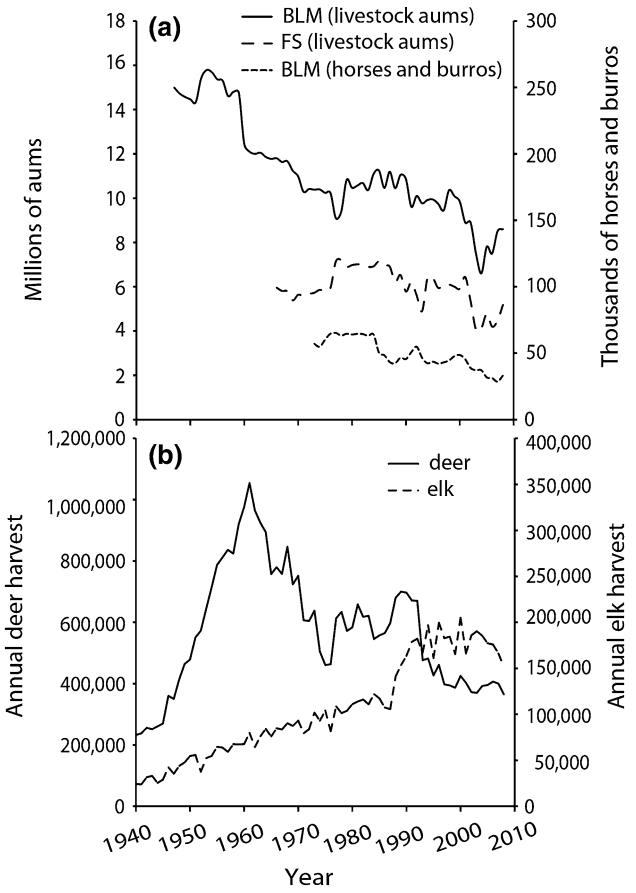

Fig. 2 **a** Bureau of Land Management (BLM) and US Forest Service (FS) grazing use in animal unit months (AUMs) and number of feral horses and burros on BLM lands, and **b** annual harvest of deer and elk by hunters, for eleven western states. *Data sources* **a** BLM grazing and number of horses and burros reported annually in Public Land Statistics; FS grazing reported annually in Grazing Statistical Summary; **b** deer and elk harvest records from individual state wildlife management agencies

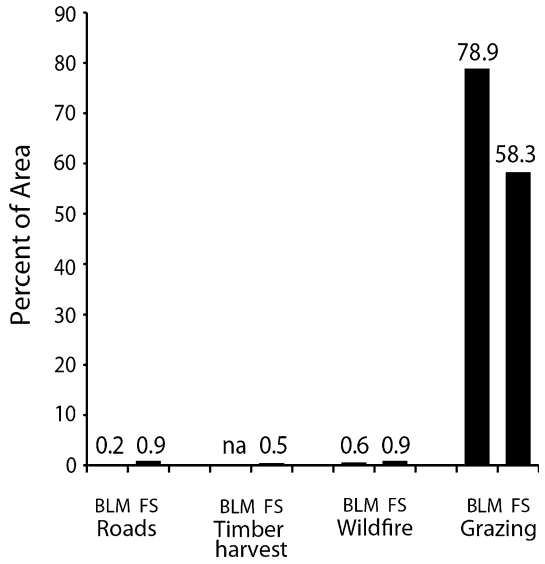

Fig. 3 Percent of Bureau of Land Management (BLM) and US Forest Service (FS) lands in eleven western states that are occupied by roads or are affected annually by timber harvest, wildfire, and grazing. *Data sources* Roads, BLM (2009) and FS, Washington Office; Timber harvest (2003–09), FS, Washington Office; Wildfire (2003–09), National Interagency Fire Center, Missoula, Montana; Grazing, BLM (2009) and GAO (2005). "na" = not available

Soils and Biological Soil Crusts

Livestock grazing and trampling can damage or eliminate biological soil crusts characteristic of many arid and semiarid regions (Belnap and Lange 2003; Asner and others 2004). These complex crusts are important for fertility, soil stability, and hydrology (Belnap and Lange 2003). In arid and semiarid regions they provide the major barrier against wind erosion and dust emission (Munson and others 2011). Currently, the majority of dust emissions in North America originate in the Great Basin, Colorado Plateau, and Mojave and Sonoran Deserts, areas that are predominantly public lands and have been grazed for nearly 150 years. Elevated sedimentation in western alpine lakes over this period has also been linked to increased aeolian deposition stemming from land uses, particularly those associated with livestock grazing (Neff and others 2008).

If livestock use on public lands continues at current levels, its interaction with anticipated changes in climate will likely worsen soil erosion, dust generation, and stream pollution. Soils whose moisture retention capacity has been reduced will undergo further drying by warming temperatures and/or drought and become even more susceptible to wind erosion (Sankey and others 2009). Increased aeolian deposition on snowpack will hasten runoff, accentuating climate-induced hydrological changes on many public lands (Neff and others 2008). Warmer temperatures will likely trigger increased fire occurrence, causing further reductions in cover and composition of biological soil crusts (Belnap and others 2006), as well as vascular plants (Munson and others 2011). In some forest types, where livestock grazing has contributed to altered fire regimes and forest structure (Belsky and Blumenthal 1997; Fleischner 2010), climate change will likely worsen these effects.

Water and Riparian Resources

Although riparian areas occupy only 1–2 % of the West's diverse landscapes, they are highly productive and ecologically valuable due to the vital terrestrial habitats they provide and their importance to aquatic ecosystems (Kauffman and others 2001; NRC 2002; Fleischner 2010). Healthy riparian plant communities provide important corridors for the movement of plant and animal species

(Peterson and others 2011). Such communities are also crucial for maintaining water quality, food webs, and channel morphology vital to high-quality habitats for fish and other aquatic organisms in the face of climate change. For example, well-vegetated streambanks not only shade streams but also help to maintain relatively narrow and stable channels, attributes essential for preventing increased stream temperatures that negatively affect salmonids and other aquatic organisms (Sedell and Beschta 1991; Kondolf and others 1996; Beschta 1997); maintaining cool stream temperatures is becoming even more important with climate change (Isaak and others 2012). Riparian vegetation is also crucial for providing seasonal fluxes of organic matter and invertebrates to streams (Baxter and others 2005). Nevertheless, in 1994 the BLM and FS reported that western riparian areas were in their worst condition in history, and livestock use—typically concentrated in these areas—was the chief cause (BLM and FS 1994).

Livestock grazing has numerous consequences for hydrologic processes and water resources. Livestock can have profound effects on soils, including their productivity, infiltration, and water storage, and these properties drive many other ecosystem changes. Soil compaction from livestock has been identified as an extensive problem on public lands (CWWR 1996; FS and BLM 1997). Such compaction is inevitable because the hoof of a 450-kg cow exerts more than five times the pressure of heavy earth-moving machinery (Cowley 2002). Soil compaction significantly reduces infiltration rates and the ability of soils to store water, both of which affect runoff processes (Branson and others 1981; Blackburn 1984). Compaction of wet meadow soils by livestock can significantly decrease soil water storage (Kauffman and others 2004), thus contributing to reduced summer base flows. Concomitantly, decreases in infiltration and soil water storage of compacted soils during periods of high-intensity rainfall contribute to increased surface runoff and soil erosion (Branson and others 1981). These fundamental alterations in hydrologic processes from livestock use are likely to be exacerbated by climate change.

The combined effects of elevated soil loss and compaction caused by grazing reduce soil productivity, further compromising the capability of grazed areas to support native plant communities (CWWR 1996; FS and BLM 1997). Erosion triggered by livestock use continues to represent a major source of sediment, nutrients, and pathogens in western streams (WSWC 1989; EPA 2009). Conversely, the absence of grazing results in increased litter accumulation, which can reduce runoff and erosion and retard desertification (Asner and others 2004).

Historical and contemporary effects of livestock grazing and trampling along stream channels can destabilize streambanks, thus contributing to widened and/or incised channels (NRC 2002). Accelerated streambank erosion and channel incision are pervasive on western public lands used by livestock (Fig. 4). Stream incision contributes to desiccation of floodplains and wet meadows, loss of floodwater detention storage, and reductions in baseflow (Ponce and Lindquist 1990; Trimble and Mendel 1995). Grazing and trampling of riparian plant communities also contribute to elevated water temperatures—directly, by reducing stream shading and, indirectly, by damaging streambanks and increasing channel widths (NRC 2002). Livestock use of riparian plant communities can also decrease the availability of food and construction materials for keystone species such as beaver (*Castor canadensis*).

Livestock effects and climate change can interact in various ways with often negative consequences for aquatic species and their habitats. In the eleven ecoregions encompassing western public lands (excluding coastal regions and Alaska), about 175 taxa of freshwater fish are considered imperiled (threatened, endangered, vulnerable, possibly extinct, or extinct) due to habitat-related causes (Jelks and others 2008, p. 377; GS and AFS 2011). Increased sedimentation and warmer stream temperatures associated with livestock grazing have contributed significantly to the long-term decline in abundance and distribution and loss of native salmonids, which are imperiled throughout the West (Rhodes and others 1994; Jelks and others 2008).

Water developments and diversions for livestock are common on public lands (Connelly and others 2004). For example, approximately 3,700 km of pipeline and 2,300 water developments were installed on just 17 % of the BLM's land base from 1961 to 1999 in support of livestock operations (Rich and others 2005). Such developments can reduce streamflows thus contributing to warmer stream temperatures and reduced fish habitat, both serious problems for native coldwater fish (Platts 1991; Richter and others 1997). Reduced flows and higher temperatures are also risk factors for many terrestrial and aquatic vertebrates (Wilcove and others 1998). Water developments can also create mosquito (e.g., *Culex tarsalis*) breeding habitat, potentially facilitating the spread of West Nile virus, which poses a significant threat to sage grouse (FWS 2010). Such developments also tend to concentrate livestock and other ungulate use, thus locally intensifying grazing and trampling impacts.

Greenhouse Gas Emissions and Energy Balances

Livestock production impacts energy and carbon cycles and globally contributes an estimated 18 % to the total anthropogenic greenhouse gas (GHG) emissions (Steinfeld and others 2006). How public-land livestock contribute to

Fig. 4 Examples of long-term grazing impacts from livestock, unless otherwise noted: **a** bare soil, loss of understory vegetation, and lack of aspen recruitment (i.e., growth of seedlings/sprouts into tall saplings and trees) (Bureau of Land Management, Idaho), **b** bare soil, lack of ground cover, lack of aspen recruitment and channel incision (US Forest Service, Idaho), **c** conversion of a perennial stream to an intermittent stream due to grazing of riparian vegetation and subsequent channel incision; channel continues to erode during runoff events (Bureau of Land Management, Utah), **d** incised and widening stream due to loss of streamside vegetation and bank collapse from trampling (Bureau of Land Management, Wyoming), **e** incised and widening stream due to loss of streamside vegetation and bank collapse from trampling (US Forest Service, Oregon), and **f** actively eroding streambank from the loss of streamside vegetation due to several decades of excessive herbivory by elk and, more recently, bison (National Park Service, Wyoming). *Photographs* **a** J Carter, **b** G Wuerthner, **c** and **d** J Carter, **e** and **f** R Beschta

these effects has received little study. Nevertheless, livestock grazing and trampling can reduce the capacity of rangeland vegetation and soils to sequester carbon and contribute to the loss of above- and below-ground carbon pools (e.g., Lal 2001b; Bowker and others 2012). Lal (2001a) indicated that heavy grazing over the long-term may have adverse impacts on soil organic carbon content, especially for soils of low inherent fertility. Although Gill (2007) found that grazing over 100 years or longer in subalpine areas on the Wasatch Plateau in central

Utah had no significant impacts on total soil carbon, results of the study suggest that "if temperatures warm and summer precipitation increases as is anticipated, [soils in grazed areas] may become net sources of CO_2 to the atmosphere" (Gill 2007, p. 88). Furthermore, limited soil aeration in soils compacted by livestock can stimulate production of methane, and emissions of nitrous oxide under shrub canopies may be twice the levels in nearby grasslands (Asner and others 2004). Both of these are potent GHGs.

Reduced plant and litter cover from livestock use can increase the albedo (reflectance) of land surfaces, thereby altering radiation energy balances (Balling and others 1998). In addition, widespread airborne dust generated by livestock is likely to increase with the drying effects of climate change. Air-borne dust influences atmospheric radiation balances as well as accelerating melt rates when deposited on seasonal snowpacks and glaciers (Neff and others 2008).

Other Livestock Effects

Livestock urine and feces add nitrogen to soils, which may favor nonnative species (BLM 2005), and can lead to loss of both organic and inorganic nitrogen in increased runoff (Asner and others 2004). Organic nitrogen is also lost via increased trace-gas flux and vegetation removal by grazers (Asner and others 2004). Reduced soil nitrogen is problematic in western landscapes because nitrogen is an important limiting nutrient in most arid-land soils (Fleischner 2010).

Managing livestock on public lands also involves extensive fence systems. Between 1962 and 1997, over 51,000 km of fence were constructed on BLM lands with resident sage-grouse populations (FWS 2010). Such fences can significantly impact this wildlife species. For example, 146 sage-grouse died in less than three years from collisions with fences along a 7.6-km BLM range fence in Wyoming (FWS 2010). Fences can also restrict the movements of wild ungulates and increase the risk of injury and death by entanglement or impalement (Harrington and Conover 2006; FWS 2010). Fences and roads for livestock access can fragment and isolate segments of natural ecological mosaics thus influencing the capability of wildlife to adapt to a changing climate.

Some have posited that managed cattle grazing might play a role in maintaining ecosystem structure in shortgrass steppe ecosystems of the US, if it can mimic grazing by native bison (*Bison bison*) (Milchunas and others 1998). But most public lands lie to the west of the Great Plains, where bison distribution and effects were limited or nonexistent; livestock use (particularly cattle) on these lands exert disturbances without evolutionary parallel (Milchunas and Lauenroth 1993; MEA 2005a).

Feral Horses and Burros

Feral horses and burros occupy large areas of public land in the western US. For example, feral horses are found in ten western states and feral burros occur in five of these states, largely in the Mojave and Sonoran Deserts and the Great Basin (Abella 2008; FWS 2010). About half of these horses and burros are in Nevada (Coggins and others 2007), of which 90 % are on BLM lands. Horse numbers peaked at perhaps two million in the early 1900s, but had plummeted to about 17,000 by 1971, when protective legislation (Wild, Free-Ranging Horses and Burros Act [WFRHBA]) was passed (Coggins and others 2007). Protection resulted in increased populations and today some 40,000 feral horses and burros utilize $\sim$ 130,000 km^2 of BLM and FS lands (DOI-OIG 2010; Gorte and others 2010). Currently, feral horse numbers are doubling every four years (DOI-OIG 2010); burro populations can also increase rapidly (Abella 2008). Unlike wild ungulates, feral equines cannot be hunted and, unlike livestock, they are not regulated by permit. Nor are their numbers controlled effectively by existing predators. Accordingly, the BLM periodically removes animals from herd areas; the NPS also has undertaken burro control efforts (Abella 2008).

In sage grouse habitat, high numbers of feral horses reduce vegetative cover and plant diversity, fragment shrub canopies, alter soil characteristics, and increase the abundance of invasive species, thus reducing the quality and quantity of habitat (Beever and others 2003; FWS 2010). Horses can crop plants close to the ground, impeding the recovery of affected vegetation. Feral burros also have had a substantial impact on Sonoran Desert vegetation, reducing the density and canopy cover of nearly all species (Hanley and Brady 1977). Although burro impacts in the Mojave Desert may not be as clear, perennial grasses and other preferred forage species likely require protection from grazing in burro-inhabited areas if revegetation efforts are to be successful (Abella 2008).

Wild Ungulates

Extensive harvesting of wild (native) ungulates, such as elk and deer, and the decimation of large predator populations (e.g., gray wolf [*Canis lupus*], grizzly bear [*Ursus arctos*], and cougar [*Puma concolor*]) was common during early EuroAmerican settlement of the western US. With continued predator control in the early 1900s and increased protection of game species by state agencies, however, wild ungulate populations began to increase in many areas. Although only 70,000 elk inhabited the western US in the early 1900s (Graves and Nelson 1919), annual harvest data indicate that elk abundance has increased greatly since the about the 1940s (Fig. 2b), due in part to the loss of apex

predators (Allen 1974; Mackie and others 1998). Today, approximately one million elk (Karnopp 2008) and unknown numbers of deer inhabit the western US where they often share public lands with livestock.

Because wild ungulates typically occur more diffusely across a landscape than livestock, their presence might be expected to cause minimal long-term impacts to vegetation. Where wild ungulates are concentrated, however, their browsing can have substantial impacts. For example, sagebrush vigor can be reduced resulting in decreased cover or mortality (FWS 2010). Heavy browsing effects have also been documented on other palatable woody shrubs, as well as deciduous trees such as aspen (*Populus tremuloides*), cottonwood (*Populus* spp.), and maple (*Acer* sp.) (Beschta and Ripple 2009).

Predator control practices that intensified following the introduction of domestic livestock in the western US resulted in the extirpation of apex predators or reduced their numbers below ecologically effective densities (Soulé and others 2003, 2005), causing important cascading effects in western ecosystems (Beschta and Ripple 2009). Following removal of large predators on the Kaibab Plateau in the early 20th century, for example, an irruption of mule deer (*O. hemionus*) led to extensive over-browsing of aspen, other deciduous woody plants, and conifers; deterioration of range conditions; and the eventual crash of the deer population (Binkley and others 2006). In the absence of apex predators, wild ungulate populations can significantly limit recruitment of woody browse species, contribute to shifts in abundance and distribution of many wildlife species (Berger and others 2001; Weisberg and Coughenour 2003), and can alter streambanks and riparian communities that strongly influence channel morphology and aquatic conditions (Beschta and Ripple 2012). Numerous studies support the conclusion that disruptions of trophic cascades due to the decline of apex predators constitute a threat to biodiversity for which the best management solution is likely the restoration of effective predation regimes (Estes and others 2011).

Ungulate Herbivory and Disturbance Regimes

Across the western US, ecosystems evolved with and were sustained by local and regional disturbances, such as fluctuating weather patterns, fire, disease, insect infestation, herbivory by wild ungulates and other organisms, and hunting by apex predators. Chronic disturbances with relatively transient effects, such as frequent, low-severity fires and seasonal moisture regime fluctuations, helped maintain native plant community composition and structure. Relatively abrupt, or acute, natural disturbances, such as insect outbreaks or severe fires were also important for the maintenance of ecosystems and native species diversity (Beschta and others 2004; Swanson and others 2011). Livestock use and/or an overabundance of feral or wild ungulates can, however, greatly alter ecosystem response to disturbance and can degrade affected systems. For example, high levels of herbivory over a period of years, by either domestic or wild ungulates, can effectively prevent aspen sprouts from growing into tall saplings or trees as well as reduce the diversity of understory species (Shepperd and others 2001; Dwire and others 2007; Beschta and Ripple 2009).

Natural floods provide another illustration of how ungulates can alter the ecological role of disturbances. High flows are normally important for maintaining riparian plant communities through the deposition of nutrients, organic matter, and sediment on streambanks and floodplains, and for enhancing habitat diversity of aquatic and riparian ecosystems (CWWR 1996). Ungulate effects on the structure and composition of riparian plant communities (e.g., Platts 1991; Chadde and Kay 1996), however, can drastically alter the outcome of these hydrologic disturbances by diminishing streambank stability and severing linkages between high flows and the maintenance of streamside plant communities. As a result, accelerated erosion of streambanks and floodplains, channel incision, and the occurrence of high instream sediment loads may become increasingly common during periods of high flows (Trimble and Mendel 1995). Similar effects have been found in systems where large predators have been displaced or extirpated (Beschta and Ripple 2012). In general, high levels of ungulate use can essentially uncouple typical ecosystem responses to chronic or acute disturbances, thus greatly limiting the capacity of these systems to provide a full array of ecosystem services during a changing climate.

The combined effects of ungulates (domestic, wild, and feral) and a changing climate present a pervasive set of stressors on public lands, which are significantly different from those encountered during the evolutionary history of the region's native species. The intersection of these stressors is setting the stage for fundamental and unprecedented changes to forest, arid, and semi-arid landscapes in the western US (Table 1) and increasing the likelihood of alternative states. Thus, public-land management needs to focus on restoring and maintaining structure, function, and integrity of ecosystems to improve their resilience to climate change (Rieman and Isaak 2010).

Federal Law and Policy

Federal laws guide the use and management of public-land resources. Some laws are specific to a given agency (e.g., the BLM's Taylor Grazing Act of 1934 and the FS's

Table 1 Generalized climate change effects, heavy ungulate use effects, and their combined effects as stressors to terrestrial and aquatic ecosystems in the western United States

Climate change effects	Ungulate use effects	Combined effects
Increased drought frequency and duration	Altered upland plant and animal communities	Reduced habitat and food-web support; loss of mesic and hydric plants, reduced biodiversity
Increased air temperatures, decreased snowpack accumulation, earlier snowmelt	Compacted soils, decreased infiltration, increased surface runoff	Reduced soil moisture for plants, reduced productivity, reductions in summer low flows, degraded aquatic habitat
Increased variability in timing and magnitude of precipitation events	Decreased biotic crusts and litter cover, increased surface erosion	Accelerated soil and nutrient loss, increased sedimentation
Warmer and drier in the summer	Reduced riparian vegetation, loss of shade, increased stream width	Increased stream temperatures, increased stress on cold-water fish and aquatic organisms
Increased variability in runoff	Reduced root strength of riparian plants, trampled streambanks, streambank erosion	Accelerated streambank erosion and increased sedimentation, degraded water quality and aquatic habitats
Increased variability in runoff	Incised stream channels	Degraded aquatic habitats, hydrologically disconnected floodplains, reduced low flows

National Forest Management Act [NFMA] of 1976), whereas others cross agency boundaries (e.g., Endangered Species Act [ESA] of 1973; Clean Water Act [CWA] of 1972). A common mission of federal land management agencies is "to sustain the health, diversity, and productivity of public lands" (GAO 2007, p. 12). Further, each of these agencies has ample authority and responsibility to adjust management to respond to climate change (GAO 2007) and other stressors.

The FS and BLM are directed to maintain and improve the condition of the public rangelands so that they become as productive as feasible for all rangeland values. As defined, "range condition" encompasses factors such as soil quality, forage values, wildlife habitat, watershed and plant communities, and the present state of vegetation of a range site in relation to the potential plant community for that site (Public Rangelands Improvement Act of 1978). BLM lands and national forests must be managed for sustained yield of a wide array of multiple uses, values, and ecosystem services, including wildlife and fish, watershed, recreation, timber, and range. Relevant statutes call for management that meets societal needs, without impairing the productivity of the land or the quality of the environment, and which considers the "relative values" of the various resources, not necessarily the combination of uses that will give the greatest economic return or the greatest unit output (Multiple-Use Sustained-Yield Act of 1960; Federal Land Policy and Management Act of 1976 [FLPMA]).

FLPMA directs the BLM to "take any action necessary to prevent unnecessary or undue degradation" of the public lands. Under NFMA, FS management must provide for diversity of plant and animal communities based on the suitability and capability of the specific land area. FLMPA also authorizes both agencies to "cancel, suspend, or modify" grazing permits and to determine that "grazing uses should be discontinued (either temporarily or permanently) on certain lands." FLPMA explicitly recognizes the BLM's authority (with congressional oversight) to "totally eliminate" grazing from large areas (> 405 km^2) of public lands. These authorities are reinforced by law providing that grazing permits are not property rights (*Public Lands Council v. Babbitt* 2000).

While federal agencies have primary authority to manage federal public lands and thus wildlife *habitats* on these lands, states retain primary management authority over resident *wildlife*, unless preempted, as by the WFRHBA or ESA (*Kleppe v. New Mexico* 1976). Under WFRHBA, wild, free-roaming horses and burros (i.e., feral) by law have been declared "wildlife" and an integral part of the natural system of the public lands where they are to be managed in a manner that is designed to achieve and maintain a thriving natural ecological balance.

Restoring Ungulate-Altered Ecosystems

Because livestock use is so widespread on public lands in the American West, management actions directed at ecological restoration (e.g., livestock removal, substantial reductions in numbers or length of season, extended or regular periods of rest) need to be accomplished at landscape scales. Such approaches, often referred to as passive restoration, are generally the most ecologically effective and economically efficient for recovering altered ecosystems because they address the root causes of degradation and allow natural recovery processes to operate (Kauffman and others 1997; Rieman and Isaak 2010). Furthermore, reducing the impact of current stressors is a "no regrets" adaptation strategy that could be taken now to help enhance

Fig. 5 Examples of riparian and stream recovery in the western United States after the removal of livestock grazing: Hart Mountain National Antelope Refuge, Oregon, in **a** October 1989 and **b** September 2010 after 18 years of livestock removal; Strawberry River, Utah, in **c** August 2002 after 13 years of livestock removal and **d** July 2003 illustrating improved streambank protection and riparian productivity as beaver reoccupy this river system; and San Pedro River, Arizona in **e** June 1987 and **f** June 1991 after 4 years of livestock removal. *Photographs* **a** Fish and Wildlife Service, Hart Mountain National Antelope Refuge, **b** J Rhodes, **c** and **d** US Forest Service, Uintah National Forest, **e** and **f** Bureau of Land Management, San Pedro Riparian National Conservation Area

ecosystem resilience to climate change (Joyce and others 2008). This strategy is especially relevant to western ecosystems because removing or significantly reducing the cause of degradation (e.g., excessive ungulate use) is likely to be considerably more effective over the long term, in both costs and approach, than active treatments aimed at specific ecosystem components (e.g., controlling invasive plants) (BLM 2005). Furthermore, the possibility that passive restoration measures may not accomplish all ecological goals is an insufficient reason for *not* removing or reducing stressors at landscape scales.

For many areas of the American West, particularly riparian areas and other areas of high biodiversity, significantly reducing or eliminating ungulate stressors should, over time, result in the recovery of self-sustaining and ecologically robust ecosystems (Kauffman and others 1997; Floyd and others 2003; Allington and Valone 2010; Fig. 5). Indeed, various studies and reviews have concluded that the most effective way to restore riparian areas and aquatic systems is to exclude livestock either temporarily (with subsequent changed management) or long-term (e.g., Platts 1991;BLM and FS 1994; Dobkin and others

1998; NRC 2002; Seavy and others 2009: Fleischner 2010). Recovering channel form and riparian soils and vegetation by reducing ungulate impacts is also a viable management tool for increasing summer baseflows (Ponce and Lindquist 1990; Rhodes and others 1994).

In severely degraded areas, initiating recovery may require active measures in addition to the removal/reduction of stressors. For example, where native seed banks have been depleted, reestablishing missing species may require planting seeds or propagules from adjacent areas or refugia (e.g., Welch 2005). While active restoration approaches in herbivory-degraded landscapes may have some utility, such projects are often small in scope, expensive, and unlikely to be self-sustaining; some can cause unanticipated negative effects (Kauffman and others 1997). Furthermore, if ungulate grazing effects continue, any benefits from active restoration are likely to be transient and limited. Therefore, addressing the underlying causes of degradation should be the first priority for effectively restoring altered public-land ecosystems.

The ecological effectiveness and low cost of wide-scale reduction in ungulate use for restoring public-land ecosystems, coupled with the scarcity of restoration resources, provide a forceful case for minimizing ungulate impacts. Other conservation measures are unlikely to make as great a contribution to ameliorating landscape-scale effects from climate change or to do so at such a low fiscal cost. As Isaak and others (2012, p. 514) noted with regard to the impacts of climate change on widely-imperiled salmonids: "…conservation projects are likely to greatly exceed available resources, so strategic prioritization schemes are essential."

Although restoration of desertified lands was once thought unlikely, recovery in the form of significant increases in perennial grass cover has recently been reported at several such sites around the world where livestock have been absent for more than 20 years (Floyd and others 2003; Allington and Valone 2010; Peters and others 2011). At a desertified site in Arizona that had been ungrazed for 39 years, infiltration rates were significantly (24 %) higher (compared to grazed areas) and nutrient levels were elevated in the bare ground, inter-shrub areas (Allington and Valone 2010). The change in vegetative structure also affected other taxa (e.g., increased small mammal diversity) where grazing had been excluded (Valone and others 2002). The notion that regime shifts caused by grazing are irreversible (e.g., Bestelmeyer and others 2004) may be due to the relative paucity of large-scale, ungulate-degraded systems where grazing has been halted for sufficiently long periods for recovery to occur.

Removing domestic livestock from large areas of public lands, or otherwise significantly reducing their impacts, is consistent with six of the seven approaches recommended for ecosystem adaptation to climate change (Julius and others 2008, pp. 1-3). Specifically, removing livestock would (1) protect key ecosystem features (e.g., soil properties, riparian areas); (2) reduce anthropogenic stressors; (3) ensure representation (i.e., protect a variety of forms of a species or ecosystem); (4) ensure replication (i.e., protect more than one example of each ecosystem or population); (5) help restore ecosystems; and (6) protect refugia (i.e., areas that can serve as sources of "seed" for recovery or as destinations for climate-sensitive migrants). Although improved livestock management practices are being adopted on some public lands, such efforts have not been widely implemented. Public land managers have rarely used their authority to implement landscape-scale rest from livestock use, lowered frequency of use, or multi-stakeholder planning for innovative grazing systems to reduce impacts.

While our findings are largely focused on adaptation strategies for western landscapes, reducing ungulate impacts and restoring degraded plant and soil systems may also assist in mitigating any ongoing or future changes in regional energy and carbon cycles that contribute to global climate change. Simply removing livestock can increase soil carbon sequestration since grasslands with the greatest potential for increasing soil carbon storage are those that have been depleted in the past by poor management (Wu and others 2008, citing Jones and Donnelly 2004). Riparian area restoration can also enhance carbon sequestration (Flynn and others 2009).

Socioeconomic Considerations

A comprehensive assessment of the socioeconomic effects of changes in ungulate management on public lands is beyond the scope of this paper. However, herein we identify a few of the *general* costs and benefits associated with implementing our recommendations (see next section), particularly with regard to domestic livestock grazing. The socioeconomic effects of altering ungulate management on public lands will ultimately depend on the type, magnitude, and location of changes undertaken by federal and state agencies.

Ranching is a contemporary and historically significant aspect of the rural West's social fabric. Yet, ranchers' stated preferences in response to grazing policy changes are as diverse as the ranchers themselves, and include intensifying, extensifying, diversifying, or selling their operations (Genter and Tanaka 2002). Surveys indicate that most ranchers are motivated more by amenity and lifestyle attributes than by profits (Torell and others 2001, Genter and Tanaka 2002). Indeed, economic returns from ranching are lower than any other investments with similar risk

(Torrell and others 2001) and public-land grazing's contributions to income and jobs in the West are relatively small fractions of the region's totals (BLM and FS 1994; Power 1996).

If livestock grazing on public lands were discontinued or curtailed significantly, some operations would see reduced incomes and ranch values, some rural communities would experience negative economic impacts, and the social fabric of those communities could be altered (Genter and Tanaka 2002). But for most rural economies, and the West in general, the economic impacts of managing public lands to emphasize environmental amenities would be relatively minor to modestly positive (Mathews and others 2002). Other economic effects could include savings to the US Treasury because federal grazing fees on BLM and FS lands cover only about one-sixth of the agencies' administration costs (Vincent 2012). Most significantly, improved ecosystem function would lead to enhanced ecosystem services, with broad economic benefits. Various studies have documented that the economic values of other public-land resources (e.g., water, timber, recreation, and wilderness) are many times larger than that of grazing (Haynes and others 1997; Laitos and Carr 1999; Patterson and Coelho 2009).

Facilitating adaptation to climate change will require changes in the management of public-land ecosystems impacted by ungulates. *How* ungulate management policy changes should be accomplished is a matter for the agencies, the public, and others. The recommendations and conclusions presented in the following section are based solely on ecological considerations and the federal agencies' legal authority and obligations.

Recommendations

We propose that large areas of BLM and FS lands should become free of use by livestock and feral ungulates (Table 2) to help initiate and speed the recovery of affected ecosystems as well as provide benchmarks or controls for assessing the effects of "grazing versus no-grazing" at significant spatial scales under a changing climate. Further, large areas of livestock exclusion allow for understanding potential recovery foregone in areas where livestock grazing is continued (Bock and others 1993).

While lowering grazing pressure rather than discontinuing use might be effective in some circumstances, public land managers need to rigorously assess whether such use is compatible with the maintenance or recovery of ecosystem attributes such as soils, watershed hydrology, and native plant and animal communities. In such cases, the contemporary status of at least some of the key attributes and their rates of change should be carefully monitored to ascertain whether continued use is consistent with ecological recovery, particularly as the climate shifts (e.g., Karr and Rossano 2001, Karr 2004; LaPaix and others 2009). To the extent possible, assessments of recovering areas should be compared to similar measurements in reference areas (i.e., areas exhibiting high ecological integrity) or areas where ungulate impacts had earlier been removed or minimized (Angermeier and Karr 1994; Dobkin and others 1998). Such comparisons are crucial if scientists and managers are to confirm whether managed systems are attaining restoration goals and to determine needs for intervention, such as reintroducing previously extirpated species. Unfortunately, testing for impacts of livestock use at landscape scales is hampered by the lack of large, ungrazed areas in the western US (e.g., Floyd and others 2003; FWS 2010).

Shifting the burden of proof for continuing, rather than significantly reducing or eliminating ungulate grazing is warranted due to the extensive body of evidence on ecosystem impacts caused by ungulates (i.e., consumers) and the added ecosystem stress caused by climate change. As Estes and others (2011, p. 306) recommended: "[T]he burden of proof [should] be shifted to show, for any ecosystem, that consumers do (or did) not exert strong cascading effects" (see also Henjum and others 1994; Kondolf 1994; Rhodes and others 1994). Current livestock or feral

Table 2 Priority areas for permanently removing livestock and feral ungulates from Bureau of Land Management and US Forest Service lands to reduce or eliminate their detrimental ecological effects

Watersheds and other large areas that contain a variety of ecotypes to ensure that major ecological and societal benefits of more resilient and healthy ecosystems on public lands will occur in the face of climate change
Areas where ungulate effects extend beyond the immediate site (e.g., wetlands and riparian areas impact many wildlife species and ecosystem services with cascading implications beyond the area grazed)
Localized areas that are easily damaged by ungulates, either inherently (e.g., biological crusts or erodible soils) or as the result of a temporary condition (e.g., recent fire or flood disturbances, or degraded from previous management and thus fragile during a recovery period).
Rare ecosystem types (e.g., perched wetlands) or locations with imperiled species (e.g., aspen stands and understory plant communities, endemic species with limited range), including fish and wildlife species adversely affected by grazing and at-risk and/or listed under the ESA
Non-use areas (i.e., ungrazed by livestock) or exclosures embedded within larger areas where livestock grazing continues. Such non-use areas should be located in representative ecotypes so that actual rates of recovery (in the absence of grazing impacts) can be assessed relative to resource trend and condition data in adjacent areas that continue to be grazed
Areas where the combined effects of livestock, wild ungulates, and feral ungulates are causing significant ecological impacts

ungulate use should continue only where stocking rates, frequency, and timing can be demonstrated, in comparison with landscape-scale reference areas, exclosures, or other appropriate non-use areas, to be compatible with maintaining or recovering key ecological functions and native species complexes. Furthermore, such use should be allowed only when monitoring is adequate to determine the effects of continued grazing in comparison to areas without grazing.

Where wild native ungulates, such as elk or deer, have degraded plant communities through excessive herbivory (e.g., long-term suppression of woody browse species [Weisberg and Coughenour 2003; Beschta and Ripple 2009; Ripple and others 2010]), state wildlife agencies and federal land managers need to cooperate in controlling or reducing those impacts. A potentially important tool for restoring ecosystems degraded by excessive ungulate herbivory is reintroduction or recolonization of apex predators. In areas of public land that are sufficiently large and contain suitable habitat, allowing apex predators to become established at ecologically effective densities (Soulé and others 2003, 2005) could help regulate the behavior and density of wild ungulate populations, aiding the recovery of degraded ecosystems (Miller and others 2001; Ripple and others 2010; Estes and others 2011). Ending government predator control programs and reintroducing predators will have fewer conflicts with livestock grazing where the latter has been discontinued in large, contiguous public-land areas. However, the extent to which large predators might also help control populations of feral horses and burros is not known.

Additionally, we recommend removing livestock and feral ungulates from national parks, monuments, wilderness areas, and wildlife refuges wherever possible and managing wild ungulates to minimize their potential to adversely affect soil, water, vegetation, and wildlife populations or impair ecological processes. Where key large predators are absent or unable to attain ecologically functional densities, federal agencies should coordinate with state wildlife agencies in managing wild ungulate populations to prevent excessive effects of these large herbivores on native plant and animal communities.

Conclusions

Average global temperatures are increasing and precipitation regimes changing at greater rates than at any time in recent centuries. Contemporary trends are expected to continue and intensify for decades, even if comprehensive mitigations regarding climate change are implemented immediately. The inevitability of these trends requires adaptation to climate change as a central planning goal on federal lands.

Historical and on-going ungulate use has affected soils, vegetation, wildlife, and water resources on vast expanses of public forests, shrublands, and grasslands across the American West in ways that are likely to accentuate any climate impacts on these resources. Although the effects of ungulate use vary across landscapes, this variability is more a matter of degree than type.

If effective adaptations to the adverse effects of climate change are to be accomplished on western public lands, large-scale reductions or cessation of ecosystem stressors associated with ungulate use are crucial. Federal and state land management agencies should seek and make wide use of opportunities to reduce significant ungulate impacts in order to facilitate ecosystem recovery and improve resiliency. Such actions represent the most effective and extensive means for helping maintain or improve the ecological integrity of western landscapes and for the continued provision of valuable ecosystem services during a changing climate.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Box 1306
Albuquerque, New Mexico 87103

In Reply Refer To:
Region 2/ES/-SE

JUL 12 1996

Charles W. Cartwright, Jr.
Regional Forester
USDA Forest Service
517 Gold Avenue SW., Room 6428
Albuquerque, New Mexico 87102-0084

000032RO

Dear Mr. Cartwright:

Enclosed is the final *Biological Opinion - Mexican Spotted Owl and Critical Habitat and Existing Forest Plans.* This document is provided in response to the Forest Service's September 6, 1995, request for initiation of formal consultation with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act, as amended, on the existing land and resource management plans for the national forests.

If you have questions regarding this transmittal, contact me or have your staff contact Susan MacMullin, Chief, Ecological Services, at (505) 248-6671.

Sincerely,

Lynn B. Starnes

Acting Regional Director

Enclosure

cc: James Lloyd, Pat Jackson, Leon Fager, Heather Hollis, USDA Forest Service, Albuquerque, NM
Geographic Managers, Region 2 (U/P) G/L)
Steve Chambers, Ron McClendon, Ecological Services, Region 2
Supervisor, Ecological Services Field Offices, Albuquerque, NM and Phoenix, AZ

Biological Opinion

Mexican Spotted Owl and Critical Habitat
and
Existing Forest Plans

U.S. Forest Service
Southwestern Region

JUL 12 1996

U.S. Fish and Wildlife Service
Region 2
Albuquerque, New Mexico

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Box 1306
Albuquerque, New Mexico 87103

In Reply Refer To:
Region 2/ES-SE

JUL 12 1996

Consultation Number 000032RO

Charles W. Cartwright, Jr.
Unites States Department of Agriculture
Forest Service
517 Gold Avenue SW
Albuquerque, New Mexico 87102-0084

Dear Mr. Cartwright:

This is in response to the Forest Service's September 6, 1995, request for the initiation of Endangered Species Act (Act), section 7 formal consultation on effects of activities carried out under the existing Forest Land and Resource Management Plans (LRMP or forest plans) with respect to the Mexican spotted owl (owl) (*Strix occidentalis lucida)*. The proposed action for this consultation is the continued implementation of the existing forest plans in the Forest Service's Region 3 (Southwestern Region) until the plans are amended. Further discussion of this proposed action is included in the following sections of this biological opinion, hereafter referred to as biological opinion.

The Forest Service's *Biological Assessment - For Re-Initiation of Consultation on Existing Forest Plans Regarding Effects on the Mexican Spotted Owl and Its Critical Habitat* dated September 22, 1995, (Biological Assessment), was submitted by the Forest Service to Region 2 of the Fish and Wildlife Service (Service) on September 28, 1995. The Service also acknowledges the receipt from the Forest Service of critical habitat and recovery unit maps on September 29, 1995, and the receipt of additional information on November 9, 1995.

The designation of critical habitat for the Mexican spotted owl is being challenged in two ongoing lawsuits: Coalition of Arizona and New Mexico Counties, et. al. v. U.S. Fish and Wildlife Service CIV 95-1285 LH/DJS (filed October 27, 1995) and State of Arizona, ex. rel. v. Babbitt, CIV 95-2893 PHX-PGR (filed December 26, 1995). Although this biological opinion considers the effects of the existing forest plans on both the Mexican spotted owl as a threatened species, and on its critical habitat, neither the effect determination nor the measures discussed in this opinion would be changed if the critical habitat designation were enjoined.

A forest plan provides guidance and direction in a setting of a broad management framework. The Service recognizes that much discretion exists on the part of forest managers at the project

level in the implementation of forest plan guidance and direction. Because of this, any forest projects carried out under the existing forest plans, and subsequent to this biological opinion, will continue to be subject to project-level section 7 consultation as the Forest Service has done in the past.

During preparation of this biological opinion the Service consulted with the Office of the Solicitor regarding how to interpret the various court orders entered in Silver et al. v. Thomas et al., No. Civ. 94-1610 PHX CAM (D.Ariz.). The Solicitor's Office has advised us as follows:

> The position of the United States is that, as a matter of law, the Fish and Wildlife Service cannot conclude in a section 7 biological opinion that a forest plan would be likely to jeopardize the continued existence of any listed species, if the forest plan does not specify or authorize ground-disturbing activities (such as timber-cutting or road building) that are permitted or required to go forward without further scrutiny under the Endangered Species Act. However, as a result of several orders issued in Silver v. Thomas, the Solicitor's Office has concluded that the District Court presiding over Silver v. Thomas will not accept a biological opinion issued consistent with the legal position of the United States. The Service should analyze the existing forest plans in this biological opinion in a manner consistent with the orders in Silver v. Thomas, and therefore may issue a jeopardy biological opinion on the existing forest plans, even if the plans do not specify or authorize ground-disturbing activities. As with any biological opinion, the Service should base its conclusion as to whether jeopardy is likely to result on the best scientific and commercial information available.

In accordance with section 7 of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 et. seq.), this document represents the Service's biological opinion for the Forest Service's proposed action's effects on the Mexican spotted owl and its designated critical habitat. The receipt by the Service of the additional data and information on November 9, 1995, is to be considered the date at which this formal consultation was initiated.

The Service finds that the continued implementation of the existing forest plans will jeopardize the continued existence of the Mexican spotted owl and will adversely modify its critical habitat. However, the Service recognizes that the Forest Service exercises considerable discretion when project-level actions are planned and executed. Actions that are subjected to section 7 consultation may be further modified to avoid jeopardy and adverse modification. In addition, the Service is aware that the continued implementation of the existing forest plans is an unusual case which is time-limited in its application. The Forest Service is now in the process of amending the forest plans to conform to the management recommendations of the *Mexican Spotted Owl Recovery Plan*, and those amendments have themselves been the subject of a biological opinion dated May 14, 1996. The Forest Service has stated to the Service that only a limited number of projects that "may affect" the Mexican spotted owl or its critical habitat are yet to be completed under the existing forest plans. A list of all forest projects that have completed consultation for the Mexican spotted owl under the existing forest plans are appended to this document; and these

projects are included in the baseline for this biological opinion. Any future projects that the Forest Service determines "may affect" the owl or its critical habitat, and for which consultation is not complete, will require that the Forest Service consult at the project level. This biological opinion offers a reasonable and prudent alternative that, if implemented, will remove jeopardy to the owl and adverse modification of the species' critical habitat at the project-level and the broad-scale level.

This biological opinion is based on information provided in: the *Mexican Spotted Owl Recovery Plan*; the Forest Service's Biological Assessment; the additional information and data submitted to the Service dated November 9, 1995; the eleven existing forest plans; Forest Service and Service discussions and meetings between the Regional offices and the field offices conducted prior to and during this consultation; and other sources. An administrative record of this consultation is on file in the Region 2 office of the Service at Albuquerque, New Mexico.

I. CONSULTATION HISTORY

The Forest Service has conducted informal and formal conferences or consultations with the Service at the project level since the proposed and final rules to list the Mexican spotted owl as threatened were published on November 4, 1991, and March 16, 1993, respectively. Until the March 1995 publication of the Draft *Mexican Spotted Owl Recovery Plan* the only guidance that existed for the design of timber activities to reduce impacts to the owl was found in the interim directives developed by the Forest Service for the management, study, and monitoring of the species. These interim directives are known as Interim Directives 1 (I.D. 1) and 2 (I.D. 2). However, since the release of the Draft *Mexican Spotted Owl Recovery Plan* in March 1995, the Service has regarded the guidance in the draft recovery plan management recommendations as the best available scientific information for the species and its habitat. The final *Mexican Spotted Owl Recovery Plan* (Recovery Plan) was signed on October 16, 1995.

The Service established a Service consultation team for the existing forest plans on August 30, 1995, in anticipation of consultation being requested from the Forest Service on the effects of implementation of the forest plans. The Southwestern Region of the Forest Service requested the initiation of informal consultation on September 6, 1995, but did not submit to the Service a Biological Assessment at that time. The Forest Service and the Service met on September 11, 15, and 20, 1995, to discuss informational needs for the Biological Assessment, and on September 28, 1995, the Forest Service submitted the Biological Assessment to the Service.

After the submission of the Biological Assessment, representatives of the Forest Service and the Service again met on October 17, 19, 23, 24, and 26, 1995, regarding additional informational needs that the Service had identified in their review of the Forest Service's document. The primary need for this additional information was for data, by National Forest and by critical habitat unit, on the number of owl territories and acres of owl habitat. On November 9, 1995, the

Forest Service provided the additional information to the Service, at which time the Service initiated formal consultation for the existing forest plans.

II. PROPOSED ACTION

The proposed action for this consultation is the continued implementation of the management direction contained in the existing forest plans for the National Forests of the Southwestern Region of the Forest Service until such time as the plans are amended. Effects of project-level activity design and implementation on the owl under the continuing application of the management direction provided by the existing Forest-level standards and guidelines are evaluated in this biological opinion.

A broad range of forest programs and associated activities exists in the Southwestern Region of the Forest Service. As described in the Biological Assessment, forest activities guided by standards and guidelines include timber management; recreational activities; range management; fire management; soil, air, and water management; transportation management; fish, wildlife, and rare plant management; minerals management; special uses; land ownership; law enforcement; planning; general administration; facilities management; pest management; and cultural resource management. The Forest Service's position is that forest plans do not fund, authorize, or carry out any habitat-disturbing activities (Gippert 1996). The Service recognizes that forest plans do provide a broad management framework for the establishment of forest goals, objectives, standards and guidelines for these forest activities. While these goals, objectives, standards, and guidelines provide the outside direction and guidance for project-level activities, project activities can be subject to considerable modification in the project design process through project-level section 7 consultation. This plan-level consultation seeks to examine the potential effects on the Mexican spotted owl and its critical habitat of future forest projects developed under the direction and guidance of existing forest plans. Experience indicates that a wide range of discretion exist on the part of forest managers at the project-level in the implementation of forest plan guidance and direction. This biological opinion can help in the design of project-level activities that would not jeopardize the Mexican spotted owl, or result in the adverse modification of the species' critical habitat. However, this opinion does not replace the need for future project-level section 7 consultation for projects carried out under the existing forest plans whenever the Forest Service determines that the project "may affect" the owl or its critical habitat.

III. STATUS OF THE SPECIES

A. Listing and Critical Habitat

All subspecies of *Strix occidentalis* were collectively classified as a candidate, category 2 species in the Service's 1989 Animal Notice of Review (54 *Federal Register* [FR] 554, January 6, 1989). A category 2 species is one for which listing as a threatened or endangered species may be

appropriate, but for which additional biological information is needed to support a proposed rule to list. On December 22, 1989, the Service received a petition requesting the listing of the Mexican spotted owl as an endangered or threatened species under the Endangered Species Act. On February 27, 1990, the Service determined that the petition presented substantial information indicating that listing may be warranted. A status review was then initiated. A notice of this status review was published in the *Federal Register* (55 FR 11413) on March 28, 1990, requesting public comments and other biological data for the species. The status review was completed in a draft report on December 6, 1990. On February 20, 1991, the Service made its finding that, based on the contents of the report, the listing of the Mexican spotted owl was warranted. A notice of this finding was published in the *Federal Register* (55 FR 14678) on April 11, 1991. A proposed rule was published in the *Federal Register* (56 FR 56344) on November 4, 1991, to list the owl as threatened without critical habitat. The proposed rule also invited the public to submit information regarding whether the owl should be listed. This comment period for the proposed rule was reopened from May 11, 1992, to September 1, 1992. Appropriate Federal and State agencies, Tribal, and county governments, organizations, and other interested parties were contacted directly. Six public hearings were held by the Service.

After a review of all comments received, the Service published a final rule in the *Federal Register* (58 FR 14248) to list the Mexican spotted owl as a threatened species on March 16, 1993. Pursuant to Service regulations 50 CFR 424.12(a)(2), critical habitat for the owl was not designated in the March 16, 1993 rule. Several factors were identified as contributing to the listing of the Mexican spotted owl. Discussions of these factors are given in the March 16, 1993 final rule in the *Federal Register* to list the owl (58 FR 14248) and in the Recovery Plan. The primary factor leading to the listing of the owl has been past, current, and predicted timber harvest practices in the Southwestern Region of the Forest Service. Also, significant portions of the owl's habitat have been lost or modified as a result of local and regional human population pressures.

On February 14, 1994, a lawsuit was filed in Federal District Court in Arizona (Dr. Robin Silver, et al. versus Bruce Babbitt, et al., [CIV-94-0337-PHX-CAM]) for failure of the Department of the Interior to designate critical habitat. On October 6, 1994, the Court ordered the Service to; "Publish a proposed designation of critical habitat, including economic exclusion pursuant to 16 U.S.C. 1533(b)(2), no later than December 1, 1994,..... (and) publish its final designation of critical habitat, following the procedure required by statute and Federal regulations for notice and comment," by submitting the final rule to the *Federal Register* no later than May 30, 1995. An extension granted by the Court allowed the Service to publish a proposed rule in the *Federal Register* (59 FR 63162) designating critical habitat for the Mexican spotted owl on December 7, 1994. Press briefings and releases were conducted prior to the issuance of the proposed rule, which was sent to affected Federal, Tribal, State, county, and local agencies and governments. In addition, a notice of availability of the proposed rule was sent to all interested parties known to the Service. Public legal notices also were sent to 18 newspapers in Arizona, Colorado, New Mexico, and Utah on December 5, 1994. The public comment period for the proposed rule was open until March 7, 1995, and was extended until May 8, 1995.

Data regarding the potential economic impacts resulting from the designation of critical habitat were requested from 13 Federal, 12 Tribal, and 10 State agencies, as well as four Governors and 42 county government offices. From the information received, a draft economic analysis was completed and its availability was published in the *Federal Register* on March 8, 1995 (60 FR 12728). The availability of the draft economic analysis also was widely announced in newspapers. Public hearings, on both the proposed rule and the draft economic analysis, were held in Santa Fe and Socorro, New Mexico, on March 22 and 23, 1995, and in Tucson and Flagstaff, Arizona, on March 29 and 30, 1995. The final economic analysis for the designation of critical habitat for the Mexican spotted owl was published in May 1995. On June 6, 1995, the Service published a final rule in the *Federal Register* (60 FR 29914) to designate critical habitat for the Mexican spotted owl on 1,874, 935 ha (4,632,9901 acres) in Arizona, Colorado, New Mexico, and Utah. The final rule became effective July 6, 1995.

The taxonomy, distribution, habitat associations, feeding habits, and other aspects of the life history of the Mexican spotted owl are extensively described in the Recovery Plan and only are summarized here.

B. Natural History

Three species exist within the genus *Strix* north of Mexico; the spotted owl (*S. occidentalis)*, the barred owl (*S. varia)*, and the great gray owl (*S. nebulosa)*. The Mexican spotted owl (*S. occidentalis lucida*) is one of three subspecies of spotted owls. The other two subspecies, the northern spotted owl (*S. o. caurina*) and the California spotted owl (*S. o. occidentalis)*, are geographically isolated from the Mexican spotted owl, which ranges throughout diverse forest types in the mountains of Arizona, New Mexico, southwestern Colorado, south-central and southern Utah, western Texas, and in the Mexico States of Aguascalientes, Chihuahua, Coahuila, Durango, Guanajuato, Jalisco, Michoacan, Nuevo Leon, San Luis Potosi, Sinaloa, Sonora, Tamaulipas, Veracruz, Zacatecas, and several others.

Although the Mexican spotted owl is taxonomically classified as a subspecies, section 3(15) of the Endangered Species Act defines the term "species" as "...any subspecies of fish and wildlife or plants, and any distinct population segment of any species or vertebrate fish and wildlife which interbreeds when mature." In this document the Mexican spotted owl is referred to as a species in the context of the definition as applied in the Endangered Species Act.

Although the Mexican spotted owl's entire range covers a broad area of the southwestern United States and Mexico, much remains unknown about the species' distribution within this range. This is especially true in Mexico where much of the owl's range has not been surveyed. Informational gaps also appear for the species' distribution within its United States range. It is apparent that the owl occupies a fragmented distribution throughout its United States range corresponding to the availability of forested mountains and canyons, and in some cases, rocky canyon lands.

Current distribution patterns are defined in the Recovery Plan from visual sightings of at least one adult owl at a site, or two auditory detections at the same vicinity in the same year. Observations prior to 1990 are considered historical. Surveys for Mexican spotted owl have revealed that the species has an affinity for older, well-structured forests, particularly for nesting and roosting. The species is known to inhabit a physically diverse landscape in the southwestern United States and in central Mexico. The Mexican Spotted Owl Recovery Team (Recovery Team) divided the owl's entire range into 11 geographic areas called recovery units. These recovery units include: the Colorado Plateau, the Southern Rocky Mountains (Colorado), the Southern Rocky Mountains (New Mexico), the Upper Gila Mountains, the Basin and Range (West), the Basin and Range (East); and in Mexico, the Sierra Madre Occidental (North), the Sierra Madre Oriental (North), the Sierra Madre Occidental (South), the Sierra Madre Oriental (South), and the Eje Neovolcanico.

Home range for the species is the area used during its normal activities and, although home ranges are believed to be larger than territories, the relationship between home range and territory are not generally understood. It does appear that the owl exhibits a high fidelity to its territory, and most will remain on the same territory throughout their life span. Radio telemetry has been used to assess home range sizes, which have been found to vary considerably among habitats and geographic areas. The varied sampling methods used in these studies have made comparisons difficult. In Arizona, radio telemetry studies have revealed mean home ranges for owl individuals from 327 ha (808 acres) to 1,053 ha (2,601 acres), and for owl pairs from 381 ha (941 acres) to 1,551 ha (3,831 acres). In New Mexico, studies have revealed mean home ranges for individual owls from 261 ha (645 acres) to 937 ha (2,314 acres), and for paired owls at 573 ha (1,415 acres) to 1,401 ha (3,461 acres.)

The habitat associations for the Mexican spotted owl are varied. The owls roost, nest, and forage in a variety of biotic communities, but throughout most of their range they inhabit mixed-conifer forests dominated by an overstory of Douglas-fir and/or white fir associated with southwestern white pine, limber pine, and ponderosa pine. The understories of these forests often contain species such as Gambel oak, maples, box elder, and New Mexico locust. In southern Arizona and in Mexico, forest habitats may be dominated by an overstory of Chihuahuan and Apache pines in association with Douglas-fir, ponderosa pine, and Arizona cypress. The understories in these habitats are predominately evergreen oaks.

Nesting and roosting habitats for the Mexican spotted owl primarily include closed-canopy forests or rocky canyons. In southern Utah and Colorado, most owl nesting occurs in caves and in cliff ledges in rocky canyons. Although cave and cliff nesting also may occur in the other parts of the owl's range, tree nesting predominates. The forests that are used for nesting and roosting usually contain mature or old-growth stands with a complex, uneven-aged, multi-storied, vegetative structure with a closed canopy. The trees used for owl nesting are normally large in size, whereas those used for roosting may either be large or small. Available information indicates that the tree species most often selected for nesting appear to be Douglas-fir, although this may vary among habitat types. Roosting may occur in a broader variety of tree species, although Douglas-fir also

is most commonly used. An intolerance for high temperatures has been hypothesized as the reason the owl prefers the microclimate of shady closed canopies and deep canyon habitats. Although knowledge of foraging habitat patterns is scanty, the species uses a wider range of forest conditions for foraging than for roosting. In general, the owls forage more in unlogged forests as opposed to selectively-logged forests.

C. Population Dynamics

Details the of the distribution and abundance of the Mexican spotted owl are found in the Recovery Plan and that information only is summarized here. The Recovery Plan examines owl distributional and abundance information that had been accumulated through 1993 to: (1) document historical and current range of the species, (2) help formulate Recovery Unit boundaries, and (3) provide a template for analyses at the landscape-scale. The Recovery Team acknowledged that historical data about distribution of the owls lacks sufficiency to allow the Team to estimate changes in the number or distribution of the species from historical to present time.

Attempts were made by the Recovery Team to estimate owl populations trends using several methods. These methods are discussed in the Recovery Plan and are not discussed in detail here. However, the Recovery Team did conclude that little confidence could be assigned to the estimates of juvenile survival because of low biasing. Data gathered by the Mexican Spotted Owl Monitoring Program of the Forest Service's Southwestern Region was assimilated, reviewed, and analyzed by the Team. The Recovery Team offered an alternative design for monitoring the species within the three core recovery units of the Upper Gila Mountains, the Basin and Range West, and the Basin and Range East. That alternative monitoring design is discussed in Part III, section C of the Recovery Plan, and is not detailed here.

IV. ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the Act, when considering the effects of the action on federally listed species, the Service is required to take into consideration the environmental baseline. Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions, and other human activities in the action area. In this case, the action area is the Southwestern Region of the Forest Service. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects that have undergone section 7 consultation, and the impacts of State and private actions that are contemporaneous with the consultation in progress.

Information regarding the environmental baseline for the owl and its habitat was gained from the following sources: Fletcher 1990; USDI 1991; Fletcher and Hollis 1994; USDA, Forest Service, in litt., November 9, 1995; USDA, Forest Service September 22, 1995, Biological Assessment; previous Service biological opinions issued to the Forest Service; *Federal Register* notices; and

USDI 1995a, 1995b. The Recovery Plan for the owl (USDI 1995a) is the most current assemblage of data on the owl to date. However, information compiled by the Forest Service and used by the Service for this analysis did not use the definitions in the Recovery Plan to describe the habitat land types (i.e., protected, restricted, and other forest types). The Forest Service provided data on "suitable" and "capable" owl habitat using definitions from the Southwest Region's Interim Directive 2 (I.D. 2). The definitions of the terms suitable and capable have always been problematic (see below), and thus future biological assessments and evaluations should follow definitions used in the Recovery Plan for the owl.

A. Status of the Species

1. Owl Abundance

A reliable estimate of the absolute number of Mexican spotted owls throughout its entire range is not available (USDI 1995b). Quality and quantity of the information regarding numbers of owls vary by source. We compiled estimates of owl abundance and summarized below. These figures should not be confused with estimates of population trend. Temporal changes in the owl population can only be estimated when intensive monitoring schemes are implemented (see White et al. 1995). Because the appropriate parameters were not measured, the past Forest Service's monitoring effort in the Southwestern Region was inadequate for detecting important changes in the population dynamics of the Mexican spotted owl (see White et al. 1995).

USDI (1991) reported a total of 2,160 owls throughout the United States. Ward et al. (1995) estimated 758 owl sites occurring from 1990-1993 within the United States. They defined an owl site as a visual sighting of at least one adult spotted owl or as a minimum of two auditory detections in the same vicinity in the same year. Ward el al. (1995) assumed that if all 758 sites were occupied by pairs, then at least 1,516 adult (or subadult) owls were known to exist in the United States from 1990 and 1993. These numbers are not reliable estimates of current population size because no measures of bias or precision can be produced (Ward et al. 1995). Ward et al. (1995) also state that the amount of survey effort devoted to deriving these numbers cannot be reliably calculated, nor is an accurate measure available for areas or habitats surveyed. Thus, it is not useful to estimate the size of the Mexican spotted owl population given the limited quality of data currently available. At best, the numbers reported in (Ward et al. 1995:3) represent a range for the minimum number of owls known to exist during some portion of a four year period in the United States (758 individuals if each site was occupied by a single owl to 1,516 individuals if each site was occupied by a pair). These figures represent owls within Arizona, New Mexico, Utah, Colorado, and Texas for all Federal, private, state, and Tribal lands.

For Arizona and New Mexico specifically, the Southwestern Region of the Forest Service began intensive spotted owl inventories in 1988. Fletcher and Hollis (1994) report that approximately 1.92 million acres (66%) of the "suitable habitat" in Arizona and New Mexico National Forests have been surveyed as of 1993. The survey effort included 71% of the owl's suitable habitat that is also considered suitable for timber harvest, and 36% of the owl suitable habitat that is not

available for timber harvest (Fletcher and Hollis 1994). Table 1 displays the proportion of suitable habitat that has been inventoried on each National Forest. Figures vary by forest, ranging from 41% for the Cibola and 42% for the Prescott, to 96% percent for the Kaibab and 99% for the Apache-Sitgreaves National Forest. Over half the National Forests have surveyed at least 50% of the suitable habitat, and all have surveyed at least 40% of the suitable habitat (Fletcher and Hollis 1994).

Guidelines from Forest Service I.D. 2 require establishing management territories around all nesting and roosting owls, as well as territorial owls detected at night for which daytime locations were not recorded (see USDA 1990). All management territories, except those on the Lincoln and Gila National Forests, are 2,000 acres in size and have a 450 acre core area surrounded by 1,550 acres of the "best available" habitat. On the Lincoln and Gila National Forests, management territories are 1,500 acres in size, with a 450 acre core surrounded by 1,050 acres of the "best available" habitat. Except for road construction, habitat degradation is not allowed within management territory cores. In the remainder of the management territories, activities including timber harvest are limited to less than 775 acres. The Forest Service guidelines provide no protection for unoccupied habitat except in wilderness areas and administratively restricted lands (USDI 1995b).

Fletcher (1990) calculated that 2,074 owls existed in Arizona and New Mexico in 1990. At the end of the 1994 field season, Fletcher and Hollis (1994) reported 841 owl management territories established at locations where at least a single Mexican spotted owl had been identified. This did not include an additional 12 management territories that were established prior to 1984, for which no subsequent occupancy information had been collected. In November 1995, the Forest Service reported a total of 866 management territories (USDA, Forest Service, in litt, November 9, 1995). Table 1 displays the number of management territories and the percentage of the total number for each National Forest. The number of management territories established has increased in direct proportion to the amount of suitable habitat surveyed (Fletcher and Hollis 1994, figure 17). The Forest Service has converted some management territories to 600 acre protected activity centers (PACs) following the recommendations of the Draft *Mexican Spotted Owl Recovery Plan* released in March 1995. The completion of these conversions varies by National Forest, but they have typically been driven by project level consultations with the Service.

Table 1. Number of management territories (MT) as reported by the Forest Service (USDA, Forest Service, in litt., November 9, 1995), percent of MTs as a proportion of the MTs in Southwestern Region, and the percentage of suitable habitat surveyed in each National Forest (Fletcher and Hollis 1994).

NATIONAL FOREST	NO. MTs	PERCENT OF MTs	PERCENT SUITABLE HABITAT SURVEYED
Apache-Sitgreaves	120	13.9	99
Carson	3	0.3	62
Cibola	42	4.8	41
Coconino	155	18.0	87
Coronado	109	12.6	49
Gila	194	22.4	50
Kaibab	6	0.9	96
Lincoln	126	14.5	90
Prescott	10	1.2	42
Santa Fe	33	3.8	44
Tonto	66	7.6	55
TOTAL	864	100	

2. Habitat Status

The current condition of Mexican spotted owl habitat within Arizona and New Mexico is a result of historic and recent human use, as well as natural habitat fragmentation, vegetative species conversion, and wildfires. The Forest Service believes that some unestimated amount of regrowth and regeneration may have contributed to current habitat conditions. Precise assessment of baseline owl habitat is difficult to assemble at this time.

Owl habitat data gathered by the Forest Service has been reported in acres of "suitable habitat". It must be noted that the definition of suitable habitat has changed throughout the years. In 1990, the Forest Service defined suitable habitat by using stand characteristics identified by Ganey (1990). These characteristics included multi-storied stands with a canopy closure which was generally greater than 70%. Steep slopes and canyons were considered to be other important characteristics used to define suitable habitat. Mixed conifer was thought to be the primary habitat typed used, but other forest types demonstrating these stand characteristics were also included. Most of the Forest Service estimates of habitat acreages were derived from stand database information, air photo interpretation, and some ground-truthing. Some of the habitat

was identified using LANDSAT Imagery (Fletcher 1990). In 1994, the Forest Service defined suitable habitat as those habitats that meet the year-round needs of the owl (i.e., providing the conditions used by owls for nesting, day-roosting, and foraging). Suitable forested habitat characteristics included stands with mid-aged, mature and old forest development stages, and multiple canopy layers. Mixed conifer forest included a closed canopy of 60% or more, and a 50% or greater canopy closure was included in pine, pine-oak, and other hardwood forest types. Interpretation and application of these definitions in the field have differed between Forest Service personnel throughout the years (H. Hollis, Forest Service, Southwestern Region, Albuquerque, NM, pers. comm.). Hereafter, the Service assumes the term "suitable habitat" to mean nesting, roosting and foraging habitat. Suitable and capable habitat in the Southwestern Region is reported for the years of 1990, 1994, and 1995 (Table 2). The Forest Service does not have comparable information for capable habitat in 1994 or 1995, so capable habitat is presented for only the years 1990 and 1993. Figures through 1993 represent a loss of approximately 30,000 acres of suitable habitat since 1990. This 0.9% per year acreage increase in the amount of suitable habitat converted to capable habitat is less that the average rate of about 7 percent per year for the 1980-1990 time period (Fletcher and Hollis 1994). The figures of suitable habitat presented for 1995 have changed significantly from 1994 figures due to more detailed analysis by the National Forests (H. Hollis, Forest Service, Southwestern Region, Albuquerque, pers. comm.).

Table 2. Comparison of capable habitat in 1990 and 1993, and suitable habitat by National Forest in 1990, 1994 and 1995 (Acres X 1,000) (Fletcher 1990, figure 8; Fletcher and Hollis 1994, figures 4, 10 and 18; Forest Service, in litt., November 9, 1995).

NATIONAL FOREST	CAPABLE 1990	CAPABLE 1993	SUITABLE 1990	SUITABLE 1994	SUITABLE 1995
Apache-Sitgreaves	100	100.1	370	258	151.9
Carson	42	48.7	250	250	278.0
Cibola	84	84.6	172	172	149.5
Coconino	170	180.1	356	216	216.0
Coronado	22	22.1	115	115	121.2
Gila	342	342.3	619	619	733.4
Kaibab	19	19.4	64	63	27.6
Lincoln	24	27.7	371	250	186.0
Prescott	53	53.0	133	133	60.0
Santa Fe	157	165.1	595	476	411.6
Tonto	25	25.4	321	317	83.1
TOTAL ACRES	1,038	1,069	3,366	2,869	2,418

Fletcher and Hollis (1994) estimate 1,183,000 acres (approximately 41%) of the suitable habitat for the owl occur on lands identified in the existing forest plans as suitable and available for timber harvest. The Cibola, Coronado, Gila, Prescott and Tonto National Forests have identified no more than 26% of their suitable habitat as available for timber harvest. The Coconino and Lincoln National Forests have identified 44 and 41% respectively, of their suitable habitat available for timber harvest. The remaining four National Forests have identified over 50% of the suitable habitat as being available for timber harvest, with the Apache-Sitgreaves National Forest having over 85% available for harvest activities (Fletcher & Hollis 1994).

The Forest Service provided the information in Table 3 which represents the number of owl territories and the amount of suitable habitat by recovery unit (see USDIb:36-51). These figures represent habitat and owls both inside and outside of critical habitat. This represents the only specific up-to-date information available at this time.

Table 3. Territories & acres of suitable habitat in each Recovery Unit (RU) (Forest Service, in litt., November 9, 1995).

RECOVERY UNITS	NO. OF TERRITORIES	"SUITABLE" ACRES
Colorado Plateau RU	13	18,524
S. Rocky Mountains-NM RU	36	689,657
Upper Gila Mountains RU	539	1,283,499
Basin and Range-West RU	150	211,698
Basin and Range-East RU	128	212,348
TOTALS	866	2,415,726

Mexican spotted owl habitat in the southwestern United States has been shaped over thousands of years by low intensity, high frequency fire regimes. Currently, high intensity, stand-replacing fires occur in ponderosa pine and mixed conifer forest types. In 1994, at least 40,000 acres of nesting and roosting habitat were impacted to some degree by catastrophic fire in the Southwestern Region (Sheppard and Farnsworth 1995, unpublished Forest Service report). The Forest Service estimates that approximately 50,000 acres of owl habitat have undergone stand replacing wildfire since 1991 (G. Sheppard, Forest Service, Kaibab National Forest, Arizona, pers. comm.). Some of the wildfires that have had a impact on Mexican spotted owl habitat since 1989 include the Dude, Burgett, Bridge, Divide, Pigeon, Ryan, Rattlesnake, Shelly, Big, Lost, and Rincon Incidents (Sheppard and Farnsworth 1995, unpublished Forest Service report).

To characterize how the existing forest plans relate to potential effects from site-specific actions, it is relevant to consider past consultations completed with the Forest Service since the owl was listed in 1993. The Service reviewed past consultations completed for the owl on Forest Service

project-level actions and summarized acres of suitable habitat that were converted (Table 4). It should be noted that the figures reported in Table 4 reflect the conservative assumption that all suitable acres identified in the consultations subject to timber harvest were converted to capable habitat. Suitable habitat that has potentially been rendered to unsuitable habitat since 1993 equates to 6,398 acres (Table 4).

Table 4. Acreage of suitable habitat converted and anticipated incidental take of Mexican spotted owls by National Forest associated with formal consultations since listing (Service biological opinions).

NATIONAL FOREST	ACRES CONVERTED[1]	INCIDENTAL TAKE
Apache- Sitgreaves	730	5
Carson	1,751	0
Cibola	183	0
Coconino	2,059	13
Coronado	27	4
Gila	584	5
Kaibab	38	2
Lincoln	634	2
Prescott	73	0
Santa Fe	142	1
Tonto	177	6
TOTAL	6,398	36

[1] Proposed treatment in previous requests for formal consultation.

Fletcher (1990) reports the conversion of 1,037,000 acres of suitable habitat to capable habitat, with forty percent of this loss occurring since 1980. Between 1990 and 1993, the Forest Service reports an additional 30,000 acres of suitable habitat converted to capable habitat (Fletcher and Hollis 1994). Since the owl was listed in 1993, the Service has documented conversion of 6,398 acres of suitable habitat, as indicated by the Service's biological opinions through 1995 (Table 4). The Service's figures for 1993 may contain some overlap with the Forest Service figures for this same year, as the species was listed early in the 1993 calendar year. The Service used the above figures, combined with an estimate of loss of habitat due to wildfire since 1991, to estimate the conversion of suitable habitat through 1995 (Table 5). Capable habitat is expected to return to suitable through regeneration and growth. However, this takes place slowly and no specific estimates of how regrowth may have contributed to baseline habitat conditions have been made.

Table 5. Estimated conversion of suitable habitat (Fletcher and Hollis 1994; Service biological opinions; G. Sheppard, Forest Service, Kaibab National Forest, AZ, pers. comm.).

CONVERSION	ACRES
Through 1989[1]	1,037,000
1990-1993[2]	30,000
1993-1995[3]	6,400
Fires since 1991[4]	50,000
TOTAL ESTIMATED CONVERSION	1,123,400

[1] Estimate by the Forest Service that includes timber harvest and fires through 1990 (Fletcher 1990 and H. Hollis, Forest Service, Southwestern Region, Albuquerque, NM, pers. comm.).
[2] Fletcher and Hollis 1994.
[3] Estimate of habitat converted by the Forest Service activities as reported in previous biological opinions (rounded to 6,400)
[4] Estimate of habitat conversion caused by stand replacing wildfires (G. Sheppard, Forest Service, Kaibab National Forest, AZ, pers. comm.). This figure does not include the 1996 fire season.

The Service estimates that the current amount of suitable habitat as reported in 1995 (2,416,000 acres: Table 3) added to the amount of suitable habitat lost as reported by the Forest Service and Service biological opinions (1,123,000 acres; Table 5), totals the possible recent historic amount of suitable habitat (3,539,000 acres). Projects implemented under the existing forest plans as well as wildfires have converted approximately 1,123,000 acres of suitable habitat to unsuitable habitat. Based on these estimates, approximately 32% of historic owl suitable habitat has been lost.

In addition to our estimate of habitat lost, other limited data sources are available for assessing habitat trend. The Recovery Team (USDI 1995b) analyzed forest inventories from the 1960s (Choate 1966, Spencer 1966) and 1980s (Conner et al. 1990, Van Hooser et al. 1993) to evaluate trends in habitat. They assessed the change in the size-class distribution of trees from the 1960s to the 1980s. The trend that emerged in the analysis indicated a substantial increase in the density of trees 5-12.9 inches dbh, but a large decrease (20%) in the numbers of trees $\geq$19 inches dbh, from 0.9 trees per acre, to 0.7 trees per acre (USDI 1995b:65). This decrease indicates an alarming negative trend with respect to a very critical component of owl habitat (USDI 1995b:66-68).

B. Critical Habitat and Recovery Units

The Southwestern Region of the Forest Service manages 3,358,499 acres of designated critical habitat for the Mexican spotted owl (60 FR 29914). Critical habitat is designed to assist the Service and all Federal agencies in preventing the further deterioration of habitat, and in this way,

contribute toward a species' conservation. The physical and biological features essential to the conservation of the owl, referred to as the primary constituent elements, include those that support nesting, roosting, and foraging (60 FR 29914).

Critical habitat is located within specific critical habitat units across the range of the owl in the United States. These critical habitat units are located within six recovery units as defined by the Recovery Plan (USDI 1995b). Five critical habitat units are located completely or partially within the Southwestern Region of the Forest Service. To date, little detailed information has been gathered on the existing condition of critical habitat in Arizona and New Mexico. Specific habitat information is needed in the habitat categories of protected and restricted as defined in the Recovery Plan.

A discussion of the owl's status and its habitat is provided below for each recovery unit in Arizona and New Mexico. These summaries provide a prelude to the analysis of effects on the owl and its habitat within these recovery units.

1. Colorado Plateau Recovery Unit

The Colorado Plateau Recovery Unit is the largest of the six units, extending from southwestern Utah, through northern Arizona into northwestern New Mexico, and a small portion of the southwestern corner of Colorado. In northern Arizona and New Mexico, owls have been reported in both canyon and montane situations. In addition, owl habitat appears to be in the form of isolated "islands" or "patches", geographically segregated from other patches of habitat. Recent records of owls exist for the Grand Canyon and Kaibab Plateau in Arizona, as well as for the Chuska Mountains, Black Mesa, and Fort Defiance Plateau on the Navajo Reservation. In addition, records exist for the Zuni Mountains and Mount Taylor in New Mexico.

Within this recovery unit, Federal lands comprise 44% of total land administration (USDI 1995b). Potential threats in the southeastern portion of this recovery unit (Arizona and New Mexico) include timber harvest; overgrazing; catastrophic fire; and oil, gas, and mining development (USDI 1995b).

Forested habitats on the North Kaibab Plateau exhibit extensive areas with partial or complete overstory removal, and canopy closure over much of the area is perhaps less than half that of the owl's habitat that exists within the adjacent Grand Canyon National Park. The forested and non-forested canyon habitat below the rim of the Plateau are minimally modified and are mostly in suitable condition. There are currently no established territories within this portion of the recovery unit, although there are recent records of pairs, singles and juvenile owls.

Within the New Mexico portion of the Colorado Plateau Recovery Unit, the accessible forested areas have undergone considerable modification (Dick-Peddie 1993). Mexican spotted owl nesting and roosting habitat may be limited primarily to forested canyons and steep slopes. A

large portion of the forested areas within the Zuni Mountains was logged for railroad construction earlier this century (Dick-Peddie 1993).

An analysis of the owl's entire range sought to identify those patches that contribute most significantly to overall habitat connectedness on a landscape scale (see Recovery Plan Part II. F). Habitat patches were ranked based on their contribution to overall connectedness. Results from this exploratory landscape analysis found the Zuni Mountains and Mt. Taylor to be important habitat clusters. In addition, these habitat clusters were considered "sensitive", not based on their size, but rather based on their role as "stepping stone" patches that connected large areas of habitat (Keitt 1994). Thus, these areas may contribute to critical demographic linkages for owl populations to the south in the Upper Gila Mountains Recovery Unit.

Mexican spotted owl distribution within this recovery unit in New Mexico appears to be highly fragmented. The disjunct owl distribution may be a natural occurrence, the result of past management earlier this century, or just a reflection of inadequate survey efforts. It also could be a combination of all three. Continued alterations, through timber harvest activities and catastrophic fires, of forested areas may be the greatest threat to recovering this owl population.

2. Southern Rocky Mountain - New Mexico Recovery Unit

This recovery unit encompasses a large portion of northern New Mexico and contains a small portion (i.e., an estimated 4.5%) of the known owl sites throughout its range. However, Johnson and Johnson (1985) documented approximately 40 observations (historic sites) of owls throughout this recovery unit in northern New Mexico. Current owl sites have been recorded in the Jemez and Sangre de Cristo Mountains, Bandelier National Monument and areas surrounding Los Alamos. Owl sites in these areas are generally described as having deep, narrow, timbered canyons with cool shady places for owls to roost.

The habitat in this recovery unit is administered by the Carson and Santa Fe National Forests. Vegetation within this recovery unit has been modified by past logging, extensive grazing, surface mining, fuelwood gathering, and fire suppression (Williams 1986, Van Hooser et al. 1992).

Little is known about Mexican spotted owl habitat within this recovery unit. Owl occurrences within this recovery unit are disjunct and appear to coincide with patchy steep sloped or canyon type habitat. As previously mentioned, owl records are scattered throughout this recovery unit (Johnson and Johnson 1985). The majority of these records are considered historic (i.e., owl sites detected prior to 1989). A continued loss of habitat from both timber harvest activities and catastrophic fire may be the greatest threat to recovering this owl population.

Although this recovery unit supports the smallest known population of owls, small populations distributed over large areas of a disjunct landscape are viewed as being at greater risk than larger populations. Disturbances (either natural or anthropogenic) may lead to further isolation of owl pairs and, eventually, these populations become "sink" populations. Dispersal acts as a bridge

between subpopulations at the metapopulation scale to provide immigrants to otherwise isolated habitat patches. If the habitat patch has been unoccupied, then the new recruits fill the void.

3. Upper Gila Mountains Recovery Unit

This recovery unit is a relatively narrow band bounded on the north by the Colorado Plateau Recovery Unit and to the south by the Basin and Range - West Recovery Unit. The southern boundary of this recovery unit includes the drainages below the Mogollon Rim in central and eastern Arizona. The eastern boundary extends to the Black, Mimbres, San Mateo, and Magdalena Mountain ranges of New Mexico. The northern and western boundaries extends to the San Francisco Peaks and Bill Williams Mountain north and east of Flagstaff, Arizona. This is a topographically complex area consisting of steep foothills and high plateaus dissected by deep forested drainages. In New Mexico, this recovery unit straddles the Continental Divide. The area west of the Divide is drained by perennial headwaters of the Upper Gila system and include the San Francisco and Tularosa Rivers. This recovery unit can be considered a "transition zone" because it is an interface between two major biotic regions: the Colorado Plateau and Basin and Range Provinces (Wilson 1969).

Habitat within this recovery unit is administered by the Kaibab, Coconino, Apache-Sitgreaves, Tonto, Cibola, and Gila National Forests. Vegetation generally consists of piñyon/juniper woodland, ponderosa pine/mixed conifer forest, some spruce/fir forest, and deciduous riparian forest in the lower elevation canyon habitat.

Mexican spotted owls are widely distributed and use a variety of habitat within this recovery unit. Owls most commonly nest and roost in mixed conifer forests dominated by Douglas fir and/or white fir and canyons with varying degrees of forest cover (Ganey and Balda 1989; USDI 1995b). Nesting and roosting occurs in ponderosa pine/Gambel oak forest, where they are typically found in stands containing well-developed understories of Gambel oak (USDI 1995b).

This recovery unit contains the largest known concentration of Mexican spotted owl with approximately 55% of known owl territories (USDI 1995b). This recovery unit is located near the center of the owl's range within the United States and is contiguous to four of the five recovery units within the United States. Because of its central location and its large and relatively continuous spotted owl population, the Mexican spotted owl Recovery Team believes that the population in this recovery unit could be uniquely important to the overall stability and persistence of the owl population in the United States. Specifically, this recovery unit may be considered the "core" or "source" population, providing immigrants to smaller, more isolated populations in other recovery units. In source-sink models (Pulliam 1988), source areas with self-propagating (typically increasing) populations provide a flow of recruits to "satellite" or sink areas where populations are not self-reproducing (and may be declining). Therefore, critical habitat units within this recovery unit may play an important role since the persistence of the satellite populations depends upon the central source population. Although the Recovery Team has little data on dispersal patterns or movements between recovery units, the Team believes that this

population should be maintained at current levels and with at least the current level of connectivity with the recovery unit (USDI 1995b). Significant discontinuities that develop in the Mexican spotted owl's distribution within this recovery unit, and the loss of habitat to support the local sub-populations, may compromise the recovery of the species.

Mexican spotted owls through this recovery unit are found primarily in mixed conifer and pine-oak forests, often in conjunction with canyon terrain (USDI 1995b). Most of the accessible forest in the central portion of this recovery unit is second-growth forest with minimal mature stand characteristics. Forest breeding habitat is mostly restricted to the steeper within-canyon stretches of mature stands. Much of the habitat south of the Mogollon Rim is inaccessible to timber harvest due to steep terrain and is mostly suitable habitat. Although productivity is the same, occupancy rates are higher below the Rim than for the habitat above. Habitat in the western portion of this recovery unit is mostly characterized by canyon systems and forested uplands and mesas. Again, much of the accessible terrain has had partial or complete overstory removal and is typically second-growth forest.

The primary threats to the owl and their habitat in this recovery unit are timber harvest and catastrophic fire. Other threats within this recovery unit include indiscriminate fuelwood cutting and overgrazing by both wildlife and livestock (USDI 1995b).

4. Basin and Range - West Recovery Unit

This recovery unit encompasses a small portion of New Mexico and the majority of southern Arizona. This is the second largest recovery unit in the United States. The known Mexican spotted owl population ranks third highest in the United States despite limited survey efforts in many areas (USDI 1995b). The northern border of this recovery unit is defined by the base of the Mogollon Rim. The western boundary defines the western extent of the Mexican spotted owl's range.

The Basin and Range - West Recovery Unit is characterized by numerous mountain ranges which arise abruptly from broad plain-like valleys and basins. Within southern Arizona the mountain ranges are sometimes referred to as the "sky islands". The mountains are surrounded by Sonoran and Chihauhuan desert-scrub.

Land ownership within this recovery unit is a mosaic of public and private lands. Habitat within this recovery unit is administered by the Prescott, Tonto, Apache-Sitgreaves, and Coronado National Forests. Accessible forest (primarily foraging habitat) in many areas has had the mature stand component partially or completely harvested. In general, however, much of the habitat is forested, steep-slope canyons and drainages, and is mostly in suitable condition. Within the sky islands, habitat is characterized by a greater amount of woodland habitat, and territories occur in both heavily forested terrain and in areas with hardwood and conifer stringers dominated by Madrean evergreen woodland.

Very little timber harvest occurs in this recovery unit, although some timber harvest occurs in the Bradshaw Mountains of the Prescott National Forest. The primary threats to Mexican spotted owl within this recovery unit are catastrophic wildfire, recreation, and grazing (USDI 1995b).

Recent wildfires have occurred in the Pinaleno, Rincon, Chiricahua, and Huachuca Mountains. The three forests are used heavily for recreation, mainly due to their proximity to the large urban areas of Tucson and Phoenix. Grazing in riparian areas is of concern because of potential negative impacts on areas that can provide dispersal habitat among mountain ranges (USDI 1995b).

5. Basin and Range - East Recovery Unit

This recovery unit lies mostly within New Mexico and contains an estimated 16% of the known owl sites throughout its range, the second largest in the U.S. Habitat is administered by the Cibola and Lincoln National Forests. This recovery unit is characterized by numerous parallel mountain ranges separated by alluvial valleys and broad, flat basins. Owls occur in the isolated mountain ranges scattered throughout this recovery unit, but the largest portion of the owl subpopulation here occurs in the Sacramento Mountains. They are most common in mixed-conifer forests, but are also found in ponderosa pine forests and piñon-juniper woodlands. Current owl sites have been recorded in National Forest lands in the Sandia, Manzano, Sacramento and Guadalupe Mountains, Guadalupe National Park and Mescalero Apache Tribal lands.

Mexican spotted owls occurring in the Sacramento Mountains have been exposed to various disturbances for more than a century. Natural disturbances include forest fires, and human disturbances include timber and fuelwood harvest, grazing, land development, and recreation. Coniferous forests, especially the mixed-conifer, were extensively logged during an era of railroad logging from 1890 to 1945 (Glover 1984). After the railroad logging era, trees grew rapidly and attained merchantable sizes in about 40-50 years on favorable sites. Consequently, much of the habitat currently used by owls in the Sacramento Mountains is regrowth forest that has attained a high density of moderately sized trees, poles, and saplings, together forming multiple canopy layers.

Past timber harvest practices have left a few remnant old-growth stands and residual pockets of pre-harvest trees in the Sacramento Mountains. Many of these stands are small (less than 10 acres) and exist as smaller groves amid the younger coniferous forests. The Recovery Plan states that these remnant patches are critical to the Mexican spotted owl, particularly for nesting and roosting (USDI 1995b).

According to the Recovery Plan, the greatest threats to recovery in this recovery unit are catastrophic fire, some forms of timber harvest and fuelwood harvest. Recovery here will require maintenance of existing and future populations by conserving habitats in areas not only inhabited by owls but also in areas between occupied sites.

C. Summary of Environmental Baseline

There are 2,418,316 acres of suitable habitat and 866 known Mexican spotted owl territories in Forest Service's Southwestern Region as of the end of 1995. Approximately 49% of this (1,183,000 acres) is available for timber harvest under existing forest plans. By 1990, the Forest Service had converted 1,037,000 acres of suitable habitat to non-suitable condition, representing a 23.5 percent loss of suitable habitat. Since 1990, the Forest Service and wildfires have converted an additional 84,167 acres to an unsuitable condition. This amounts to a total of 1,121,167 acres converted, or a 32% reduction in the recent historic amount of suitable habitat in the Forest Service's Southwestern Region.

There are five recovery units in the Southwestern Region of the Forest Service. The Upper Gila Mountains Recovery Unit contains the largest known concentration of Mexican spotted owls, and is located near the center of the owl's range within the U.S. This population could serve as the source population for all other recovery units. The primary threats to recovery in all recovery units are timber harvest, catastrophic fire, indiscriminate fuelwood cutting, overgrazing, and recreation (USDI 1995b).

V. EFFECTS OF THE ACTION

Activities that disturb or remove the primary constituent elements may affect the owl and/or may adversely modify owl CHUs. These activities may include actions that reduce the canopy closure of a forest stand, reduce the average diameter of trees in a stand, modify the multi-layered structure of a stand, reduce the availability of nesting structures and sites, reduce regeneration or modify the structure of riparian habitat, reduce the suitability of the landscape to provide adequate cover, or reduce the abundance or availability of prey species (60 FR 19914-19951). In addition, actions such as recreation activities (e.g., cross country race events, major trail construction) or road construction projects that cause disturbance may affect the owl.

Pursuant to 50 CFR 402.02, an action that would "jeopardize the continued existence of a species" means that an action would reasonably be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. For an action to result in the "destruction or adverse modification of critical habitat", would mean a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, actions adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02).

Effects of project-level activity design and implementation on the owl under the continuing application of the management direction provided by the existing Forest-level standards and guidelines are evaluated in this biological opinion. The forest plans for the eleven forests in the

Southwestern Region were developed and approved between 1985 and 1988, before the listing of the Mexican spotted owl and did not contain specific measures to protect the owl. Approval of projects under these forest plans and prior to the listing of the owl lead to adverse effects on the owl and contributed to the necessity of the species' listing. Since the listing of the owl as threatened, projects approved under the existing forest plans, and for which the Forest Service determined "may affect" the owl, were required to undergo interagency consultation with the Service. Projects which were likely to adversely affect the owl, or result in the destruction or adverse modification of the owl's critical habitat, would have been subject to reasonable and prudent alternatives and/or measures set forth in Service-issued project-level biological opinions.

The Service's objective in this analysis is to determine whether the effects of continuing the implementation of the existing forest plans is likely to jeopardize the continued existence of the Mexican spotted owl, or result in the destruction or adverse modification of the owl's critical habitat. Project-level activities that have been developed under the existing forest plans and undergone consultation are listed in Appendix A. The Service uses several of these projects as examples in this section. As previously stated, any projects under the existing forest plans that "may affect" the owl and/or its critical habitat, and not yet consulted on, are still subject to separate, project-level section 7 consultation under the ESA.

A. Timber Harvest and Forest Management

The effects of timber harvest on the owl have been described in the Recovery Plan for the owl (USDI 1995b), previous Biological Opinions provided by the Service to the Forest Service on August 23, 1993, and October 8, 1993, *Federal Register* notices (58 FR 14248-14271, 60 FR 29914-29951), and Status Review for the owl (USDI 1991). However, we present the following summaries of effects on the owl and its habitat by silvicultural treatments and forest management practices permitted under existing forest plans. This is not an exhaustive discussion of forest management and in no way covers all silvicultural prescriptions. It is intended to provide an overview of the effects of these treatments on owl habitat in Arizona and New Mexico.

In the Southwest, two broad classifications of silvicultural systems based on methods of reproduction and resulting age-class mixes of forested stands, are even-age and uneven-age management. Even-age management has been commonly used in Southwestern forest types and usually involves relatively small differences in stem ages existing within a given stand. Within even-age systems are included clearcutting, shelterwood, and seed tree methods. The uneven-age system employs the selection method. The two primary variations of the selection method are individual tree selection and group selection. These methods are discussed in detail below as well as other forest management activities such as thinning, salvage, and personal-use fuelwood activities.

Clearcutting

This term denotes the complete removal of an entire stand in one cutting with reproduction obtained artificially by seeding or planting, and naturally by seeding from adjacent stands (USDI

1995b, Hunter 1990). This prescription is used in cases of heavy insect or disease infestations and to regenerate quaking aspen, where reproduction is obtained from suckering of sub-terrain clones. The seed-tree method resembles clearcutting except that a few trees are left to provide a source of seed within the treated area (USDI 1995b:69). In general, clearcutting is used relatively little (2%) in southwestern forests. Of 1,045,000 acres harvested from 1987 through 1996, an estimated 20,900 acres were projected for clearcut in New Mexico and Arizona (Fletcher 1990:42). Although large-scale clearcutting is seldom used in the Southwest, this type of harvest is particularly harmful to owls since it may eliminate potential nesting habitat for many years and could impact dispersal ability. In the case of aspen regeneration, which is usually applied to a relatively small area (0.5-20 acres in size), clear cutting may increase the diversity of prey available to the owl through diversifying the vegetative habitat. However, without a method of tracking the effects of clearcuts on an already fragmented landscape, from both natural and anthropomorphic causes, it is impossible to assess the effect that clearcuts have on the owl in the Southwest.

Shelterwood Cutting

The shelterwood method typically involves a series of cuttings. The first cut in mature stands is to stimulate cone and seed production for regeneration, and is followed by a series of harvests that remove the larger, older stems as regeneration matures (USDI 1995b:69). Specifically, most of the trees are removed in a short period, but anywhere from 25% to 75% of the largest, most vigorous trees are left behind as a seed source and to provide some shelter to sensitive seedlings (Hunter 1990:85). Pre-commercial thinning is carried out on young stands to maintain tree spacing and numbers at levels that will maximize growth of the remaining trees. Intermediate cuts follow pre-commercial thinning at about 10 year intervals. Intermediate cuts thin the stand and improve its commercial quality by removing diseased and poorly formed trees. Unlike pre-commercial thinning, intermediate cuts produce yields of commercial timber. There are usually one to three intermediate cuts prior to the next regeneration cut which completes the full harvest cycle. In the shelterwood system, the full harvest cycle is 100 to 140 years for mixed-conifer forests in the Southwest. This method is used predominantly (93%) in the Southwest under existing forest plans with variations on the general method such as irregular shelterwood and group-shelterwood. For the 10 year period, the existing forest plans estimate 972,146 acres of timberland will be harvested using the shelterwood system (USDI 1991).

When used for maximum timber production, the shelterwood system produces vigorous disease-free stands with little age or structural diversity. Reduction of diversity begins with pre-commercial thinning that removes less vigorous trees and non-commercial species (i.e., hardwoods such as Gambel oak, maple, and New Mexico locust) that would otherwise remain in the understory (USDI 1991). Standard intermediate cuts also remove less vigorous trees and create even spacing for those that remain, thereby removing many trees that would otherwise contribute standing snags or downed material, which are important components of owl nesting and roosting habitat.

In general, even-age stand structures are not used to any great extent by the owl. Owl nest and roost sites are typically found in structurally-complex, uneven-aged forests, with a variety of age- and /or size-classes, a large tree component, many snags and down logs, and relatively high basal area and canopy closure (Ganey and Dick 1995:14-29, see also SWCA 1992, Armstrong et al. 1994, Ganey and Balda 1994, Ruess 1985, Seamans and Gutierrez 1995.) Further, with its intent to promote uniformity in tree age, size, and density, even-age management would not be a preferred system for short-term spotted owl habitat development. Although a widescale application of even-age management across the Southwest is not preferable, a notable exception to this would be aspen regeneration. Also, even-age silviculture may be a useful tool if used to meet certain ecosystem objectives when employed at the proper scale.

Individual Tree Selection

Individual or single tree selection, as the name implies, involves the removal of single, scattered trees. This method generally favors shade-tolerant species, but its affects are a function of the residual stocking levels. The effects of this treatment vary depending on the location, number, and type of trees removed. Individual tree selection may be incompatible with maintaining and developing owl habitat if individual trees are chosen for removal because they have grown to maturity, or because they are of poor commercial quality. Diversity of tree species and diameters appears to be high in many owl nesting and roosting areas (Johnson and Johnson 1988, Johnson 1989, 1990, Seamans and Gutierrez 1995). Owl nest and roost sites typically contain a large tree component (Ganey and Balda 1989a, Duncan and Taiz 1992, Ganey et al. 1992, Fletcher and Hollis 1994, Tarango et al. 1994, Seamans and Gutierrez 1995). Further, besides old raptor nests, nest structures in live conifers include broken top cavities, witches brooms, stick platforms on "bayonet limbs", and stick nests in a multiple-topped tree (Ganey and Dick 1995, SWCA 1992:21). Therefore, selecting individual trees in order to maximize timber production will eliminate key owl habitat components. However, if this type of timber harvest method is used correctly, it can, in some instances, enhance owl habitat by creating natural openings which may increase prey availability (Ward and Block 1995).

Group Selection

Group selection entails the removal of a small patch of trees; the width of the patch is usually less than twice the height of the dominant (i.e., largest) tree. Group selection treatments create a landscape mosaic composed of small, usually 1/4-2 acre, patches. This is somewhat analogous to a small clearcut, but the difference between the group selection and the clearcut method is in the spatial scale of application. Group selection is used to create a balance of age- or size-classes in small contiguous groups resulting in a mosaic within a stand, whereas even-age methods, such as a clearcut are typically applied to an entire stand.

Group selection offers a number of advantages for the development of potential owl habitat over single-tree selection techniques. Application of the group selection method could provide a mosaic of many small even-aged or two-storied groups across a forest stand. Edge effects found

at group interfaces can provide structural features and openings that mimic gap-phase regeneration, and provide early-seral vegetation for prey species (Ward and Block 1995). In some cases, group-selection methods may result in less residual damage to the stand as the result of logging activities than single-tree selection (USDI 1995b). In either case, group selection methods have been scheduled on 48,571 acres (5%) out of 1,045,000 acres to be harvested from 1987 through 1996 (USDI 1991).

Thinning

This treatment usually falls into two categories; precommercial and commercial thinning. However, the terms may vary by forest, with some forest managers using the term thinning as a single category. Kimball and Hunter (1990:223-230) discusses thinning techniques under the category of intermediate treatments. Thinning treatments that mimic competition-induced mortality by removing trees from beneath the main crown canopy are termed low thinning or thinning from below (Smith 1986). Crown thinning and dominant thinning refer to removing trees from within or above the main crown canopy respectively and is termed thinning from above (Kimball and Hunter 1990:227).

Fundamentally, thinning is considered the practice of removing some of the smaller trees in a stand so that remaining trees will grow faster. This is sometimes beneficial to owl habitat because it decreases competition in the residual trees, allowing them to grow larger faster, and reduces the potential for stand replacing fires by reducing the "ladders" provided by the small trees. Further, thinning can maintain and increase the growth, health and vigor of the residual trees, and potentially make a stand more desirable as nesting/roosting habitat over time. Thinning activities can also be adverse to owl habitat when biomass accumulated by a forest is reduced, especially if stand basal areas and diversity is eliminated.

Sanitation and Salvage

Another type of intermediate cut, as reported by USDI (1991:41), is salvage or sanitation salvage. Salvage is most commonly used to remove dead and dying trees caused by insects or fire. These treatments remove dead, damaged, or susceptible trees primarily to prevent the spread of pests or pathogens. The most common tree disease in Southwestern forests is caused by parasitic seed plants of the genus *Arceuthobium*, the dwarf mistletoes. Salvage logging has the potential to adversely affect owl habitat by the removal of existing dead trees as well as "dying" trees which are important habitat characteristics of nesting and roosting habitat. For example, dwarf mistletoe creates nest sites for owls in Douglas-fir and ponderosa pine trees (USDI 1995b). Insect and disease management, as specified in existing forest plans, is in conflict with the protection and recovery needs of the owl (Forest Service in litt September 22, 1995). Although limited salvage in owl habitat may have minimal adverse affects, salvage sales often remove commercial-size trees that otherwise would have contributed to snag recruitment and overall stand diversity (see also Beschta et al. 1995).

Steep-slope Logging

Also referred to as cable or skyline logging, steep-slope logging is used to harvest timber on forested areas with grades ≥ 40%. Existing forest plans for 4 of the 11 New Mexico and Arizona National Forests contain provisions to allow cable or skyline logging on slopes ≥ 40% (USDI 1991). For example, the Gila National Forest (USFS 1986a) suggests total timber harvest for the forest could be increased by entering steep slopes, with as much as 50% of the total timber volume coming from these areas in five decades. The *Lincoln National Forest Plan* (USFS 1986b) specifies 4,850 acres of steep-slope logging, and the *Santa Fe National Forest Plan* (USFS 1987c) calls for harvest of 1.5 million board feet annually by skyline logging.

Many steep-slopes that have not been harvested in the past contain owls (B. Block, Rocky Mountain Range Experimental Station, Flagstaff, Arizona, pers. comm.). Steep slopes typically provide superior owl habitat by virtue of the owls' preference for steep topography, rock outcrops and cliffs, and the generally cooler microclimates. These slopes also often support multilayered mixed-conifer forest (USDI 1991). The cool, north facing forested slopes in the Southwest often contain large, mature trees and, thus, owls are often present. Logging activities within these areas could remove an important component of owl habitat.

Personal Use Fuelwood

Fuelwood gathering of dead and down timber and small green wood is generally permitted throughout the Southwest in the National Forests. Fuelwood gathering activities are widely distributed across nearly all forest and woodland types. Although most National Forests have specific designated fuelwood gathering areas, until 1995 the Coronado National Forest allowed firewood collections forest-wide "as wood is accessibly found", subject to the terms of a special fuelwood gathering permit. The majority of dead and down wood is gathered in areas that were recently thinned or commercially logged. These areas are easily accessible and downed wood is abundant. It is, however, difficult to ascertain the exact volume (cords) actually removed from National Forests of the Southwest. This activity may be beneficial to the forest by removing excess fuel, thus, reducing the risk of stand-replacing fires. However, wood collection in owl nesting and roosting habitat may adversely affect the owl and its habitat if important habitat components are removed such as large snags and downed logs.

B. Grazing Management

The Recovery Plan summarizes the major suspected influences of grazing on owls as: (1) changes to prey availability; (2) lessened potential for beneficial low-intensity ground fires, and increased potential for destructive high-intensity vertical fires; (3) deterioration of riparian areas; and (4) suppression of the capacity of areas to mature into habitat for the owl and its prey.

The Recovery Team concluded that predicting the extent of effects caused by grazing and developing management options will require more understanding of the relationship of owls and

grazing. However, negative effects of excessive grazing are predictable, especially in riparian communities (USDI 1995b). Livestock and wildlife grazing has the potential to affect changes in owl habitat composition and structure, as well as food availability. Trampling may alter plant communities by the removal of plant materials or plant reproductive structures, or by damaging soils. Plant densities, cover, biomass, vigor, and regeneration capacities may be reduced in some areas. Prey community structures may be changed in grazed areas thus altering the foraging habitat for the owls. Grazing may also result in the loss, reduction, or suppression, of regeneration of riparian areas. Other potential effects of grazing include increases in duff layers, accelerated decomposition of woody materials, compaction of soils, and stream and shore bank damage.

The Biological Assessment acknowledges that overuse of riparian habitat for grazing has occurred, that the greatest impact of grazing on the Mexican spotted owl occurs in riparian areas, and that the effects vary from site to site. Forest plan components that could benefit the owl include giving priority to threatened and endangered species; establishing minimum shading, stream bank stability, and woody plant composition for riparian habitats; designing grazing systems to minimize impacts; controlling livestock with management or fencing to allow re-establishment of vegetation; and considering the exclusion of livestock from riparian areas if there is a need to protect listed species.

Forest plan components that could conflict with, or weaken the above positive measures, for the Mexican spotted owl include directions to provide high quality range forage and improvement and directions to balance utilization with capacity. However, targets for balance between utilization and capacity are provided over relatively long time periods (e.g., by the third decade of implementation).

When the needs of "wildlife" are provided for in grazing management, it is not always clear that endangered and threatened species would have priority over other species. There is also a lack of information on how utilization standards might affect individual species. For an example, whatever positive actions might be taken for the owl and other listed species may not be fully realized because of simultaneous directions to provide forage to the extent benefits are commensurate with costs without impairing land productivity and within the constraints of social needs.

More consistent and effective management direction can be achieved by clarifying the priority of endangered and threatened species by: establishing specific grazing standards that would provide for the regeneration of riparian forest attributes favorable to the Mexican spotted owl; providing specific time frames for achieving interim and ultimate management goals; and providing for monitoring to reliably determine effectiveness of management.

C. Recreational Management

The Recovery Team recognized that recreational programs or activities in the Southwestern National Forests also have some potential to adversely affect Mexican spotted owl by disturbing nest, roost, and foraging areas. Indirect disturbance may occur through habitat alteration caused by the trampling of vegetation or soil damage, or both. The Recovery Team assumed that activities that do not cause habitat alteration generally have a low potential to impact the Mexican spotted owl, but recognized that exceptions to this may exist in local situations or in Recovery Units where recreational use is high. The determining factors for an activity's ability to impact the owl is a combination of the activity's location, intensity, frequency, and duration.

Widespread activities identified by the Recovery Team as having some potential to affect the owl and the owl's habitat include camping, hiking, off-road vehicle use, rock-climbing, and wildlife viewing and photography. Each of the existing forest plans contains within their forest-wide management direction and/or standards and guidelines specific guidance for the recreational planning, as well as endangered and threatened species. As demonstrated in past consultations, specific recreational projects do have the potential to affect the Mexican spotted owl and its critical habitat. The Biological Assessment indicates that, although some recreation projects on the National Forests have been proposed that have an effect on the owl, all have been modified through project-level consultation, or dropped from consideration.

The actual effects of projects in this management area are localized and highly specific to the individual project and therefore difficult to characterize over the long term. The standards and guidelines under Recreation Management do not, by themselves, foreclose the development of project-level activities likely to adversely affect the Mexican spotted owl.

D. Other Forest Programs

As discussed in the Biological Assessment, other forest programs include: soil, air, and water management; transportation management; fish, wildlife, and rare plant management; minerals management; special use management; land ownership; law enforcement; planning, general administration; facilities management; pest management; and cultural resource management.

Although each of these programs may contain project-level activities that may affect the owl and its critical habitat, guidance and direction are found in the existing standards and guidelines, along with management direction, such that effects on the owl and/or its critical habitat may be avoided or moderated at the project-level.

As with recreation management, the actual effects of projects in these management areas are localized and highly specific to the individual project and therefore difficult to characterize over the long term. The standards and guidelines that provide direction for these other programs do not, by themselves, foreclose the development of project-level activities likely to adversely affect the Mexican spotted owl. However, individual activities that "may affect" the Mexican spotted

owl or its critical habitat would be expected to be scrutinized under project-level consultation, and modified if the need arose.

E. Summary of Effects of the Action

The existing forest plans provide the broad framework for managing National Forests and do not directly commit to specific actions on the ground. However, the existing forest plans and their underlying standards and guidelines are fairly explicit with respect to the silvicultural practices to be used and the timber volumes that may be allowed to be extracted (USDI 1995a). These forest plans articulate classic even-age management regimes that stress the simplicity of stand structure, decreased residual densities, and elimination of large, slow-growing, but high value trees (e.g., Douglas-fir). According to the Forest Service (in litt September 22, 1995), existing forest plans contain standards and guidelines that have the potential to conflict with owl protection and recovery needs. In addition, forest management, as specified in existing forest plans, is incompatible with maintaining and developing spotted owl habitat (USDI 1995b). For example, these forest plans provide for a three-fold increase in the proportion of regeneration cuts under the shelterwood method. As previously mentioned, an estimated 1/3 of the known suitable owl habitat has been rendered unsuitable for owls through 1993 as a result of wildfire and projects implemented under the existing forest plans.

In addition to the 93% of forested lands to be managed under the shelterwood system, forest practices creating concern include compressing 10-year timber harvest schedules into 6 to 8 years, re-entering timber stands at intervals as short as 5 to 7 years after previous harvest, and logging steep slopes (USDI 1991). These practices represent attempts to meet current timber sale quotas without regard for long-term environmental or economic consequences (Arizona Game and Fish Department in litt 1990, New Mexico Department of Game and Fish in litt 1990). Although the Forest Service established management guidelines for the owl (i.e., I.D. 2), owl habitat outside of designated MTs is not protected and fragmentation within MTs occurs. Specifically, I.D. 2 establishes 2,000 acres MTs with 450 acre core areas; however, this is not uniform over the Southwest.

Recreation and range management activities developed under the forest plans may also conflict with recovery needs for the owl. Other forest activities dealing with soil, air, and water management, transportation, minerals, special use management, law enforcement, cultural resources, fish, wildlife, and rare plant management, land ownership, and facilities management may have effects to the owl. Effects on the owl by activities in these areas are highly localized, variable, and dependent on the nature of the specific action and local habitat conditions.

VI. CUMULATIVE EFFECTS

Regulations at 50 CFR 402.14(g)(4) require the Service to consider cumulative effects along with the effects of the proposed action in determining whether a proposed action is likely to jeopardize

the continued existence of a listed species or destroy or adversely modify a listed species' critical habitat. "Cumulative effects" is defined at 50 CFR 402.02 as "...those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation."

A. State and Private Activities

The Service's most recent assessment of spotted owls and owl habitat on non-Federal lands is found in the final rule designating critical habitat for the Mexican spotted owl (60 FR 29916-29917). According to that document, approximately 3% of known Mexican spotted owl habitat in the U.S. is found on State and private land in Arizona and New Mexico. Neither State has laws specifically protecting spotted owl habitat on either State or private land (USDI 1995). The Act prohibits incidental taking of listed species through habitat degradation, but the Service is unaware of instances where private actions have resulted in such habitat degradation.

If one assumes that all State and private spotted owl habitat is unprotected, and that all such lands are subject to timber harvest, then approximately 3% of existing spotted owl habitat in the action area is unprotected. However, regulations require only that actions "reasonably certain to occur" be considered in analyses of cumulative effects. While the Service has no data on the extent of harvest of owl habitat on State and private lands, it is reasonable to assume that some such lands are not sufficiently timbered for commercially viable harvests; are inaccessible for purpose of timber harvest; are logistically unavailable; or are otherwise not subject to habitat-degrading activities.

B. Tribal Lands

Tribal lands are held in "trust" by the Federal Government for the beneficial use of the Tribes. They are not considered public lands or part of the public domain. Tribes are sovereign governments with management authority over wildlife and other Tribal land resources. For purposes of this biological opinion, Tribal management of Mexican spotted owl habitat that does not involve Federal agency actions is considered non-Federal and therefore is considered under this cumulative effects analysis.

The final rule designating critical habitat for the Mexican spotted owl states that approximately 15% of Mexican spotted owl habitat in the U.S. occurs on Tribal lands (60 FR 29917). Only a small percentage of spotted owl habitat in Colorado and Utah is tribally managed, so the percentage of tribally managed spotted owl habitat in the action area is probably slightly more than 15%.

Many Tribes maintain professionally staffed wildlife and natural resources management programs to ensure prudent management and protection of tribal resources, including threatened and endangered species. The FWS is aware of spotted owl conservation efforts on five Indian

reservations in the action area: the Mescalero Apache, White Mountain Apache, San Carlos Apache, Jicarilla Apache, and Navajo Nation.

1. Mescalero Apache Tribe

The Mescalero Apache Reservation in the Basin and Range - East Recovery Unit in New Mexico lies between two administrative units of the Lincoln National Forest. The reservation is an important part of this recovery unit because of its position in the Sacramento Mountains, which support the largest and densest spotted owl population in the recovery unit. The Tribe actively manages its forest while managing for all federally listed or proposed threatened or endangered species that may exist on the reservation, including the Mexican spotted owl. There are known effects to spotted owls on the Mescalero Reservation resulting from the Tribe's timber management program. This is accomplished through developing strategies for identifying and managing habitat determined by the Tribe to be necessary to ensure protection.

The Mescalero Tribe has been working with the Service in development of a conservation strategy for the subspecies on reservation lands. Early drafts of the plan propose a management strategy similar to that proposed on the Fort Apache Reservation of the White Mountain Apache Tribe (see discussion, below). However, since the management plan has not been adopted by the Mescalero Tribal Council, the Service can only consider the general management philosophy described above in evaluating the effects of Tribal practices in the Basin and Range - East Recovery Unit.

The effects of management under the Tribal philosophy are difficult to determine. The Service is aware that several spotted owl sites, including verified nesting sites, have been established on the reservation, and that those sites receive some protection. However, since no specific spotted owl management guidelines are in place, and since the Service is unaware of the extent of timber management on the Mescalero reservation, the cumulative effect of Tribal management is difficult to evaluate. Given this lack of information, the Service's assessment of Forest Service actions on the spotted owl population of the Basin and Range - East Recovery Unit must be done without considering the activities of the Mescalero Apache. This limitation in the assessment does not affect the conclusion of the Biological Opinion.

2. White Mountain Apache Tribe

The Fort Apache Reservation is located in the Upper Gila Mountains Recovery Unit, and is largely surrounded by the Apache-Sitgreaves National Forest. The White Mountain Apache recently developed a conservation plan for Mexican spotted owls on the reservation. Areas containing spotted owls are placed in one of two land-management categories, termed Designated Management Areas (DMAs). Areas supporting "clusters" of four or more territories are considered "Category-1" DMAs. In these areas, spotted owl habitat concerns drive management prescriptions; timber harvest is a secondary objective. Category-1 DMAs range from about

2,430-4,050 ha (6,000-10,000 ac), and contain 57% of known spotted owl sites on the reservation.

"Category-2" DMAs include areas supporting 1-3 owl territories. Habitat outside the territories is managed only secondarily for spotted owls, with other resource objectives given priority. No timber harvest is allowed in 30-ha (75 ac) patches around owl activity centers. A seasonal restriction on potentially disturbing activities is provided in a 202-ha (500 ac) area, and timber prescriptions within this area should be designed to improve habitat integrity. The Service has determined that the White Mountain Apache plan is adequate to reasonably ensure persistence of the Mexican spotted owl on Tribal lands.

3. San Carlos Apache Tribe

The San Carlos Indian Reservation lies in the Basin and Range - West Recovery Unit and the Upper Gila Mountains Recovery Unit. Less than 10% of Mexican spotted owl nesting, roosting, and foraging habitat is within the Tribe's commercial timber base. The Service and the Tribe are currently working on, but have not completed, a conservation plan for the reservation.

4. Jicarilla Apache Tribe

The Jicarilla Apache Reservation is located in the Southern Rocky Mountains - New Mexico Recovery Unit. The Jicarilla Apache Tribe has developed a spotted owl conservation plan, approved by the Jicarilla Tribal Council and accepted by the FWS. No resident owls have been detected to date on the reservation; however, in the event resident owls are detected, the Tribe has proposed to designate a 405-ha (1,000 ac) management territory. Uneven-aged timber management will be allowed to continue in all but 40 ha (100 ac) of the territory. In the absence of confirmed resident owls, all mixed-conifer stands of 10 ha (25 ac) or greater are treated as roosting/nesting sites, and timber harvest is not allowed. A seasonal restriction around any active nest sites is also proposed.

5. Navajo Nation

The Navajo Nation lies in the Colorado Plateau Recovery Unit. The Navajo Nation is working with the Bureau of Indian Affairs on a Navajo Forest Management Plan, and no timber harvest activity is expected until the plan is complete.

VII. CONCLUSION

Pursuant to 50 CFR 402.02, to "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing reproduction, numbers, or distribution of that species. "Destruction or adverse modification"

means a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of the species. Pursuant to 50 CFR 402.14(g), the Service has reviewed all relevant information provided by the Forest Service, as well as the current status of the Mexican spotted owl and its designated critical habitat. The Service also has reviewed the environmental baseline for the affected area, and the direct and cumulative effects for the Forest Service's proposal.

The Service finds that continued implementation of the existing forest plans will jeopardize the continued existence of the Mexican spotted owl and will adversely modify the species' critical habitat. However, the Service recognizes that the listing of the owl has effectively precluded the worst-case scenario because project effects have been addressed in project-level consultations. This biological opinion is based on the results of our analyses of the effects of continued implementation of the management direction contained in the existing forest plans for the National Forests of the Forest Service's Southwestern Region. The Service believes that aspects of the existing forest plans do not provide for the physical and biological requirements of the Mexican spotted owl or its critical habitat. Additionally, the Service recognizes that much discretion exists on the part of forest managers at the project level in the implementation of forest plan guidance and direction. The broad range of effects that could result from the implementation of the management direction of the existing forest plans is suggested by the discretion forest managers use in their implementation of plan-level direction. As can be seen in the attached list of forest projects (Appendix A), the existing forest plans lack the management direction to prevent the development of forest project-level activities that are likely to adversely affect the Mexican spotted owl. These are shown in this document's appendix as "LAA."

In the past, the Forest Service primarily has relied on project-level consultations to resolve conflicts between activities and the needs of the owl. The Service believes that the standards of ESA, section 7(a)(1) are better ensured by the Forest Service's amendment of the existing forest plans to provide management direction that reflects the biological and physical needs of the owl. In this regard, the Southwestern Region of the Forest Service is commended for their proposed amendments to the existing forest plans. These amendments were the subject of another consultation and are addressed in the *Biological Opinion - Mexican Spotted Owl and Critical Habitat and Forest Plan Amendments* dated May 14, 1996.

VIII. REASONABLE AND PRUDENT ALTERNATIVE

The Service believes that compliance with the following alternative guidance in the development and design of project-level activities would remove jeopardy to the continued existence of the Mexican spotted owl, and would avoid adverse modification of the species' critical habitat. These are extracted from the Mexican spotted owl management guidelines of Alternative G in the October, 1993, *Final Environmental Impact Statement For Amendment of Forest Plans* and the Recovery Plan. The definition of standards and guidelines as given in the FEIS is assumed for this

analysis. That definition states that standards and guidelines are, "the bounds or constraints within which all management activities are to be carried out in achieving forest plan objectives."

Compliance with the alternative guidance described in the following elements will not satisfy the Forest Service's responsibility to consult on project-level activities that "may affect" the Mexican spotted owl or its critical habitat. However, any projects carried out under the existing forest plans will be reviewed by the Service in terms of their conformity with these elements pursuant to Section 7 of the Endangered Species Act.

Forest Plan Standards

- Provide for three levels of habitat management - protected, restricted, and other forest and woodland types to achieve a diversity of habitat conditions across the landscape. Protected areas should include delineated protected activity centers (PACs); mixed conifer and pine-oak forests with slopes greater than 40% where timber harvest has not occurred in the last 20 years; and reserved lands which include wilderness, research natural areas, wild and scenic rivers, and congressionally recognized wilderness study areas. Restricted areas will include all mixed-conifer, pine-oak, and riparian forests outside of protected areas. Other forest and woodland types include all ponderosa pine, spruce-fir, woodland, and aspen forests outside protected and restricted areas.

- Provide for survey of all potential spotted owl areas including protected, restricted, and other forest and woodland types within an analysis area plus the area ½ mile beyond the perimeter of a proposed treatment area.

- Provide for the establishment of PACs at all Mexican spotted owl sites located during surveys and all management territories established since 1989.

- Provide that, except for fuel wood and fire risk abatement, no timber harvest be allowed in established PACs. For PACs destroyed by fire, windstorm, or other natural disaster, salvage timber harvest or declassification may be allowed on a case-by-case basis after consultation with the Service. Note: a provision in the following section of these alternatives allows for some treatments in PACs for fuel accumulations to abate fire risk.

- Provide that, except for fire risk abatement, no timber harvest be allowed in mixed conifer and pine-oak forests on slopes greater than 40% where timber harvest has not occurred in the last 20 years.

- Limit human activity in PACs during the owl's breeding season.

- Provide that, in protected and restricted areas, when activities conducted in conformance with these standards and guidelines may adversely affect other threatened, endangered, or sensitive species or may conflict with other established recovery plans or conservation agreements, consultation with the Service is required.

- Provide that changes in owl density and habitat needed for delisting be monitored.

Forest Plan Guidelines

- Provide that surveys be conducted following Southwestern Region (Region 3) survey protocol.

PROTECTED AREAS

Protected Activity Centers (PACs)

- Provide that areas of not less than 600 acres be delineated around the activity center using boundaries of known habitat polygons and/or topographic features. Written justification for boundary delineation should be provided. Activity center is defined as the nest site. In the absence of a known nest, the activity center should be defined as a roost grove commonly used during breeding. In the absence of a known nest or roost, the activity center should be defined as the best nest/roost habitat.

- Provide that PAC boundaries should enclose the best possible owl habitat configured in as compact a unit as possible, with the nest or activity center located near the center.

- Provide that PAC boundaries should never overlap.

- Provide that PAC maps and descriptions be provided to the recovery unit working group for comment as soon as possible after completion of surveys.

- Provide that road or trail building in protected activity centers should be avoided but be permitted on a case-by-case basis for pressing management reasons.

- Provide that, in general, a continuation of the level of recreation activities that was occurring prior to listing be allowed.

- Provide that "birding" guides be required to apply for and obtain a special use permit. A condition of the permit shall be that they obtain a sub permit under the Service's Master endangered species permit. The permit should stipulate the sites, dates, number of visits and maximum group size permissible.

- Provide that harvest of fuel wood be done in such a way as to minimize effects on the owl whenever possible within the following management limitations:

  - Retain key forest species such as oak.
  - Retain key habitat components such as snags and large downed logs.
  - Harvest conifers less than 9 inches in diameter only within those protected activity centers treated to abate fire risk as described below.

- Provide that treatments for fuel accumulations to abate fire risk be managed accordingly:

  - Select for treatment 10% of the PACs where nest sites are known in each recovery unit having high fire risk conditions. Also select another 10% of the PACs where nest sites are known as a paired sample to serve as control areas.
  - Designate a 100 acre "no treatment" area around the known nest site of each selected PAC. Habitat in the no treatment area should be as similar as possible in structure and composition as that found in the activity center.
  - Use combinations of thinning trees less than 9 inches in diameter, mechanical fuel treatment and prescribed fire to abate fire risk in the remainder of the selected PAC outside the 100 acre 'no treatment" area.
  - Retain woody debris larger than 12 inches in diameter, snags, clumps of broad-leafed woody vegetation, and hardwood trees larger than 10 inches in diameter at the root collar.
  - Select and treat additional PACs in 10% increments if monitoring of the initial sample shows there were no negative impacts or there were negative impacts which can be mitigated by modifying treatment methods.
  - Use light prescribed burns in non selected PACs on a case-by-case basis. Burning should avoid a 100 acre "no treatment" area around the activity center. Large woody debris, snags, clumps of broad-leafed woody vegetation should be retained and hardwood trees larger than 10 inches diameter at the root collar.
  - Pre- and post-treatment monitoring should be conducted in all PACs treated for fire risk abatement.

Steep Slopes (mixed conifer and pine-oak forests with greater than 40% slopes outside PACs)

- Provide that treatments for fuel accumulations to abate fire risk be done within the following limitations:

  - No seasonal restrictions apply.
  - Combinations of thinning trees less than 9 inches in diameter, mechanical fuel removal, and prescribed fire be used.

- Retain woody debris larger than 12 inches in diameter, snags, clumps of broad-leafed woody vegetation, and hardwood tress larger than 10 inches in diameter at the root collar.
- Pre and post treatment monitoring should occur within all steep slopes treated for fire risk abatement.

Reserved Lands (Wilderness, Research Natural Areas, Wild and Scenic Rivers, and Congressionally Recognized Wilderness Study Areas)

- Provide that prescribed natural fire where appropriate be allowed.

RESTRICTED AREAS (Mixed conifer, pine-oak, and riparian forests)

- Provide that mixed conifer and pine-oak forests be managed within the parameters below:

  - Manage to ensure a sustained level of owl nest/roost habitat well distributed across the landscape. Create replacement owl nest/roost habitat where appropriate while providing a diversity of stand conditions across the landscape to ensure habitat for a diversity of prey species.
  - Manage restricted areas in accordance with the minimum percentages of restricted habitat shown in the following table 6. The table displays the minimum percentage of restricted area which should be managed to have nest/roost characteristics. The minimum mixed conifer restricted area includes 10% at 170 basal area and an additional amount of area at 150 basal area. The additional area of 150 basal area is +10% in BR-E and +15% in all other recovery units. The variables are for stand averages and are minimum threshold values. In project design, no stands at or above the minimum threshold values should be reduced below the threshold values unless a district-wide or larger landscape analysis of restricted areas shows that there is a surplus of restricted area acres meeting the threshold values. Management should be designed to create minimum threshold conditions on project areas where there is a deficit of stands meeting minimum threshold conditions unless the district-wide or larger landscape analysis shows there is a surplus.

TABLE 6

VARIABLE	MC ALL RU	MC BR-E RU	MC OTHER RU	PINE-OAK
Restricted Area %	10%	+10%	+15%	10%
Stand Averages for: Basal Area	170	150	150	150
18 inch + trees/ac	20	20	20	20
Oak basal area	NA	NA	NA	20
Percent total existing stand density index by size class:				
12-18"	10	10	10	15
18-24"	10	10	10	15
24+"	10	10	10	15

MC = Management territory
RU = Recovery Unit
BR-E = Basin & Range East

- Provide that natural disturbance patterns be mimicked by incorporating natural variation, such as irregular tree spacing and various patch sizes, into management prescriptions.
- Provide that all species of native trees in the landscape including early seral species be maintained.
- Allow for natural canopy gap processes to occur, thus producing horizontal variation in stand structure.
- Provide for emphasis on uneven-aged management systems. Both even-aged and uneven-aged systems may be used where appropriate to provide variation in existing stand structure and species diversity. Existing stand conditions will determine which system is appropriate.
- Provide for extension of rotation ages for even-aged stands to greater than 200 years. Silvicultural prescriptions should explicitly state when vegetative manipulation will cease until rotation age is reached.
- Provide that all trees greater than 24 inches dbh be saved.
- In pine-oak forests, provide for the retention of existing large oaks and promote growth of additional large oaks.

- Provide that prescribed and prescribed natural fire to reduce hazardous fuel accumulation be encouraged. Thinning from below may be desirable or necessary before burning to reduce ladder fuels and the risk of crown fire.

- Provide that substantive amounts of key habitat components be retained including:

  - Snags 18 inches in diameter and larger.
  - Down logs over 12 inches midpoint diameter.
  - Hardwoods for retention, recruitment, and replacement of large hardwoods.

Riparian Areas

- Provide that emphasis be given to maintenance and restoration of healthy riparian ecosystems through conformance with forest plan riparian standards and guidelines. Management strategies should move degraded riparian vegetation toward good condition as soon as possible. Damage to riparian vegetation, stream banks, and channels should be prevented.

Domestic Livestock Grazing

- Provide that forest plan forage utilization standards and guidelines be implemented to maintain owl prey availability, maintain potential for beneficial fire while inhibiting potential destructive fire, maintain and restore riparian ecosystems, and promote development of owl habitat. Strive to attain good to excellent range conditions.

Old Growth

- Except where otherwise noted, provide for the implementation of forest plan old growth standards and guidelines that maintain and promote development of owl habitat.

OTHER FOREST AND WOODLAND TYPES

- Provide that ecosystem approaches be applied to manage for landscape diversity mimicking natural disturbance patterns, incorporating natural variation in stand conditions and retaining special features such as snags and large trees, utilizing appropriate fires, and retention of existing old growth in accordance with forest plan old growth standards and guidelines.

GUIDELINES FOR SPECIFIC RECOVERY UNITS

Colorado Plateau Recovery Unit

- No special additional guidelines apply.

Southern Rocky Mountain - New Mexico Recovery Unit

- No special additional guidelines apply.

Upper Gila Mountains Recovery Unit

- No special additional guidelines apply.

Basin and Range - West Recovery Unit

- Emphasize restoration of lowland riparian habitats.
- Provide that any management activities necessary to implement the Mt Graham red squirrel recovery plan, which may conflict with standards and guidelines for Mexican spotted owl, will require project-level consultation with the Service to resolve conflicts.

Basin and Range - East Recovery Unit

- Emphasize restoration of lowland riparian habitats.
- Management activities necessary to implement the Sacramento Mountain thistle recovery plan, which may conflict with standards and guidelines for Mexican spotted owl, will require project-level consultation with the Service to resolve conflicts.

MONITORING GUIDELINES

- Monitoring and evaluation should be collaboratively planned and coordinated with involvement from each national forest, the Service Ecological Services Field Office and Regional Office, the Forest Service's Regional Office, Rocky Mountain Research Station, recovery team, and recovery unit working groups.
- Population monitoring should be a collaborative effort with participation of all appropriate resource agencies.
- Habitat monitoring of gross habitat changes should be a collaborative effort of all appropriate resource agencies.
- Habitat monitoring of treatment effects (pre and post treatment) should be done by the agency conducting the treatment.

- Prepare an annual monitoring and evaluation report covering all levels of monitoring done in the previous year. The annual report should be forwarded to the Regional Forester with copies provided to the recovery unit working groups, the Service's Ecological Services field offices, and the Service's Regional Office.

Range wide monitoring

- Track gross changes in acres of owl habitat resulting from natural and human caused disturbances. Acreage changes in vegetation composition, structure, and density should be tracked, evaluated, and reported. Remote sensing techniques should provide an adequate level of accuracy.

- In protected and restricted areas where silvicultural or fire abatement treatments are planned, monitor treated stands pre and post treatment to determine changes and trajectories in fuel levels; snag basal areas; live tree basal areas; volume of down logs over 12 inches in diameter; and basal area of hardwood trees over 10 inches in diameter at the root crown.

Upper Gila Mountain, Basin and Range East, and Basin and Range West Recovery Units Monitoring

- Assist the Recovery Team and recovery unit working groups in the establishment of sampling units consisting of 19 to 39 square mile quadrats randomly allocated to habitat strata. Quadrats should be defined based on ecological boundaries such as ridge lines and watersheds. Quadrat boundaries should not traverse owl territories. Twenty percent of the quadrats will be replaced each year at random.

- Using the sample quadrats, monitor the number of territorial individuals and pairs per quadrat; reproduction; apparent survival; recruitment; and age structure. Track population density both per quadrat and habitat stratum.

IX. INCIDENTAL TAKE

Section 4(d) and 9 of the ESA, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of,

carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The Service has developed the following incidental take statement based on the premise that the reasonable and prudent alternative of this biological opinion will be implemented.

The Service anticipates that little, if any, incidental take of Mexican spotted owls may occur as the result of the implementation of individual projects designed and approved under the reasonable and prudent alternative to the proposed action. The precise level of incidental take cannot be determined at this time, and this incidental take statement does not cover incidental take that might result from those individual projects. Any incidental take must be covered by lower-level (programmatic or project-level) biological opinions, where the amount and the effect of any incidental take can be more accurately defined and reasonable and prudent measures can be designed to eliminate or minimize take.

X. REINITIATION STATEMENT

This concludes formal consultation for the Mexican spotted owl and designated critical habitat in regard to the continued implementation of the existing forest plans. Pursuant to 50 CFR 402.16, reinitiation of formal consultation is required if: (1) new information reveals that management direction may affect the Mexican spotted owl or its critical habitat in a manner or to an extent not previously considered; (2) the agency action is subsequently modified in a manner that causes an effect to the owl or critical habitat in a manner not considered in this opinion; or (3) a new species is listed, or critical habitat is designated, that may be affected by the action.

The Service has evaluated the impacts to the owl in this consultation under the assumption that the Recovery Plan will be implemented. Essential components of that plan are population and habitat monitoring for the owl. This monitoring will standardize monitoring efforts for tracking the region-wide condition of owl habitat, and thereby greatly increase the consistency and reliability of data used in determining the baseline conditions in consultations on the owl. Because some of the management guidelines in the Recovery Plan are largely untested, the Plan itself recognizes that timely implementation of monitoring is essential to validate and, if necessary, adjust the recovery strategy presented in the Plan. The continuing effectiveness of this biological opinion depends on the validity of the Recovery Plan strategy and on confirmation that the inferred baseline conditions accurately reflect the status of owl populations and habitat.

Accordingly, the Service expects that the Forest Service will initiate the pilot study for the population and macrohabitat monitoring program within one year of the date of this biological opinion.

Another assumption in this consultation is that the Forest Service will proceed with the adoption of the amendments to the forest plans that will provide added protection for the Mexican spotted owl. In this consultation, the Service has identified the amendments in its reasonable and prudent alternative that is to be applied at the project level pending amendment of the plans. Failure to adopt the amendments by December 1997 would constitute new information requiring re-initiation of this consultation.

If you or your staff have any questions regarding this consultation, feel free to contact Ron McClendon of Ecological Services at 248-6653.

Sincerely,

Acting Lynn B. Starnes

Regional Director

cc:
James Lloyd, Pat Jackson, Leon Fager, Heather Hollis, Forest Service, Albuquerque, NM
Geographic Managers, (U/P)(G/L), Region 2, Albuquerque, NM
Chief, Ecological Services, Region 2, Albuquerque, NM
Supervisors, Ecological Services Field Offices, Albuquerque, NM, and Phoenix, AZ
Steve Chambers, Ron McClendon, Region 2, Albuquerque, NM

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NF	Project Name	Dec. Date	Type	Number	Find	Sent	Rec'd	Action	BegVol/mmbf	RevVol/mmbf	Suit.Ac	Cap.Ac	CHU	CHsent	CHrecd	CHact	Comp
01	Bearcat TS		01	1	NLAA	041493	082393	nonjept	5.600	5.600	28.0	288.0	2				Y
01	Burro/Spruce Springs TS		01	2	NLAA	041493	082393	non jep	6.410	6.410	141.0	2,352.0	2	062395			N
01	Lake Mountain TS		01	12	NLAA	041493	082393	non jep	0.224	0.224	0.0	0.0	5				Y
01	North Unit TS		01	13	NLAA	041493	082393	nonjept	2.400	2.400	0.0	519.0	5				Y
01	O.D. TS		01	14	NLAA	041493	082393	nonjept	5.160	5.160	0.0	1,481.0	5	062395	070695	noadvmo	N
01	St Joe TS		01	15	NLAA	041493	082393	nonjept	8.310	8.310	0.0	0.0	6,7	062395	070695	noadvmo	N
01	Conklin TS		01	4	NLAA	041493	082393	nonjept	6.816	6.816	55.0	393.0	2				Y
01	Draw TS		01	5	NLAA	041493	082393	nonjept	6.000	5.500	272.0	501.0	2	062395	070695	noadvmo	N
01	Hagen TS		01	6	NLAA	041493	082393	nonjept	0.200	0.200	21.0	88.0	2				Y
01	Hay TS		01	7	NLAA	041493	082393	nonjept	11.415	9.915	0.0	1,508.0	5	063295	070695	noadvmo	N
01	Horton TS		01	8	LAA	041493	082393	nonjept	6.500	6.500	202.0	255.0	2	062395	070695	noadvmo	N
01	Isabelle TS		01	9	NLAA	041493	082393	nonjept	5.700	5.700	11.0	698.0	2	062395	070695	noadvmo	N
01	Jersey Horse TS		01	10	NLAA	051993	100893	nonjept	1.728	0.000	0.0	0.0	6	062395	070695	noadvmo	N
01	Campbell TS		01	3	NLAA	022394	041594	nonjep	2.000	2.000	0.0	0.0	2	062395	070695	noadvmo	N
01	Kettle TS		01	11	NLAA	050694	082494	rel	6.000	0.000	0.0	0.0	2				N
01	Tenney TSI		04	16	NLAA	060394	072294	rel	0.000	0.000	0.0	720.0	2				Y
01	Cottonwood Wash TS		01	18	NLAA	071494	030195	non jep	3.500	3.500	0.0	0.0	N/A				N
01	Tenney Fuelbreak		10	19	NLAA	010995	040595	rel	0.000	0.000	0.0	0.0	2				N
01	Elk TS		01	20	NLAA	020195	022195	non jep	5.754	5.754	0.0	0.0	N/A				N
01	Mogollon Rim E. Prescribed Burn		10	21	NLAA	032795	033195	rel	0.000	0.000	100.0	150.0	N/A				N
01	Black Fire Salvage		10	17	NLAA	062095	062195	nonjept	0.000	0.000	0.0	0.0	6	062095	062195	noadvmo	N
									0.000	0.000	0.0	0.0					
02	Turkey TS	07/03/90	01	2-09	NLAA	041493	082393	non jep	0.744	0.744	0.0	156.0	NM-CNAF-9				Y
02	Diablo TS	07/03/90	01	2-10	NLAA	041493	082393	non jep	0.450	0.450	28.0	27.0	NM-CNAF-9				Y
02	Personal Use Fuelwood	07/03/90	02	2-11	NLAA	041493	082393	non jep	0.000	0.000	0.0	0.0	NM-CNAF-9				N
02	Maestas Ridge TS	07/03/90	01	2-12	NLAA	041493	072193	rel/chg	2.002	2.002	0.0	0.0	NM-CNAF-9				Y
02	Dinner Personal Use Fuelwood	08/09/91	02	2-13	NLAA	041493	082393	non jep	0.000	0.000	0.0	9.0	N/A				Y
02	Chiquito Personal Use Fuelwood	08/09/91	02	2-14	NLAA	041493	051793	rel	0.000	0.000	0.0	8.0	N/A				Y
02	La Yegua Personal Use Fuelwood	08/09/91	02	2-15	NLAA	041493	051793	rel	0.000	0.000	0.0	9.0	N/A				N
02	Tent Canyon Pers. Use Fuelwood	08/09/91	02	2-16	NLAA	041493	051793	rel	0.000	0.000	0.0	30.0	N/A				Y
02	Cuervo timber sale	08/09/91	01	2-17	NLAA	041493	082393	non jep	0.023	0.023	0.0	10.0	N/A				Y
02	Pajarito TS	08/09/91	01	2-18	NLAA	041493	051793	rel	0.011	0.011	0.0	10.0	N/A				Y
02	Little Joe TS	08/09/91	01	2-19	NLAA	041493	082393	non jep	0.024	0.024	0.0	10.0	N/A				Y
02	Llano TS	08/09/91	01	2-20	NLAA	041493	082393	non jep	0.049	0.049	0.0	13.0	N/A				N
02	Ojo TS	08/09/91	01	2-21	NLAA	041493	082393	non jep	0.076	0.076	0.0	12.0	N/A				Y
02	Ojo de Agua TS	08/09/91	01	2-22	NLAA	041493	082393	non jep	0.149	0.149	0.0	23.0	N/A				Y
02	El Filo TS	08/09/91	01	2-23	NLAA	041493	082393	non jep	0.065	0.065	0.0	55.0	N/A				Y
02	Compressor Project	05/14/93	07	2-04	NLAA	041493	042893	rel	0.000	0.000	0.0	0.0	N/A				Y
02	Well Pad Project #34-1	08/17/92	07	2-07	NLAA	041493	042893	rel	0.000	0.000	0.0	0.0	NM-CANF-2				N
02	Foster TS	07/23/90	01	2-08	NLAA	041493	082393	non jep	0.657	0.657	91.0	0.0	N/A				N
02	Warm Springs TS	09/06/85	01	2-33	LAA	041493	082393	non jep	0.366	0.000	74.0	0.0	NM-CNAF-8				Y
02	Little Tusas TS	03/14/91	01	2-34	NLAA	041493	042893	rel	0.325	0.325	28.0	145.0	N/A				Y
02	Felipito Timber Sale	06/26/92	01	2-30	LAA	041493	082393	non jep	3.026	3.026	481.0	0.0	NM-CNAF-7	032295	072695	noadvmo	N
02	Forest Pers.Use Fuelwood Program		02		NLAA	041493	062393	rel	0.000	0.000	0.0	0.0					
02	Loco-Mule Thinning	03/20/84	04	2-25	NLAA	051993	091693	rel	0.000	0.000	0.0	52.0	N/A				Y
02	Well Pad Chicosa #35-1	08/26/93	07	2-06	NLAA	051993	062193	rel	0.000	0.000	0.0	0.0	N/A				N
02	Spring TS	10/18/91	01	2-26	LAA	051993	100893	nonjep	0.396	0.396	45.0	0.0	N/A				N
02	1993 PJ Personal Use Fuelwood	08/11/92	02	2-27	NLAA	051993	062193	rel	0.150	0.150	0.0	0.0	N/A				Y
02	Valle Grande Thinning	10/18/91	04	2-28	NLAA	051993	091693	rel/chg	0.250	0.250	0.0	147.0	NM-CNAF-5				Y
02	El Rito Thinning	04/17/89	04	2-29	NLAA	051993	091693	rel/chg	0.250	0.250	0.0	134.0	N/A				Y
02	Chicken Fry Canyon Gas Wells	08/31/93	07	2-03	NLAA	070993	090893	rel	0.000	0.000	0.0	2.0	NM-CANF-2				N
02	Carracas Area Wells	09/06/94	07	2-01	NLAA	072393	090893	rel	0.000	0.000	0.0	12.0	NM-CNAF-1				N
02	La Manga TS	03/03/94	01	2-31	NLAA	072393	122193	nonjep	4.205	4.205	948.0	3.0	NM-CNAF-7	070595	072695	noadvmo	N
02	Mestenas Mesa Area Wells	09/15/93	07	2-05	NLAA	081993	090893	rel	0.000	0.000	0.0	6.0	NM-CANF-2				N
02	1994 Carracas Wells	09/09/94	07	2-02	NLAA	041294	061694	rel	0.000	0.000	0.0	0.0	NM-CANF-1				N

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NF	Project Name	Dec. Date	Type	Number	Find	Sent	Rec'd	Action	BegVol/mmbf	RevVol/mmbf	Suit.Ac	Cap.Ac	CHU	CHsent	CHrecd	CHact	Comp
03	Rincon TS		01	2-2	NLAA	041493	082393	non jep	2.062	2.047	59.0	30.0	NM-CF-2		071995	REL	N*
03	Albuquerque Trailhead		09	4-1	NLAA	041493	042893	rel	0.000	0.000	5.0	0.0	NM-CF-8				Y
03	FR49/50 Road Reconstruction		11	2-1	MAB	041493	042893	rel	0.004	0.000	71.0	0.0	NM-CF-2	031795	032895	REL	N
03	Red Canyon Campground		08	4-2	NLAA	041493	042893	rel	0.000	0.000	43.0	10.0	NM-CF-8				Y
03	Six Mile TS		01	2-4	NLAA	041493	082393	non jep	0.701	0.701	0.0	11.0	NM-CF-2				Y
03	Spudpatch TS		01	2-5	NLAA	041493	071093	rel	2.558	2.558	0.0	0.0	NM-CF-1		072695	non rel	N
03	Willow Springs TS		01	2-6	NLAA	041493	071093	rel/chg	2.832	0.330	0.0	0.0					Y
03	Alamosa TS		01		NLAA	051993	100893	nonjep	0.100	0.100	0.0	78.0					
03	Sawyer TS		01	2-3	NLAA	070993	122193	nonjep	0.876	0.876	5.0	0.0	NM-CF-2		072695	non rel	N
03	Trail 37/38 Connection		09	3-1	NLAA	071894	083194	rel	0.000	0.000	0.0	0.0					Y
03	4th of July Campground		08	4-3	NLAA	031695	041995	rel	0.000	0.000	35.0	0.0	NM-CF-8	031795	032895	rel	N
03	Aspen Regeneration		03	2-7	NLAA	042195	052595	rel/chg	0.138	0.000	0.0	0.0	NM-CF-1	042195	052595	rel	N
									0.000	0.000	0.0	0.0					
04	Limestone Aspen Regeneration	091492	01	0436	NLAA	040593	022194	rel	0.000	0.000	0.0	0.0					
04	Anchor TS	032191	01	0403	NLAA	041493	082393	non jep	1.462	1.462	0.0	219.0					Y
04	Buzzard Site Preparation	----87	05	0415	NLAA	041493	042893	rel	0.000	0.000	0.0	57.0					Y
04	Bar-M Multiproduct TS		01	0410	LAA	041493	082393	nonjept	7.750	7.400	1,101.0	739.0					Y
04	Arizona Trail	11--92	09	0406	LAA	041493	082393	non jep	0.000	0.000	0.0	0.0					
04	Half Moon KV		04	0422	NLAA	041493	052793	rel/chg	0.000	0.000	0.0	82.0					Y
04	Happy TS	093092	01	0423	NLAA	041493	082393	non jep	2.300	2.300	0.0	731.0	AZCCNF3	041995	050395	rel	Y
04	Hospital TS	031488	01	0425	NLAA	041493	082393	non jep	1.015	1.015	0.0	272.0					Y
04	Hutch TS	021893	01	0426	NLAA	041493	082393	non jep	4.693	4.693	0.0	1,564.0	AZCCNF3	041995	062995	noadvmo	N
04	Limestone TS	031488	01	0437	NLAA	041493	082393	nonjept	1.827	0.000	0.0	0.0					Y
04	Lake TS	092691	01	0432	NLAA	041493	082393	non jep	2.006	2.006	0.0	677.0					Y
04	Lebarron Hwy 89 (TS)	07--90	01	0434	NLAA	041493	082393	non jep	0.244	0.244	0.0	159.0					Y
04	Jones 10K TS	030593	01	0430	NLAA	041493	082393	non jep	0.989	0.989	0.0	0.0					N
04	Newman Reforestation		05	0446	NLAA	041493	042893	rel	0.000	0.000	0.0	0.0					
04	Personal Use Fuelwood		02	0447	NLAA	041493	063093	rel/chg	7.000	7.000	0.0	0.0					
04	Sinks KV	----86	04	0451	NLAA	041493	052793	rel/chg	0.000	0.000	0.0	35.0					
04	Valley TS	04/26/89	01	0555	LAA	041493	082393	nonjept	1.598	0.000	0.0	732.0					Y
04	Back BD	122089	10	0407	NLAA	051993	080693	rel/chg	0.000	0.000	0.0	560.0					Y
04	Landmark BD	032482	10	0433	NLAA	051993	080693	rel/chg	0.000	0.000	475.0	332.0					Y
04	Baker BD	062284	10	0408	NLAA	051993	080693	rel/chg	0.000	0.000	600.0	600.0					Y
04	Immigrant BD	080890	10	0427	NLAA	051993	080693	rel/chg	0.000	0.000	161.0	376.0					N
04	Immigrant KV	080890	05	0428	NLAA	051993	080693	rel	0.000	0.000	0.0	0.0					Y
04	Anchor KV	032191	13	0402	NLAA	051993	080693	rel/chg	0.000	0.000	0.0	0.0					Y
04	LeBarron TS	07--90	01	0435	LAA	051993	100893	nonjept	15.275	14.525	696.0	31.0					Y
04	Lockwood TS	121090	01	0439	LAA	051993	100893	non jep	2.139	1.639	0.0	0.0					N
04	Merritt TS	040891	01	0442	NLAA	051993	100893	nonjept	2.871	0.000	162.0	1,113.0					Y
04	Mud Assessment Area TS	12--92	01	0445	LAA	051993	100893	nonjept	2.263	0.000	77.0	199.0	AZCCNF3	041995	062895	noadvmo	N
04	Potato BD	102683	10	0449	NLAA	051993	080693	rel/chg	0.000	0.000	2,500.0	1,750.0					N
04	Structural Range Improvement	09/18/90	12	0453	NLAA	051993	080693	rel/chg	0.000	0.000	0.0	0.0					N
04	U-Bar TS	12/10/90	01	0454	LAA	051993	100893	non jep	8.180	6.980	107.0	800.0					Y
04	Crackerbox TS	071792	01	0416	LAA	070993	122193	nonjept	5.411	0.000	23.0	575.0					N
04	Maverick TS	040891	01	0441	NLAA	070993	122193	non jep	2.114	2.114	0.0	653.0					N
04	Buck Mtn. 10K TS	041994	01	0411	NLAA	111793	051294	nonjept	2.947	0.000	0.0	768.0					N
04	Jacks 10K TS	041994	01	0429	NLAA	111793	051294	nonjept	4.236	0.000	0.0	728.0					N
04	Pine Canyon CG		08	0448	NLAA	111793	051294	nonjept	0.000	0.000	0.0	0.0					N
04	Sinks Roundwood	04--94	01	0452	NLAA	112293	041294	rel/chg	0.698	0.698	0.0	0.0					N
04	Hog/Red Hill Fuels Reduction	09--85	10	0424	NLAA	012794	052794	rel/chg	0.000	0.000	0.0	0.0					N
04	Pumphouse 10K TS		01	0450	NLAA	020894	071994	nonjept	2.291	0.000	0.0	84.0					N
04	Buckhorn 4 TSI and Slash Treatmt	112591	04	0413	NLAA	042694	100694	rel/chg	0.000	0.000	0.0	0.0					
04	East Blue Ridge 10K	090694	00	0420	NLAA	052094	070594	rel	0.000	0.000	0.0	0.0					N
04	Willow Valley Range Allotment	09/22/94	12	0458	NLAA	070794	072994	rel/chg	0.000	0.000	0.0	0.0					N
04	Kendrick LMSC	04--92	01	0431	NLAA	082994	091394	rel/chg	7.550	7.339	0.0	0.0					N
04	Arboretum Naval/Observatory	02--94	10	0405	NLAA	100394	121494	rel/chg	0.000	0.000	0.0	0.0					N

NF	Project Name	Dec. Date	Type	Number	Find	Sent	Rec'd	Action	BegVol/mmbf	RevVol/mmbf	Suit.Ac	Cap.Ac	CHU	CHsent	CHrecd	CHact	Comp
04	Little Elden/Jack Smith Fuels RD	09--87	10	0438	NLAA	100494	030494	rel/chg	0.000	0.000	0.0	0.0					N
04	Crowley TS	09--92	01	0417	NLAA	120594	022195	rel	7.670	7.440	0.0	0.0	CCNF-7	021395	022195	rel/chg	N
04	White Vulcan	----89	07	0457	NLAA	020195	030795	rel	0.000	0.000	0.0	0.0					N
04	13 Mile Rock Allotment	082487	12	0401					0.000	0.000	0.0	0.0	AZCCNF2	070395	pendin	pendin	N
04	Walker Basin Allotment	03/21/91	12	0456					0.000	0.000	0.0	0.0	AZCCNF2	070395	pendin	pendin	N
04	Apache Maid Allotment	032295	12	0404					0.000	0.000	0.0	0.0	AZCCNF3	070395	pendin	pendin	N
04	Buckhorn Allotment	091890	12	0414					0.000	0.000	0.0	0.0	AZCCNF2	070395	pendin	pendin	N
04	Buck Springs Allotment CH	081688	12	0412					0.000	0.000	0.0	0.0	AZCCNF1	070395	pendin	pendin	N
04	Bar T Bar Allotment CH	050988	12	0409					0.000	0.000	0.0	0.0	AZCCNF1	070395	pendin	pendin	N
04	Dane 10K-CH (U-Bar, Coyote)	121090	01	0418					0.000	0.000	0.0	0.0	AZCCNF1	041995	062895	noadvmo	N
04	Dick Hart 10K-CH (Merritt,Barber Maverick TS)	040891	01	0419					0.000	0.000	0.0	0.0	AZCCNF1	041995	062895	noadvmo	N
04	Hackberry/Pivot Rock Allotment	091687	12	0421					0.000	0.000	0.0	0.0					N
04	Lost Eden Allotment CH	022091	12	0440					0.000	0.000	0.0	0.0	CCNF1,2	070395	pendin	pendin	N
04	Miller 10K-CH (Crackerbox TS)	071792	01	0443					0.000	0.000	0.0	0.0	AZCCNF1	070395	pendin	pendin	N
04	Monument TS	030593	01	0444					0.000	0.000	0.0	0.0	AZCCNF1	042195	pendin	pendin	N
									0.000	0.000	0.0	0.0	AZCCNF3	041995	050395	rel	N
05	Riggs Lake Hazard Tree Removal	NA	08	0402	NLAA	051993	100893	nonjept	0.060	0.000	24.0	6.0					Y
05	Twilight Campground	07/07/95	08	0403	NLAA	072393	122193	nonjept	0.000	0.000	0.0	8.0		032895	071895	NOADVMO	N
05	Noon Fire Emergency Action	09/02/93	10	0401	LAA	100793	022394	nonjept	0.000	0.000	316.0	219.0	AZ-13				Y
05	LB Telescope - Mt. Graham	12/06/93	14	0404	NLAA	110493	112393	rel	0.010	0.010	0.0	0.0					N
									0.000	0.000	0.0	0.0					
06	Cap-Mamie TS	02/02/90	01	3-2	NLAA	041493	082393	non jep	2.140	2.140	7.0	105.0	GINF-9				N
06	Mangitas TS	01/24/90	01	3-4	NLAA	041493	082393	non jep	1.810	1.363	0.0	0.0	GINF-8				N
06	Swapp-Booth TS	08/12/91	01	3-5	NLAA	041493	082393	nonjept	2.430	0.200	0.0	0.0	GINF-5				N
06	Continental Divide Trail	10/17/90	09	6-2	NLAA	041493	080693	rel/chg	0.000	0.000	0.0	0.0	GINF-4	041493	080693	rel/chg	Y
06	Eagle Peak KV Thinning	07/19/90	04	6-3	NLAA	041493	052693	rel/chg	0.000	0.000	0.0	280.0	GINF-4	041493	052693	rel/chg	Y
06	Rocker TS	09/02/92	01	6-4	NLAA	041493	082393	nonjept	3.557	3.000	132.0	886.0	GINF-4	041493		non jep	N
06	Sheep TS	05/29/90	01	6-5	LAA	041493	082393	nonjept	2.400	1.600	11.0	260.0	GINF-4	041493	082393	non jep	Y
06	South Fork TS	06/12/91	01	6-7	NLAA	041493	082393	nonjept	0.610	0.520	0.0	22.0	GINF-4	041493	082393	non jep	N
06	Water TS	09/06/89	01	6-8	LAA	041493	082393	nonjept	1.000	0.000	184.0	0.0	GINF-4	041493		non jep	Y
06	Cat #2 Thinning	11/19/80	04	9-1	NLAA	041493	082393	non jep	0.000	0.000	0.0	75.0	GINF-7				N
06	El Caso TS	06/18/91	01	9-2	NLAA	041493	082393	non jep	1.610	1.384	0.0	0.0	GINF-7	060095	070795	rel	N
06	Oak BD Burn	05/30/89	10	9-3	NLAA	041493	042893	rel	0.000	0.000	0.0	0.0	GINF-7				Y
06	Jones KV Thinning	10/22/86	04	3-3	NLAA	070993	072393	rel	0.000	0.000	0.0	0.0	GINF-9				Y
06	Badger Aspen Regeneration	08/15/93	03	3-1	NLAA	070993	072393	rel	0.000	0.000	0.0	10.0	GINF-9				Y
06	Black Mountain Burn	--------	10	---	NLAA	070993	072393	rel	0.000	0.000	250.0	0.0					Y
06	Cold Water Thinning	86 -9/89	04	6-1	NLAA	070993	111893	rel	0.000	0.000	0.0	615.0	GINF-4	070993	111893	rel	Y
06	Signal Peak Road Improvement	04/12/93	11	7-2	NLAA	072993	112393	rel	0.100	0.100	0.0	0.0	GINF-3	072993	112393	rel	N
06	Glenwood FMA PNF&MIF plan	10/06/93	10	4-1		091693	100493	rel	0.000	0.000	0.0	0.0	GINF-4	091693	100493	rel	N
06	Mill TS	--------	01	7-1	NLAA	111793	030794	rel	0.750	0.750	60.0	400.0	GINF-3	071295	081195	rel	N
06	Rocker TS after CH consult	09/02/92	01	6-41	NLAA				0.000	0.000	0.0	0.0	GINF-4	062295	072695	rel	N
06	Lost Lake KV Thinning	05/29/90	04	6-56	NLAA				0.000	0.000	0.0	0.0	GINF-4	050495	071395	rel	N
06	Dutchman KV Thinning	05/29/90	04	6-6	NLAA				0.000	0.000	0.0	0.0	GINF-4	050495	071395	rel	Y
06	South Fork KV Thinning	06/12/91	04	6-71	NLAA				0.000	0.000	0.0	0.0	GINF-4	032995	050495	rel	N
06	Hermosa Allot Fence Reconst	04/07/95	14	2-1	NLAA				0.000	0.000	0.0	0.0		041795	060995	rel	N
06	Bell,Blackhawk, Whiskey Salvg TS	12/14/94	01	2-2	NLAA				0.000	0.000	0.0	0.0	GINF-1	100793	121793	rel/chg	Y
06	Hermos By-pass	06/07/94	11	2-3	NLAA				0.000	0.000	0.0	0.0		042994	070894	rel	N
									0.000	0.000	0.0	0.0					
07	Bill Williams Mtn. Ski Area	09/24/93	08	0701	NLAA	041493	052793	rel	0.000	0.000	0.0	5.0	AZKANF2	N/A	N/A	N/A	Y
07	Cougar Prescribed Burn	11/06/89	10	0703	NLAA	041493	052793	rel/chg	0.000	0.000	0.0	0.0	N/A	N/A	N/A	N/A	Y
07	El Paso TS	08/17/89	01	0704	NLAA	041493	072093	rel/chg	0.771	0.040	38.0	0.0	AZKANF3	N/A	N/A	N/A	Y
07	Reneke Mtn. Prescribed Burn	04/30/90	10	0710	NLAA	041493	052793	rel/chg	0.000	0.000	0.0	0.0	N/A	N/A	N/A	N/A	Y
07	Tule Prescribed Burn	03/06/91	10	0712	NLAA	041493	052793	rel/chg	0.000	0.000	0.0	0.0	AZKANF1	N/A	N/A	N/A	Y
07	Twin Springs Prescribed Fire	12/21/92	10	0713	NLAA	051993	080693	rel/chg	0.000	0.000	125.0	160.0	AZKANF2	062695			N
07	Saginaw Kennedy TS	11/09/92	01	0711	NE	100793	022394	nonjep	1.684	1.684	0.0	0.0	AZKANF1	122194	041995	rel	N

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07	Holy Hollow TS	10/26/94	01	0706	NE	111793	051294	nonjept	11.500	11.250	160.0	0.0	AZKANF5	063095	Norecd	NE	N
07	Brannigan Veg treatment	06/08/92	01	0702	NE	111793	051294	nonjept	6.100	5.500	0.0	0.0	N/A	N/A	N/A	N/A	N
07	Mesa TS	06/08/92	01	0708	NLAA	111793	051294	nonjept	3.706	0.000	0.0	0.0	AZKANF4	062895			N
07	Paris TS	06/18/95	01	0709	NLAA	111793	051294	nonjept	9.502	8.750	500.0	151.0	AZKANF5	041095	063095	NE	N
07	Government TS	06/25/92	01	0705	NE	020894	071994	nonjept	4.770	5.200	0.0	0.0	N/A	N/A	N/A	N/A	N
07	Lost Canyon ELU	08/02/95	01	0707	NLAA	062994	011295	nonjept	7.500	6.000	107.2	528.6	AZKANF5	063095	082395	NE	N
07	Hat Allotment/Critical Habitat	12/21/92	12	0714	NLAA				0.000	0.000	0.0	0.0	AZKANF2	062195	063095	rel	Y
08	1993 Enduro	08/15/94	08	0826	NLAA	031693	041493	rel	0.000	0.000	0.0	0.0					
08	Apache Pt.Observatory Additions	04/01/93	08	0801	NLAA	041493	042893	rel	0.000	0.000	0.0	0.0	LINC10				Y
08	Bear/Cubs/Wyatt Thinning T.Sales	07/06/95	01	0802	NLAA	041493	052693	rel/chg	0.000	0.000	0.0	2.0	LINC10				Y
08	Glover Small Tracts	02/10/93	06	0805	NLAA	041493	042893	rel	0.247	0.247	0.0	139.0	LINC10				Y
08	Harvey Fence Maintenance	03/04/93	06	0806	NLAA	041493	052693	rel	0.000	0.000	7.0	0.0	LINC				Y
08	Hay TS	08/27/92	01	0807	LAA	041493	082393	non jep	0.045	0.045	24.0	0.0	LINC10				Y
08	Ranger TS	08/09/91	01	0810	LAA	041493	082393	non jep	1.754	1.754	453.0	0.0	LINC10	052595	072495	nonjept	N
08	Silver Campground Ampitheater	06/25/92	08	0812	NLAA	041493	042893	rel	0.295	0.295	27.0	115.0	LINC10				Y
08	Toboggan Canyon Powerline TS	03/22/93	01	0813	NLAA	041493	042893	rel	0.000	0.000	0.0	1.0	LINC10				Y
08	Scott Able TS	06/30/89	01	0811	LAA	051993	100893	nonjep	0.035	0.035	10.0	0.0	LINC10				Y
08	Toboggan Canyon Tel. Line Repair	07/13/93	14	0814	NLAA	051993	062193	rel	0.024	0.024	14.0	0.0	LINC10	050995	042495	rel	N
08	Camp Wehinahpay Land Exchange	09/22/93	06	0803	NLAA	070993	090893	rel	0.035	0.035	1.5	0.0	LINC10				Y
08	Mexican Canyon Trestle Project	09/21/93	08	0809	NLAA	070993	090893	rel	0.000	0.000	20.0	0.0	LINC10				Y
08	Hornbuckle Canyon Mistletoe TS	10/94	01	0808	LAA	081993	122193	nonjep	0.000	0.000	2.0	4.0	LINC10				Y
08	1994 Enduro	06/30/93	08	0827	NLAA	052594	072994	rel	0.017	0.017	35.0	0.0	LINC10			DROPPED	NA
08	Sacramento Road Maintenance	01/19/95	11	0823	NLAA	120894	011995	rel	0.000	0.000	0.0	0.0	LINC10				Y
08	Westside Road Maintenance	01/24/95	11	0825	NLAA	121394	012495	rel	0.000	0.000	0.0	0.0	LINC10				N
08	Bridge Salvage	05/01/95	01	0824	NLAA	031795	042895	rel	0.000	0.000	0.0	0.0	LINC10				N
08	Haynes Canyon Vista	08/14/95	08	0821	NLAA	062895	081195	rel	2.034	2.034	0.0	674.0	LINC10	031795	042895	rel	N
08	Sunspot Visitor Center	08/16/95	08	0822	NLAA	070795	081095	rel	0.000	0.000	0.5	0.0	LINC10	070795	081695	rel	N
08	Potato Knob/Mule Peak P/J Clear	08/13/93	03	0815	NLAA	N/A	N/A	N/A	0.040	0.040	5.0	0.0	LINC10	070795	081095	rel	N
08	Bear Thinning	07/06/95	04	0816	NLAA	N/A	N/A	N/A	0.000	0.000	0.0	600.0	LINC10	070795	081695	rel	Y
08	1995 Thinning	07/06/95	04	0817	NLAA	N/A	N/A	N/A	0.000	0.000	0.0	70.0	LINC10	070795	081695	rel	N
08	16 Sprs Mistletoe Control	08/13/93	00	0818	NLAA	N/A	N/A	N/A	0.000	0.000	0.0	60.0	LINC10	072095	083195	rel	N
08	Potato Knob Mistletoe Control	08/13/93	00	0819	NLAA	N/A	N/A	N/A	0.039	0.039	0.0	37.0	LINC10	070795	081695	rel	N
08	Draw and Ridge Prescribed Fire	10/09/93	10	0820	NLAA	N/A	N/A	N/A	0.044	0.044	0.0	30.0	LINC10	070795	081695	rel	N
09	Maverick Project TS	10/13/92	01		NLAA	041493	082393	non jep	0.000	0.000	1,400.0	1,400.0	LINC10	070795	081695	rel	N
10	Guadalupe Area Projects/TS		00	1019	NLAA	082892	112592	rel	2.400	2.400	49.0	550.0	2	062295	082295	noadvmo	n
10	Davis Willow/Tumwater TS		01	1004	NLAA	041493	042893	rel	0.000	0.000	0.0	0.0					
10	Barillas Mistletoe Project TS		01	1006	NLAA	041493	082393	non jep	2.500	2.500	0.0	150.0	10,11	070795	082495	rel	N
10	Barley TS		01	1007	NLAA	041493	082393	non jep	0.200	0.200	0.0	0.0	4	062295	070795	rel	N
10	Capulin (Flat, Westcap TS)		01	1009	NLAA	041493	082393	non jep	0.300	0.300	0.0	122.0	NONE	N/A	N/A	N/A	N
10	Lagunitas TS		01	1011	NLAA	041493	082393	non jep	0.830	0.830	118.0	29.0	12	N/A	N/A	N/A	Y
10	Walker Flats Viga TS & Thinning		01	1015	NLAA	041493	042893	rel	0.206	0.206	36.0	0.0	2	062295	070795	rel	N
10	Barillas Latilla		01	1025	NLAA	041493	042893	rel	0.375	0.375	0.0	103.0	15	N/A	N/A	N/A	Y
10	Capulin(Carton,Saaz,Paddy,Tango)		00	1008	NLAA	051993	100893	non jep	0.025	0.025	8.0	0.0	1	062295	070795	rel	N
10	South Maestas Habitat Improvemt.		00	1003	NLAA	051993	091693	rel	0.050	0.050	0.0	7,000.0	4	062295	070795	rel	N
10	Aspen Fuelwood		02	1001	NLAA	051993	062193	rel	0.442	0.442	35.0	45.0	2	062295	070795	rel	N
10	Ole Powerline		06	1012	NLAA	072993	122193	nonjept	1.699	1.699	0.0	0.0	NONE	N/A	N/A	N/A	N
10	Road 18 Habitat Improvement/TS		00	1013	NLAA	090393	122193	nonjep	0.075	0.075	0.0	22.0	2	N/A	N/A	N/A	Y
10	South Ojitos Projects/Sales		01	1014	NLAA	090393	111893	rel	0.000	0.000	222.3	205.3	7,13	N/A	N/A	N/A	N
10	Seven Springs Habitat Developmt.		03	1020	NLAA	101194	110394	rel	1.400	1.400	105.0	146.0	4	070795	082495	rel	N
10	Garcia Eco Restoration Projects		00	1022	MAB	110394	112394	rel	5.300	5.300	0.0	1,325.0	12	070795	082495	rel	N
10	Paliza Veg. EA Ecol. Restoration		00	1016	NLAA	020695	031795	rel	0.015	0.015	0.0	3.0	12	N/A	N/A	N/A	Y
10	Cañada de Ojitos TS		01	1023	NLAA	020795	032095	rel	0.200	0.200	0.0	10.0	7	110394	112394	rel	N
10	Mesa Gallina Prescribed Burn		10	1024	MAB	032395	042795	rel	2.656	2.656	15.0	0.0	8,9	070795	082495	rel	N
									0.057	0.057	0.0	0.0	13	020795	032095	rel	Y
									0.000	0.000	0.0	0.0	14	032395	042795	rel	Y

NF	Project Name	Dec. Date	Type	Number	Find	Sent	Rec'd	Action	BegVol/mmbf	RevVol/mmbf	Suit.Ac	Cap.Ac	CHU	CHsent	CHrecd	CHact	Comp
10	Rio Grande Cutthroat Transplant		03	1021	NLAA	052295	061195	rel	0.000	0.000	0.0	0.0	12	N/A	N/A	N/A	Y
10	Bales II Wildlife Habitat/TS		00	1017	NLAA	N/A	N/A	N/A	1.439	1.439	0.0	0.0	11	070795	082495	rel	N
10	Dome Precommercial Thinning		01	1018	NLAA	N/A	N/A	N/A	0.000	0.000	0.0	0.0	8	070795	082495	rel	N
									0.000	0.000	0.0	0.0					
12	Pioneer Pass Road	06/29/94	11	1201	NLAA	041493	082393	non jep	0.000	0.000	6.0	0.0	N/A	N/A	N/A	N/A	N
12	Ashmo Timber Sale	04/12/90	01	1206	NLAA	041493	082393	nonjept	5.015	4.100	142.0	35.0	AZTONF1	081695	-	-	N
12	Wooffidd Timber Sale	04/19/91	01	1208	NLAA	041493	082393	nonjept	0.660	0.510	25.0	0.0	AZTONF3	-	-	-	Y
12	Wooffidd Fuel Break	04/19/91	10	1209	NLAA	041493	082393	nonjept	0.000	0.000	0.0	0.0	AZTONF3	-	-	-	N
12	Wooffidd Broadcast Burn	04/19/91	10	1210	NLAA	041493	082393	nonjept	0.000	0.000	0.0	0.0	AZTONF3	-	-	-	N
12	Promontory Prescribed Burn	04/12/90	10	1212	NLAA	041493	082393	nonjept	0.000	0.000	0.0	0.0	AZTONF1	-	-	-	N
12	Mt. Peeley Trailhead	12/03/93	09	1205	NLAA	051993	080693	rel	0.000	0.000	0.0	0.0	N/A	N/A	N/A	N/A	N
12	Bull Owl Timber Sale	11/19/93	01	1207	NLAA	051993	100893	non jep	1.968	1.968	4.0	0.0	AZTONF3	-	-	-	N
12	Bobtail Burn (Lyons Fork AMP)	09/21/94	10	1202	LAA	070993	122193	non jep	0.000	0.000	1,002.0	0.0	N/A	N/A	N/A	N/A	N
12	Pinal Mtn. Prescribed Burns	08/03/94	10	1203	LAA	070993	122193	non jep	0.000	0.000	3,393.0	0.0	N/A	N/A	N/A	N/A	N
12	Tonto Basin AMP		12	1230	NLAA	020894		-	0.000	0.000	0.0	0.0	AZTONF5	071995	080495	rel	N
12	Sunflower AMP - Dos S Unit	08/05/94	12	1204	NLAA	041294	050694	rel	0.000	0.000	0.0	0.0	N/A	N/A	N/A	N/A	N
12	Horse Prescribed Burn	01/17/95	10	1211					0.000	0.000	0.0	0.0	AZTONF1	-	-	-	N
12	Elk Pole Area	12/06/88	02	1213					0.000	0.000	0.0	0.0	AZTONF1	-	-	-	N
12	Dude Mistletoe #2	04/02/91	01	1214					0.000	0.000	0.0	0.0	AZTONF2	-	-	-	N
12	Salt Timber Sale	09/22/92	01	1220					3.240	3.240	0.0	0.0	AZTONF1	081695	-	-	N
12	Buzzard Roost Timber Sale	05/05/95	01	1221					0.769	0.769	0.0	0.0	AZTONF5	-	-	-	N
12	Rose TSI #1	10/24/91	04	1222					0.000	0.000	0.0	0.0	AZTONF1	-	-	-	N
12	Rose TSI #2	04/12/90	04	1223					0.000	0.000	0.0	0.0	AZTONF1	-	-	-	N
12	Lake Pole Area	04/27/88	02	1224					0.000	0.000	0.0	0.0	AZTONF1	-	-	-	N
12	Cherry Prescribed Burn	04/27/88	10	1229					0.000	0.000	0.0	0.0	AZTONF1				

Legend:

NF 01 = Apache-Sitgreaves National Forest
NF 02 = Carson National Forest
NF 03 = Cibola National Forest
NF 04 = Coconino National Forest
NF 05 = Coronado National Forest
NF 06 = Gila National Forest
NF 07 = Kaibab National Forest
NF 08 = Lincoln National Forest
NF 09 = Prescott National Forest
NF 10 = Santa Fe National Forest
NF 11 = Tonto National Forest

United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Box 1306
Albuquerque, New Mexico 87103

In Reply Refer To:
Region 2/ES-SE

MAY 14 1996 000031RO

Charles C. Cartwright, Jr., Regional Forester
Forest Service
U.S. Department of Agriculture
517 Gold Avenue SW., Room 6428
Albuquerque, New Mexico 87102-0084

Dear Mr. Cartwright:

Please find enclosed the final *Biological Opinion - Mexican Spotted Owl and Critical Habitat and Forest Plan Amendments.* This document is prepared in response to the Forest Service's July 14, 1995, request for formal consultation with the U.S. Fish and Wildlife Service under section 7 of the Endangered Species Act, as amended.

If you have questions regarding this transmittal, please contact Ron McClendon, Endangered Species, at (505) 248-6653.

Sincerely,

Regional Director

Enclosure

cc:
James Lloyd, Pat Jackson, Leon Fager, Heather Hollis, Forest Service, Albuquerque, New Mexico
Supervisor, Ecological Services Field Offices, Albuquerque, New Mexico and Phoenix, Arizona
Joe Mazzoni, Geographic Manager - New Mexico, Region 2
Jim Young, Geographic Manager - Arizona, Region 2
Susan Macmullin, Chief - Endangered Species, Region 2
Steve Chambers, Chief - Listing, Region 2
Ron McClendon, Consultation Biologist, Region 2

Biological Opinion

Mexican Spotted Owl and Critical Habitat
and
Forest Plan Amendments

U.S. Forest Service
Southwestern Region

14 MAY 1996

U.S. Fish and Wildlife Service
Region 2
Albuquerque, New Mexico

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Box 1306
Albuquerque, New Mexico 87103

In Reply Refer To:
Region 2/ES-SE

14 MAY

Consultation Number 00003 1RO

Charles C. Cartwright, Jr.
United States Department of Agriculture
Forest Service
517 Gold Avenue SW
Albuquerque, New Mexico 87102-0084

Dear Mr. Cartwright:

This is in response to the Forest Service's July 14, 1995, request for formal consultation with the U.S. Fish and Wildlife Service (Service) under section 7 of the Endangered Species Act (Act), as amended. The Forest Service proposes to implement new amended standards and guidelines on the 11 National Forests of Arizona and New Mexico in the Forest Service's Region 3 (Southwestern Region.)

This consultation considers the effects on the Mexican spotted owl (owl) and its critical habitat from the implementation of the Forest Service's Regionwide amendment of forest plans, which is the preferred alternative (Alternative G) of the Forest Service's *Final Environmental Impact Statement for Amendment of Forest Plans*, dated October 1995 (FEIS).

The Forest Service included with its July 14 request for the initiation of consultation the *Biological Assessment - Environmental Impact Statement Amending Forest Plans To Incorporate Standards and Guidelines for the Mexican Spotted Owl and Northern Goshawk*, dated July 6, 1995 (Biological Assessment.) That document presented an assessment of the effects of implementing amended standards and guidelines that would direct National Forest management in a manner in conformity with the *Mexican Spotted Owl Recovery Plan* (Recovery Plan) (USDI 1995b). In the Biological Assessment, the Forest Service determined that, because the standards and guidelines implement a recovery plan, and are designed to provide for the needs of the owl, the forest plan amendments "may affect, but are not likely to adversely affect", the owl or its critical habitat.

The Service also acknowledges receipt of the Forest Service's supplemental consultation package dated October 10, 1995, that included the *Supplemental Biological Assessment - Environmental Impact Statement Amending Forest Plans To Incorporate Standards and Guidelines for the Mexican Spotted Owl and Northern Goshawk.*

This biological opinion primarily is based on information provided in: the Recovery Plan, the Forest Service's FEIS; the Forest Service's consultation packages, dated July 14, 1995 and October 10, 1995; Forest Service and Service discussions and meetings conducted prior to, and during this consultation involving Regional and field office staff. An administrative record of this consultation is on file in the Service's Region 2 office at Albuquerque, New Mexico.

In accordance with section 7 of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 et. seq.), this document represents the Service's biological opinion on the effects of the Forest Service's proposed action on the Mexican spotted owl and its designated critical habitat. The receipt by the Service of the supplemental Biological Assessment on October 10, 1995, is to be considered the date at which this formal consultation was initiated.

The Service finds that implementation of the forest plans, as amended by the new standards and guidelines, is not likely to jeopardize the continued existence of the Mexican spotted owl, and is not likely to destroy or adversely modify the species' critical habitat. Project-level actions and activities planned and implemented under the amended standards and guidelines, taken together, should promote the recovery of the owl.

The Forest Service had expressed in their July 14, 1995, letter a hope that future project-level consultations may be unnecessary if future projects meet the proposed forestwide amended standards and guidelines for the Mexican spotted owl. In later correspondence, the Forest Service stated that "in any case of project design where there is any apparent conflict between the new standards and guidelines and old standards and guidelines, the new standards and guidelines will take precedence." (USDA, Forest Service, in litt., February 14, 1996.) In the July 14 letter, the Forest Service stated that: "It is our hope as a result of this consultation effort for the Mexican spotted owl and its designated critical habitat, that if our projects meet these standards and guidelines no further consultation is necessary. This would be because, at the programmatic level, you concur that the owl or its critical habitat may be affected but are not likely to be adversely affected."

The Service anticipates that most, if not all, actions that follow the standards and guidelines amended to conform with the management recommendations in the Recovery Plan would not be likely to adversely affect the owl or the owl's critical habitat. However, given the generality of the forest plans' standards and guidelines, and the information in the Biological Assessment, the Service cannot predict that all projects developed within these standards and guidelines will avoid all adverse effects to the owl at the project-level. Formal consultation on the Mexican spotted owl would not be necessary for a future project-level activity if: (1) the project is developed within the amended standards and guidelines for the Mexican spotted owl; (2) a biological evaluation of the project concludes that the project is not likely to adversely affect the owl or its critical habitat; and (3) a copy of the biological evaluation covering the project area is supplied to the Service's Ecological Services office for concurrence. The Service will review the results of

projects implemented under these forest plan amendments one year from the effective date of these amendments and determine if a higher level of concurrence on future project-level activities is appropriate.

I. CONSULTATION HISTORY

After the completion of the *Draft Mexican Spotted Owl Recovery Plan* in March, 1995, meetings were held on May 1 and 2, 1995, between the Department of Justice, Forest Service personnel, and Service personnel to discuss the Forest Service's *Draft Environmental Impact Statement - Amendment of Forest Plans* (DEIS). It was decided at that time that the Forest Service would, in cooperation with the Service, and with input from the Mexican Spotted Owl Recovery Team, amend and revise the standards and guidelines of the existing forest plans to conform with the management recommendations found in the Recovery Plan. These amended standards and guidelines will be implemented upon the signing of the Record of Decision for the Forest Service's FEIS. That document was released in final version on October, 1995. The preferred alternative of the FEIS is named as Alternative G. This alternative calls for the amended standards and guidelines to be incorporated into the 11 forest plans of the National Forests of the Forest Service's Southwestern Region.

Several steps were taken to develop the Alternative G in the FEIS. On May 5, 1995, a Standards and Guidelines Team was formed with members of the Forest Service, a member from the Mexican Spotted Owl Recovery Team, and a member from the Service. This team was charged to cooperatively amend existing standards and guidelines to conform with the owl management recommendations in the *Draft Mexican Spotted Owl Recovery Plan.* On July 14, 1995, the Forest Service submitted to the Service their July 6, 1995, Biological Assessment. The proposed action in this document was Alternative G, as proposed in the DEIS.

During the time that the July 6, 1995, Biological Assessment was being developed, the Mexican Spotted Owl Recovery Team was still reviewing and incorporating public comments received on the draft Recovery Plan. Because this review indicated that the final management recommendations for the owl would be somewhat modified from those in the draft Recovery Plan, the Service met with the Forest Service on August 8, 1995, to discuss the latest owl management recommendations and Alternative G. Members of the Recovery Team also met with individuals of the Service in the week of August 14, 1995. The final Recovery Plan was signed by the Regional Director of the Fish and Wildlife Service, Region 2 on October 16, 1995.

On October 10, 1995, the Forest Service submitted the *Supplemental Biological Assessment - Environmental Impact Statement Amending The Forest Plans To Incorporate Standards and Guidelines for the Mexican Spotted Owl and Northern Goshawk,* dated October 10, 1995, (October 10, 1995, Biological Assessment) along with additional data and information. The purpose of this second biological assessment was to revise certain portions of the July 14, 1995, consultation package.

II. PROPOSED ACTION

It is the Forest Service's position that forest plans do not fund, authorize, or carry out any habitat-disturbing activities (Gippert 1996). However, the Service recognizes that forest plans do provide a broad management framework for the establishment of forest goals, objectives, standards and guidelines for individual forest activities.

The proposed action for this consultation is the implementation of amended standards and guidelines for the Mexican spotted owl and northern goshawk in the 11 National Forests of the Forest Service's Southwestern Region. These amended standards and guidelines are defined in the Forest Service's preferred alternative (Alternative G), and are analyzed in the FEIS. Alternative G includes revisions to standards and guidelines in the existing forest plans that amend grazing and old growth management to be in conformity with the management recommendations of the Recovery Plan, as well as management recommendations for the northern goshawk. Alternative G incorporates the needs of these two species within the concept of ecosystem management.

The area encompassed by the proposed action is the 11 National Forests in Arizona and New Mexico. The amendments focus on the management of forested areas within the owl and goshawk's habitats. These areas include ponderosa pine, mixed conifer, and spruce fir forests. The desired future condition of Alternative G is to have uneven-aged forests containing older and larger trees than what currently exists across the landscape.

The Recovery Plan for the owl suggests three levels of habitat management; protected areas, restricted areas, and other forest and woodland types. Protected areas receive the highest level of protection under the Recovery Plan. Guidelines for restricted areas are less specific and operate in conjunction with ecosystem management and existing management guidelines. No owl-specific guidelines for lands not included in protected and restricted are proposed, other than owl surveys (USDI 1995). Management recommendations for the northern goshawk suggest that all nest sites and post-fledgling areas (PFAs) contain high stocking levels of trees to ensure high canopy cover. All areas outside PFAs will contain desired stocking levels that provide for an average canopy cover of 40% (USDA 1992). Management recommendations for both species emphasize uneven-aged management and the retention of large trees (i.e., > 24" diameter at breast height [dbh]).

III. STATUS OF THE SPECIES

A. Listing and Critical Habitat

All subspecies of *Strix occidentalis* were classified as a candidate, category 2 species in the Service's 1989 Animal Notice of Review (54 *Federal Register* [FR] 554, January 6, 1989.) A category 2 species is one for which listing as a threatened or endangered species may be appropriate, but for which additional biological information is needed to support a proposed rule

to list. On December 22, 1989, the Service received a petition requesting the listing of the Mexican spotted owl as an endangered or threatened species under the Endangered Species Act. On February 27, 1990, the Service determined that the petition presented substantial information indicating that listing may be warranted. A status review was then initiated. A notice of this status review was published in the *Federal Register* (55 FR 11413) on March 28, 1990, requesting public comments and other biological data for the species. The status review was completed in a draft report on December 6, 1990. On February 20, 1991, the Service made its finding that, based on the contents of the report, the listing of the Mexican spotted owl was warranted. A notice of this finding was published in the *Federal Register* (55 FR 14678) on April 11, 1991. A proposed rule was published in the *Federal Register* (56 FR 56344) on November 4, 1991, to list the owl as threatened without critical habitat. The proposed rule also invited the public to submit information regarding whether the owl should be listed. This comment period for the proposed rule was reopened from May, 1992, to September 1, 1992. Appropriate Federal and State agencies, Tribal, and county governments, organizations, and other interested parties were contacted directly. Six public hearings were held by the Service.

After a review of all comments received, the Service published a final rule in the *Federal Register* (58 FR 14248) to list the Mexican spotted owl as a threatened species on March 16, 1993. Pursuant to Service regulations 50 CFR 424.12(a)(2), critical habitat for the owl was not designated in the March 16, 1993 rule. Several factors were identified as contributing to the listing of the Mexican spotted owl. Discussions of these factors are given in the March 16, 1993 final rule in the *Federal Register* to list the owl (58 FR 14248) and in the Recovery Plan. The primary factor leading to the listing of the owl has been past, current, and predicted timber harvest practices in the Southwestern Region of the Forest Service. Also, significant portions of the owl's habitat have been lost or modified as a result of local and regional human population pressures.

On February 14, 1994, a lawsuit was filed in Federal District Court in Arizona (Dr. Robin Silver, et al. versus Bruce Babbitt, et al., [CIV-94-0337-PHX-CAM]) for failure of the Department of the Interior to designate critical habitat. On October 6, 1994, the Court ordered the Service to; "Publish a proposed designation of critical habitat, including economic exclusion pursuant to 16 U.S.C. 1533(b)(2), no later than December 1, 1994,..... (and) publish its final designation of critical habitat, following the procedure required by statute and Federal regulations for notice and comment," by submitting the final rule to the *Federal Register* no later than May 30, 1995. An extension granted by the Court allowed the Service to publish a proposed rule in the *Federal Register* (59 FR 63162) designating critical habitat for the Mexican spotted owl on December 7, 1994. Press briefings and releases were conducted prior to the issuance of the proposed rule, which was sent to affected Federal, Tribal, State, county, and local agencies and governments. In addition, a notice of availability of the proposed rule was sent to all interested parties known to the Service. Public legal notices also were sent to 18 newspapers in Arizona, Colorado, New Mexico, and Utah on December 5, 1994. The public comment period for the proposed rule was open until March 7, 1995, and was extended until May 8, 1995.

Data regarding the potential economic impacts resulting from the designation of critical habitat were requested from 13 Federal, 12 Tribal, and 10 State agencies, as well as four Governors and 42 county government offices. From the information received, a draft economic analysis was completed and its availability was published in the *Federal Register* on March 8, 1995 (60 FR 12728). The availability of the draft economic analysis also was widely announced in newspapers. Public hearings, on both the proposed rule and the draft economic analysis, were held in Santa Fe and Socorro, New Mexico, on March 22 and 23, 1995, and in Tucson and Flagstaff, Arizona on March 29 and 30, 1995. The final economic analysis for the designation of critical habitat for the Mexican spotted owl was published in May, 1995. On June 6, 1995, the Service published a final rule in the *Federal Register* (60 FR 29914) to designate critical habitat for the Mexican spotted owl on 1,874, 935 ha (4,632,9901 acres) in Arizona, Colorado, New Mexico, and Utah. The final rule became effective July 6, 1995.

The taxonomy and distribution, habitat associations, feeding habits, and other aspects of the life history of the Mexican spotted owl are extensively described in the Recovery Plan and only are summarized here.

B. Natural History

Three species exist within the genus *Strix* north of Mexico; the spotted owl (*S. occidentalis)*, the barred owl (*S. varia)*, and the great gray owl (*S. nebulosa)*. The Mexican spotted owl (*S. occidentalis lucida*) is one of three subspecies of spotted owls. The other two subspecies, the northern spotted owl (*S. o. caurina*) and the California spotted owl (*S. o. occidentalis)*, are geographically isolated from the Mexican spotted owl, which ranges throughout diverse forest types in the mountains of Arizona, New Mexico, southwestern Colorado, south-central and southern Utah, western Texas, and in the Mexico States of Aguascalientes, Chihuahua, Coahuila, Durango, Guanajuato, Jalisco, Michoacan, Nuevo Leon, San Luis Potosi, Sinaloa, Sonora, Tamaulipas, Veracruz, Zacatecas, and several others.

Although the Mexican spotted owl is taxonomically classified as a subspecies, section 3(15) of the Endangered Species Act defines the term "species" as "...any subspecies of fish and wildlife or plants, and any distinct population segment of any species or vertebrate fish and wildlife which interbreeds when mature." In this document the Mexican spotted owl is referred to as a species in the context of the definition as applied in the Endangered Species Act.

Although the Mexican spotted owl's entire range covers a broad area of the southwestern United States and Mexico, much remains unknown about the species' distribution within this range. This is especially true in Mexico where much of the owl's range has not been surveyed. Informational gaps also appear for the species' distribution within its United States range. It is apparent that the owl occupies a fragmented distribution throughout its United States range corresponding to the availability of forested mountains and canyons, and in some cases, rocky canyon lands.

Current distribution patterns are defined in the Recovery Plan from visual sightings of at least one adult owl at a site, or two auditory detections at the same vicinity in the same year. Observations prior to 1990 are considered historical. Surveys for Mexican spotted owl have revealed that the species has an affinity for older, well-structured forests, particularly for nesting and roosting. The species is known to inhabit a physically diverse landscape in the southwestern United States and in central Mexico. The Mexican Spotted Owl Recovery Team (Recovery Team) divided the owl's entire range into 11 geographic areas called recovery units. These recovery units include; the Colorado Plateau, the Southern Rocky Mountains (Colorado), the Southern Rocky Mountains (New Mexico), the Upper Gila Mountains, the Basin and Range (West), the Basin and Range (East), and in Mexico, the Sierra Madre Occidental (North), the Sierra Madre Oriental (North), the Sierra Madre Occidental (South), the Sierra Madre Oriental (South), and the Eje Neovolcanico.

Home range for the species is the area used during its normal activities and, although home ranges are believed to be larger than territories, the relationship between home range and territory are not generally understood. It does appear that the owl exhibits a high fidelity to its territory and most will remain on the same territory throughout their life span. Radio telemetry has been used to assess home range sizes which have been found to vary considerably among habitats and geographic areas. The varying sampling methods used in these studies have made comparisons difficult. In Arizona, radio telemetry studies have revealed mean home ranges for owl individuals from 327 ha (808 acres) to 1,053 ha (2,601 acres) and for owl pairs from 381 ha (941 acres) to 1,551 ha (3,831 acres). In New Mexico, studies have revealed mean home ranges for individual owls from 261 ha (645 acres) to 937 ha (2,314 acres), and for paired owls at 573 ha (1,415 acres) to 1,401 ha (3,461 acres.)

The habitat associations for the Mexican spotted owl are varied. The owls roost, nest, and forage in a variety of biotic communities, but throughout most of their range they inhabit mixed-conifer forests dominated by an overstory of Douglas-fir and/or white fir associated with southwestern white pine, limber pine, and ponderosa pine. The understorys of these forests often contain species such as Gambel oak, maples, box elder, and New Mexico locust. In southern Arizona and in Mexico, forest habitats may be dominated by an overstory of Chihuahuan and Apache pines in association with Douglas-fir, ponderosa pine, and Arizona cypress. The understories in these habitats are predominately evergreen oaks.

Nesting and roosting habitats for the Mexican spotted owl primarily include closed-canopy forests or rocky canyons. In southern Utah and Colorado, most owl nesting occurs in caves and in cliff ledges in rocky canyons. Although cave and cliff nesting also may occur in the other parts of the owl's range, tree nesting predominates. The forests that are used for nesting and roosting usually contain mature or old-growth stands with a complex, uneven-aged, multi-storied, vegetative structure with a closed canopy. The trees used for owl nesting are normally large in size, whereas those used for roosting may either be large or small. Available information indicates that the tree species most often selected for nesting appear to be Douglas-fir, although this may vary among habitat types. Roosting may occur in a broader variety of tree species, although Douglas-fir also

is most commonly used. An intolerance for high temperatures has been hypothesized as the reason the owl prefers the microclimate of shady closed canopies and deep canyon habitats. Although knowledge of foraging habitat patterns is scanty, the species uses a wider range of forest conditions for foraging than for roosting. In general, the owls forage more in unlogged forests as opposed to selectively-logged forests.

C. Population Dynamics

Details the of the distribution and abundance of the Mexican spotted owl are found in the Recovery Plan and that information only is summarized here. The Recovery Plan examines owl distributional and abundance information that had been accumulated through 1993 to: (1) document historical and current range of the species, (2) help formulate Recovery Unit boundaries, and (3) provide a template for analyses at the landscape-scale. The Recovery Team acknowledged that historical data about distribution of the owls lacks sufficiency to allow the Team to estimate changes in the number or distribution of the species from historical to present time.

Attempts were made by the Recovery Team to estimate owl populations trends using several methods. These methods are discussed in the Recovery Plan and are not discussed in detail here. However, the Recovery Team did conclude that little confidence could be assigned to the estimates of juvenile survival because of low biasing. Data gathered by the Mexican Spotted Owl Monitoring Program of the Forest Service's Southwestern Region was assimilated, reviewed, and analyzed by the Team. The Recovery Team offered an alternative design for monitoring the species within the three core recovery units of the Upper Gila Mountains, the Basin and Range West, and the Basin and Range East. That alternative monitoring design is discussed in Part III, section C of the Recovery Plan, and is not detailed here.

IV. ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the Act, when considering the effects of the action on federally listed species, the Service is required to take into consideration the environmental baseline. Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions, and other human activities in the action area. In this case, the action area is the Southwestern Region of the Forest Service. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects that have undergone section 7 consultation, and the impacts of State and private actions that are contemporaneous with the consultation in progress.

Information regarding the environmental baseline for the owl and its habitat was gained from the following sources: Fletcher 1990; USDI 1991; Fletcher and Hollis 1994; USDA, Forest Service, in litt., November 9, 1995; USDA, Forest Service September 22, 1995, Biological Assessment; past biological opinions written by the Service issued to the Forest Service; *Federal Register*

notices; and USDI 1995a, 1995b. The Recovery Plan for the owl (USDI 1995a) is the most current assemblage of data on the owl to date. However, information compiled by the Forest Service and used by the Service for this analysis did not use the definitions in the Recovery Plan to describe the habitat land types (i.e., protected, restricted, and other forest types). The Forest Service provided data on "suitable" and "capable" owl habitat using definitions from the Southwest Region's Interim Directive 2 (I.D. 2). The definitions of the terms suitable and capable have always been problematic (see below), and thus future biological opinions should follow definitions used in the Recovery Plan for the owl.

A. Status of the Species

1. Owl Abundance

A reliable estimate of the absolute number of Mexican spotted owls throughout its entire range is not available (USDI 1995b). Quality and quantity of the information regarding numbers of owls vary by source. We compiled estimates of owl abundance and summarized below. These figures should not be confused with estimates of population trend. Temporal changes in the owl population can only be estimated when intensive monitoring schemes are implemented (see White et al. 1995). Because the appropriate parameters were not measured, the past Forest Service's monitoring effort in the Southwestern Region was inadequate for detecting important changes in the population dynamics of the Mexican spotted owl (see White et al. 1995).

USDI (1991) reported a total of 2,160 owls throughout the United States. Ward et al. (1995) estimated 758 owl sites occurring from 1990-1993 within the United States. They defined an owl site as a visual sighting of at least one adult spotted owl or as a minimum of two auditory detections in the same vicinity in the same year. Ward el al. (1995) assumed that if all 758 sites were occupied by pairs, then at least 1,516 adult (or subadult) owls were known to exist in the United States from 1990 and 1993. These numbers are not reliable estimates of current population size because no measures of bias or precision can be produced (Ward et al. 1995). Ward et al. (1995) also state that the amount of survey effort devoted to deriving these numbers cannot be reliably calculated, nor is an accurate measure available for areas or habitats surveyed. Thus, it is not useful to estimate the size of the Mexican spotted owl population given the limited quality of data currently available. At best, the numbers reported in (Ward et al. 1995:3) represent a range for the minimum number of owls known to exist during some portion of a four year period in the United States (758 individuals if each site was occupied by a single owl to 1,516 individuals if each site was occupied by a pair). These figures represent owls within Arizona, New Mexico, Utah, Colorado, and Texas for all Federal, private, state, and Tribal lands.

For Arizona and New Mexico specifically, the Southwestern Region of the Forest Service began intensive spotted owl inventories in 1988. Fletcher and Hollis (1994) report that approximately 1.92 million acres (66%) of the "suitable habitat" in Arizona and New Mexico National Forests have been surveyed as of 1993. The survey effort included 71% of the owl's suitable habitat that is also considered suitable for timber harvest, and 36% of the owl suitable habitat that is not

available for timber harvest (Fletcher and Hollis 1994). Table 1 displays the proportion of suitable habitat that has been inventoried on each National Forest. Figures vary by forest, ranging from 41% for the Cibola and 42% for the Prescott respectively, to 96% percent for the Kaibab, and 99% for the Apache-Sitgreaves National Forest. Over half the National Forests have surveyed at least 50% of the suitable habitat, and all have surveyed at least 40% of the suitable habitat (Fletcher and Hollis 1994).

Guidelines from Forest Service I.D. 2 require establishing management territories around all nesting and roosting owls, as well as territorial owls detected at night for which daytime locations were not recorded (see USDA 1990). All management territories, except those on the Lincoln and Gila National Forests, are 2,000 acres in size and have a 450 acre core area surrounded by 1,550 acres of the "best available" habitat. On the Lincoln and Gila National Forests, management territories are 1,500 acres in size, with a 450 acre core surrounded by 1,050 acres of the "best available" habitat. Except for road construction, habitat degradation is not allowed within management territory cores. In the remainder of the management territories, activities including timber harvest are limited to less than 775 acres. The Forest Service guidelines provide no protection for unoccupied habitat except in wilderness areas and administratively restricted lands (USDI 1995b).

Fletcher (1990) calculated that 2,074 owls existed in Arizona and New Mexico in 1990. At the end of the 1994 field season, Fletcher and Hollis (1994) reported 841 owl management territories established at locations where at least a single Mexican spotted owl had been identified. This did not include an additional 12 management territories that were established prior to 1984, for which no subsequent occupancy information had been collected. In November 1995, the Forest Service reported a total of 866 management territories (USDA, Forest Service, in litt. November 9, 1995). Table 1 displays the number of management territories and the percentage of the total number for each National Forest. The number of management territories established has increased in direct correlation with the amount of suitable habitat surveyed (Fletcher and Hollis 1994, figure 17). The Forest Service has converted some management territories to 600 acre protected activity centers (PACs) following the recommendations of the *Draft Mexican Spotted Owl Recovery Plan* released in March 1995. The completion of these conversions varies by National Forest, but they have typically been driven by project level consultations with the Service.

Table 1. Number of management territories (MT) as reported by the Forest Service (USDA, Forest Service, in litt., November 9, 1995), percent of MTs as a proportion of the MTs in Southwestern Region, and the percentage of suitable habitat surveyed in each National Forest (Fletcher and Hollis 1994).

NATIONAL FOREST	NO. MTs	PERCENT OF MTs	PERCENT SUITABLE HABITAT SURVEYED
Apache-Sitgreaves	120	13.9	99
Carson	3	0.3	62
Cibola	42	4.8	41
Coconino	155	18.0	87
Coronado	109	12.6	49
Gila	194	22.4	50
Kaibab	6	0.9	96
Lincoln	126	14.5	90
Prescott	10	1.2	42
Santa Fe	33	3.8	44
Tonto	66	7.6	55
TOTAL	864	100	

2. Habitat Status

The current condition of Mexican spotted owl habitat within Arizona and New Mexico is a result of historic and recent human use, as well as natural habitat fragmentation, vegetative species conversion, and wildfires. The Forest Service believes that some unestimated amount of regrowth and regeneration may have contributed to current habitat conditions. Precise assessment of baseline owl habitat is difficult to assemble at this time.

Owl habitat data gathered by the Forest Service has been reported in acres of "suitable habitat". It must be noted that the definition of suitable habitat has changed throughout the years. In 1990, the Forest Service defined suitable habitat by using stand characteristics identified by Ganey (1990). These characteristics included multi-storied stands with a canopy closure which was generally greater than 70%. Steep slopes and canyons were considered to be other important characteristics used to define suitable habitat. Mixed conifer was thought to be the primary habitat typed used, but other forest types demonstrating these stand characteristics were also included. Most of the Forest Service estimates of habitat acreages were derived from stand database information, air photo interpretation, and some ground-truthing. Some of the habitat

was identified using LANDSAT Imagery (Fletcher 1990). In 1994, the Forest Service defined suitable habitat as those habitats that meet the year-round needs of the owl (i.e., providing the conditions used by owls for nesting, day-roosting, and foraging). Suitable forested habitat characteristics included stands with mid-aged, mature and old forest development stages, and multiple canopy layers. Mixed conifer forest included a closed canopy of 60% or more, and a 50% or greater canopy closure was included in pine, pine-oak, and other hardwood forest types. Interpretation and application of these definitions in the field have differed between Forest Service personnel throughout the years (H. Hollis, Forest Service, Southwestern Region, Albuquerque, NM, pers. comm.). Hereafter, the Service assumes the term "suitable habitat" to mean nesting, roosting and foraging habitat. Suitable and capable habitat in the Southwestern Region is reported for the years of 1990, 1994, and 1995 (Table 2). The Forest Service does not have comparable information for capable habitat in 1994 or 1995, so capable habitat is presented for only the years 1990 and 1993. Figures through 1993 represent a loss of approximately 30,000 acres of suitable habitat since 1990. This 0.9% per year acreage increase in the amount of suitable habitat converted to capable habitat is less that the average rate of about 7 percent per year for the 1980-1990 time period (Fletcher and Hollis 1994). The figures of suitable habitat presented for 1995 have changed significantly from 1994 figures due to more detailed analysis by the National Forests (H. Hollis, Forest Service, Southwestern Region, Albuquerque, pers. comm.).

Table 2. Comparison of capable habitat in 1990 and 1993, and suitable habitat by National Forest in 1990, 1994 and 1995 (Acres X 1,000) (Fletcher 1990, figure 8; Fletcher and Hollis 1994, figures 4, 10 and 18; Forest Service, in litt., November 9, 1995).

NATIONAL FOREST	CAPABLE 1990	CAPABLE 1993	SUITABLE 1990	SUITABLE 1994	SUITABLE 1995
Apache-Sitgreaves	100	100.1	370	258	151.9
Carson	42	48.7	250	250	278.0
Cibola	84	84.6	172	172	149.5
Coconino	170	180.1	356	216	216.0
Coronado	22	22.1	115	115	121.2
Gila	342	342.3	619	619	733.4
Kaibab	19	19.4	64	63	27.6
Lincoln	24	27.7	371	250	186.0
Prescott	53	53.0	133	133	60.0
Santa Fe	157	165.1	595	476	411.6
Tonto	25	25.4	321	317	83.1
TOTAL ACRES	1,038	1,069	3,366	2,869	2,418

Fletcher and Hollis (1994) estimate 1,183,000 acres (approximately 41%) of the suitable habitat for the owl occur on lands identified in the existing forest plans as suitable and available for timber harvest. The Cibola, Coronado, Gila, Prescott and Tonto National Forests have identified no more than 26% of their suitable habitat as available for timber harvest. The Coconino and Lincoln National Forests have identified 44 and 41% respectively, of their suitable habitat available for timber harvest. The remaining four National Forests have identified over 50% of the suitable habitat as being available for timber harvest, with the Apache-Sitgreaves National Forest having over 85% available for available for harvest activities (Fletcher & Hollis 1994).

The Forest Service provided the information in Table 3 which represents the number of owl territories and the amount of suitable habitat by recovery unit (see USDIb:36-51). These figures represent habitat and owls both inside and outside of critical habitat. This represents the only specific up-to-date information available at this time.

Table 3. Territories & acres of suitable habitat in each Recovery Unit (RU) (Forest Service, in litt., November 9, 1995).

RECOVERY UNITS	NO. OF TERRITORIES	"SUITABLE" ACRES
Colorado Plateau RU	13	18,524
S. Rocky Mountains-NM RU	36	689,657
Upper Gila Mountains RU	539	1,283,499
Basin and Range-West RU	150	211,698
Basin and Range-East RU	128	212,348
TOTALS	866	2,415,726

Mexican spotted owl habitat in the southwestern United States has been shaped over thousands of years by low intensity, high frequency fire regimes. Currently, high intensity, stand-replacing fires occur in ponderosa pine and mixed conifer forest types. In 1994, at least 40,000 acres of nesting and roosting habitat were impacted to some degree by catastrophic fire in the Southwestern Region (Sheppard and Farnsworth 1995, unpublished Forest Service report). The Forest Service estimates that approximately 50,000 acres of owl habitat have undergone stand replacing wildfire since 1991 (G. Sheppard, Forest Service, Kaibab National Forest, Arizona, pers. comm.). Some of the wildfires that have had a impact on Mexican spotted owl habitat since 1989 include the Dude, Burgett, Bridge, Divide, Pigeon, Ryan, Rattlesnake, Shelly, Big, Lost, and Rincon Incidents (Sheppard and Farnsworth 1995, unpublished Forest Service report).

To characterize how the existing forest plans relate to potential effects from site-specific actions, it is relevant to consider past consultations completed with the Forest Service since the owl was listed in 1993. The Service reviewed past consultations completed for the owl on Forest Service

project-level actions and summarized acres of suitable habitat that were converted (Table 4). It should be noted that the figures reported in Table 4 reflect the conservative assumption that all suitable acres identified in the consultations subject to timber harvest were converted to capable habitat. Suitable habitat that has potentially been rendered to unsuitable habitat since 1993 equates to 6,398 acres (Table 4).

Table 4. Acreage of suitable habitat converted and anticipated incidental take of Mexican spotted owls by National Forest associated with formal consultations since listing (Service biological opinions).

NATIONAL FOREST	ACRES CONVERTED[1]	INCIDENTAL TAKE
Apache- Sitgreaves	730	5
Carson	1,751	0
Cibola	183	0
Coconino	2,059	13
Coronado	27	4
Gila	584	5
Kaibab	38	2
Lincoln	634	2
Prescott	73	0
Santa Fe	142	1
Tonto	177	6
TOTAL	6,398	36

[1] Proposed treatment in previous requests for formal consultation.

Fletcher (1990) reports the conversion of 1,037,000 acres of suitable habitat to capable habitat, with forty percent of this loss occurring since 1980. Between 1990 and 1993, the Forest Service reports an additional 30,000 acres of suitable habitat converted to capable habitat (Fletcher and Hollis 1994). Since the owl was listed in 1993, the Service has documented conversion of 6,398 acres of suitable habitat, as indicated by the Service's biological opinions through 1995 (Table 4). The Service's figures for 1993 may contain some overlap with the Forest Service figures for this same year, as the species was listed early in the 1993 calendar year. The Service used the above figures, combined with an estimate of loss of habitat due to wildfire since 1991, to estimate the conversion of suitable habitat through 1995 (Table 5). Capable habitat is expected to return to suitable through regeneration and growth. However, this takes place slowly and no specific estimates of how regrowth may have contributed to baseline habitat conditions have been made.

Table 5. Estimated conversion of suitable habitat to date (Fletcher and Hollis 1994; Service biological opinions; G.Sheppard, Forest Service, Kaibab National Forest, AZ, pers. comm.).

CONVERSION	ACRES
Through 1989[1]	1,037,000
1990-1993[2]	30,000
1993-1995[3]	6,400
Fires since 1991[4]	50,000
TOTAL ESTIMATED CONVERSION	1,123,400

[1] Estimate by the Forest Service that includes timber harvest and fires through 1990 (Fletcher 1990 and H. Hollis, Forest Service, Southwestern Region, Albuquerque, NM, pers. comm.).
[2] Fletcher and Hollis 1994.
[3] Estimate of habitat converted by the Forest Service activities as reported in previous biological opinions (rounded to 6,400)
[4] Estimate of habitat conversion caused by stand replacing wildfires (G.Sheppard, Forest Service, Kaibab National Forest, AZ, pers. comm.) This figure does not include the 1996 fire season.

The Service estimates that the current amount of suitable habitat as reported in 1995 (2,416,000 acres: Table 3) added to the amount of suitable habitat lost as reported by the Forest Service and Service biological opinions (1,123,000 acres; Table 5), totals the possible recent historic amount of suitable habitat (3,539,000 acres). Projects implemented under the existing Forest Plans as well as wildfires have converted approximately 1,123,000 acres of suitable habitat to unsuitable habitat. Based on these estimates, approximately 32% of historic owl suitable habitat has been lost.

In addition to our estimate of habitat lost, other limited data sources are available for assessing habitat trend. The Recovery Team (USDI 1995b) analyzed forest inventories from the 1960s (Choate 1966, Spencer 1966) and 1980s (Conner et al. 1990, Van Hooser et al. 1993) to evaluate trends in habitat. They assessed the change in the size-class distribution of trees from the 1960s to the 1980s. The trend that emerged in the analysis indicated a substantial increase in the density of trees 5-12.9 inches diameter at breast height (dbh), but a large decrease (20%) in the numbers of trees ≥19 inches dbh, from 0.9 trees per acre, to 0.7 trees per acre (USDI 1995b:65). This decrease indicates an alarming negative trend with respect to a very critical component of owl habitat (see USDI 1995b:66-68).

B. Critical Habitat and Recovery Units

The Southwestern Region of the Forest Service manages 3,358,499 acres of designated critical habitat for the Mexican spotted owl (60 FR 29914). Critical habitat is designed to assist the Service and all Federal agencies in preventing the further deterioration of habitat, and in this way,

contribute toward a species' conservation. The physical and biological features essential to the conservation of the owl, referred to as the primary constituent elements, include those that support nesting, roosting, and foraging (60 FR 29914).

Critical habitat is located within specific critical habitat units across the range of the owl in the United States. These critical habitat units are located within six recovery units as defined by the Recovery Plan (USDI 1995b). Five critical habitat units are located completely or partially within the Southwestern Region of the Forest Service. To date, little detailed information has been gathered on the existing condition of critical habitat in Arizona and New Mexico. Specific habitat information is needed in the habitat categories of protected and restricted as defined in the Recovery Plan.

A discussion of the owl's status and its habitat is provided below for each recovery unit in Arizona and New Mexico. These summaries provide a prelude to the analysis of effects on the owl and its habitat within these recovery units.

1. Colorado Plateau Recovery Unit

The Colorado Plateau Recovery Unit is the largest of the six units, extending from southwestern Utah, through northern Arizona into northwestern New Mexico, and a small portion of the southwestern corner of Colorado. In northern Arizona and New Mexico, owls have been reported in both canyon and montane situations. In addition, owl habitat appears to be in the form of isolated "islands" or "patches", geographically segregated from other patches of habitat. Recent records of owls exist for the Grand Canyon and Kaibab Plateau in Arizona, as well as for the Chuska Mountains, Black Mesa, and Fort Defiance Plateau on the Navajo Reservation. In addition, records exist for the Zuni Mountains and Mount Taylor in New Mexico.

Within this recovery unit, Federal lands comprise 44% of total land administration (USDI 1995b). Potential threats in the southeastern portion of this recovery unit (Arizona and New Mexico) include timber harvest, overgrazing, catastrophic fire, oil, gas, and mining development (USDI 1995b).

Forested habitat on the North Kaibab Plateau exhibit extensive areas with partial or complete overstory removal, and canopy closure over much of the area is perhaps less than half that of the owl's habitat that exists within the adjacent Grand Canyon National Park. The forested and non-forested canyon habitat below the rim of the Plateau are minimally modified and are mostly in suitable condition. There are currently no established territories within this portion of the recovery unit, although there are recent records of pairs, singles and juvenile owls.

Within the New Mexico portion of the Colorado Plateau Recovery Unit, the accessible forested areas have undergone considerable modification (Dick-Peddie 1993). Mexican spotted owl nesting and roosting habitat may be limited primarily to forested canyons and steep slopes. A

large portion of the forested areas within the Zuni Mountains was logged for railroad construction earlier this century (Dick-Peddie 1993).

An analysis of the owl's entire range sought to identify those patches that contribute most significantly to overall habitat connectedness on a landscape scale (see Recovery Plan Part II.F). Habitat patches were ranked based on their contribution to overall connectedness. Results from this exploratory landscape analysis found the Zuni Mountains and Mt. Taylor to be important habitat clusters. In addition, these habitat clusters were considered "sensitive", not based on their size, but rather based on their role as "stepping stone" patches that connected large areas of habitat (Keitt 1994). Thus, these areas may contribute to critical demographic linkages for owl populations to the south in the Upper Gila Mountains Recovery Unit.

Mexican spotted owl distribution within this recovery unit in New Mexico appears to be highly fragmented. The disjunct owl distribution may be a natural occurrence, the result of past management earlier this century, or just a reflection of inadequate survey efforts. It also could be a combination of all three. Continued alterations, through timber harvest activities and catastrophic fires, of forested areas may be the greatest threat to recovering this owl population.

2. Southern Rocky Mountain - New Mexico Recovery Unit

This recovery unit encompasses a large portion of northern New Mexico and contains a small portion (i.e., an estimated 4.5%) of the known owl sites throughout its range. However, Johnson and Johnson (1985) documented approximately 40 observations (historic sites) of owls throughout this recovery unit in northern New Mexico. Current owl sites have been recorded in the Jemez and Sangre de Cristo mountains, Bandelier National Monument and areas surrounding Los Alamos. Owl sites in these areas are generally described as having deep, narrow, timbered canyons with cool shady places for owls to roost.

The habitat in this recovery unit is administered by the Carson and Santa Fe National Forests. Vegetation within this recovery unit has been modified by past logging, extensive grazing, surface mining, fuelwood gathering, and fire suppression (Williams 1986, Van Hooser et al. 1992).

Little is known about Mexican spotted owl habitat within this recovery unit. Owl occurrences within this recovery unit are disjunct and appear to coincide with patchy steep sloped or canyon type habitat. As previously mentioned, owl records are scattered throughout this recovery unit (Johnson and Johnson 1985). The majority of these records are considered historic (i.e., owl sites detected prior to 1989). A continued loss of habitat from both timber harvest activities and catastrophic fire may be the greatest threat to recovering this owl population.

Although this recovery unit supports the smallest known population of owls, small populations distributed over large areas of a disjunct landscape are viewed as being at greater risk than larger populations. Disturbances (either natural or anthropogenic) may lead to further isolation of owl pairs and, eventually, these populations become "sink" populations. Dispersal acts as a bridge

between subpopulations at the metapopulation scale to provide immigrants to otherwise isolated habitat patches. If the habitat patch has been unoccupied, then the new recruits fill the void.

3. Upper Gila Mountains Recovery Unit

This recovery unit is a relatively narrow band bounded on the north by the Colorado Plateau Recovery Unit and to the south by the Basin and Range - West Recovery Unit. The southern boundary of this recovery unit includes the drainages below the Mogollon Rim in central and eastern Arizona. The eastern boundary extends to the Black, Mimbres, San Mateo, and Magdalena Mountain ranges of New Mexico. The northern and western boundaries extends to the San Francisco Peaks and Bill Williams Mountain north and east of Flagstaff, Arizona. This is a topographically complex area consisting of steep foothills and high plateaus dissected by deep forested drainages. In New Mexico, this recovery unit straddles the Continental Divide. The area west of the Divide is drained by perennial headwaters of the Upper Gila system and include the San Francisco and Tularosa Rivers. This recovery unit can be considered a "transition zone" because it is an interface between two major biotic regions: the Colorado Plateau and Basin and Range Provinces (Wilson 1969).

Habitat within this recovery unit is administered by the Kaibab, Coconino, Apache-Sitgreaves, Tonto, Cibola, and Gila National Forests. Vegetation generally consists of pinyon/juniper woodland, ponderosa pine/mixed conifer forest, some spruce/fir forest, and deciduous riparian forest in the lower elevation canyon habitat.

Mexican spotted owls are widely distributed and use a variety of habitat within this recovery unit. Owls most commonly nest and roost in mixed conifer forests dominated by Douglas fir and/or white fir and canyons with varying degrees of forest cover (Ganey and Balda 1989; USDI 1995b). Nesting and roosting occurs in ponderosa pine/Gambel oak forest, where they are typically found in stands containing well-developed understories of Gambel oak (USDI 1995b).

This recovery unit contains the largest known concentration of Mexican spotted owl with approximately 55% of known owl territories (USDI 1995b). This recovery unit is located near the center of the owl's range within the United States and is contiguous to four of the five recovery units within the United States. Because of its central location and its large and relatively continuous spotted owl population, the Mexican spotted owl Recovery Team believes that the population in this recovery unit could be uniquely important to the overall stability and persistence of the owl population in the United States. Specifically, this recovery unit may be considered the "core" or "source" population, providing immigrants to smaller, more isolated populations in other recovery units. In source-sink models (Pulliam 1988), source areas with self-propagating (typically increasing) populations provide a flow of recruits to "satellite" or sink areas where populations are not self-reproducing (and may be declining). Therefore, critical habitat units within this recovery unit may play an important role since the persistence of the satellite populations depends upon the central source population. Although the Recovery Team has little data on dispersal patterns or movements between recovery units, the Team believes that this

population should be maintained at current levels and with at least the current level of connectivity with the recovery unit (USDI 1995b). Significant discontinuities that develop in the Mexican spotted owl's distribution within this recovery unit, and the loss of habitat to support the local sub-populations, may compromise the recovery of the species.

Mexican spotted owls through this recovery unit are found primarily in mixed conifer and pine-oak forests, often in conjunction with canyon terrain (USDI 1995b). Most of the accessible forest in the central portion of this recovery unit is second-growth forest with minimal mature stand characteristics. Forest breeding habitat is mostly restricted to the steeper within-canyon stretches of mature stands. Much of the habitat south of the Mogollon Rim is inaccessible to timber harvest due to steep terrain and is mostly suitable habitat. Although productivity is the same, occupancy rates are higher for the below-Rim than for the habitat abpove the Rim. Habitat in the western portion of this recovery unit is mostly characterized by canyon systems and forested uplands and mesas. Again, much of the accessible terrain has had partial or complete overstory removal and is typically second-growth forest.

The primary threats to the owl and their habitat in this recovery unit are timber harvest and catastrophic fire. Other threats within this recovery unit include indiscriminate fuelwood cutting and overgrazing by both wildlife and livestock (USDI 1995b).

4. Basin and Range - West Recovery Unit

This recovery unit encompasses a small portion of New Mexico and the majority of southern Arizona. This is the second largest recovery unit in the United States. The known Mexican spotted owl population ranks third highest in the United States despite limited survey efforts in many areas (USDI 1995b). The northern border of this recovery unit is defined by the base of the Mogollon Rim. The western boundary defines the western extent of the Mexican spotted owl's range.

The Basin and Range - West Recovery Unit is characterized by numerous mountain ranges which arise abruptly from broad plain-like valleys and basins. Within southern Arizona the mountain ranges are sometimes referred to as the "sky islands". The mountains are surrounded by Sonoran and Chihauhuan desert-scrub.

Land ownership within this recovery unit is a mosaic of public and private lands. Habitat within this recovery unit is administered by the Prescott, Tonto, Apache-Sitgreaves, and Coronado National Forests. Accessible forest (primarily foraging habitat) in many areas have had the mature stand component partially or completely harvested. In general, however, much of the habitat is forested, steep-slope canyons and drainages, and is mostly in suitable condition. Within the sky islands, habitat is characterized by a greater amount of woodland habitat, and territories occur in both heavily forested terrain and in areas with hardwood and conifer stringers dominated by Madrean evergreen woodland.

Very little timber harvest occurs in this recovery unit, though some timber harvest occurs in the Bradshaw Mountains of the Prescott National Forest. The primary threats to Mexican spotted owl within this recovery unit are catastrophic wildfire, recreation, and grazing (USDI 1995b).

Recent wildfires have occurred in the Pinaleno, Rincon, Chiricahua, and Huachuca Mountains. The three forests are used heavily for recreation, mainly due to their proximity to the large urban areas of Tucson and Phoenix. Grazing in riparian areas is of concern because of potential negative impacts on areas that can provide dispersal habitat among mountain ranges (USDI 1995b).

5. Basin and Range - East Recovery Unit

This recovery unit lies mostly within New Mexico and contains an estimated 16% of the known owl sites throughout its range, the second largest in the U.S. Habitat is administered by the Cibola and Lincoln National Forests. This recovery unit is characterized by numerous parallel mountain ranges separated by alluvial valleys and broad, flat basins. Owls occur in the isolated mountain ranges scattered throughout this recovery unit, but the largest portion of the owl subpopulation here occurs in the Sacramento Mountains. They are most common in mixed-conifer forests, but are also found in ponderosa pine forests and piñon-juniper woodlands. Current owl sites have been recorded in National Forest lands in the Sandia, Manzano, Sacramento and Guadalupe Mountains, Guadalupe National Park and Mescalero Apache Tribal lands.

Mexican spotted owls occurring in the Sacramento Mountains have been exposed to various disturbances for more than a century. Natural disturbances include forest fires, and human disturbances include timber and fuelwood harvest, grazing, land development, and recreation. Coniferous forests, especially the mixed-conifer, were extensively logged during an era of railroad logging from 1890 to 1945 (Glover 1984). After the railroad logging era, trees grew rapidly and attained merchantable sizes in about 40-50 years on favorable sites. Consequently, much of the habitat currently used by owls in the Sacramento Mountains is regrowth forest that has attained a high density of moderately sized trees, poles, and saplings, together forming multiple canopy layers.

Past timber harvest practices have left a few remnant old-growth stands and residual pockets of pre-harvest trees in the Sacramento Mountains. Many of these stands are small (less than 10 acres) and exist as smaller groves amid the younger coniferous forests. The Recovery Plan states that these remnant patches are critical to the Mexican spotted owl, particularly for nesting and roosting (USDI 1995b).

According to the Recovery Plan, the greatest threats to recovery in this recovery unit are catastrophic fire, some forms of timber harvest and fuelwood harvest. Recovery here will require maintenance of existing and future populations by conserving habitats in areas not only inhabited by owls but also in areas between occupied sites.

C. Summary of Environmental Baseline

There are 2,418,316 acres of suitable habitat and 866 known Mexican spotted owl territories in Forest Service's Southwestern Region as of the end of 1995. Approximately 49% of this (1,183,000 acres) is available for timber harvest under existing forest plans. By 1990, the Forest Service had converted 1,037,000 acres of suitable habitat to non-suitable condition, representing a 23.5 percent loss of suitable habitat. Since 1990, the Forest Service and wildfires have converted an additional 84,167 acres to an unsuitable condition. This amounts to a total of 1,121,167 acres converted, or a 32% reduction in the recent historic amount of suitable habitat in the Forest Service's Southwestern Region.

There are five recovery units in the Southwestern Region of the Forest Service. The Upper Gila Mountains Recovery Unit contains the largest known concentration of Mexican spotted owls, and is located near the center of the owl's range within the U.S. This population could serve as the source population for all other recovery units. The primary threats to recovery in all recovery units are timber harvest, catastrophic fire, indiscriminate fuelwood cutting, overgrazing, and recreation (USDI 1995b).

V. EFFECTS OF THE ACTION

A. Spotted Owl Amendments

The amended standards and guidelines for the owl were derived from *Mexican Spotted Owl Recovery Plan*. These are included as Alternative G, the preferred alternative in the FEIS. The Forest Service intends for these region-wide standards and guidelines to replace, or take priority over, the existing standards and guidelines specified for each National Forest. This assumption is based on the Forest Service' statement that "in any case of project design where there is any apparent conflict between the new standards and guidelines and old standards and guidelines, the new standards and guidelines will take precedence." (USDA, Forest Service, in litt., February 14, 1996.) The Service also assumes that project-level activities will be planned within the "bounds and constraints" of the new amended standards and guidelines. The Service draws this assumption from the definition of standards and guidelines as provided in the glossary of the FEIS.

Three levels of habitat management are given in the Recovery Plan: protected areas, restricted areas, and other forest and woodland types. Protected areas receive the highest level of protection under the Plan. Guidelines for restricted areas, and other forests and woodland types, are less specific and operate in conjunction with ecosystem management and existing management guidelines.

Although the standards and guidelines summarize the general recommendations of the Recovery Plan (see USDI 1995b), the standards and guidelines in the FEIS do not encompass everything

needed for the recovery of the owl. For example, the FEIS on page 154, states, "monitor changes in owl density and habitat needed for delisting." The owl monitoring scheme detailed in the Recovery Plan is designed to monitor changes in the owl population over time (i.e., population trends, but not density per se. The Service offers a conservation recommendation in this biological opinion to clarify this terminology in the FEIS.

Another example on page 154 of the FEIS, is the statement, "allow no timber harvest except for fuelwood and fire risk abatement in established protected activity centers (PACs)." The Recovery Plan details several caveats to minimize effects on the owl, its prey, and their habitats. For example, the Recovery Plan recommends the use of road closures, prohibiting harvest of key habitat components such as snags and large downed logs (> 12 inches midpoint diameter), and encouraging the harvest of small diameter conifers in accordance with the implementation of a program consisting of appropriate treatments to abate fire risk (see USDI 1995b:86). Several of these are summarized on page 155 of the FEIS, however they are not explicitly tied to fuelwood programs. It is especially important that these recommendations be considered for fuelwood programs in northern New Mexico.

Regarding timber salvage within PACs, it must be pointed out that the Recovery Plan states, "If a stand-replacing fire occurs within a PAC, timber salvage plans must be evaluated on a case-specific basis." The FEIS on page 154 states that, salvage timber harvest may be allowed on a case-by-case basis after consultation with the Service. These slight changes in wording can lead to misinterpretations of the general intent of the Recovery Plan. The Recovery Plan gives several cautions to timber salvage in PACs that must be adhered to during planning processes.

Although the FEIS covers the majority of the Recovery Plan's recommendations, interpretations of the standards and guidelines can vary. It is crucial that resource managers and biologists on the ground refer to the Recovery Plan directly in order to comprehend assumptions, guiding principles and, supporting documents. If this is done, the Service believes that project-level activities designed within the bounds and constraints of the amendments for the protection of the owl will be in conformity with the Recovery Plan and will promote the recovery of the owl. This is particularly the case for protected and restricted areas. Guidelines for other forest and woodland types are much more general. These other types may be of value to owls for foraging and possibly for dispersing and wintering. The Recovery Plan, however, contends that, "existing and planned management for these types will maintain or improve habitat for these needs of the owl." Continuation of such management in conformity with the guidelines for other forest and woodland types, along with the special protections provided for protected and restricted areas and old growth, would promote the recovery of the owl.

B. Northern Goshawk Amendments

The preferred Alternative G incorporates standards and guidelines for the northern goshawk that are based on the recommendations contained in *Management Recommendations for the Northern Goshawk in the Southwestern United States*. The standards and guidelines apply to all goshawk

habitat across the National Forests outside of protected and restricted habitat for the owl (H. Hollis, Forest Service, Southwestern Region, Albuquerque, NM, pers. comm.). The FEIS (USDA 1995) states that recovery recommendations for the owl take precedence over all other recommendations for non-listed species because of status as a listed species under the Endangered Species Act. Roughly 25 percent of suitable owl habitat overlaps with goshawk habitat (FEIS, USDA 1995).

The FEIS (USDA 1995) states that under the northern goshawk recommendations all goshawk nest and post-fledgling areas (PFAs) will be restricted with higher stocking levels (canopy cover). All areas outside PFAs will have the desired stocking levels correlating to an average of 40 percent canopy cover. For both the owl and the goshawk, the landscape will contain trees that are uneven-aged, allowing for more large, old trees. Direction for this management includes a standard to manage for uneven-age stand conditions for live trees, and retain live reserve trees, snags, downed logs, and woody debris levels throughout woodland, ponderosa pine, mixed conifer and spruce-fir forest cover types. Direction is to manage for old age trees such that as much old forest structure as possible is retained over time across the landscape, sustaining a mosaic of vegetation densities (overstory and understory), age classes and species composition across the landscape. Guidelines state that outside PFAs, the distribution of vegetation structural stages for ponderosa pine, mixed conifer and spruce-fir forests is 10% grass/forb/shrub, 10% seedling-sapling, 20% young forest, 20% mid-age forest, 20% mature forest, and 20% old forest. These guidelines also state that these percentages are a guide and actual percentages are expected to vary up to 3%.

In addition, guidelines state that managers should emphasize maintenance and restoration of healthy riparian ecosystems through conformance with forest plan riparian standards and guidelines, restore degraded riparian areas to good condition as soon as possible, and prevent damage to riparian vegetation, stream banks, and channels.

In themselves, the guidelines outlined in *Management Recommendations for the Northern Goshawk in the Southwestern United States* are not adequate for their use as a comprehensive forest management plan for the Mexican spotted owl in that they do not provide adequate protection for the habitat of the species (FR 60: 29914-29951). However, the recommendations may support the development of some of the forest habitat attributes suitable for owl foraging activities (FR 60: 29914-29951). For this reason, the Service believes that project-level activities planned within the "bounds and constraints" of the goshawk standards and guidelines as outlined in Alternative G, would not hinder the recovery of the owl.

C. Grazing Management Amendments

The Recovery Plan summarizes the major suspected influences of grazing on owls as: (1) changes in prey availability; (2) lessened potential for beneficial low-intensity ground fires, and increased potential for destructive high-intensity vertical fires; (3) deterioration of riparian areas; and (4) suppression of areas to mature into habitat for the owl and its prey.

The Recovery Team concluded that predicting the extent of effects caused by grazing, and the development of management options, will require more understanding of the relationship of owls and grazing. However, negative effects of excessive grazing are predictable, especially in riparian communities USDI 1995b.) Livestock and wildlife grazing has the potential to change owl habitat composition and structure, as well as food availability. Grazing may alter plant communities by the removal of plant materials or plant reproductive structures by trampling, or by soil damage. Plant densities, cover, biomass, vigor, and regeneration ability may be reduced in some areas. Prey community structure may be changed in grazed areas and thus alter the foraging habitat for the owls. Within ponderosa pine forests, grazing can remove, or reduce grasses and forbs, that can serve as fuels for low intensity fires that tend to reduce pine seedling establishment. Increases in tree densities and forest floor fuels contribute to more frequent large crown fires (Covington and Moore 1994.) Grazing may also result in the loss, reduction, or suppression, of regeneration of riparian areas. Other potential effects of grazing include increase in duff layers, accelerated decomposition of woody materials, compacted soils, and damage to stream and shore banks.

In the following discussion, the grazing guidelines identified in the Recovery Plan are summarized (paragraphs numbered 1, 2, 3) along with the forest plan amendments that address the intent of the guidelines.

(1) Monitor grazing use and livestock and wildlife in "key grazing areas" to detect changes in plant composition. The intent is to maintain good to excellent range conditions in key areas while accommodating the needs of the owls and its prey.

Amended forest plan guidelines for grazing management include identification of key ungulate forage monitoring areas. Within these areas, key species are to be selected to monitor average allowable use. The Biological Assessment and the FEIS provide levels of allowable key species utilization by ungulates in key forage monitoring areas. Allowable utilization rates depend on range conditions and management strategy.

By themselves, the grazing management guidelines would seem to fall short of the Recovery Plan guidelines. However, the amended guidelines for Mexican spotted owl include a provision that, with respect to domestic livestock grazing, forage utilization standards in the forest plans be implemented to maintain owl prey availability and promote the development of owl habitat. These guidelines also include the direction to: "[strive to attain good to excellent range conditions." The Service assumes that projects will be planned within the bounds of the amended guidelines for the Mexican spotted owl as well as the grazing management guidelines.

(2) Implement and enforce grazing utilization standards that would attain good to excellent range conditions within the key grazing areas. Establish maximum allowable use levels that are conservative and that will expedite attaining and maintaining good to excellent range conditions. A primary purpose is to maintain and restore adequate levels of residual plant cover, fruits, seeds, and regeneration to provide for the needs of prey species and development of future owl foraging and dispersal habitat.

General utilization standards for given range conditions and management strategies are provided in the guidelines for grazing management, with the provision that they be applied in the absence of more specific guidelines currently established through site specific National Environmental Policy Act (NEPA) analysis for individual allotments. It is not clear whether these use levels are conservative with respect to the needs of the owl, or whether the guidelines, by themselves, will expedite attainment of good to excellent range conditions. However, the Mexican spotted owl guidelines call for management strategies to move riparian vegetation toward good condition as soon as possible and to implement the forage utilization standards to promote development of owl habitat and attain good to excellent range conditions.

(3) Implement management strategies that will restore good conditions to degraded riparian communities as soon as possible. Strategies may include reductions in grazing levels and increased numbers of exclosures to protect riparian plant cover and regeneration, and to prevent damage to stream banks and channels.

The amendments on grazing management do not specifically address riparian areas, other than to describe the allowable proximity of key monitoring areas to perennial streams. More specific guidance on riparian habitats is provided in the Mexican spotted owl guidelines for Riparian Areas and Domestic Livestock Grazing. The guidelines for Riparian Areas call for conformance with forest plan riparian standards and guidelines and management strategies that should move degraded riparian vegetation toward good condition as soon as possible. The section of the Mexican spotted owl guidelines on Domestic Livestock Grazing states that forage utilization standards and guidelines are to be implemented to maintain and restore riparian ecosystems.

It is not clear that the amendments on grazing management alone would provide adequate direction to expedite improved conditions for the Mexican spotted owl. However, amended guidelines for the Mexican spotted owl, which according to the Biological Assessment are to be applied across the landscape, together with the continuing riparian guidelines, should moderate or avoid adverse effects to the Mexican spotted owl and its critical habitat from grazing activities. Therefore, the Grazing Management amendments, the Mexican spotted owl amendments, and the existing riparian guidelines, when implemented together, provide direction that should result in project-level activities that would not likely impede the recovery of the Mexican spotted owl.

D. Old-Growth Amendments

Alternative G standards and guidelines direct that no less than 20 percent of each forest ecosystem management area should be allocated to old growth. One guideline states that old growth function should be developed or retained on at least 20 percent of the naturally forested area by forest type in any landscape. Required attributes of five primary forest cover types are displayed in the FEIS (USDA 1995). These forest types include pinyon-juniper, ponderosa pine, aspen, mixed-species (Douglas fir), and Engelmann spruce-subalpine fir. For an area to be considered old growth in the mixed-species group, it needs to have minimum attributes of 80 to 100 square feet of basal area, 50-60 percent canopy cover, and be 150 years old. The 20 percent

allocation can overlap with owl PACs, goshawk nest sites, wilderness, research natural areas, and other forest structures managed for old growth function (H. Hollis, Forest Service, Southwest Region, Albuquerque, NM, pers. comm.).

The effects of these old growth allocations on the owl, particularly in mixed conifer habitats, will be positive as existing old growth is maintained. What is not clear in the FEIS is how stands, that are allocated toward the 20 percent and are located in protected or restricted owl habitat, but do not yet meet or exceed the attributes, will be "developed". If the owl guidelines were overridden by the old growth guidelines, the Service would have concerns. However, it is the Service's understanding that activities also will follow owl guidelines.

It is also not clear how the old growth allocations will be distributed, or what the size of the blocks will be. However, maintenance of large, old trees across the landscape will be beneficial for the owl. Owls may use habitat allocated to old growth for nesting, roosting and foraging, as these areas may contain large, old trees, high canopy coverage, and dead and down material. Therefore, project-level activities planned within the bounds of the old growth guidelines, when implemented to also conform to the owl guidelines, will not impede the recovery of the owl.

VI. CUMULATIVE EFFECTS

Regulations at 50 CFR 402.14(g)(4) require the Service to consider cumulative effects along with the effects of the proposed action in determining whether a proposed action is likely to jeopardize the continued existence of a listed species or destroy or adversely modify a listed species' critical habitat. "Cumulative effects" is defined at 50 CFR 402.02 as "...those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action are subject to consultation."

A. State and Private Activities

The Service's most recent assessment of spotted owls and owl habitat on non-Federal lands is found in the final rule designating critical habitat for the Mexican spotted owl (60 FR 29916-29917). According to that document, approximately 3% of known Mexican spotted owl habitat in the United States is found on State and private land in Arizona and New Mexico. Neither Arizona nor New Mexico has laws specifically protecting spotted owl habitat on State or private lands (USDI 1995). The Act prohibits incidental taking of listed species through habitat degradation, but the Service is unaware of instances where private actions have resulted in such habitat degradation.

If one assumes that all State and private spotted owl habitat is unprotected, and that all such lands are subject to timber harvest, then approximately 3% of existing spotted owl habitat in the action area is unprotected. However, regulations require only that actions "reasonably certain to occur" be considered in the analysis of cumulative effects. While the Service has no data on the extent of

harvest of owl habitat on State and private lands, it is reasonable to assume that some such lands are not sufficiently timbered for commercially viable harvests; are inaccessible for purpose of timber harvest; are logistically unavailable; or are otherwise not subject to habitat-degrading activities.

B. Tribal Lands

Tribal lands are held in "trust" by the Federal Government. They are not considered public lands or part of the public domain. Tribes are sovereign governments with management authority over wildlife and other Tribal land resources. For the purposes of this biological opinion, Tribal management of Mexican spotted owl habitat that does not involve Federal agency actions is considered non-Federal and therefore is considered under this cumulative effects analysis. The final rule designating critical habitat for the Mexican spotted owl states that approximately 15% of Mexican spotted owl habitat in the United States occurs on Tribal lands (60 FR 29917). Only a small percentage of spotted owl habitat in Colorado and Utah is tribally managed, so the percentage of tribally managed spotted owl habitat in the action area is probably slightly more than 15%. Tribal beliefs and philosophies guide resource management on Tribal lands. Some Tribes consider owls a bad omen; however, Tribal beliefs also dictate that all living creatures are essential parts of nature and, as such, they are revered and protected (USDI 1995).

Many Tribes maintain professionally staffed wildlife and natural resources management programs to ensure prudent management and protection of tribal resources, including threatened and endangered species. The Service is aware of spotted owl conservation efforts on five Indian reservations in the action area: the Mescalero Apache, White Mountain Apache, San Carlos Apache, Jicarilla Apache, and Navajo Nation.

1. Mescalero Apache Tribe

The Mescalero Apache Reservation in the Basin and Range - East Recovery Unit in New Mexico lies between two administrative units of the Lincoln National Forest. The reservation is an important part of this recovery unit because of its position in the Sacramento Mountains, which support the largest and densest spotted owl population in the recovery unit. The known effects to spotted owls on the Mescalero Apache Reservation result from the Tribal timber management program. The Tribe actively manages its forest while managing for all federally listed or proposed threatened or endangered species that may exist on the Reservation, including the Mexican spotted owl. This is accomplished through developing strategies for identifying and managing habitat determined by the Tribe to be necessary to ensure protection.

The Mescalero Tribe has been working with the Service in development of a conservation strategy for the subspecies on reservation lands. Early drafts of the plan propose a management strategy similar to that proposed on the Fort Apache Reservation of the White Mountain Apache Tribe (see discussion, below). However, since the management plan has not been adopted by the Mescalero Tribal Council, the Service can only consider the general management philosophy

described above in evaluating the effects of Tribal practices in the Basin and Range - East Recovery Unit.

The effects of management under the Tribal philosophy are difficult to determine. The Service is aware that several spotted owl sites, including verified nesting sites, have been established on the reservation, and that those sites receive some protection. However, since no specific spotted owl management guidelines are in place, and since the Service is unaware of the extent of timber management on the Mescalero reservation, the cumulative effect of Tribal management is difficult to evaluate. Given this lack of information, the Service's assessment of Forest Service actions on the spotted owl population of the Basin and Range - East Recovery Unit must be done without considering the activities of the Mescalero Apache. This limitation in the assessment does not affect the conclusion of this biological opinion.

2. White Mountain Apache Tribe

The Fort Apache Reservation is located in the Upper Gila Mountains Recovery Unit, and is largely surrounded by the Apache-Sitgreaves National Forest. The White Mountain Apache recently developed a conservation plan for Mexican spotted owls on the reservation. Areas containing spotted owls are placed in one of two land-management categories, termed Designated Management Areas (DMAs). Areas supporting "clusters" of four or more territories are considered "Category-1" DMAs. In these areas, spotted owl habitat concerns drive management prescriptions; timber harvest is a secondary objective. Category-1 DMAs range from about 2,430-4,050 ha (6,000-10,000 ac), and contain 57% of known spotted owl sites on the reservation.

"Category-2" DMAs include areas supporting 1-3 owl territories. Habitat outside the territories is managed only secondarily for spotted owls, with other resource objectives given priority. No timber harvest is allowed in 30-ha (75 ac) patches around owl activity centers. A seasonal restriction on potentially disturbing activities is provided in a 202-ha (500 ac) area, and timber prescriptions within this area should be designed to improve habitat integrity. The Service has determined that the White Mountain Apache plan is adequate to reasonably ensure persistence of the Mexican spotted owl on Tribal lands.

3. San Carlos Apache Tribe

The San Carlos Indian Reservation lies in the Basin and Range - West Recovery Unit and the Upper Gila Mountains Recovery Unit. Less than 10% of Mexican spotted owl nesting, roosting, and foraging habitat is within the Tribe's commercial timber base. The Service and the Tribe are currently working on, but have not completed, a conservation plan for the reservation.

4. Jicarilla Apache Tribe

The Jicarilla Apache Reservation is located in the Southern Rocky Mountains - New Mexico Recovery Unit. The Jicarilla Apache Tribe has developed a spotted owl conservation plan, approved by the Jicarilla Tribal Council and accepted by the Service. No resident owls have been detected to date on the reservation; however, in the event resident owls are detected, the Tribe has proposed to designate a 405-ha (1,000 ac) management territory. Uneven-aged timber management will be allowed to continue in all but 40 ha (100 ac) of the territory. In the absence of confirmed resident owls, all mixed-conifer stands of 10 ha (25 ac) or greater are treated as roosting/nesting sites, and timber harvest will not be allowed. A seasonal restriction around any active nest sites that are found is also proposed.

5. Navajo Nation

The Navajo Nation lies in the Colorado Plateau Recovery Unit. The Navajo Nation is working with the Bureau of Indian Affairs on a Navajo Forest Management Plan, and no timber harvest activity is expected until the plan is complete. The Bureau of Indian Affairs intends to conduct section 7 consultation, and the Navajo Nation is considering developing a conservation plan under section 10(a)(1)(B) of the Act.

VII. CONCLUSION

According to 50 CFR 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of the species. Pursuant to 50 CFR 402.14(g), the Service has reviewed all relevant information provided by the Forest Service, and the current status of the Mexican spotted owl and its designated critical habitat. The Service also has reviewed the environmental baseline for the affected area, and the direct and cumulative effects for the Forest Service's proposal.

The Service finds that implementation of the forest plans, as amended by the new standards and guidelines of Alternative G in the FEIS, is not likely to jeopardize the continued existence of the Mexican spotted owl or result in the destruction or adverse modification of the species' critical habitat. Project-level actions and activities planned and implemented under these standards and guidelines, taken together, should promote the recovery of the owl.

This finding does not obviate the need, pursuant to 50 CFR 402.14, for the Forest Service to continue to consult on project-level actions that "may affect" the Mexican spotted owl or its critical habitat.

VIII. INCIDENTAL TAKE

Section 4(d) and 9 of the ESA, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The Service anticipates that little, if any, incidental take may occur as the result of the implementation of individual projects designed and approved under this proposed action. The precise level of incidental take cannot be determined at this time, and this incidental take statement does not cover incidental take that might result from those individual projects. Any incidental take must be covered by lower-level (programmatic or project-level) biological opinions, where the amount and the effect of any incidental take can be more accurately defined and reasonable and prudent measures can be designed to eliminate or minimize take.

IX. CONSERVATION RECOMMENDATIONS

A. Forest managers should be notified that all management activities are to be carried out within the bounds or constraints of the standards and guidelines of the Forest Plans, as described in the Glossary of the FEIS under the definition of "standards and guidelines" in the FEIS.

B. The monitoring standard in the FEIS on page 154 should be clarified by changing it to: "Monitor changes in owl populations and habitat needed for delisting."

C. An improved data management system should be developed that allows for standardized and uniform data collection at the Forest level to be used in the monitoring of owl populations and habitats as recommended in the Recovery Plan. This computerized database should have the following characteristics:

- Have a centralized location.
- Be accessible to field workers.
- Should allow for field workers to produce summaries of their own data and to allow them to make comparisons of their own data to past years' data, and to overall data.

IX. REINITIATION STATEMENT

This concludes formal consultation for the Mexican spotted owl and designated critical habitat in regard to the effects of the Mexican spotted owl and its critical habitat from implementation of all eleven forest plans as amended with the new standards and guidelines under Alternative G.

Pursuant to 50 CFR 402.16, reinitiation of formal consultation is required if: (1) new information reveals that management direction may affect the Mexican spotted owl or its critical habitat in a manner or to an extent not previously considered; or (2) the direction is subsequently modified in a manner that causes an effect to the Mexican spotted owl or its critical habitat that was not considered in this opinion. The Service assumes that the Forest Service will select Alternative G as analyzed in the October, 1995, FEIS, and that the Record of Decision for the FEIS will indicate this selection. Should the Forest Service decide to accept an alternative other than Alternative G, this would constitute new information for which re-initiation of consultation for the new proposal would be necessary.

The Service has evaluated the impacts to the owl in this consultation under the assumption that essential components of the Recovery Plan will be implemented. These include population and habitat monitoring for the owl that will standardize monitoring efforts for tracking the region-wide condition of owl habitat. This in turn should greatly increase the consistency and reliability of data used in determining the baseline conditions in consultations on the owl. Because some of the management guidelines in the Recovery Plan are largely untested, the Recovery Plan itself recognizes that timely implementation of the monitoring is essential to validate and, if necessary, adjust the recovery strategy presented in the Plan. The continuing effectiveness of this biological opinion depends on the validity of the Recovery Plan strategy and on confirmation that the inferred baseline conditions accurately reflect the status of owl populations and habitat. Accordingly, the Service expects that the Forest Service will initiate the pilot study for the population and macrohabitat monitoring program within one year of the issuance of this biological opinion. If timely progress is not made on the monitoring program, re-initiation of consultation will be necessary to re-evaluate impacts to the species and habitat.

If you or your staff have any questions regarding this consultation or the consultative process, feel free to contact Ron McClendon of Ecological Services at 248-6653.

Sincerely,

Regional Director

cc:
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Geographic Managers, (U/P)(G/L), Region 2, Albuquerque, NM
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In Reply Refer To:
AESO/SE
22410-2007-F-0028
22410-2007-F-0077 June 26, 2007

Mr. Timothy Short
District Ranger
North Kaibab Ranger District
P.O. Box 248
430 South Main Street
Fredonia, Arizona 86022-0248

Dear Mr. Short:

This biological opinion responds to your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). We received your March 12, 2007, request for formal consultation on March 13, 2007. At issue are impacts that may result from the proposed Warm Fire Hazard Tree Removal projects in the North Kaibab Ranger District (District) of the Kaibab National Forest located in Coconino County, Arizona, on the Mexican spotted owl (MSO) (*Strix occidentalis lucida*) and its critical habitat.

The March 12 letter included a request for concurrence with a determination that the proposed project may affect, but is not likely to jeopardize, the nonessential experimental population of California condors (*Gymnogyps californianus*), which is regarded as a proposed species on Forest Service lands. Section 7 regulations do not require a conference for non-jeopardy determinations made by action agencies for proposed species. However, we recommend full implementation of the conservation measures, and have included our concurrence in Appendix A.

The March 12 letter also includes a request for concurrence with a determination that the proposed action will not affect the conservation agreement species Kaibab plains cactus (*Pediocactus paradinei*). Section 7 regulations do not require you to request our concurrence on "no effect" determinations. However, we agree with your proposal to implement appropriate measures from the conservation strategy. Based on the information you have provided, we do not believe the species will be affected by the project.

This biological opinion is based on information provided in a March 8, 2007, biological evaluation (BE), telephone conversations, meetings, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, road rehabilitation and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

Table 1 is a summary of the consultation history for the proposed project.

Table 1. Consultation history for the Warm Fire Hazard Tree Removal projects in the Kaibab National Forest.

Date	*Event*
September 12, 2006	We received a scoping letter regarding hazard tree removal associated with the Warm Fire along Highway 89A.
October 16, 2006	We responded with comments on the proposed action.
October 25, 2006	We received a scoping letter regarding hazard tree removal associated with the Warm Fire along Forest Service System roads and the Arizona Trail.
November 17, 2006	We responded with comments on the proposed action.
February 21, 2007	We received a draft February 7, 2007, BE for the Hazard Tree Removal projects for review.
March 13, 2007	We received a March 8, 2007, BE for the Hazard Tree Removal projects and received a March 12, 2007, letter requesting formal consultation.
April 26, 2007	We issued a thirty-day letter initiating formal consultation.
May 11, 2007	We issued a draft biological opinion to the District for review.
June 6, 2007	We received comments on the draft biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Most of the information regarding the proposed action in this document is from the March 8, 2007 BE (Sanders 2007). The Warm Fire started on June 8, 2006, from a lightning strike near the junction of Forest Road 205 and Highway 67 on the North Kaibab Ranger District. The fire was managed as wildland fire use until the weather and management conditions abruptly changed on June 24. The fire was converted to a suppression attack wildfire on June 25. The fire was contained on July 3, controlled on August 9, and declared out on September 14. A total of 58,622 acres were burned during wildland fire use and wildfire/suppression. Approximately 39,110 acres that burned during wildfire/suppression sustained severe fire effects.

The fire burned with sufficient intensity to kill many of the trees along Forest Service System roads and the Arizona Trail. Due to concern for public safety, the District developed two hazard tree removal projects to remove dead and dying trees along roads traditionally experiencing high public use and along the Arizona Trail. One project was referred to as the Arizona Department of Transportation (ADOT) Slivers Project, and the other was referred to as the Forest Service Roads Hazard Tree Removal Project. The ADOT Slivers project includes removing trees along Highways 89A and 67 within the fire area where trees could fall into the road prism, but were not within the right-of-way owned by ADOT (our consultation number 22410-2007-F-0028). The other project includes fire mortality salvage along interior unpaved forest roads and along the Arizona Trail (our consultation number 22410-2007-F-0077). The District combined and addressed both projects in the March 8, 2007 BE. The combined projects constitute the proposed action addressed by this biological opinion.

The proposed action will result in removing all trees that pose a hazard to human health and life. Highway rights-of-way and forest roads selected for hazard tree removals burned in both the wildland fire use and wildfire/suppression portions of the Warm Fire. Hazard trees in the wildland fire use portion are scattered, but trees in the wildfire/suppression portion experienced crown fires resulting in large areas of tree mortality.

The entire project will include treatment of more than 82 miles of roads for a total of approximately 2,247 acres. Approximately 11.9 miles (288.6 acres) of the non-highway roads are within the wildland fire use portion and 71.8 miles (1,178.9 acres) are in the wildfire/suppression portion.

For roads that were affected by wildfire/suppression, all trees within an identified treatment area will be removed. The width of the treatment area for roads selected for hazard tree removal will be defined as a 200 foot-wide buffer area centered on the centerline of the road. The length of the treatment area for each road is specific to the given road. For roads that were affected by wildland fire use, only those trees with potential to imminently fall into the road prism will be removed.

Along the Arizona Trail, only those trees in imminent danger of falling into the trail will be removed. The width of the treatment area for the Arizona Trail will be defined as a 100 foot-wide corridor centered on the centerline of the trail. Approximately 14.6 miles of the Arizona Trail will be treated, resulting in about 177 acres of potential tree removal. Areas proposed for hazard tree removal along the Arizona Trail include 4.2 miles (51.2 acres) in the wildland fire use portion and 10.4 miles (124.6 acres) in the wildfire/suppression portion.

Small branches that break off during hazard tree removal will be deposited and left on the forest floor. Larger diameter pieces (3 inches and up) that are the result of hazard tree removal activities will be piled and burned, removed from the hazard tree units to another location for burning, or chipped on site. Only project-created slash would be removed, burned or chipped; some fire-hardened down wood would be retained on the site. The decision to remove or leave some or all of the activity created slash will be at the discretion of implementation crews who will consider site, public safety, contract requirements, funding and soil protection needs.

STATUS OF THE SPECIES

Mexican Spotted Owl

The MSO was listed as a threatened species in 1993 (USDI 1993). The primary threats to the species were cited as even-aged timber harvest and stand-replacing wildfire, although grazing, recreation, and other land uses were also mentioned as possible factors influencing the MSO population. The Fish and Wildlife Service appointed the Mexican Spotted Owl Recovery Team in 1993, which produced the Recovery Plan for the Mexican Spotted Owl (Recovery Plan) in 1995 (USDI 1995).

A detailed account of the taxonomy, biology, and reproductive characteristics of the MSO is found in the Final Rule listing the MSO as a threatened species (USDI 1993) and in the Recovery Plan (USDI 1995). The information provided in those documents is included herein by reference. Although the MSO's entire range covers a broad area of the southwestern United States and Mexico, the MSO does not occur uniformly throughout its range. Instead, it occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Surveys have revealed that the species has an affinity for older, uneven-aged forest, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico.

The U.S. range of the MSO has been divided into six recovery units (RU), as discussed in the Recovery Plan. The primary administrator of lands supporting the MSO in the United States is the Forest Service. Most owls have been found within Forest Service Region 3 (including 11 National Forests in Arizona and New Mexico). Forest Service Regions 2 and 4 (including two National Forests in Colorado and three in Utah) support fewer owls. According to the Recovery Plan, 91 percent of MSO known to exist in the United States between 1990 and 1993 occurred on lands administered by the Forest Service.

The proposed action occurs in the Colorado Plateau Recovery Unit which includes most of southern and south-central Utah, plus portions of northern Arizona, northwestern New Mexico, and southwestern Colorado. MSO habitat appears to be naturally fragmented in this RU, with most owls found in disjunct canyon systems or isolated mountain ranges. In northern Arizona, MSO have been reported in both canyon and montane situations. Recent records of MSO exist for the Grand Canyon and Kaibab Plateau, as well as for the Chuska Mountains, Black Mesa, Fort Defiance Plateau, and the Rainbow/Skeleton Plateau on the Navajo Nation. Federal lands account for 44 percent of this RU. Tribal lands collectively total 30 percent, with the largest single entity being the Navajo Nation.

Historical and current anthropogenic uses of MSO habitat include both domestic and wild ungulate grazing, recreation, fuels reduction treatments, resource extraction (e.g., timber, oil, gas), and development. These activities have the potential to reduce the quality of MSO nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season. Livestock and wild ungulate grazing is prevalent throughout Region 3 National Forest lands and is thought to have a negative effect on the availability of grass cover for prey species. Recreation impacts are increasing on all forests, especially in meadow and riparian areas. There is anecdotal

information and research that indicates that owls in heavily used recreation areas are much more erratic in their movement patterns and behavior. Fuels reduction treatments, though critical to reducing the risk of severe wildfire, can have short-term adverse effects to MSO through habitat modification and disturbance. As the population grows, especially in Arizona, small communities within and adjacent to National Forest System lands are being developed. This trend may have detrimental effects to MSO by further fragmenting habitat and increasing disturbance during the breeding season. West Nile Virus also has the potential to adversely impact the MSO. The virus has been documented in Arizona, New Mexico, and Colorado, and preliminary information suggests that owls may be highly vulnerable to this disease (Courtney *et al.* 2004). Unfortunately, due to the secretive nature of owls and the lack of intensive monitoring of banded birds, we will most likely not know when owls contract the disease or the extent of its impact to MSO range-wide.

Currently, high-intensity, stand-replacing fires are influencing ponderosa pine and mixed conifer forest types in Arizona and New Mexico. Uncharacteristic, severe, stand-replacing wildfire is probably the greatest threat to MSO within the action area. As throughout the West, fire severity and size have been increasing within this geographic area

A reliable estimate of the numbers of owls throughout its entire range is not currently available (USDI 1995) and the quality and quantity of information regarding numbers of MSO vary by source. USFWS (1991) reported a total of 2,160 owls throughout the United States. Fletcher (1990) calculated that 2,074 owls existed in Arizona and New Mexico. However, Ganey *et al.* (2000) estimates approximately 2,950 ± 1,067 (SE) MSOs in the Upper Gila Mountains RU alone. The FS Region 3 most recently reported a total of approximately 1,025 PACs established on NFS lands in Arizona and New Mexico (B. Barrera, pers. comm. June 18, 2007). Based on this number of MSO sites, total numbers in the United States may range from 1,025 individuals, assuming each known site was occupied by a single MSO, to 2,050 individuals, assuming each known site was occupied by a pair of MSOs. The FS Region 3 data are the most current compiled information available to us; however, survey efforts in areas other than NFS lands have resulted in additional sites being located in all Recovery Units. Approximately 200 MSO PACs have been designated in the Colorado Plateau Recovery Unit (S. Hedwall, FWS, pers. comm. 2007).

Researchers studied MSO population dynamics on one study site in Arizona (n = 63 territories) and one study site in New Mexico (n = 47 territories) from 1991 through 2002. The Final Report, titled "Temporal and Spatial Variation in the Demographic Rates of Two Mexican Spotted Owl Populations," (*in press*) found that reproduction varied greatly over time, while survival varied little. The estimates of the population rate of change (Λ=Lamda) indicated that the Arizona population was stable (mean Λ from 1993 to 2000 = 0.995; 95 percent Confidence Interval = 0.836, 1.155) while the New Mexico population declined at an annual rate of about 6 percent (mean Λ from 1993 to 2000 = 0.937; 95 percent Confidence Interval = 0.895, 0.979). The study concludes that spotted owl populations could experience great (>20 percent) fluctuations in numbers from year to year due to the high annual variation in recruitment. However, due to the high annual variation in recruitment, the MSO is then likely very vulnerable to actions that impact adult survival (e.g., habitat alteration, drought, etc.) during years of low recruitment.

Since the owl was listed, we have completed or have in draft form a total of 183 formal consultations for the MSO. These formal consultations have identified incidences of anticipated incidental take of MSO in 376 PACs. The form of this incidental take is almost entirely harm or harassment, rather than direct mortality. These consultations have primarily dealt with actions proposed by FS Region 3. However, in addition to actions proposed by FS Region 3, a total of 18 (approximately 9 percent) PACs in the Colorado Plateau Recovery Unit have been involved in actions where incidental take has been anticipated. We have also reviewed the impacts of actions proposed by the Bureau of Indian Affairs, Department of Defense (including Air Force, Army, and Navy), Department of Energy, National Park Service, and Federal Highway Administration. These proposals have included timber sales, road construction, fire/ecosystem management projects (including prescribed natural and management ignited fires), livestock grazing, recreation activities, utility corridors, military and sightseeing overflights, and other activities. Only two of these projects (release of site-specific owl location information and existing forest plans) have resulted in biological opinions that the proposed action would likely jeopardize the continued existence of the MSO. The jeopardy opinion issued for existing Forest Plans on November 25, 1997, was rendered moot as a non-jeopardy/no adverse modification BO was issued the same day.

In 1996, we issued a biological opinion on FS Region 3 adoption of the Recovery Plan recommendations through an amendment to their Land and Resource Management Plans (LRMPs). In this non-jeopardy biological opinion, we anticipated that approximately 151 PACs would be affected by activities that would result in incidental take of MSOs, with approximately 91 of those PACs located in the Upper Gila Mountains RU. In addition, on January 17, 2003, we completed a reinitiation of the 1996 Forest Plan Amendments biological opinion, which anticipated the additional incidental take of five MSO PACs in Region 3 due to the rate of implementation of the grazing standards and guidelines, for a total of 156 PACs. Consultation on individual actions under these biological opinions resulted in the harm and harassment of approximately 243 PACs on Region 3 NFS lands. FS Region 3 reinitiated consultation on the LRMPs on April 8, 2004. On June 10, 2005, the FWS issued a revised biological opinion on the amended LRMPs. We anticipated that while the Region 3 Forests continue to operate under the existing LRMPs, take is reasonably certain to occur to an additional 10 percent of the known PACs on NFS lands. We expect that continued operation under the plans will result in harm to 49 PACs and harassment to another 49 PACs. To date, consultation on individual actions under the amended Forest Plans, as accounted for under the June 10, 2005, biological opinion has resulted in the incidental take of owls associated with 19 PACs. Incidental take associated with Forest Service fire suppression actions, which was not included in the LRMP proposed action, has resulted in the incidental take of owls associated with 11 PACs.

Mexican spotted owl critical habitat

The final MSO critical habitat rule (USDI 2004) designated approximately 8.6 million acres of critical habitat in Arizona, Colorado, New Mexico, and Utah, mostly on Federal lands (USDI 2004). Within this larger area, critical habitat is limited to areas that meet the definition of protected and restricted habitat, as described in the Recovery Plan. Protected habitat includes all known owl sites and all areas within mixed conifer or pine-oak habitat with slopes greater than 40 percent where timber harvest has not occurred in the past 20 years. Restricted habitat includes mixed conifer forest, pine-oak forest, and riparian areas outside of protected habitat.

The primary constituent elements for proposed MSO critical habitat were determined from studies of their habitat requirements and information provided in the Recovery Plan (USDI 1995). Since owl habitat can include both canyon and forested areas, primary constituent elements were identified in both areas. The primary constituent elements which occur for the MSO within mixed-conifer, pine-oak, and riparian forest types that provide for one or more of the MSO's habitat needs for nesting, roosting, foraging, and dispersing are in areas defined by the following features for forest structure and prey species habitat:

Primary constituent elements related to forest structure include:

- A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30 percent to 45 percent of which are large trees with diameter-at-breast height (dbh) of 12 inches or more;

- A shade canopy created by the tree branches covering 40 percent or more of the ground; and,

- Large, dead trees (snags) with a dbh of at least 12 inches.

Primary constituent elements related to the maintenance of adequate prey species include:

- High volumes of fallen trees and other woody debris;

- A wide range of tree and plant species, including hardwoods; and

- Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration.

The forest habitat attributes listed above usually are present with increasing forest age, but their occurrence may vary by location, past forest management practices or natural disturbance events, forest-type productivity, and plant succession. These characteristics may also be observed in younger stands, especially when the stands contain remnant large trees or patches of large trees. Certain forest management practices may also enhance tree growth and mature stand characteristics where the older, larger trees are allowed to persist.

There are eight critical habitat units located in the Colorado Plateau RU totaling approximately 3.4 million acres of designated critical habitat, although not all of those acres meet the definition of critical habitat.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

A. Status of the species within the action area

Mexican Spotted Owl

Some, but not all, of the project area containing MSO habitat has been surveyed to protocol in conjunction with other projects in 2000, 2002, 2004, and 2005 (Sanders 2007). Table 2 summarizes the survey status of MSO habitat within the wildfire/suppression area, not just that within hazard tree removal corridors along the roads. No MSO were detected during those surveys.

Table 2. Survey status of MSO habitat within the Warm Fire suppression area.

Surveyed		*Unsurveyed*	
Habitat Category	*Acres*	*Habitat Category*	*Acres*
Restricted	4,407.59	Restricted	1,928.25
Target	2,183.66	Target	347.16
Threshold	473.92	Threshold	40.23
Total	7,065.17	Total	2,315.64

The project area was subjected to an intense wildfire. No surveys were conducted in advance of burning, and no surveys have been completed since due to a lack of access, safety concerns, and time of fire occurrence in relation to MSO breeding seasons.

Mexican Spotted Owl Critical Habitat

All of the MSO habitat in the project area is also designated forested critical habitat in MSO critical habitat unit CP-10. Unit CP-10 is 918,000 acres in size, but because not all of that acreage is protected or restricted MSO habitat (USDI 2004), the amount of actual MSO critical habitat in the unit is an unknown smaller proportion of that figure. There is no canyon MSO critical habitat in the project area.

B. Factors affecting the species' environment within the action area

Mexican Spotted Owl

No MSO habitat occurs in the wildland fire use portion of the Warm Fire. MSO habitat occurs in the wildfire/suppression portion of the burned area, and Table 3 summarizes the fire effects in that portion of the Warm Fire.

Table 3. Summary of fire effects to MSO habitat in the wildfire/suppression portion of the Warm Fire.

Habitat Category	*Low Severity (acres)*	*Low-Moderate Severity (acres)*	*Moderate-High Severity (acres)*	*High Severity (acres)*	*Total (acres)*
Restricted	763	658	539	4,374	6,334
Target	309	301	240	1,680	2,530
Threshold	21	58	57	378	514
Totals	1,093	1,017	836	6,432	9,378

Mexican Spotted Owl Critical Habitat

Because all of the MSO habitat in the project area is also designated critical habitat in MSO critical habitat unit CP-10, the fire effects summarized in Table 3 also apply to the critical habitat.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Mexican Spotted Owl

In general, MSO can be affected in two major ways. The regular behavior (feeding, sheltering, breeding) of individuals can be affected by noise or other disturbance associated with project activity. The second major category of potential effect to the species is alteration or loss of its habitat.

Most of the MSO habitat involved in the project area has been surveyed for MSO, and no individuals were detected as a result of the surveys. The relevant surveys were conducted in 2000, 2004, 2005, and 2006 prior to other project activities, in accordance with the protocol in effect at the time of the surveys. However, there are unsurveyed areas within the wildfire/suppression area and the hazard tree removal areas (Sanders 2007). The Wildfire/Suppression Area column of Table 4 represents all acres within the suppression area that were not surveyed, and the Hazard Tree Removal Areas column represents all acres in the hazard tree removal corridors along the roads.

Table 4. Unsurveyed MSO habitat in the Warm Fire wildfire/suppression and hazard tree removal areas.

Habitat Category	*Wildfire/ Suppression Area (acres)*	*Hazard Tree Removal Areas (acres)*
Restricted	1,928.25	94.48
Target	347.16	31.90
Threshold	40.23	0.10
Total	2,315.64	126.48

Project implementation will begin as soon as possible during summer 2007 and continue until completed. Some of the project areas were not previously surveyed, and the Forest Service does not plan to survey these areas prior to implementation. Although much of the Warm Fire resulted in high severity burns (Table 3), some herbaceous vegetation remained or responded following the fire in areas that burned at a lower intensity. This regrowth is likely to result in higher populations of small mammals in these areas, increasing the prey base available for MSO or other raptors. It is possible that noise and human activity during hazard tree removal could disturb MSO foraging in or dispersing through the project area.

Table 5 summarizes the amount of MSO habitat in each habitat category that will be affected by the proposed project. All or most of the dead and dying trees will be removed from this habitat.

Table 5. MSO habitat that will be treated with hazard tree removal.

Habitat Category	*Acres*
Restricted	436
Target	288
Threshold	140
Total	864

MSO habitat in the project area sustained a range of fire effects due to the Warm Fire. The proposed project will further remove dead trees in the MSO habitat of the selected treatment areas. The large snag component of the MSO habitat will be reduced by the project. Complete removal of the trees will also affect the recovery of the large down log component of that MSO habitat in the future. Combined with the fire effects, hazard tree removal will result in even-aged stand conditions over a large area until trees age enough to develop mixed-species and uneven-aged conditions. Roadside areas are key zones to protect visitors and allow speedy access into remote areas for future fire suppression. Therefore, these roadside areas will likely not contribute to long-rotation periods and uneven-aged conditions (Sanders 2007), reducing the amount of MSO habitat that can be recovered in the project area.

Large snags are a key habitat component of MSO habitat, and that component will be significantly reduced by the project. The estimated numbers of large (12 inches in diameter at breast height [dbh] or larger) snags to be removed from the 864 acres of MSO habitat are summarized in Table 6.

Table 6. Estimated number of large snags that will be removed in MSO habitat.

Location	*MSO Habitat (acres)*	*Ponderosa Pine*	*White Fir*	*Douglas-fir*	*Engelmann Spruce*	*Aspen*	*Total*
Between mileposts 586 and 594 of Highway 67	243	300	70	28	1	12	411
Forest Service Roads and the Arizona Trail	618	742	185	7,107	247	3,028	11,309
Total	861	1,042	255	7,135	248	3,040	11,720

Trees smaller than 12 inches dbh will not be targeted for removal unless they obstruct equipment access to larger trees, they pose a hazard to cutting crews, or they pose a risk to motorists. Those smaller trees, when cut, would be treated like slash from larger trees during the operation and piled and burned, removed, or chipped. Some aspen may be bucked into segments and left on-site due to limited market and extensive heart rot.

Large down logs are another key habitat component of MSO habitat. Most of the down wood that existed prior to the Warm Fire was probably consumed by the fire. The proposed action will remove the large diameter (3 inches and larger) debris created by removing the hazard trees. In addition, removal of all or most of the standing trees from the treatment areas will preclude the recruitment of large down logs in the treated MSO habitat. Only scattered, residual fire-hardened down wood will remain after hazard tree operations. Portions of Forest Service Road 641U (approximately 2.5 miles), and the tips of roads that overlap Inventoried Roadless Areas will not have trees removed once fallen. Trees may be bucked up to allow them to be manually rolled away from the roadbed, and could be collected by fuel-wood harvesters or others.

Ground-disturbance activities associated with hazard tree removal will also slow recovery of treated MSO habitat. Use of machinery and other project activity on already damaged soils can lead to soil compaction and scarification (Beschta *et al.* 2004, Donato *et al.* 2006). Continued disturbance of the ground could result in less or slower recovery of the vegetation, including trees and understory plant cover, that constitutes MSO habitat.

In summary, the proposed action will adversely affect key habitat components including large snags and large down logs in the 864 acres of MSO habitat in the treatment units. The project will remove most of the key habitat components that remain in the road and trail corridors. These areas will serve as fuelbreaks and safety corridors indefinitely. The Forest Service will not deliberately alter the natural recovery until vegetation is of sufficient density and size to provide a fuels or safety hazard. This management will likely reduce the overstory MSO habitat characteristics from developing. The project will create wider road and trail corridors across the area, limiting recovery of habitat in these corridors. This leads to further habitat fragmentation, reducing value of the area for dispersing and foraging birds.

Mexican Spotted Owl Critical Habitat

All of the 864 acres of MSO habitat selected for treatment are also designated forested MSO critical habitat in critical habitat unit CP-10. The anticipated effects of the action on the primary constituent elements of that critical habitat are summarized below.

30-45 percent of trees are 12 inches dbh or larger

The proposed action will remove most or all of the dead trees from the selected road or trail prisms in the project area. As a result of the Warm Fire, those areas of MSO critical habitat do not currently contain live trees, and the project will not affect the proportion of live trees over 12 inches dbh in the hazard tree removal areas.

Shade canopy of tree branches covering 40 percent or more of the ground

Shade canopy will not be affected within the hazard tree removal areas because living tree canopies no longer exist in the affected MSO critical habitat.

Large snags that are 12 inches dbh or larger

As stated above in the Effects of the Action-Mexican Spotted Owl section, all or most of the trees in the selected treatment areas in MSO habitat will be removed. Thus, all or most (11,720) large snags will be removed from 861 acres of MSO critical habitat. The removal virtually eliminates this primary constituent element in long corridors through the affected MSO critical habitat.

High volumes of fallen trees and other woody debris

As stated above in the Mexican Spotted Owl section, few large down logs and little other woody debris remains in the project area as a result of the Warm Fire. The proposed action will remove the large-diameter debris created by removing the hazard trees, but not the fire-caused existing down wood unless it provides a hazard to crews or the public. Furthermore, removal of all or most standing trees from the treatment areas will preclude the recruitment and recovery of large down logs in the treated MSO critical habitat. Thus, this primary constituent element will also be virtually eliminated in the treated MSO critical habitat.

A wide range of tree and plant species, including hardwoods

Dominant vegetation in MSO critical habitat in the project area prior to the Warm Fire consisted of a mixture of woody plants, warm and cool season grasses, and forbs. Woody plants included aspen, Gambel oak, ponderosa pine, blue spruce, Douglas-fir, white fir, Engelmann spruce, sub alpine fir, Fendler's ceanothus, and New Mexico locust. Those species may recover in the future, depending on how the treatment areas are managed. However, ground activities associated with hazard tree removal will slow the recovery of these species in MSO critical habitat. Effects to the soils from project activity may also differentially affect the recovery of each of the species.

Adequate levels of residual plant cover to maintain fruits, seeds and allow plant regeneration

Due to the fire effects of the Warm Fire, little residual plant cover exists in the MSO critical habitat that will be treated in the proposed action. Plant cover may recover in the future, depending on how the treatment areas are managed. However, ground activities associated with hazard tree removal will slow the recovery of plant cover in MSO critical habitat. Effects to the soils from project activity may also differentially affect the recovery of species that contribute to plant cover.

In summary, the proposed action will adversely affect the primary constituent elements that include large snags, large down logs, and other plant cover in the 864 acres of MSO critical habitat in the treatment units. That habitat will be altered to the point that few to no primary constituent elements will remain. These areas will not be managed to eventually recover to pre-fire conditions due to the treatments. The affected MSO critical habitat will be lost, and will no longer contribute to the survival and recovery of the species.

We know from past experience in occupied areas that, immediately post-fire, MSO use burned forests in the short-term for foraging, roosting, and nesting due to increased prey response following understory production (Bond *et al.* 2002). In the longer-term, severely burned areas across large landscapes may offer less use to MSO. However, as the MSO habitat affected by the Warm Fire recovers either naturally and/or with human facilitation, MSO in the area will eventually be able to use the habitat again for foraging, sheltering, dispersal and other movements, and reproduction. The Kaibab Plateau may play an important role in dispersal of MSO from canyon habitats in Utah to those in northern Arizona. Future management of burned MSO critical habitat in the Warm Fire area to recover the primary constituent elements that have been lost can play an important role in recovery of the MSO.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The action area occurs entirely on Federal land, and therefore non-Federal actions are likely to be minimal. Private actions that are likely to occur within the action area include various forms of recreation such as sightseeing, camping, hunting, horse riding, hiking, and biking.

CONCLUSION

After reviewing the current status of the MSO and MSO critical habitat, the environmental baseline for the action area, the effects of the proposed project in the North Kaibab Ranger District, and the cumulative effects, it is our biological opinion that the Warm Fire Hazard Tree Removal projects in the Kaibab National Forest, as proposed, are not likely to jeopardize the continued existence of the MSO, or result in adverse modification of MSO critical habitat.

We present this conclusion for the following reasons:

1. No designated MSO PACs are in the project area.

2. The proposed action is of limited scope and duration.

3. The project will affect 864 acres of MSO critical habitat which is an unknown but very small percentage of critical habitat in the CP-10 critical habitat unit (USDI 2004).

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). "Harass" is defined as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering (50 CFR 17.3). "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

AMOUNT OR EXTENT OF TAKE

We do not anticipate that the proposed action will incidentally take any MSO.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species, initial notification must be made to our Law Enforcement Office, 2450 West Broadway Road, Suite 113, Mesa, Arizona 85202 (telephone: 480/967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

We have not identified any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate your efforts to identify and minimize effects to listed species from this project. For further information, please contact Bill Austin at (928) 226-0614 (x102) or Brenda Smith (x101).

Sincerely,

/s/ Steven L. Spangle
Field Supervisor

cc: Forest Supervisor, Kaibab National Forest, Williams, AZ

Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix AZ
Regional Supervisor, Arizona Game and Fish Department, Flagstaff, AZ
Shaula Hedwall, Fish and Wildlife Service, Flagstaff, AZ

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APPENDIX A - CONCURRENCE

We concur with your determination that the proposed project may affect, but is not likely to jeopardize, the nonessential experimental population of the California condor. We base this concurrence on the following measures that are part of the proposed action (Sanders 2007):

1. At least one week prior to the beginning of any human project-related activity, the district biologist will contact the Peregrine Fund to identify condor locations and type of behavior or activity in or near the activity area. If multiple activities are undertaken within a similar timeframe, condor activity will be monitored by the district biologist during that period rather than for a specific treatment type. Educate all crews about the potential for condors to arrive on-site, and the appropriate actions to take.

2. While nesting activity is likely limited in and adjacent to potential treatment areas, condors may select a nest site within or near the project boundary. If condor nesting activity is identified within 0.5 mile of any treatment area, some types of activity may require adjustments to work areas (i.e. shifting to another area away from nesting area, etc.), or limitations to human disturbance during the nesting season. Different activities have different effects on condor behavior; therefore, no set direction can be given for all activities.

3. The need to alter implementation schedules, adjust work areas, or take other appropriate action will be evaluated by the district biologist and applied when condor nesting near a project site becomes an issue, on a case-by-case basis. FWS Biologists may be notified to assist in project adjustments to protect condors as needed. The important factor is rapid notification to avoid condor or human injury, and appropriate steps to allow project continuation without interfering with condor behavior.

4. If condors arrive and remain in or are very near human activity areas, the following actions will be taken:

    - Elevate the awareness of crews working in the area of the potential for condors to visit an area

    - Educate crews working in the area of potential visitation by condors and how to respond.

    - Prior to the start of a project component, the district contact personnel monitoring condor locations and movement to determine condor status in or near the project.

    - Project workers and supervisors will be instructed to avoid interaction with condors and to contact the appropriate personnel immediately if and when condor(s) occur at a project site.

    - If a condor occurs at the project site, permitted personnel (biologists) will employ techniques to cause the condor to leave the site as necessary. The particular

project activity will temporarily cease if injury of a condor is imminent, until a biologist can assess the situation and determine the correct course of action.

- Project sites will be cleaned up at the end of each work day (i.e., trash disposed of, scrap materials picked up) to minimize the likelihood of condors visiting the site. District condor staff will complete a site visit to ensure adequate clean-up measures.

- To prevent water contamination and potential condor poisoning, the district-approved vehicle fluid-leakage and spill plan will be adhered to. The plan will be reviewed by the district biologist for adequacy in addressing condors.

Region II Commission Briefing July 27, 2007

U.S. Forest Service

TMR

The Coconino National Forest has scheduled a third round of public meetings on the Travel Management Rule July 31 to August 4. In this round of public meetings the Forest will be presenting a proposed action including maps and will be taking Public Comment. The Department will be represented at all four meetings. The Kaibab has not scheduled any more public meetings or made any decisions at this point.

Forest Plan Revision

The Kaibab has said they hope to resume collaborative efforts on the Plan Revisions in September. The following are excerpts from the letter we received:

> *"Nationally, the Forest Service has filed a notice to prepare an environmental impact statement to address the flaws identified by the court in the 2005 Rule process. The Arizona Forests have all continued to work on several tasks associated with Plan revision in a manner consistent with the National Forest Management Act and neutral with respect to the various planning rules that might apply. The Kaibab NF will continue to work on those over the next several months to identify needs for change to the Plan. We intend to do much of this with those of you who would like to help us.*

The work many of you helped us with previous to the court ruling is not lost. Nearly all of it will continue to be used in identifying the needs for change. Specifically:

- *Public participatory processes will resume. Although the 2005 Rule was the only one that required collaboration, none of the others prohibited it, and we think it's a good idea.*
- *We will continue to aim for a more strategic, less prescriptive Plan as an end product, with a primary focus upon desired conditions and objectives to make progress toward the desired conditions.*
- *Sustainability analyses are continuing in order to ensure compliance with the requirements of NFMA. We are preparing a rough draft of the ecological sustainability report, incorporating information and public input for the two primary parts of this analysis – ecosystem diversity and species diversity. While we are not sure how species will eventually be addressed in the Plan, the information developed with your help is captured in a database that will serve as an invaluable reference, regardless of which process we use. We have finished a rough draft of our social and economic sustainability report, incorporating information and public input. Once these sustainability analyses have been reviewed internally, we will share them and engage in dialogue with our publics to identify the social and economic needs for change.*

Beginning in late September, we hope to resume public processes to continue this work, aiming toward completion of a comprehensive assessment of the needs to change the Plan this winter. As we move through the summer, we will be sending you specifics about meeting topics, times and places"

Plan revision efforts have been extremely quite and the Region has not been involved on any of the Forests.

Goshawk Guidelines

The Department has concern about a shift in how the Forest Service implements their own Northern Goshawk Guidelines within the current Forest Plan. One of the primary concerns the Department has with the new interpretation is that forest thinning treatments have the potential to reduce overall tree canopy cover to levels that may not meet the habitat needs for wildlife within those treated areas. The Department has vetted these concerns at several meetings and has been unable to resolve these concerns with the Forest Service. All previous Forest Service planning projects have planned canopy cover reduction levels at the stand level. Under the new interpretation of the goshawk guidelines, the Forest Service is proposing target canopy cover ranges at the group level as opposed to the stand level (where a group is defined as an aggregation of one or more clumps of trees of varying age and size interspersed with openings).

The Management Recommendations for the Northern Goshawk in the Southwestern United States (GTR-RM-217) defines northern goshawk habitat through the structural habitat attributes of 14 of the hawk's prey species. The canopy cover data described for these prey species, and for the northern goshawk, were measured at the stand level – not the tree group level. By changing the canopy cover targets from the stand level to the group level, the Department is concerned that the Forest Service may not be meeting the habitat requirements for those 14 wildlife species, and also may not be meeting the habitat requirements for the northern goshawk per the 1996 Forest Plan Amendment.

Related to the new Forest Service guidance for implementing the northern goshawk guidelines, the Department is also concerned that Forest Service proposed treatment might trend toward even-aged group selection over time. For example, the Forest Service proposed to regenerate groups of VSS1 and 2 while reducing canopy cover for tree groups of other VSS classes. Managing tree groups by VSS class comes across as even-aged tree group management. However, scientific literature describing the historic range of variability in southwestern ponderosa pine does not find that tree groups were even aged. Rather, the literature suggests that tree groups were often comprised of multi-aged trees intermingled intimately in the same area (Long and Smith 2000, Mast et al. 1999, White 1985). Uneven aged tree composition within groups is important for vertical structure and provides forage and breeding habitat for songbirds as well as thermal cover for raptors as well as deer and elk.

Department personnel from Regions I and II, Research Branch, Nongame Branch and Habitat Branch attended a workshop on the new interpretation in Flagstaff including a field trip to stands marked under the new interpretation. All the Department personnel who attended the workshop were concerned that the degree of openness permitted under the new interpretation because of its potential to negatively impact forest wildlife including goshawk squirrel, bear, turkey, and dense forest songbirds.

The Forests have decided that they do not need to do any NEPA on these changes because they believe it is simply clarification of existing guidance. The Department is of the opinion that the Forests should have gone through the NEPA process, or at minimum consulted with the state and federal fish and wildlife agencies. Consultation, or a forum for discussion, is necessary between the Forests and the Department to resolve these concerns.

Regional Wood Supply Analysis

The Department is participating in the Wood Supply Working Group, which just recently held its second (of 7) meetings. The WSWG is comprised of natural resource agencies and wood utilization private industries; the group is facilitated through a Forest ERA (NAU – Tom Sisk's Lab) grant; and the grant is funded by the Forest Service. The group is tasked with estimating the amount of small-diameter ponderosa pine wood that would be available from forest restoration projects, for the purpose of establishing a small-diameter wood industry. As per the Governor's Forest Health Strategy, and other regional economic assessments, landscape-scale restoration of fire-adapted ecosystems is unaffordable under current contracting processes. The only way to see landscape scale treatments be implemented would be to allow small diameter wood industries to pay for the restoration treatments. Wood industries, however, are only willing to pay for these treatments if they know the wood supply will be adequate to cover the costs and generate profit.

The Department supports this effort, as long as the analysis is driven by goals of forest restoration, wildlife habitat, and restoration of fire-adapted ecosystems (as opposed to designing treatments that maximize industry gain and encourage long-term extraction of trees beyond the goals of forest restoration). The analysis uses a GIS approach, and the Department has worked successfully to ensure that threatened and endangered species habitat, riparian habitat, and wildlife movement corridors are considered during the analysis. A product from this WSWG is expected in fall 2007.

Kaibab National Forest

Westside Habitat Improvement/Slide Fire:

On July 5, 2007 at 2:30 pm lightning ignited a fire within the Westside project area. This fire burned about 6,000 acres and burned sections of the treatment area defined as pinyon/juniper push areas, pinyon juniper woodlands, upland areas, and valley bottoms. The fire burned in a mosaic pattern and a majority of the fire was low to moderate intensity. A significant portion of the fire burned over the acreage burned in the 1996

Bridger fire. A Burned Area Emergency Response (BAER) team was formed and several rehabilitation treatments for the areas that burned at a moderate to high intensity are planned for implementation. As stated in the draft BAER report, the goal for the treatments is for the control of cheatgrass not for erosion control.

During the time of the fire, it was recognized by the media radio and press releases that this area is in quality mule deer habitat. Region II had the opportunity to comment on the initial report and suggested to the team that they incorporate shrub seed into the treatments to aid in the return of winter browse species; and that they consider increasing the amount of early successional native grasses as opposed to planting sterile rye. There is evidence in the literature that if successfully germinated, sterile rye grasses can impede the establishment of native vegetation.

At the present time, the fire has not slowed plans for implementation on the Westside. There may be slight modifications in timing of seeding and herbicide treatments however; the Department still plans on seeding 500 acres of desirable browse species in the fall of 2007. The Region has been working with Truax Drills, Inc. who has been developing an interseeding tool that will seed shrubs into existing vegetation. Jim will be coming out to do a site visit on the 30th of July to the Westside treatment area to hone in on specifications for the tool as well as look at current conditions within the fire footprint and beyond.

Currently, pinyon and juniper habitat treatments are expected to resume on the Westside next week. Forest closures due to dry conditions as well as the wildfire halted implementation for several weeks. The contractor continues to do an excellent job removing juniper from historic push treatments. This type of treatment will continue throughout the summer.

Coconino National Forest

Senate Bill 1441 Progress on Anderson Mesa Grassland Restoration

Both the grassland restoration and the lake fencing are on going since the last commission briefing. Approximately an additional 1500 acres of grassland restoration and 200 acres of seeding have been completed. This brings us up to approximately 2600 total acres of grassland restoration and 530 acres of seeding. Diablo trust is currently talking with additional contractors and considering hiring more crews to speed up the work.

GFFP

The Department continues to participate in the Greater Flagstaff Forests Partnership (GFFP) on two primary projects: 1. Completion of the Jack Smith/Schultz Fuels Reduction Project NEPA planning, and 2. Ensuring that the Forest's and GFFP's commitment to assisting with Research Branch's wildlife research in the wildland-urban interface of GFFP projects is honored. While the scope and future activities of GFFP are still uncertain at this time, the Department will continue to follow GFFP activities and gauge the benefit of our continued participation.

BLM Arizona Strip District:

Upper Lang's Run Integrated Vegetation Management:

The Department commented on a draft EA for a 9,000-acre watershed vegetation project near Mount Trumbull. The Strip District is beginning to look at planning at a watershed level, which will increase acreages associated with treatments. While the Department is in full support of this type of planning, it has become increasingly important to be involved with all stages of the project. We have been working well with the District on this project; however, we have some concerns that not all the appropriate tools are being addressed as possibilities to meet vegetation objectives. For example, many of the conditions in the project area are that of an overstory of pinyon and juniper with little to no understory. At this point the BLM plans to thin some of the overstory, but has not fully explored methods to do so, as well as how to incorporate appropriate seeding techniques. The Department has plans for several field trips to this project area and is confident at this point that our issues will be heard and at lease partially incorporated into project planning.

OTHER

Colorado Plateau Native Plant Initiative (CPNPI) and the Northern Arizona Native Seed Association (NANSA)

During the week of June 11th, Regional staff attended the Colorado Plateau Native Plant Initiative Meeting in Moab, Utah.

For several years, state, federal, and non-profit groups in Utah have been engaged with the development of native plant materials on the northern part of the Colorado Plateau. Region II has worked with members of these groups over the last 2 years in gaining skills in how to use these native plant materials on the landscape, specifically related to the Westside Project on the North Kaibab Ranger District. With increasing habitat degradation due to fire, drought, and excessive grazing, important AZ wildlife habitat continues to be at risk. To date, the limiting factor for habitat restoration is adequate native plant materials.

Until recently, the scale of Utah's native plant program did not include the southern part of the Colorado Plateau or any of AZ to speak of. This status is changing and the main reason for this meeting was to work toward joining the existing groups into one Colorado Plateau Native Plant Initiative, and the expansion of efforts Colorado Plateau wide. At this time, AZ groups and agencies are welcomed, invited, and encouraged to participate. The group is not asking for money at this time but more importantly ideas and needs for the program. Because this group is just starting, there is an opportunity to be in an active, leadership role from the states perspective. The UTDWR has had a successful habitat

restoration program for years, and should the Dept. head in this direction, the Region recommends that we utilize their experience.

Notes from the 1st Colorado Plateau Native Plant Initiative are available upon request. Opportunities to learn and participate more in the program will become available in September at a Restoration Workshop in Grand Junction, CO and in early November at The Ninth Biennial Conference of Research on the Colorado Plateau, Flagstaff, AZ.

At a more local level, the Northern Arizona Native Plant Association (NANSA) had an additional meeting in July. This group continues to work as a sub-group of the CPNPI. This group hopes to raise awareness within the local area for the need for native seed, work on developing a market for local seed, and continue to work on small native seeding projects. Although this group has only recently formed, there is now the potential for a coordinator, which will expedite the ability to gather interest and apply for grant money.

Coconino County

We are actively engaged in the Coconino County Parks and Recreation effort to sell a conservation easement on Pumphouse Greenway to NRCS through the Farm Bill's Wetland Reserve Program. The Department is currently working with Coconino County and NRCS to develop a conservation plan for the easement that will restore and enhance the wetlands of Pumphouse Greenway, reduce wildlife disturbances and control human/domestic dog access within the wetland, and provide substantially more Watchable Wildlife developments for the area. Planning is almost complete, and the easement purchase is scheduled to occur in November 2007. The Department recently participated in a public meeting on the Pumphouse WRP, where we presented information on wildlife habitat in the wetlands as well as Watchable Wildlife opportunities.

Naval Observatory INRMP

We attended a meeting and reviewed a draft plan for the management of natural resources on the Naval Observatory.

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Gene Waldrip
District Ranger, Peaks Ranger District
5075 N. Highway 89
Flagstaff, AZ 86004

RE: Comments on the Jack Smith/Schultz Fuel Reduction and Forest Health Project Proposed Action

5 June 2007

Dear Mr. Waldrip,

The Arizona Game and Fish Department (Department) has reviewed the Jack Smith/Schultz Project: Proposed Action (PA) by the Coconino National Forest Peaks Rangers District (FS). The Department appreciates the extensive opportunities for collaborative participation with the FS Inter-disciplinary Team (IDT) and the Greater Flagstaff Forest Partnership (GFFP) during development of the Proposed Action.

The Department would like to take this opportunity to acknowledge the progress the FS has made over the last several GFFP-collaborative fuels reduction project in their approach toward forest restoration and wildlife habitat. We have seen a positive evolution in FS-GFFP proposed actions that will result in more heterogeneous forest stand structure that provides higher quality wildlife habitat for multiple species. In particular, the Department would like to thank the IDT for their willingness to craft language within the PA that explicitly defines the terms they used to describe spatial heterogeneity (e.g., tree groups and stand openings). Clumpy/groupy stand structure tends to offer better vertical diversity, thermal and hiding cover, as well as better foraging opportunity for wildlife than does a more evenly-aged, evenly-spaced forested stand. The stand structure described in the PA will provide wildlife habitat that more closely resembles the historic range of variability than would a homogeneous stand structure, and the Department acknowledges the IDT's efforts to achieve these conditions within the PA.

Moreover, the Department appreciates the IDT's efforts to ensure that there is a diversity of group sizes within the stands of the project area, and that the amount of forested area in canopy cover is well-represented within the range of canopy covers proposed. For example, in the Schultz Pass WUI West Zone, the FS proposed a minimum of 25% of groups will retain canopy cover greater than 50%, 50% of groups will be retained with canopy cover between 40 and 50%, and no more than 25% of groups will reain canopy cover between 30 and 40%. This type of planning helps to ensure that some groups will be large in size with higher canopy cover, which is an important forest characteristic upon which many wildlife species depend, particularly passerines, turkeys, raptors, mule deer, and black bear.

However, the Department reserves some concern about the proposed shift in how the FS plans to reduce overall tree canopy cover within treated areas. The Department has vetted these concerns during several IDT and GFFP meetings and has been unable to resolve these concerns with the FS. All previous FS-GFFP planning projects have planned canopy cover reduction levels at the stand level. In this PA, the FS is proposing target

canopy cover ranges at the group level as opposed to the stand level (where a group is defined as an aggregation of one or more clumps of trees of varying age and size interspersed with openings). The Department finds that this change has the potential to significantly reduce the amount of forest cover within treated areas. For example, the PA proposes to reduce the forested area in certain zones to between 30-50%. Canopy cover within that forested area will be reduced to 30-60%. Under this proposal, overall canopy cover in this management zone could be reduced to as little as 10% canopy cover if measured across the stand. Without considering the average canopy cover across stands, the Department has some concerns that the FS may not meet the canopy cover requirements for wildlife in the project area.

It is our understanding that the decision to reduce canopy cover at the group level is based on Region 3 guidance, per a new interpretation of the northern goshawk guidelines within the 1996 Forest Plan Amendment (#11). However, the Department has received no formal documentation of the new interpretation.

The Management Recommendations for the Northern Goshawk in the Southwestern United States (GTR-RM-217) defines northern goshawk habitat through the structural habitat attributes of 14 of the hawk's prey species. The canopy cover data described for these prey species, and for the northern goshawk, were measured at the stand level – not the tree group level. By changing the canopy cover targets from the stand level to the group level, the Department is concerned that the FS may not be meeting the habitat requirements for those 14 wildlife species, and also may not be meeting the habitat requirements for the northern goshawk per the 1996 Forest Plan Amendment.

Related to the new FS guidance for implementing the northern goshawk guidelines, the Department is also concerned that FS proposed treatment may trend toward even-aged group selection over time. For example, the FS proposed to regenerate groups of VSS1 and 2 while reducing canopy cover for tree groups of other VSS classes. Managing tree groups by VSS class comes across as even-aged tree group management. However, scientific literature describing the historic range of variability in southwestern ponderosa pine does not find that tree groups were even aged. Rather, the literature suggests that tree groups were often comprised of multi-aged trees intermingled intimately in the same area (Long and Smith 2000, Mast et al. 1999, White 1985). Uneven aged tree composition within groups is important for vertical structure and provides forage and breeding habitat for songbirds as well as thermal cover for raptors as well as deer and elk.

The Department requests the FS consider our concerns regarding overall canopy cover across stands as well as across the treated areas, and recommend the FS carefully evaluate potential impacts this canopy cover reduction might have on wildlife habitat during the Effects Analysis. The Department also requests any formal documentation that may be available describing the new Region 3 guidance for interpreting the northern goshawk guidelines, as well as an opportunity to formally comment on that new interpretation.

Thank you for the opportunity to comment on the Jack Smith/Schultz PA. We acknowledge the IDT efforts to carefully describe resultant forest structure post-treatment, and we look forward to continued cooperation on implementation of this important forest restoration and community protection project. If you have any questions or require additional information, please contact Sarah Lantz, Urban Wildlife Planner at 928-607-0650, slantz@azgfd.gov.

Sincerely,

Sarah Lantz

The Important Role of Standards in National Forest Planning, Law, and Management

by Martin Nie and Emily Schembra

Martin Nie is Professor of Natural Resources Policy in the College of Forestry and Conservation at the University of Montana. Emily Schembra is an Associate at the Center for Natural Resources and Environmental Policy, University of Montana. The authors wish to thank the McIntire-Stennis Cooperative Forestry Research Program for its generous grant support.

Summary

A focal point in conflict over U.S. national forest management is the writing of regulations and forest plans pursuant to the National Forest Management Act. One of the most contested questions in forest planning is what role standards play and ought to play in the process. Standards are legally enforceable, binding, and mandatory requirements and constraints that are found in planning regulations or individual unit-level national forest plans. Case law and public comments reveal key issues, questions, and concerns related to the use of standards in forest planning and law.

Much of the controversy surrounding U.S. national forest management has centered on the writing of forest planning regulations pursuant to the National Forest Management Act (NFMA) of 1976.[1] These regulations shape how national forests throughout the United States are managed. The issue of how standards should be used in forest planning is a focal point in this debate. While some interests believe that enforceable standards promote accountability and ensure environmental protection, others view them as too cumbersome, onerous, and inflexible.[2] We observed that missing from this debate was a shared understanding of the term and how standards have actually been used by the U.S. Forest Service (USFS) in the past. We also noticed that little attention has been given to the issue of how standards might be used in a more effective fashion in the future.

This Article sets out to clarify how forest planning standards have been used in the past and how they might be used more effectively in the future. It begins by placing the issue of standards in its complicated legal and regulatory context. This background helps explain why the issue of standards will become increasingly important as roughly one-half of the national forests throughout the United States soon begin revising their land and resource management plans (forest plans), as required by the NFMA.[3] We then summarize some of the key lessons to be drawn from the case law surrounding forest-planning standards. This brief review provides additional context for readers and helps explain some of the issues that are raised in subsequent sections. Following the methods section is a typology of what standards are most typically found in our sample of forest plans. This is followed by a summary of common arguments and counterarguments pertaining to standards. We finish the Article with a number of observations and recommendations.

I. Background

The U.S. National Forest System (NFS) is governed by three core laws: the Organic Act (1897),[4] the Multiple-Use Sustained-Yield Act (MUSYA 1960),[5] and the NFMA 1976. The latter created a three-tiered regulatory approach to planning.[6] At the highest level, national-level NFMA

1. 16 U.S.C. §§1600-1687, ELR Stat. NFMA §§2-16.
2. *See infra* Part III.
3. National Forest System Land Management Planning, 77 Fed. Reg. 21162; 21164 (Apr. 9, 2012).
4. Organic Administration Act of 1897 (Organic Act), Act of June 4, 1897, ch. 2, 30 Stat. 11, 34-36 (codified as amended at 16 U.S.C. §§473-482, 551 (2000)).
5. Multiple-Use Sustained-Yield Act of 1960, 16 U.S.C. §§528-531 (2000).
6. For a more elaborate explanation of this tiered approach, see *Citizens for Better Forestry v. U.S. Dep't of Agric.*, 341 F.3d 961, 33 ELR 20263 (9th Cir. 2003).

regulations govern the development and revision of second-tier forest plans. Site-specific projects make up the third tier of planning, and they must be consistent with the NFMA regulations and their forest plan.[7] Forest plans typically make zoning and suitability decisions and limit and regulate various activities within a forest area, therefore acting as a gateway through which subsequent project-level proposals must pass.[8] They do not, however, authorize or mandate site-specific projects. Instead, plans address issues such as the prioritization of various multiple use goals, the determination of which land is suitable for timber cutting along with the allowable volume of timber that could be harvested, and the choice of harvesting and regeneration methods.[9]

Born out of the clear-cutting controversies of the 1960s and 1970s, the NFMA was passed in order to better balance timber management, resource use, and environmental protection.[10] Unlike the highly discretionary Organic Act and MUSYA 1960, the NFMA provides substantive and procedural planning requirements, goals, and constraints on the agency. The NFMA requires the writing of land and resource management plans by every national forest and grassland in the NFS. The law requires the incorporation of "standards and guidelines" in these unit-level plans, as applied to such things as wildlife diversity, watershed protection, and timber harvesting and silvicultural practices.[11]

There has been considerable controversy and litigation over the writing of the NFMA planning regulations.[12] The USFS rewrote its 1982 NFMA regulations in 2000,[13] 2005,[14] and 2008.[15] The George W. Bush Administration considered the 2000 regulations unworkable because of their detailed analytical requirements and purported lack of flexibility, so these regulations were revised in 2005 and 2008.[16] But these regulations were enjoined by the courts because of their failure to meet legal requirements.[17] New planning regulations were then promulgated under the Barack Obama Administration in 2012.[18]

There are currently 127 land management plans being used in the NFS, with 68 of these plans past due for revision.[19] This means that more than one-half of the national forests in the system will soon begin the process of writing revised "second-generation" forest plans. One of the most contested parts of this process will be focused on how standards are defined and applied in individual "unit-level" forest plans. As defined in the 2012 NFMA regulations: "A standard is a mandatory constraint on project and activity decisionmaking, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements."[20] A guideline, on the other hand, is "a constraint on project and activity decisionmaking that allows for departure from its terms, so long as the purpose of the guideline is met."[21]

The 2012 NFMA regulations require the use of standards and guidelines in every forest plan and that they are applied to a range of resources and uses.[22] But the 2012 rule also leaves some discretion to individual national forests in determining how standards will be defined and applied on the ground. How standards are used in revised forest plans will be politically contested. Our review of public comments, as discussed below, confirms that this was one of most controversial parts of the 2012 NFMA rulemaking process.[23] We also believe that there will be ample confusion regarding the role that standards have historically played in forest planning. Part of the confusion stems from the very different ways that standards have been defined and used by the USFS in the past. Some national forests, for example, used standards as simple mandatory constraints on particular uses of the forest, while others defined them in more vague and discretionary fashion.

There is a surprising lack of academic and legal literature focused on the role that standards play in forest planning. The political and legal dimensions of the NFMA, and the problems and challenges of forest planning, are covered in detail,[24] and some of this literature makes reference to

7. 16 U.S.C. §1604(i).
8. *See* Scott W. Hardt, *Federal Land-Use Planning and Its Impact on Resource Management Decisions*, 4-7 to 4-32, Rocky Mtn. Min. L. Foundation, Public Land Law Special Institute (Nov. 1997).
9. *See generally* Charles F. Wilkinson & H. Michael Anderson, Land and Resource Planning in the National Forests (1987) (providing an authoritative review of NFMA's planning history and requirements); Michael J. Gippert & Vincent L. DeWitte, *The Nature of Land and Resource Management Planning Under the National Forest Management Act*, 3 Envtl. Law. 149, 153-55 (1996) (discussing the various planning processes under the NFMA).
10. *See id*; and Martin Nie, The Governance of Western Public Lands: Mapping Its present & future (2008).
11. 16 U.S.C. §1604(c).
12. *See, e.g.*, Courtney Schultz et al., *Wildlife Conservation Planning Under the United States Forest Service's 2012 Planning Rule*, 77(3) J. Wildlife Mgmt. 428 (2013); Nathaniel S.W. Lawrence, *A Forest of Objections: The Effort to Drop NEPA Review for National Forest Management Act Plans*, 39 ELR 10651 (July 2009); Alyson Flournoy et al., *Regulations in Name Only: How the Bush Administration's National Forest Planning Rule Frees the Forest Service From Mandatory Standards and Public Accountability* (Center for Progressive Reform, White Paper No. 508, June 2005); and Barry R. Noon et al., *Conservation Science, Biodiversity, and the 2005 U.S. Forest Service Regulations*, 19(5) Conservation Biology 1359 (2005); George Hoberg, *Science, Politics, and U.S. Forest Service Law: The Battle Over the Forest Service Planning Rule*, 44 Nat. Resources J. 1 (2004); and Roger A. Sedjo, *Mission Impossible*, 97 J. Forestry 6 (May 1999) (part of special issue focused on the Committee of Scientists' Report).
13. National Forest System Land and Resource Management Planning, 65 Fed. Reg. 67514 (Nov. 9, 2000).
14. National Forest System Land Management Planning, 70 Fed. Reg. 1023 (Jan. 5, 2005).
15. National Forest System Land Management Planning, 73 Fed. Reg. 21468 (Apr. 21, 2008).
16. The 2008 planning regulations were necessitated by a decision holding the 2005 planning regulations in violation of the APA, NEPA, and the ESA. Citizens for Better Forestry v. U.S. Dep't Agric., 481 F. Supp. 2d 1089 (N.D. Cal. 2007).
17. Citizens for Better Forestry v. U.S. Dep't Agric., 632 F. Supp. 968 (N.D. Cal. 2009).
18. National Forest System Land Management Planning, 77 Fed. Reg. 21162 (Apr. 9, 2012).
19. *Id*. at 21164.
20. 36 C.F.R. §219.7.
21. 36 C.F.R. §219.7.
22. 77 Fed. Reg. 21162; 21206.
23. *See infra* Part III.
24. *See, e.g.*, Wilkinson & Anderson, *supra* note 9; U.S. Forest Serv., Synthesis of the Critique of Land Management Planning (1990) (part of multi-volume collection focused on problems of forest planning); Donald J. Ellis & Jo Ellen Force, National Forest Planning and the Na-

particular regulations and the conflicts and controversies associated with them.[25] There is also a lot of literature focused on the scientific dimensions of a particular standard, such as the controversial wildlife viability standard.[26] But there is little literature focused on the more general role played by standards in national forest law, planning, and management.

This background helps explain three main objectives of this Article: (1) to analyze how standards have been used by the USFS in the past; (2) to create a typology of the most common forms of forest plan standards; and (3) to describe the most common arguments for and against the use of standards in forest planning. By doing so, we hope the research will provide a more common understanding and reference point for forthcoming debates over the topic. We finish with a more subjective analysis, making a number of recommendations in how we believe standards should be used in future forest planning endeavors.

A. Methods

We analyzed a purposive sample of national forest plans and plan amendments, a total of 25 plans (see Table 1). Within this sample are 19 original and revised plans and six plan amendments and strategies covering multiple national forests. The sample includes three different administrative regions of the USFS, though there is an emphasis on forests in Region 1 of the agency. This is because many of these national forests have been legally challenged on the basis of their implementation of planning standards and because of geographic proximity to the authors. This litigation provides a legal record where we could examine the differing interpretations and arguments pertaining to standards in forest planning. All of the plans cover national forests found within the jurisdiction of the U.S. Court of Appeals for the Ninth Circuit, an appellate court that hears a disproportionate share of national forest management cases, including those focused on standards. We reviewed each plan to assess how standards were defined and operationalized. From this sample, we created a typology of the most common types of standards found in forest planning, as discussed below.

We next analyzed official public comment letters submitted in response to the revising of NFMA planning regulations. We first obtained two databases of public comment, one from the 2008 NFMA planning rule, and one from the 2012 rulemaking process. The latter was filtered by the phrase "standards and guidelines," so that we could focus on those 1,310 comments specific to this topic. We performed a similar "standards and guidelines" search using the 2008 database. These searchable databases allowed us to focus on those comments specific to the issue of standards. From these two databases, we identified and organized the most common issues, ideas, and arguments made about standards in planning. We also studied these public comments to ensure that we were not missing an important component of this debate or a recommendation with which we were not already familiar.

This research was then supplemented with interviews with forest planning participants. We identified interviewees through our reading of case law and associated materials, forest planning documents, and public comment letters. We conducted a total of 15 personal and telephone interviews in 2012 with interest group representatives, attorneys, scientists, and USFS planners and interdisciplinary team members responsible for implementing standards at the project level. We asked questions about how participants evaluated the role of standards in forest planning and how they believe standards should be used in future forest plans. We also identified people that were very familiar with a particular standard in one of the forest plans we reviewed, thus providing a reference point for our interviewees, while also allowing us to ask more specific questions.

B. Case Law

This section reviews how the judiciary generally views the use of standards in forest planning. Unless the U.S. Congress writes new forest management legislation, this case law will shape how standards are used and implemented in the future, as the 2012 regulations, like the 1982 regulations before them, continue to view standards as mandatory constraints on projects and activities.[27]

Standards are typically understood as legally enforceable, binding, and mandatory requirements placed on the agency through either NFMA planning regulations (covering all national forests) or individual forest plans. The

tional Forest Management Act of 1976: An Annotated Bibliography, 1976-1986 (Society of American Foresters, 1988); George Cameron Coggins, *The Developing Law of Land Use Planning on the Federal Lands*, 61 U. Colo. L. Rev. 307, 309 (1999); Richard W. Behan, *The RPA/NFMA: Solution to a Nonexistent Problem*, 88 J. Forestry 20 (1990); Andy Stahl, *The Broken Promises of Forest Planning*, 15 Western Wildlands 28 (1990); Jack Tuholske & Beth Brennan, *The National Forest Management Act: Judicial Interpretation of a Substantive Environmental Statute*, 15 Public Land L. Rev. 53 (1994); Federico Cheever, *Four Failed Forest Standards: What We Can Learn From the History of the National Forest Management Act's Substantive Timber Management Provisions*, 77 Or. L. Rev. 601, 705 (1998); Michael J. Gippert & Vincent L. DeWitte, *The Nature of Land and Resource Management Planning Under the National Forest Management Act*, 3 Envtl. Law. 149, 153-55 (1996); Charles F. Wilkinson, *The National Forest Management Act: The Twenty Years Behind, The Twenty Years Ahead*, 68 U. Colo. L. Rev. 659, 665 (1997).

25. *See, e.g.,* Nell Green Nylen, *To Achieve Biodiversity Goals, the New Forest Service Planning Rule Needs Effective Mandates for Best Available Science and Adaptive Management*, 38 Ecology L.Q. 241 (2011); Hoberg, *supra* note 12; W. Hugh O'Riordan & Scott W. Horngren, *The Minimum Management Requirements of Forest Planning*, 17 Envtl. L. 643 (1987).

26. *See, e.g.*, Schultz et al. and Noon et al. *supra* note 12; Barry Noon et al., *Conservation Planning for the U.S. National Forests: Conducting Comprehensive Biodiversity Assessments*, 53(12) Bioscience 1217 (2003); Michael A. Padilla, *The Mouse That Roared: How the National Forest Management Act Diversity of Species Provision Is Changing Public Timber Harvesting*, 15 UCLA J. Envtl. L. & Pol'y 113 (1996-1997); and Steven R. Beissinger & Dale R. Mccullough (eds.), Population Viability Analysis (2002). *See also* F. Al Espinosa Jr. et al., *The Failure of Existing Plans to Protect Salmon Habitat in the Clearwater National Forest in Idaho*, 49 J. Envtl. Mgmt. 205 (1997) (examining why forest management plans failed to protect salmon habitat).

27. *See supra* note 18.

courts generally view standards in this fashion, and most often emphasize that "resource plans and permits, contracts, and other instruments for the use and occupancy of NFS lands shall be consistent with the land management plans."[28] In other words, if a plan has standards, then subsequent actions must be consistent with that forest plan. Standards, as articulated by the court in *Swan View Coalition v. Turner*,[29] "operate as parameters within which all future development must take place." Courts also make a distinction between standards and guidelines, viewing the former as "mandatory requirements" and the latter as discretionary.[30] We suspect that this interpretation may change in the future. This is because the 2012 regulations view both standards and guidelines as mandatory, though the latter "allows for either strict adherence to the terms of the guideline, or deviation from the specific terms of the guideline, so long as the purpose for which the guideline was included in the plan is met."[31]

Several courts emphasize the mandatory nature of standards in the context of the Endangered Species Act (ESA).[32] One of the five factors to be considered by the National Oceanic and Atmospheric Administration (NOAA) Fisheries and the U.S Fish and Wildlife Service (FWS) in making ESA listing decisions is "the inadequacy of existing regulatory mechanism[s]."[33] Vague, voluntary, speculative, and unenforceable measures found in plans are generally not considered a sufficient "regulatory mechanism."[34] On several occasions, the courts have viewed forest plan standards as constituting an "adequate regulatory mechanism" because of their binding and enforceable nature.[35]

Also key to the courts is the exact language used in defining a standard in a forest plan. Courts assess whether a standard is defined in mandatory or discretionary terms and whether exceptions and latitude are afforded in their implementation. Whether a standard "is cast in suggestive (i.e., 'should' and 'may') rather than mandatory (e.g., 'must' or 'only') terms" is significant to the courts.[36]

Projects proposed by a national forest can be enjoined if that forest cannot demonstrate it is in compliance with a plan standard.[37] This means that some standards can be written to serve as a sort of gateway through which subsequent projects must pass.[38] In some situations, the USFS may have to demonstrate that it is in compliance with a plan standard, but only when there is a clear link between the planning standard in question and the project being challenged.[39] This is because forest plans, according to the U.S. Supreme Court, are generally not ripe for judicial review.[40] Generally speaking, instead of challenging a plan, citizens have to wait until more site-specific projects implementing the plan are initiated by the agency. This means that plaintiffs must wait to challenge a particular project's consistency with a plan standard.[41]

The legal enforceability of standards must also be considered in the context of *Norton v. Southern Utah Wilderness Ass'n (SUWA)*.[42] In this decision, the Supreme Court ruled that "a land use plan is generally a statement of priorities; it guides and constrains actions, but does not (at least in the usual case) prescribe them."[43] This decision makes it difficult to enforce some commitments made in a land use plan, like the commitment that an area "will be monitored and closed if warranted" due to motorized recreational use.[44] This sort of statement, said the Court, is not a "sufficiently discrete" action warranting judicial review.[45] The USFS has used the *SUWA* decision to "successfully insulate from judicial review a wide variety of federal actions as well as inactions."[46] Nevertheless, the Court also states in *SUWA*, "an action called for in a plan may be compelled . . . when language in the plan itself creates a commitment binding on the agency."[47] We believe that forest planning standards fall into this category because they represent a "clear indication of binding commitment in the terms of the plan."[48]

The case law also reveals the traditional tendency of the judiciary to defer to the USFS in how to best achieve and implement a particular standard. This is especially so in cases involving scientific uncertainty. The courts are likely to defer to the USFS in how best to implement a standard if that standard is defined in broad, aspirational, and suggestive terms. Unless clearly stated in a plan, the courts will also likely defer to the USFS in determining the methods used to implement a standard.[49] But if defined with preci-

28. 16 U.S.C. §1604(i); Lands Council v. McNair, 537 F.3d 981 (9th Cir. 2008).
29. 824 F. Supp. 923, 935, 24 ELR 20318 (D. Mont. 1992).
30. Greater Yellowstone Coalition v. Servheen, 672 F. Supp. 2d 1105 (D. Mont. 2009), citing Miller v. United States, 163 F.3d 591, 594 (9th Cir. 1998); The Wilderness Society v. Bosworth, 118 F. Supp. 2d 1082 (D. Mont. 2000).
31. 77 Fed. Reg. 21162; 21206 (Apr. 9, 2012).
32. 16 U.S.C. §§1531-1544, ELR Stat. ESA §§2-18.
33. 16 U.S.C. §1533.
34. *See* Oregon Natural Resources Council v. Daley, 6 F. Supp. 2d 1139, 1153-56, 29 ELR 20514 (D. Ore. 1998).
35. *See* Schultz et al., *supra* note 12, for a review of relevant cases; Greater Yellowstone Coalition v. Servheen, 665 F.3d. 1015, 41 ELR 20347 (9th Cir. 2011).
36. The Ecology Center v. Castaneda, 574 F.3d 652 (9th Cir. 2009).
37. Native Ecosystems Council v. U.S. Forest Service, 418 F.3d 953 (9th Cir. 2005).
38. Hapner v. Tidwell, 621 F.3d 1239 (9th Cir. 2010); Neighbors of Cuddy Mountain v. Alexander, 303 F.3d 1059 (9th Cir. 2002).
39. Neighbors of Cuddy Mountain v. Alexander, 303 F.3d 1059 (9th Cir. 2002); The Wilderness Society v. Bosworth, 118 F. Supp. 2d 1082 (D. Mont. 2000).
40. Ohio Forestry Ass'n v. Sierra Club, 523 U.S. 726, 733-38, 28 ELR 21119 (1998). According to the Court, plans are "tools for agency planning and management" that "do not command anyone to do anything or to refrain from doing anything; they do not grant, withhold, or modify any formal legal license, power, or authority; they do not subject anyone to any civil or criminal liability; they create no legal rights or obligations."
41. San Juan Citizens Alliance v. Stiles, 654 F.3d 1038 (10th Cir. 2011).
42. 542 U.S. 55 (2004).
43. *Id.* at 71.
44. *Id.* at 68.
45. *Id.* at 72.
46. Michael C. Blumm & Sherry L. Bosse, Norton v. SUWA *and the Unraveling of Federal Public Land Planning*, Duke Envtl. L. & Pol'y F. 18, 105 (2007).
47. 542 U.S. 55, 72 (2004).
48. *Id.* at 69.
49. Lands Council v. McNair, 537 F.3d 981 (9th Cir. 2008); The Ecology Center v. Castaneda, 562 F.3d 986 (9th Cir. 2009).

sion and specificity, the courts are more likely to ensure that the agency is in compliance with the standard. And if that standard is no longer considered scientifically valid by the USFS, then the appropriate path is to amend the forest plan with a new standard.[50]

II. Typology of Forest Planning Standards

At the broadest level, we found three general categories of standards in the selected forest plans. Each should be considered on a continuum, with examples ranging from one end to the other.

Mandatory and Discretionary Standards. The first major distinction is between mandatory and discretionary standards. This is a confusing way to begin, because standards, as discussed above, are commonly assumed to be cast in mandatory language. But our review reveals that standards are occasionally defined in ways allowing for varying levels of discretion. Some standards, for example, encourage or discourage particular uses or activities. "Trees *should* be felled away from streams"[51] and "ORV [off-road vehicle] use is not encouraged but *may* be permitted where it is currently occurring"[52] are examples of discretionary standards.

Contrast discretionary standards to those defined in a more mandatory and restrictive fashion: "No commercial timber harvest is allowed within 100ft horizontal distance either side of Class I streams and Class II streams which flow directly into a Class I stream"[53] and "prohibit cutting of snags for firewood within 300 feet of any river, lake, or reservoir."[54] These types of standards clearly prohibit and constrain certain uses and activities. Other mandatory standards require that certain lands and values, such as old growth and wildlife habitat needs, be "maintained" in specific ways.

Somewhere between these two categories are default standards that allow for exceptions. A plan, for example, can close an area for winter elk range habitat, while allowing for some undefined exceptions for access.[55] Exceptions can also be more fully articulated, explaining in more detail what sorts of exceptions can be made to a default standard and the process that must be used to make them. For example, the Inland Native Fish Strategy, which is amended to several national forest plans, requires specified buffer zones around lakes, streams, and wetlands where logging might occur.[56] However, the USFS can alter these buffers if based on recommendations from a watershed analysis, stream reach, or site-specific review data that support the change.[57]

Forest(s)-Wide and Management Area Standards. The second broad category is between standards applying to an entire national forest, or multiple national forests, and those applying to a specific management area or zone as drawn in a forest plan. The Beaverhead Forest plan, for example, uses a forest-wide prohibition on tractor yarding on slopes exceeding 45%, with some exceptions allowed.[58] Though more rare, standards can also apply to multiple forests, such as a soil quality standard that applies to all Region 1 national forests.[59] Even more broadly applied to all national forests is NFMA's wildlife diversity standard, as defined in the law's implementing regulations.[60]

Often times, however, a standard applies to a singular management area as defined in a plan. "Chemical herbicides and pesticides will not be used within the Ashley Creek Watershed" is an example of a relatively simple and mandatory management area standard.[61] Prohibiting the issuance of livestock grazing permits in a specific management area provides another example.[62] Some management areas are also defined via plan amendments applicable to a particular species, such as the standards used by the USFS in predefined "Lynx analysis units"[63] or the "primary conservation area" delineated for grizzly bear recovery.[64] These types of standards help distinguish how one management area is managed in contrast to others.

Simple and Complex. Our review found standards ranging from the simple to the complex. On the simple end of the spectrum are management area standards stating that "the commercial harvest of camas is prohibited"[65] or that "livestock grazing permits will not be issued" in a management area.[66] We found numerous standards stated in similar straightforward fashion.

At the other end of the spectrum are relatively complicated and detailed standards pertaining to such things as tree snag-retention, required elk cover, and bird habitat requirements. Some of the more complicated standards pertain to managing habitat for the needs of a specific

50. Native Ecosystems Council v. U.S. Forest Service, 418 F.3d 953 (9th Cir. 2005).
51. U.S. Forest Serv., Forest Plan: Flathead National Forest II-53 (2001) (emphasis added) [hereinafter Flathead Plan 2001].
52. U.S. Forest Serv., Forest Plan: Clearwater National Forest II-37 (1987) (emphasis added) [hereinafter Clearwater Plan 1987].
53. U.S. Forest Serv., Tongass National Forest: Land and Resource Management Plan 4-54 (1997) [hereinafter Tongass Plan 1997].
54. Flathead Plan 2001, *supra* note 51, at II-36.
55. U.S. Forest Serv., Forest Plan: Helena National Forest II-18 (1986) [hereinafter Helena Plan 1986].
56. U.S. Forest Serv., Inland Native Fish Strategy Environmental Assessment: Decision Notice and Finding of No Significant Impact (1995) [hereinafter INFISH 1995].
57. *Id.* at 3.
58. U.S. Forest Serv., Beaverhead National Forest Plan: Final Environmental Impact Statement II-36.
59. U.S. Forest Serv., Region 1, Forest Serv. Manual, Ch. 2500, Watershed and Air Management (2010).
60. 16 U.S.C. §1604(g)(3)(B); 36 C.F.R. §219.9.
61. U.S. Forest Serv., The Lolo National Forest Plan III-4 (1986) [hereinafter Lolo Plan 1986].
62. *Id.*
63. U.S. Forest Serv., Northern Rockies Lynx Management Direction: Record of Decision (2007) [hereinafter Lynx Amendment 2007].
64. U.S. Forest Serv., Forest Plan Amendment for Grizzly Bear Habitat Conservation for the Greater Yellowstone Area National Forests: Record of Decision (2006) [hereinafter Grizzly Bear Amendment 2006].
65. U.S. Forest Serv., Beaverhead-Deerlodge National Forest: Land and Resource Management Plan 83 (2009) [hereinafter Beaverhead-Deerlodge Plan 2009].
66. Lolo Plan 1986, *supra* note 61, at III-4.

species, such as lynx and goshawks. They can be complicated because the plans often specify how the standard is to be measured and operationalized on the ground. A good example of this is provided by the standards used to conserve the northern goshawk (Queen Charlotte subspecies) on the Tongass National Forest. This standard specifies what is to be considered in determining confirmed or probable nest sites, the types of old growth nesting habitat that shall be maintained on the Tongass, and several specific requirements for timber harvests (pertaining to stand structural characteristics) depending on their size and location.[67]

Within these three broad categories fall several different types of standards that are most commonly found in forest plans. They include the following.

Prioritization Standards. Several plans use standards that help prioritize some values over others. Consider, for example, two prioritization standards: "Conflicts between grazing by livestock and mountain goat in cirque basins will be resolved in favor of mountain goat"[68]; and "on big game winter range and key big game summer habitat, priority will be given to big game needs."[69] Both provide guidance to managers while allowing for some interpretation and discretion. Also within this category is what might be called a "compatibility standard." These types of standards make clear what values and resources are most important in a management area, such as stating that "all management prescriptions will be compatible with the needs of grizzly bear . . . ," but leave some discretion to managers in making this determination.[70]

Threshold-Based Standards. Standards are sometimes defined by using quantitative thresholds that may not be crossed. We found examples ranging from water quality[71] and the amount of soil disturbance allowed[72] to the amount of forest cover required for big game.[73] A good example of this is provided by the standards used for lynx conservation across multiple national forests in the Northern Rockies. Some of these standards limit precommercial thinning in winter snowshoe hare habitat. One standard, for example, prohibits vegetation treatment projects "[i]f more than 30 percent of the lynx habitat in an LAU [lynx analysis unit] is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat," while another prohibits timber projects on "more than 15 percent of lynx habitat on [USFS] lands within [an LAU] in a ten-year period."[74]

Mitigation Standards. Standards often require or encourage the mitigation of various actions. A soil standard, for example, may require mitigation and restoration in an activity area where existing conditions of detrimental disturbance to soil exceed 15%.[75] "Logging in sensitive areas requires special considerations and mitigating measures" is an example of a more discretionary and open-ended standard.[76] Standards may also require development of mitigation measures prior to project approval. For example, a management area project proposal "will be analyzed and evaluated to determine the potential water quantity and quality impacts. Mitigation measures will be developed to minimize adverse effects. If the unacceptable effects can not be adequately mitigated, the project will be redesigned or abandoned."[77]

Process-Based Standards. One of the most common types of standards used in planning regards how decisions must or ought to be made by the agency. This type of standard may require consultation with wildlife agencies "whenever conflicts between wolves and livestock arise,"[78] or to consult with tribal governments regarding various management decisions. They may also require the USFS to coordinate or cooperate with other agencies or landowners. There are also some information-generating standards that are procedural in nature, such as requiring cultural resource inventories or certain types of economic analyses before certain decisions can be made.

Management Method Standards. Several plans we reviewed use standards as a way to define the methods and protocols that must or should be used by the USFS in various situations, such as the methods to be used to prevent the spread of noxious weeds[79] or the size of mesh most appropriate for intake hoses.[80] A plan, for example, may require fences in antelope range to have a "smooth bottom wire which is at least 18 inches above the ground."[81]

III. Arguments and Counterarguments

We read and organized public comments submitted as part of the 2008 and 2012 NFMA planning rulemaking processes and supplemented this with personal interviews with planning participants.[82] Our research revealed significant differences of opinion regarding the role standards ought to play in forest planning. As expected, standards often served

67. Tongass Plan 1997, *supra* note 53, at 4-89.
68. U.S. Forest Serv., Land and Resource Management Plan for the Sawtooth National Forest IV-49 (1987) [hereinafter Sawtooth Plan 1987].
69. U.S. Forest Serv., Forest Plan: Idaho Panhandle National Forests II-31 (1987) [hereinafter Idaho Panhandle Plan 1987].
70. Lolo Plan 1986, *supra* note 61, at III-30.
71. Clearwater Plan 1987, *supra* note 52, app. K.
72. U.S. Forest Serv., Sawtooth National Forest: Land and Resource Management Plan III-21 (2003) [hereinafter Sawtooth Plan 2003].
73. Helena Plan 1986, *supra* note 55, at II-17.
74. Lynx Amendment 2007, *supra* note 63, att. 1, p. 3.
75. U.S. Forest Serv., Payette National Forest: Land and Resource Management Plan III-21 (2003).
76. Flathead Plan 2001, *supra* note 51, at II-45.
77. Helena Plan 1986, *supra* note 52, at III-65.
78. U.S. Forest Serv., Nez Perce Forest Plan II-19 (1987).
79. Sawtooth Plan 2003, *supra* note 72, at III-36.
80. U.S. Forest Serv., Boise National Forest Land and Resource Management Plan II-14 (2003).
81. Sawtooth Plan 1987, *supra* note 72, at PR134348.
82. *See* methods review, *supra* Part I.A.; and National Forest System Land Management Planning, 76 Fed. Reg. 8480 (proposed Feb. 14, 2011) (to be codified at 36 C.F.R. pt. 219); National Forest System Land Management Planning, 72 Fed. Reg. 48514 (proposed Aug. 23, 2007) (to be codified at 36 C.F.R. pt. 219).

as a surrogate for more inclusive issues and controversies, with some groups using the standards issue as an opportunity to provide more general feedback and criticism regarding national forest management. On a very simplified level there is a pro-standards camp and a critical-of-standards camp. Of course, there is important nuance within each argument, and we cannot do justice to the details here. Instead, our goal is to place the issue of standards in its more political context, outlining the broad contours of the debate. We generalize and simplify each argument in turn below. Some of the arguments and themes introduced here are revisited in the following section.

The pro-standards argument is that standards ought to play an essential role in planning because they promote political and legal accountability and help protect national forests from various commodity and recreational uses that could cause environmental harm. Commonly argued is that standards can be measured,[83] legally enforced,[84] and that they provide more certainty about future management actions.[85] Without meaningful standards, some interests believe that environmental protections will give way to other agency pressures and priorities.[86]

This side is generally skeptical of providing increased discretion to the USFS in how to implement NFMA planning regulations and associated forest plans.[87] Instead, it advocates for more specific and environmentally protective standards,[88] and for these standards to apply to multiple resources and uses of the national forests, from watershed/riparian protection to route (road and motorized trail) density.[89] This camp generally views standards as a way to prevent or mitigate environmental harm and as a means to achieve other planning objectives, such as restoring watersheds,[90] increasing resilience,[91] or providing ecosystem services.[92] To ensure these constraints work and objectives are met, there is also widespread support for more certain and rigorous monitoring by the agency.[93]

Also commonly argued is that standards should be applied at multiple levels of planning, from NFMA regulations to individual management areas. Several groups, for example, sought a NFMA planning rule that would include various national-level standards that would apply throughout the NFS.[94] Some groups, for example, advocated for numerous default standards that would apply to watershed protection, such as mandatory buffer widths for water bodies and route-density standards to achieve sediment reduction.[95]

Such baseline standards, it is said, promote national consistency and prevent some units in the NFS from opting out and disregarding national-level planning direction. The concern is that without national baseline standards, some forests will write plans lacking any meaningful safeguards at all.[96]

At the same time, many groups also advocate that standards be applied at the forest level because of the unique attributes of individual national forests and the variation among them.[97] Another common argument is to have more standards being applied to more resources in particular management areas of a forest. Many people see this as an important way to distinguish one management zone from another, and perhaps with greater specificity than when standards are applied only at the forest level.[98]

On the other side of the debate are those people generally skeptical of planning standards because of the difficulties and inefficiencies often associated with writing and then applying them on the ground. Many commenters on the 2012 planning rule focused on what they view as a complex, cumbersome, and expensive planning process that would bog the agency down in endless analysis.[99]

Standards are often viewed as a legal weapon used by environmental groups to stop various activities on the

83. *See, e.g.*, Notice of Intent to Prepare an Environmental Impact Statement for a National Forest System Land Management Planning Rule, 74 Fed. Reg. 67165 (Dec. 18, 2009) (statement of Earthjustice) [hereinafter 2009 NOI] (letter on file with authors).
84. *See, e.g.*, U.S. Forest Serv. Draft Programmatic Environmental Impact Statement: National Forest System Land Management Planning (2011) (statement of Defenders of Wildlife) [hereinafter USFS DEIS 2011] (public comment database on file with authors).
85. *See, e.g.*, USFS DEIS 2011 (statement of California Attorney General's Office) (suggesting that flexibility may result in uncertainty, which is "unacceptable" when "restoration and sustainability of one of our nation's greatest natural resources is at stake").
86. *See, e.g.*, USFS DEIS 2011 (statement of Richard Spotts) (stating, "history has shown that they [Forest Supervisors] are overall too subject to local commodity interests and political pressure," and "by making forest planning standards more specific, measurable, and enforceable it would . . . give forest supervisors a much improved ability to say 'no' when necessary to local commodity interests and political pressure").
87. *See, e.g.*, USFS DEIS 2011 (statement of Oregon Wild).
88. *See, e.g.*, USFS DEIS 2011 (statement of The Wilderness Society) (advocating for specific standards for fire management).
89. *Id.* (arguing, ". . . it is essential that the agency require responsible officials to establish route density standards for all management areas including . . . priority watersheds, riparian areas, and important wildlife areas").
90. *See. e.g.*, USFS DEIS 2011 (statement of Portland Water Bureau) (advocating in favor of watershed standards for biological and biophysical connectivity of key watersheds, limits on road densities, and other protections).
91. *See, e.g.*, USFS DEIS 2011 (statement of American Rivers) (discussing the importance of standards in "maintaining, protecting, and restoring healthy, resilient watersheds").
92. *See, e.g.*, USFS DEIS 2011 (statement of Restore Mt. Hood Campaign) (suggesting that clear standards are necessary to ensure conservation objectives are met, such as "well-distributed ecological functions and ecosystem services").
93. *See, e.g.*, USFS DEIS 2011 (statement of Center for Biological Diversity) (explaining that "protective, objective, and enforceable" standards can help ensure that monitoring objectives are carried out).
94. *See, e.g.*, USFS DEIS 2011 (statement of Southern Environmental Law Center).
95. *See, e.g.*, USFS DEIS 2011 (statement of Defenders of Wildlife) (joining many organizations to advocate for a national minimum default riparian buffer width and other national-level protections).
96. *See, e.g.*, USFS DEIS 2011 (statement of World Temperate Rainforest Network).
97. *See, e.g.*, USFS DEIS 2011 (statement of Ruffed Grouse Society) (refuting calls for a national minimum default riparian buffer and discussing the need for spatial and temporal management flexibility).
98. *See, e.g.*, USFS DEIS 2011 (statement of The Wilderness Society) (explaining, "The delineation of standards and guidelines by management area provides an effective method for targeting specific standards and guidelines to specific geographic areas, rather than having to rely on generic standards and guidelines in a more one-size-fits-all approach.").
99. *See, e.g.*, USFS DEIS 2011 (statement of American Forest and Paper Association) (urging the agency to consider costs prior to placing cumbersome requirements on itself that may not be financially achievable).

national forests.[100] This is a key reason, for example, why there has been so much acrimony over the wildlife viability standard, as this provision has been extensively used as a way to challenge USFS decisions and projects.[101] This argument also explains why many groups critical of standards are also opposed to treating guidelines, which have historically been viewed as discretionary, as mandatory constraints that can be legally enforced.[102] Associated with this argument is that standards are essentially "de facto regulations" that are not subject to congressional review. Testimony provided on behalf of the American Forest Resource Council and Federal Forest Resource Coalition provided language that we found repeatedly in the public comment:

> By creating Forest Plan "standards," a planning team is able to impose significant, costly, and unsupported restrictions on resource management that have the effect of regulations (i.e., the force of law) . . . Compliance with forest plan standards is the centerpiece of many lawsuits challenging projects that implement a forest plan . . . So if there is a dispute over whether a particular project complies with a forest plan standard such as providing for "ecological sustainability" then it ends up in the courts where the judges decide what the standard means and whether a project violates the standard.[103]

It is also commonly argued that the national forests are too variable for national "one-size-fits-all" planning standards. Such constraints, it is said, limit the ability of professional resource managers to adapt to new circumstances, such as changed environmental and market conditions.[104] If standards are used, some groups want them applied at the most local level possible, so that they can be tailored to fit particular places and projects. Some believe that it is far more useful to have project-specific environmental analysis rather than spending time developing forest-level standards that are often more generic in nature.[105]

Several groups also question the logic behind the 2012 rule's requirement that the responsible official "shall use the best available scientific information to inform the planning process. . . ."[106] We discuss this provision in more detail below. But the general concern here is that the agency's use of standards will get mired in the "science wars" that have come to characterize disputes related to the ESA.[107] Within this theme are also questions and skepticism about monitoring and how scientific uncertainty can be used to prevent any management actions on the national forests.[108]

Administrative discretion is another large part of the critical-of-standards argument. Many groups complain that the USFS is unwisely ceding the discretion it has in managing the national forests. Several groups, for example, asked why the agency would impose on itself the requirement to use standards or guidelines in ways that go beyond the minimal requirements imposed by the NFMA.[109] This is especially bewildering to some commenters, and legal counsel, who believe that the USFS is abandoning significant legal victories that have secured greater discretion for the agency.[110]

Though discretion is a major part of the critical-of-standards narrative, for some groups, it does not apply to all uses of the national forests. We found, for example, that many of those groups critical of standards asked for more certainty (and *less* discretion) in the management of particular resources and uses of forests.[111] Accountability and specific metrics were needed, according to some public commenters, but they should be applied to multiple use objectives such as how many board feet of timber will be cut per year.[112]

Stepping back, it is easy to see how the debate over the appropriate use of standards parallels other long-running debates over forest management. First, is the ever-present tension between legal prescription and administrative discretion, a theme dating back to the writings and politics of the first Chief of the USFS, Gifford Pinchot.[113] This is a foundational tension in federal lands management of which the debate over standards perfectly exemplifies. The standards debate also brings to the fore, once again, tensions between national versus more localized decisionmaking.[114] On the one hand are those advocating the virtues of

100. *See, e.g.*, USFS DEIS 2011 (statement of Blue Ribbon Coalition) (describing the wildlife viability standard as a "litigation magnet" and describing other planning requirements as "legal nightmares").
101. *See* Schultz et al., *supra* note 12; Anna M. Seidman & Douglas S. Burdin, *Forest Wildlife Management: A Legal Battleground for a Scientific Delimma*, 20 Nat. Res. & Env't 40, 41 (2005).
102. *See, e.g.*, USFS DEIS 2011 (statement of Blue Ribbon Coalition) (asserting that "Courts have taken numerous opportunities to reject arguments that the Forest Service was under a legal obligation to follow a plan guideline and the Agency should not take this opportunity to throw away the precedence that guidelines are discretionary where standards are mandatory.").
103. Forest Service Regulatory Roadblocks to Productive Land Use and Recreation: Proposed Planning Rule, Special-Use Permits, and Travel Management: Oversight Hearing Before the House Comm. on Natural Resources, Subcomm. on National Parks, Forests and Public Lands, 112th Cong. (2011) (statement of Scott W. Horngren, Attorney, American Forest Resource Council and Federal Forest Resource Coalition).
104. *See, e.g.*, USFS DEIS 2011 (statement of Council of Western State Foresters).
105. *See, e.g.*, USFS DEIS 2011 (statement of state of Alaska) (explaining that standards and other requirements "should be determined by local conditions and the objectives of the plan for a particular forest").
106. 36 C.F.R. §219.3.
107. *See* Eugene H. Buck et al., *The Endangered Species Act and "Sound Science,"* Congressional Research Service Report RK32992 (2007); Holly Doremus, *The Purposes, Effects, and Future of the Endangered Species Act's Best Available Science Mandate*, 34 Envtl. L. 397 (2004); J.B. Ruhl, *The Battle Over Endangered Species Act Methodology*, 34 Envtl. L. 555 (2004).
108. *See, e.g.*, USFS DEIS 2011(statement of Northwest Mining Association) (insisting, "the process [to determine what is best available science] will be rife with controversy, confusion, and . . . fertile ground for litigation").
109. *See, e.g.*, USFS DEIS 2011 (statement of American Forest and Paper Association).
110. *See, e.g.*, USFS DEIS 2011 (statement of Blue Ribbon Coalition) (arguing that the proposed forest planning rule disregards the legal ground gained in *Lands Council v. McNair*, 537 F.3d 981 (9th Cir. 2008)).
111. *See, e.g.*, USFS DEIS 2011 (statement of Sustainable Northwest).
112. *See, e.g.*, USFS DEIS 2011 (statement of Minnesota Forest Industries).
113. *See, e.g.*, Federico Cheever, *The United States Forest Service and National Park Service: Paradoxical Mandates, Powerful Founders, and the Rise and Fall of Agency Discretion*, 74 Denv. U. L. Rev. 625-48 (1997); Paul W. Hirt, A Conspiracy of Optimism: Management of the National Forests Since World War II (1994); and Nie, *supra* note 10.
114. *See, e.g.*, Robert B. Keiter, *Public Lands and Law Reform: Putting Theory, Policy, and Practice in Perspective*, 2005 Utah L. Rev. 1127 (2005) (reviewing the prevalence of this theme in federal lands management).

national consistency and federal baseline standards versus those who would rather see management devolve as much as possible to localized levels, especially when those local levels are perceived to be more amenable to commodity production. This tension is visible in several high-profile forest conflicts, from the national level roadless rule to the writing of planning regulations.

Some political context is worth noting at this point as well. Clearly evident in several comment letters, and our interviews, is a considerable amount of mistrust in the USFS. Part of this stems from the NFMA planning rules that were promulgated in 2005 and 2008. These regulations were very controversial, partly because they failed to incorporate the use of standards and other environmental protections and were seen by some interests as providing an unlawful amount of discretion to the USFS.[115] These regulations stalled in the courts, and were eventually replaced by the 2012 regulations, but some cynicism and mistrust still linger.

IV. Analysis and Recommendations

A. *Why Standards?*

Before proceeding with recommendations, we must ask an important question: why would the USFS impose on itself binding and enforceable standards? As discussed earlier, the agency has some discretion in deciding how standards or guidelines will be applied in forest plans. Several national forests have also faced numerous appeals and lawsuits that were based on projects and activities being inconsistent with plan standards. Why, then, would the USFS willingly constrain itself in the future?

The first response to this question is a legal one. The NFMA requires that standards and guidelines be used to "insure" the protection of various resources such as soil, watershed conditions, and wildlife diversity.[116] Merriam Webster defines the term "insure" as "to make certain especially by taking necessary measures and precautions."[117] Standards are the only planning component that can adequately insure such protection because of their binding and enforceable nature. Other planning components, such as objectives and desired future conditions, are important but cannot insure protection because of the discretion they afford in implementation.

In writing the 1982 regulations, the agency limited the scope of the environmental impact statement to standards and guidelines "because those are the only elements . . . that could significantly affect the environment." In response to questions asked of the decision, the agency responded in the preamble, "[a]ny other planning guidance not reflected in standards and guidelines would have no predictable effect on the environment, but would simply add additional procedural direction."[118]

Similar logic should be applied to the 2012 planning regulations. The regulations make clear that every forest plan must include standards as one of five plan components.[119] They also require every plan to provide for social, economic, and ecological sustainability. To do so, the regulations require standards or guidelines be used "to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area," with more specific requirements pertaining to such things as water resources and riparian areas.[120] The regulations also require that plan components "must ensure" the protection of various resources and values in the context of timber harvesting and the management of recommended wilderness areas and wild and scenic rivers.[121] Standards are the only plan component that can ensure that the planning mandates found in the 2012 NFMA regulations are satisfied.

Planning efficiency is a second reason why national forests should embrace the use of standards when writing future plans. This may sound counterintuitive to some readers who believe that standards inevitably lead to "analysis paralysis" and planning inefficiencies. We are sympathetic to this critique, and in no way wish to add to what is already a time-consuming and complicated planning process, but our research and interviews did not identify standards as being the cause of this problem. To the contrary, standards can actually facilitate the implementation of forest plans. This is because a forest plan standard, applied at the forest or management area level, eliminates the need for interdisciplinary (ID) planning teams to write project-specific standards—over and over again. In fact, some of the most pro-standard arguments we heard in our interviews came from USFS planning team members who saw standards as facilitating project implementation because ID teams did not have to constantly negotiate the application of project-specific rules and constraints.

Standards can also lead to efficiencies in forest management outside of the planning process, especially as they apply to ESA consultation. Section 7 of the ESA requires federal agencies to undergo consultation with the federal wildlife agencies to ensure their projects will not cause jeopardy to a listed species.[122] Courtney Schultz and others review several cases in which NOAA Fisheries and the FWS made no-jeopardy determinations because a forest plan contained sufficient standards and other regulatory mechanisms to protect the species.[123] In some cases, moreover, the courts have allowed particular wildlife standards to serve as a surrogate approach to ESA consultation. With lynx standards, for example,

115. *See, e.g.*, 2009 NOI (statement of Sierra Club et al.) (joining with a coalition of 30 environmental organizations to explain: "Recent rulemaking efforts failed, in large part, because they sought to move away from this robust statutory mandate for prescriptive forest plans and to replace it with standardless 'aspirational' documents.").
116. 16 U.S.C. §1604.
117. "insure." [Def. 2] Merriam Webster Online Dictionary (2013), http://www.merriam-webster.com/dictionary/insure (last visited Feb. 25, 2014).
118. 47 Fed. Reg. 43026.
119. 36 C.F.R. §219.7.
120. 36 C.F.R. §219.8.
121. 36 C.F.R. §219.10-11.
122. 16 U.S.C. §1536(a)(2).
123. *See* Schultz et al., *supra* note 12.

the USFS does not need to engage in consultation on a project-by-project basis if those projects comply with the USFS' lynx standards.[124] Similarly, we found NOAA Fisheries equating Aquatic Conservation Strategy consistency with no-jeopardy findings, a practice that has satisfied the courts.[125] This is not an endorsement of the surrogate approach, but it shows one possible way that standards can facilitate §7 consultation.

Standards can also create efficiencies by either eliminating the need for additional resource-specific planning processes or by reducing the scope of analysis required by these processes. Consider some of the recently litigated travel management plans prepared by the USFS.[126] Some of the issues addressed in these travel plans could have been dealt with by using forest plan standards. The Lolo Forest plan provides an example. Because the Lolo utilized forest planning standards to restrict motorized use, "a forest-wide travel management plan was not necessary."[127]

Politics provides the third reason why the USFS should employ standards when writing future forest plans. Our interviews and analysis of public comment make clear that many planning participants want a greater degree of certainty and predictability in forest plans and view standards as a means to this end. Of course, plans, by their very nature and context, can never provide the degree of certainty that some political actors desire. Uncertainty is inherent in all planning endeavors. But standards can provide increased certainty because participants understand, a priori, the fundamental rules of the game.

Also worth considering in this context is the deep level of dissatisfaction that many actors have in the forest planning process. Such frustrations were particularly evident when the 2005 and 2008 planning regulations were in effect, as these regulations viewed plans not as decisionmaking documents, but rather as "strategic and aspirational" in nature.[128] Standards were not required in these rules, and the USFS generally emphasized that other planning components were not "commitments or final decisions."[129] This emphasis on discretion, and the resulting dissatisfaction, is one reason why so many interests are pursuing "place-based" forest legislation and more formalized agreements with the USFS, as they are searching for increased certainty and "zones of agreement" as applied to such things as environmental protection, restoration, and timber supply.[130] For instance, a common characteristic of several collaborative agreements focused on forest management is their use of specific management areas and the rules associated with what can and cannot happen in each one of them.[131] Some of these rules perform the role of standards by constraining activities such as providing definitive sideboards for restoration activities (e.g., old growth protections and road density standards). These developments show that standards, or standard-like rules, resonate with a cross-section of interests who participate in forest management.

The ESA provides our final answer as to why the USFS should impose on itself binding and enforceable standards. Forest plan standards play a significant role in decisions to list or delist a species under the ESA. One of the five factors to be considered by NOAA Fisheries and the FWS in making ESA listing decisions is "the inadequacy of existing regulatory mechanism[s]."[132] Vague, voluntary, speculative, and unenforceable measures found in plans are generally not considered a sufficient regulatory mechanism.[133] Instead, federal wildlife agencies and the courts typically assess whether a plan contains specific and legally enforceable standards having regulatory force.

Schultz and others provide several examples where forest plan standards, or the lack thereof, played significant factors in decisions to list or not list a species under the ESA.[134] In some cases, for example, a species was listed in part because a forest plan failed to provide sufficiently certain, binding, and detailed protection to a species to count as an adequate regulatory mechanism (e.g., Canada lynx [*Lynx canadensis*] and the greater sage grouse [*Centrocercus urophasianus*]). While in other cases, a species was not listed because of specific standards found in a forest plan (e.g., Queen Charlotte goshawk [*Accipiter gentilis laingi*]). And in more rare cases, a species was delisted, or proposed for delisting, partly because of species-specific standards incorporated into governing forest plans (e.g., Robbin's cinquefoil [*Potentilla robbinsiana*] and Yellowstone distinct population segment of grizzly bears [*Ursus arctos horribilis*]).

On the national forests, there are currently 430 species that are listed under the ESA as threatened or endangered and an additional 60 species that are candidates for listing.[135] The number of ESA listing decisions will significantly increase in the future, given a 2011 settlement between the FWS and environmental groups which

124. Friends of the Wild Swan v. U.S. Forest Serv., CV 11-125-M-DWM (D. Mont. 2012).
125. Pacific Coast Federation v. National Marine, 265 F.3d 1028, 1034-35 (9th Cir. 2001).
126. *See, e.g.*, Idaho Conservation League v. Guzman, 766 F. Supp. 2d 1056, 41 ELR 20090 (D. Idaho 2011); Montana Wilderness Association v. McAllister, 666 F.3d 549, 41 ELR 20352 (9th Cir. 2011); and Russell Country Sportsman v. U.S. Forest Serv., 668, F.3d 1037, 41 ELR 20314 (9th Cir. 2011).
127. U.S. Forest Serv., Lolo National Forest, *Motor Vehicle Use Map Available at Ranger Districts* (News Release, Oct. 14, 2013). *See also* Montana Snowmobile Ass'n v. Wildes, 103 F. Supp. 2d 1239, 30 ELR 20381 (D. Mont. 2000).
128. 70 Fed. Reg. 1023, 1032 (Jan. 5. 2005).
129. *Id.* at 1057.
130. Martin Nie, *Place-Based National Forest Legislation and Agreements: Common Characteristics and Policy Recommendations*, 41 ELR 10229 (Mar. 2011).
131. *Id.*
132. 16 U.S.C. §1533.
133. *See, e.g.*, Oregon Natural Resources Council v. Daley, 6 F. Supp. 2d. 1139, 1153-56, 29 ELR 20514 (D. Ore. 1998). *See generally* Courtney Schultz & Martin Nie, *Decision-Making Triggers, Adaptive Management, and Natural Resources Law and Planning*, 52 Nat. Resources J. 443 (2012) (reviewing related case in the context of adaptive management).
134. Schultz et al., *supra* note 12.
135. U.S. Forest Serv., Biological Assessment of the U.S. Department of Agriculture National Forest System Land Management Planning Rule for Federally Listed Endangered and Threatened Species, Species Proposed for Federal Listing, Species That Are Candidates for Federal Listing on National Forest System Lands (Wash., D.C. 2011), 14.

require the agency to make listing decisions for over 800 species, including 262 candidate species.[136] Altogether, it is possible that another 1,000 listing decisions will have to be made by 2020.[137] For these reasons, we believe that the ESA will figure more prominently in national forest management in the future. This context provides further incentive for the USFS to use wildlife-based standards as they will likely factor in future decisions to list or not list species in the future.

B. Recommendations

In this section, we offer some recommendations in how we believe standards ought to be used when writing second-generation forest plans. We also raise a number of issues and questions that we hope will be considered in future planning endeavors. It is beyond the purview of this Article, and our professional capabilities, to offer science-based recommendations regarding what standards ought to apply to specific values, resources, and species, such as the most effective standards for riparian protection, road density, or elk security. Instead, we focus on more policy, planning, and process-based issues that we hope will be considered in the future.

1. On Writing Standards

The first recommendation pertains to how standards should be written and not written in the future. Our review of forest plans shows some inconsistent and sometimes problematic writing of standards. As shown above, some forests used standards as they are commonly understood, as clear-cut binding constraints on agency actions. But some forests used standards in more curious ways, such as writing standards that were merely suggestive or discretionary in nature. This inconsistency explains why there has been some disagreement and misunderstanding of the term by planning participants. Some of this inconsistency stems from the lack of national-level guidance provided to planning teams during the writing of first-generation forest plans.[138] We believe such guidance is necessary for the writing of plan revisions and that this guidance could be provided in the agency's Directive System or via more informal ways. However accomplished, some national, or even regional-level, direction pertaining to standards could facilitate the writing of plan revisions while providing greater consistency among them. For example, USFS Region 2 national forests maintain consistency by following a regional guide that provides a "menu of standards and guidelines" for use during plan revisions.[139]

To be considered in this context is a recommendation to not use discretionary standards. In our view, a discretionary standard is an oxymoron. Discretionary language is more appropriately used in other plan components, such as stating desired future conditions. It also makes little sense to write standards in a way that simply restate preexisting legal or regulatory requirements. Instead, standards should be written so that they serve as a link and clearly assist the agency in achieving its legal mandates, such as ESA §7 consultation requirements,[140] Clean Water Act (CWA)[141] §404 regulations, or maintenance of wilderness characteristics pursuant to the Wilderness Act (1964).[142] A standard, for example, can be written so that it serves as a clear linkage to protecting the characteristics of an area that is recommended for wilderness designation. The Kootenai National Forest, for example, links the goal of "retaining the wilderness characteristics and values . . ." of a recommended wilderness area[143] with a standard stating all rehabilitation projects will protect wilderness values by "using only native species for revegetation."[144] Using standards in this fashion—as a means to an end—will also explain to the public why a particular standard is being used and what purpose it serves.

We also recommend that special attention be paid to how the measurement and analysis of particular standards will be accomplished at the project level. This will be most necessary when writing relatively complex standards, and especially when thresholds are used. Much of the case law we reviewed hinges on how a standard applied to a resource is measured by the USFS, spatially and temporally. Measuring compliance with elk, road density, and soil standards provide examples. In *Native Ecosystems Council v. USFS*,[145] the court found the agency's measurement of an "elk herd unit" impermissible because it measured hiding cover by excluding private and nonfederal lands from the elk herd's range and hiding cover calculations. In a similar case, the court described the agency's methods to measure compliance with elk standards as "numerical acrobatics."[146]

Measuring a road density standard is similarly contingent upon the spatial definition of a landscape, especially if the base from which a road density standard is measured includes large roadless areas. For example, a management area standard may require a certain "average road density" or "net density." In the "average road density" scenario, the impact of a project overlapping several management areas

136. Center for Biological Diversity, *Historic 757 Agreement: One Year Later*, Earth Online, http://www.biologicaldiversity.org/publications/earthonline/endangered-earth-online-no625.html (last visisted Feb. 25, 2014).
137. Jason C. Rylander, *Recovering Endangered Species in Difficult Times: Can the ESA Go Beyond Mere Salvage?*, 42 ELR 10017, 10018 (Jan. 2012).
138. 36 C.F.R. §219.1 (1982).
139. U.S. Forest Serv., Region 2, Regional Desk Guide (2003) (unpublished guide, on file with authors).
140. 16 U.S.C. §1536(a)(2); *see* Gippert & DeWitte, *supra* note 24 (explaining how consultation is one mechanism that may harmonize NFMA and ESA requirements).
141. 33 U.S.C. §§1251-1387, ELR Stat. FWPCA §§101-607.
142. Peter Landres et al., U.S. Dep't of Agric. Forest Serv., Gen. Technical Rep. No. Rmrs-Gtr-212, Keeping It Wild: An Interagency Strategy to Monitor Trends in Wilderness Character Across the National Wilderness Preservation System 4 (2008) (explaining legal requirements related to wilderness character).
143. U.S. Forest Serv., Kootenai National Forest Plan, Volume 1 III-33 (1987) [hereinafter Kootenai Plan 1987].
144. *Id.* at III-34.
145. Native Ecosystem Council v. USFS, 418 F.3d 953, 963 (9th Cir. 2005).
146. Helena Hunters and Anglers v. Tidwell, 841 F. Supp. 2d 1129, 1143 (D. Mont. 2009).

may not be accounted for unless the average road density standard is exceeded in an entire individual management area.[147] Similarly, if a forest is limited to "no net increase" in permanent road or trail density, the forest has latitude to build temporary roads or increase density in some locations without affecting overall net density.[148]

There is also a temporal dimension to some standards deserving attention and finer detail. Conflicts have emerged, for example, when a threshold or mitigation-type standard or guideline is not specified in a forest plan. Consider the following standard: "Manage land treatments to limit the sum of . . . detrimentally compacted . . . land to no more than 15% of any land unit."[149] The question here, and before the court in *Rocky Mountain Wild v. Vilsack*, is one of timing: when must reclamation occur if compaction levels exceeding the standard are identified?[150] Also tied to this issue are the details necessary in explaining how the agency will bring soil compaction levels back in compliance with the standard.[151] Some of this confusion, and possible litigation, could be avoided in revised plans if more attention was paid to these sorts of measurement issues.

As with the soil case, we suspect that threshold and mitigation standards will continue to be used in some contexts. To recall, these standards are defined by the use of quantitative metrics that should not or shall not be crossed, such as the amount of permitted soil disturbance or precommercial thinning that is allowed in an area. In no way should the use of threshold standards in planning be tied to biological or ecological-based thresholds. These are the sorts of thresholds that cannot be so easily reversed. If used in the future, we recommend that threshold standards are defined and explained in greater detail. In some cases, it would be advantageous to link management actions that are triggered if a threshold standard is crossed.[152] These trigger mechanisms could provide an added degree of certainty and accountability by specifying, in advance, what must happen upon the crossing of a threshold.[153]

2. Standards That Constrain and/or Compel

One issue emerging from our research is the difference of opinion regarding whether standards can and should be used to compel agency actions rather than just constrain them. Some forest planners we interviewed, for example, felt strongly that standards should be used solely as restrictions, such as requiring an amount of stream buffer or old growth when harvesting timber. Part of the logic here is that implementing standards should not be contingent on agency budgets, and standards that might compel certain activities would be inherently subject to adequate funding. And if not funded, the USFS would not be in compliance with a plan standard and would likely face litigation as a result. Others, however, believe that standards could be used in a more proactive fashion, as a way, for example, to achieve various restoration and biological conservation goals.[154] There is a fear that such goals will not be achieved if they are stated as discretionary planning objectives or desired future conditions.[155]

Our view is that standards are most appropriately used as constraints, but could also be used to achieve other planning goals that are stated in the 2012 rule. Consider the 2012 rule's focus on watershed protection and restoration.[156] Future forest plans could be written so that once a watershed is restored, a maintenance standard is used to keep the watershed in a certain condition class.[157] This example demonstrates why the line between standards that constrain and compel is not always so bright. After all, a standard requiring mitigation or reclamation is compelling the USFS to do something after all, which will inherently be contingent upon funding.

Standards should also be linked to the proactive recovery and conservation of threatened, endangered, proposed, and candidate species as defined by the ESA. The 2012 planning rule emphasizes the connections between forest planning and the ESA more than previous regulations. The agency "anticipates that plan components, including standards or guidelines, for the plan area would address conservation measures and actions identified in recovery plans relevant to T&E [threatened and endangered] species."[158] One way in which the USFS can actively contribute to species conservation and recovery is by providing wildlife- and habitat-based standards in forest plans. We recommend that more study, and guidance, be provided in how synergies might be developed in writing forest plans that

147. Habitat Education Center v. Bosworth, 363 F. Supp. 2d 1070, 1088 (D. Mont. 2005).
148. *See, e.g.*, Beaverhead-Deerlodge Plan 2009, *supra* note 65, at 145.
149. Rocky Mountain Wild v. Vilsack, 843 F. Supp. 2d 1188, 1195 (D. Colo. 2012).
150. *Id.* at 1196-97.
151. *Id.* at 1197-98.
152. *See* Martin Nie & Courtney Schultz, *Decision-Making Triggers in Adaptive Management*, 26(6) Conservation Biology 1137, 1143 (2012) (summarizing how management triggers could be used to prevent the crossing of ecological and regulatory thresholds that correspond with irreversible ecological variables).
153. *See id.* (discussing the use of triggers in an adaptive management system) (noting at 1142, however, that "if . . . adaptive management plans fail to make the link between management actions, monitoring information, and learning, the opportunity to reduce uncertainty about the ecosystem likely is lost").
154. *See, e.g.*, USFS DEIS 2011(statement of Wyoming State Division of Forestry) (suggesting that standards be used to manage suitable timber lands towards desired future conditions or reduce fuels around the wildland-urban interface).
155. *See, e.g.*, USFS DEIS 2011 (statement of Lands Council).
156. The 2012 planning rule summary states, for example:
> The planning rule is designed to ensure that plans provide for the sustainability of ecosystems and resources; *meet the need for forest restoration and conservation, watershed protection*, and species diversity and conservation; and assist the Agency in providing a sustainable flow of benefits, services, and uses of NFS lands that provide jobs and contribute to the economic and social sustainability of communities.

National Forest System Land Management Planning, 77 Fed. Reg. 21162, 21162 (Apr. 9, 2012).
157. *See* U.S. Forest Serv., Watershed Condition Framework: A Framework for Assessing and Tracking Changes to Watershed Condition (2011), *available at* http://www.fs.fed.us/publications/watershed/Watershed_Condition_Framework.pdf.
158. National Forest System Land Management Planning, 77 Fed. Reg. 21162, 21215 (Apr. 9, 2012).

are better synced with ESA recovery, from critical habitat determinations to species' recovery plans.

One possible way to bridge the issue of using standards to compel or constrain is by choosing to write more specific and measurable proactive planning "objectives." An objective is defined in the NFMA regulations as "a concise, measurable, and time-specific statement of a desired rate of progress toward a desired condition or conditions."[159] Some lessons can be drawn from the writing of Comprehensive Conservation Plans (CCPs) for units within the National Wildlife Refuge System (NWRS).[160] Though the legal and planning context differs, the NWRS has the clearest mandate to manage for ecosystem restoration and ecological integrity,[161] which are two values emphasized in the 2012 NFMA planning rule.[162] In order to meet these and other legal requirements, the FWS provides specific guidance in how to write refuge objectives that are (1) specific, (2) measurable, (3) achievable, (4) results-oriented, and (5) time-fixed. Several units within the refuge system have incorporated these "SMART" objectives into their CCPs, with varying levels of success.[163] This initiative—replete with policy guidance, refuge plans, and outside evaluation—provides the USFS with an opportunity to learn lessons from another federal land agency. In some cases, it could be advantageous to use standards to constrain agency activities while opting to use SMART-like objectives to achieve the stated goals of the 2012 planning rule.

3. Standards and Science

The writing and application of standards demonstrates a few long-standing challenges at the policy-science interface. On one hand are the inherent complexities, uncertainties, and probabilities involved in science, while on the other is the demand for legal accountability via generally applicable and enforceable rules. Part of the challenge is that standards, like other enforceable legal and policy instruments, are sometimes stated as regulatory thresholds that cannot be crossed. A standard, in other words, may be dichotomous so that the agency can proceed as long as it does not cross line X. But sometimes a regulatory-science mismatch is evident because highly variable ecosystems and resources are often better characterized and managed on a continuum.[164] Consider old growth standards, for instance. Some planning standards mandate a specified percentage of old growth be maintained on a national forest. But much of the scientific literature on the topic use several different definitions of old growth,[165] with some experts calling for using an index of "old-growthness" that "would allow the threshold for identifying old-growth to be moved depending on the management objective."[166] The challenge, then, is how to better align planning standards with this sort of scientific nuance and complexity.

Such complexity, however, should not be used as an excuse for not using standards where they could be used notwithstanding the scientific uncertainty associated with them. Of course, the amount of scientific uncertainty associated with a standard will vary depending on the value and resource. In some cases, for example, the science will be more consensual and easier to apply, such as the relationship between route density and sediment delivery to waterways. As Jamie Goode, Charles Luce, and John Buffington confirm: "Forest roads are widely recognized to increase sediment supplied to forest streams by altering hillslope hydrology and sediment flux."[167] There is a considerable amount of scientific literature on this topic that could be drawn from in writing future plans, with Hermann Gucinski et al. providing the most influential synthesis.[168]

In other cases, the science will be more uncertain and more difficult to incorporate as a standard. In these cases, the agency will face the classic administrative dilemma in how to respond in the face of scientific uncertainty, from a posture emphasizing administrative discretion to one invoking the precautionary principle.[169] The choice will likely mean that a political judgment and assessment of risk must be made. As discussed below, we believe such political choices, including the agency's use of science, and other factors considered in the decisionmaking process, should be clearly explained to the public. If the choice to use or not use a particular standard is based on factors going beyond science, it should be clearly stated as such.

Our sample of forest plans revealed differences in how science was used in the writing and application of planning standards. Some standards emerged out of processes in which the use of science was clearly evident. Lynx standards, for example, can be readily traced back to the sci-

159. 36 C.F.R. §219.7(e).

160. *See* U.S. Fish & Wildlife Serv., Comprehensive Conservation Planning Process (2000), *available at* http://www.fws.gov/policy/602fw3.pdf.

161. *See, e.g.*, Robert L. Fischman, *National Wildlife Refuge System and the Hallmarks of Modern Organic Legislation*, 29 Ecology L.Q. 457, 563 (2002) (discussing the unique ecological criteria contained in the wildlife refuge system's organic act).

162. *See, e.g.*, National Forest System Land Management Planning, 77 Fed. Reg. 21162, 21260 (Apr. 9, 2012) (explaining that one purpose of the rule "is to guide the collaborative and science-based development, amendment, and revision of land management plans that promote the ecological integrity of national forests and grasslands and other administrative units of the NFS").

163. *See* Vicky J. Meretsky et al., *New Directions in Conservation for the National Wildlife Refuge System*, 56.2 Bioscience 135 (2006); Richard L. Schroeder, *Evaluating the Quality of Biological Objectives for Conservation Planning in the National Wildlife Refuge System*, 26 Geo. Wright F. 22 (2009); Richard L. Schroeder, *A System to Evaluate the Quality of Restoration Objectives Using National Wildlife Refuge Comprehensive Conservation Plans as a Case Study*, 14 J. Nat. Conservation 200 (2006).

164. Malcolm L. Hunter et al., *Thresholds and the Mismatch Between Environmental Laws and Ecosystems*, 23 Conservation Biology 1053 (2009).

165. *See generally* Thomas A. Spies & Sally L. Duncan (Eds.), Old Growth in a New World: A Pacific Northwest Icon Reexamined (2009).

166. Thomas A. Spies, *Ecological Concepts and Diversity of Old-Growth Forests*, J. Forestry 14 (Apr./May 2004).

167. Jamie R. Goode et al., *Enhanced Sediment Delivery in a Changing Climate in Semi-Arid Mountain Basins: Implications for Water Resource Management and Aquatic Habitat in the Northern Rocky Mountains*, 139 Geomorphology 1 (2012) (reviewing literature focused on linkages between roads and increased sedimentation).

168. Hermann Gucinski, Forest Roads: A Synthesis of Scientific Information (Pacific Northwest Research Station, General Technical Report No. 509, 2001).

169. *See* J.B. Ruhl, *The Battle Over Endangered Species Act Methodology*, 34 Envtl. L. 555, 576-99 (2004).

ence used in writing the species' conservation plan,[170] and a considerable body of science was used in the writing of the Aquatic Conservation Strategy.[171]

Standards found in the Tongass National Forest Plan provide a more unusual and intriguing example. The 1997 Plan was written using an innovative process whereby scientists within the Pacific Northwest Research Station (an independent research arm of the USFS) were assembled into risk assessment panels "to assist decisionmakers in interpreting and understanding the available technical information and to predict levels of risk for wildlife and fish, old growth ecosystems, and local socioeconomic conditions resulting from different management approaches."[172] In this case, "science consistency checks" were used as a type of audit to ensure that the policy and management branch writing the Tongass Plan could not misrepresent or selectively use information in ways not supported by the best available science. The process, at the very least, facilitated the consideration of best available science when writing the Tongass Plan, even if parts of the Tongass Plan were based on factors going beyond science.[173]

In other cases, the linkages between standards and science are less clear. The case law we reviewed demonstrates that environmental plaintiffs and the USFS sometimes question the lack of science behind a particular standard or guideline. Environmental plaintiffs, for example, argued that a 10% old growth guideline was insufficient to ensure species viability,[174] and the USFS tried to amend a plan's road density and elk habitat standard because the Supervisor found the restriction "not scientifically supportable or logical."[175] Other times, *all* parties seem to question the scientific validity of a standard. This currently seems to be the case in implementing controversial elk security standards as found in several national forest plans, with the USFS and environmental plaintiffs questioning the efficacy of these relatively dated standards.[176]

Some standards apparently get used because of their administrative and operational simplicity. This is similar to use of "policy-driven" rather than "evidence-based" conservation, such as the politically convenient, though biologically questionable, target of setting aside 10% of lands for conservation purposes.[177] One of the most common standards is the use of "fixed-width buffers" for protecting freshwaters and their riparian areas from timber harvesting. John Richardson and others trace the lineage of riparian buffers and show how the approach used by the Forest Ecosystem Management Assessment Team (FEMAT) in the Pacific Northwest of the United States was quickly replicated throughout the United States and Canada.[178] They conclude, however, "requirements for narrow, fixed-width buffers usually originated for administratively simple but scientifically untested reasons."[179] Their review of the literature finds that typically mandated widths are often insufficient to protect some riparian functions, while others suggest that minimum widths are insufficient in conserving riparian organisms.[180] Of course, measuring effectiveness ultimately depends on plan objectives, but these are often vaguely stated.[181]

The 2012 planning regulations state that national forests "shall use the best available scientific information to inform the planning process," which includes a requirement to determine and document "what information is the most accurate, reliable, and relevant to the issues being considered."[182] This new provision provides planning teams an excellent opportunity to explain the science that was used to write new standards. We recommend that the USFS document the rationale for plan standards, describing necessary background, assumptions, sources of information, and technical details so that the public can understand why a particular standard was used or not used. This sort of documentation is to be used when writing SMART planning objectives for national wildlife refuges, as discussed above. Such documentation, according the FWS, "promotes informed debate on the objective's merits, continuity in management through staff turnover, and reevaluation of the objective as new information becomes available."[183] We believe that a more transparent and documented use of science when writing plan standards will generate trust in the writing of plans and improve their overall effectiveness. As discussed in more detail below, we also believe that this type of documentation and transparency could facilitate more adaptive forest planning.

170. *See* Lynx Amendment 2007, *supra* note 63.
171. Gordon H. Reeves et al., *The Aquatic Conservation Strategy of the Northwest Forest Plan*, 20(2) Conservation Biology 319 (2006).
172. Kent R. Julin & Charles G. Shaw III, Science Matters: Information for Managing the Tongass National Forest 2 (1999).
173. For a review of this process, see Douglas A. Boyce Jr. & Robert C. Szaro, *An Overview of Science Contributions to the Management of the Tongass National Forest, Alaska*, 72 Landscape & Urb. Plan. 251 (2005); Fred H. Everest et al., Evaluation of the Use of Scientific Information in Developing the 1997 Forest Plan for the Tongass National Forest (Pacific Northwest Research Station, General Technical Report 415, 1997); Charles G. Shaw III et al., *Working With Knowledge at the Science/Policy Interface: A Unique Example From Developing the Tongass Land Management Plan*, 27 Computers & Electronics Agric. 377, 378 (2000); Charles G. Shaw III et al., *Independent Scientific Review in Natural Resources Management: A Recent Example From the Tongass Land Management Plan*, 73 Northwest Sci. 58, 60 (1999); and Martin Nie, *Governing the Tongass: National Forest Conflict and Political Decision Making*, 36 Envtl. L. 385 (2006).
174. The Ecology Center v. Castaneda, 574 F.3d 652 (9th Cir. 2009).
175. Hapner v. Tidwell, 621 F.3d 1239 (9th Cir. 2010).
176. *See id*; Helena Hunters & Anglers v. Tidwell, 841 F. Supp. 2d 1129 (D. Mont. 2009); Island Range Chapter of the Montana Wilderness Association v. U.S. Forest Service, 117 F.3d 1435 (9th Cir. 1997); and Native Ecosystems Council v. Weldon, 848 F. Supp. 2d 1207 (D. Mont. 2012).
177. Leona K. Svancara et al., *Policy-Driven Versus Evidence-Based Conservation: A Review of Political Targets and Biological Needs*, 55(11) Bioscience 989 (2005).
178. John S. Richardson et al., *How Did Fixed-Width Buffers Become Standard Practice for Protecting Freshwaters and Their Riparian Areas From Forest Harvest Practices?*, 31(1) Freshwater Sci. 232 (2012).
179. *Id.* at 237.
180. *See* Laurie Marczak et al., *Are Forested Buffers an Effective Conservation Strategy for Riparian Fauna? An Assessment Using Meta-Analysis*, 20 Ecological Applications 126 (2010).
181. *See* Richardson et al., *supra* note 178.
182. 36 C.F.R. §219.3.
183. U.S. Fish & Wildlife Service & U.S. Geological Survey, Writing Refuge Management Goals and Objectives: A Handbook (2004), at 10.

4. Standards and Adaptive Management

One of the most difficult challenges in writing and implementing standards, and forest plans in general, is making them responsive, adaptive, and consistent with best available science. A common argument made against standards is that they can be inflexible and that such rigidness makes adaptive planning more difficult. Climate change is also often invoked in this context, with increasing calls to "plan for uncertainty."[184] We believe that standards do not have to be an impediment to adaptive management. This is because standards have frequently been changed in the past, and the 2012 regulations provide a framework in which to keep plans and standards more dynamic and contemporary. In writing some standards in the future, it will be necessary for the USFS to try to anticipate possible changes to a standard and to provide mechanisms for their adjustment. How to incorporate possible changes to a standard should be considered early in the planning process.

We found that amending or exempting standards for particular projects as amendments to a plan is commonplace. These numerous exemptions and amendments demonstrate that standards have been modified or exempted in the past and could be so in the future. Standards need not be static and difficult to improve upon. Some of the plans in our sample provide a framework in which standards can be modified or exempted in the future. For example, the lynx standards amended to multiple national forest plans require that fuel treatment projects within the wildland urban interface that do not meet particular standards shall occur on no more than 6% of lynx habitat on each national forest.[185] On the Tongass National Forest, marbled murrelet nest buffer protections may be removed if monitoring shows that nesting sites were "inactive for two or more nesting seasons."[186] Another approach is to create a generally applicable default standard that allows for modification upon satisfying certain analytical requirements. The Inland Native Fish Strategy (INFISH) provides an example. The INFISH standards pertaining to required stream buffers can be adjusted from default widths based on recommendations from a watershed analysis, stream reach, or site-specific review supporting the change.[187] Default standards can provide an important presumption that standards will be followed, but also provide foresight and a framework allowing for change when necessary.

In general, standards should provide boundaries to prevent volatility (altering decisions too substantially, too soon) and drift (too many small adjustments over time that send agencies far off the original course of action) in an adaptive system.[188] Such standards, or "objective boundaries," allow decisionmakers to adjust decisions in a transparent and accountable manner, which allows the adaptive management strategy to be monitored by the public and policed by the courts.[189]

One challenge likely to arise if standards are changed or exempted is the process used by the USFS to do so and whether the changes trigger legal requirements imposed by the National Environmental Policy Act (NEPA)[190] or ESA consultation. These and other laws are sometimes viewed as impediments to adaptive management because of their time-consuming analytical requirements.[191] This issue emerged in some of the case law we reviewed. In one decision, for example, the court required the USFS to subject changes to maps of LAUs, and the standards associated with them, to NEPA analysis and to consult with the FWS under §7 of the ESA.[192]

The tiering of projects to plans provides one way in which this challenge can be addressed in the future. Tiering is a process whereby project-level NEPA analysis may reference more broad NEPA analyses that have already been completed. J.B. Ruhl and Robert Fischman find that the courts have upheld several adaptive management plans, including the Northwest Forest Plan, when project-level changes were anticipated and analyzed in more general resource management plans.[193] These plans anticipated the emergence of new information and provided mechanisms for adjustment. When changes to standards are not anticipated in a forest plan, the courts may likely ask for supplemental analysis as required by NEPA.[194]

The 2012 planning rule provides an ideal framework in which to revisit planning standards upon the finding of new information or science or changed conditions. We concur with the agency that the rule's framework, including a biennial evaluation and report of monitoring information,[195] "provides a scientifically supported process for decisionmaking in the face of uncertainty and particularly under changing conditions."[196] Fundamental to this process will be a funded and scientifically credible monitoring program. Political and legal questions about monitoring are beyond the scope of this Article. Generally speaking, the courts are very reluctant to force agencies to conduct monitoring, especially in the context of land use planning, and they are often deferential when it comes to how monitoring is conducted by an agency.[197] The 2012

184. *See, e.g.*, Linda A. Joyce et al., *Managing for Multiple Resources Under Climate Change: National Forests*, 44 Envtl. Mgmt. 1022 (2009); Jordan M. West et al., *U.S. Natural Resources and Climate Change: Concepts and Approaches for Management Adaptation*, 44 Envtl. Mgmt. 1001 (2009).
185. Lynx Amendment 2007, *supra* note 63, at 2.
186. Tongass Plan 1997, *supra* note 53, at 4-115.
187. INFISH 1995, *supra* note 56, at 3.
188. *See* J.B. Ruhl, *Regulation by Adaptive Management—Is It Possible?*, 7 Minn. J. L. Sci. & Tech. 21, 55 (2006).
189. *Id.* at 55.
190. 42 U.S.C. §§4321-4370h, ELR Stat. NEPA §§2-209.
191. *See* Nie & Schultz, *supra* note 152.
192. Native Ecosystems Council & Alliance v. U.S. Forest Service, 866 F. Supp. 2d 1209 (D. Idaho 2012).
193. J.B. Ruhl & Robert L. Fischman, *Adaptive Management in the Courts*, 95 Minn. L. Rev. 424 (2010).
194. *See* Klamath Siskiyou Wildlands Center v. Boody, 468 F.3d 549 (9th Cir. 2006).
195. 36 C.F.R. §219.12.
196. National Forest System Land Management Planning, 77 Fed. Reg. 21162, 21194 (Apr. 9, 2012).
197. *See, e.g.*, Eric Biber, *The Problem of Environmental Monitoring*, 83 U. Colo. L. Rev. 1 (2011); Blumm & Bosse, *supra* note 46; Lands Council v. McNair, 537 F.3d 981 (9th Cir. 2008); Norton v. Southern Utah Wilderness Alliance, 542 U.S. 55, 124 S. Ct. 2372, 159 L. Ed. 2d 137 (2004).

planning rule also states that the rule's monitoring requirements "are not a prerequisite for making a decision to carry out a project or activity."[198]

This context notwithstanding, monitoring commitments can be made binding and enforceable by the USFS. Martin Nie and Schultz find that "enforceability increases if the details and timelines of the monitoring and mitigation responses are prespecified" and that "[i]t is necessary to identify what will be monitored and when, how and when monitoring information will trigger a change in management action, and what activities can continue while monitoring or mitigation decisions are ongoing."[199] The enforceability of monitoring is also increased if a plan requires some sort of monitoring before a discrete agency action can be taken. In these cases, monitoring compliance with a standard essentially serves as a precondition or gateway to future agency actions. We found some cases where the courts asked the USFS to demonstrate, with some reliable monitoring information, that it was in compliance with a particular planning standard, such as maintaining a certain percentage of old growth.[200] The key in these cases and others is having clear connections between the particular standard, monitoring requirement, and specific agency actions or projects. When linked in such fashion, the courts' inquiry is whether the project at hand is "consistent" with the land management plan, as required by NFMA.

We found other examples where monitoring or assessment serves as a precondition or gateway to future agency actions. This approach varies in levels of restriction. On the strict end are the survey and management requirements under the Northwest Forest Plan that requires that some species be surveyed before ground-disturbing activities can proceed.[201] INFISH provides a less restrictive example as it requires watershed analyses be completed before proposed projects and activities can be considered by the agency in riparian habitat conservation areas and key watersheds.[202]

We also found several instances where standards were linked to monitoring requirements, and in some cases, decisionmaking triggers were used so that monitoring information could be tied into the decisionmaking process. Management of the Christ's Indian paintbrush (*Castilleja christii*) provides a recent example. The plant was removed from the list of ESA candidate species after the Sawtooth National Forest "successfully implemented numerous conservation actions" that ameliorated threats to the species and established a "long-term monitoring program to document their effectiveness."[203] The forest developed a Candidate Conservation Agreement with the FWS that tiers from a forest plan management area standard directing managers to "maintain habitat and populations of Christ's Indian paintbrush consistent with the conservation strategy."[204] Under the conservation agreement, the forest must perform annual monitoring and use monitoring data to "determine the effectiveness of Conservation Agreement actions taken on behalf of the species."[205] All conservation actions address a specific threat, and align with discrete tasks, performance metrics, and a trigger that results in a management response if "pulled." For example, in order to address threats from livestock use, the forest must monitor for unauthorized livestock within the Christ Indian paintbrush's habitat area. If unauthorized livestock are observed, a trigger is pulled and the forest must contact the permittee and remove the livestock "as quickly as possible."[206]

5. Standards and Management Areas

Standards are often applied to particular management areas as delineated in a forest plan. A management area standard, for instance, can prohibit an activity such as grazing or the application of herbicides. Standards provide an essential way of distinguishing how one area of a forest will be managed in contrast with another. There is not much use in designating a management area if no rules are associated with what can and cannot be done in each one of them.

Sometimes related to management area designations are "suitability determinations" that are required by the NFMA and its regulations. The NFMA requires "identification of the suitability of lands for resource management."[207] This mandate goes beyond timber, though most of the law's guidance on the matter pertains to the Act's requirement to determine an area's suitability for timber harvesting. The 1982 regulations also required suitability determinations be made for other resources such as recreation and grazing.[208] The 2012 regulations also require that specific lands be identified as suitable and not suitable for various multiple uses or activities, but "the suitability of lands need not be identified for every use or activity."[209] Also required by the regulations is the designation of management or geographic areas.[210] These provisions leave discretion to the USFS in identifying lands as suitable for various activities and the extent to which management areas will be used in a plan.

198. 36 C.F.R. §219.12.
199. Nie & Schultz, *supra* note 46, at 1142.
200. Neighbors of Cuddy Mountain v. Alexander, 303 F.3d 1059 (9th Cir. 2002); The Wilderness Society v. Bosworth, 118 F. Supp. 2d 1082 (D. Mont. 2000).
201. U.S. Forest Serv. & Bureau of Land Mgmt., Record of Decision for Amendments to Forest Serv. and Bureau of Land Mgmt. Planning Documents Within the Range of the Northern Spotted Owl (1994).
202. INFISH 1995, *supra* note 56 at A9.
203. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Proposed Rule, 77 Fed. Reg. 69994 (Nov. 21, 2012).
204. Sawtooth Plan 2003, *supra* note 72, at III-300.
205. U.S. Forest Serv. & U.S. Fish and Wildlife Serv., Candidate Conservation Agreement for *Caastilleja Christii* (Christ's Indian Paintbrush) (2005), 26.
206. *Id.* at 52.
207. 16 U.S.C. §1604.
208. 36 C.F.R. §219.20-21.
209. 36 C.F.R. §219.7.
210. 36 C.F.R. §219.7.

We believe that the designation of management areas, especially when tied to suitability determinations, can provide a more efficient way of protecting some resources than by relying upon overly complicated standards that can be time-consuming to write and difficult to implement. In some cases, for example, it would make more sense to outright prohibit grazing in a particular area rather than write several detailed grazing-based standards, from fencing requirements to riparian area protections. Suitability determinations also make sense for management areas containing inventoried roadless, recommended wilderness, and other protected lands. For example, the Kootenai National Forest designated a management area with the goal of "protection and enhancement of areas of roadless recreation."[211] However, instead of classifying all lands within the management area as unsuitable for motorized use, some existing roads remain open to various forms of use. Several management area standards related to recreation, wildlife, and fish are therefore required to constrain motorized use.[212] As another example, the Clearwater National Forest designated one management area containing recommended wilderness as an "exclusion area for potential utility corridors."[213] Contrast this simple suitability standard to a management area in the Sawtooth National Forest also consisting of inventoried roadless and recommended wilderness areas. The management area permits utility and communication sites, thus requiring standards and guidelines determining how and where sites may be built.[214]

V. Conclusion

The writing of forest planning regulations, and individual forest plans, has become a primary venue for conflict over national forest management. One of the most contested parts of forest planning is the use of standards, with some interests viewing them as enforceable, and therefore essential constraints on agency actions, and others viewing them as overly prescriptive, burdensome, and inflexible. As this debate goes on, there has been confusion regarding how standards have actually been used by the USFS in the past. Some of this confusion stems from the very different ways in which standards have been used by the agency. Our review of case law and public comment provides legal and political context for readers, explaining the significance of what might otherwise seem like a rather arcane policy debate. We also hope that our review of national forest plans, and our typology of standards, will provide a common language and reference point for the writing of future forest plan revisions.

We recommend that the USFS embrace the use of standards when writing second-generation forest plans. Not only do law and regulation require standards, but they can also lead to efficiencies in forest planning. They can also be advantageous from a political perspective, as they resonate with a cross section of planning participants, most of whom want a greater degree of certainty, structure, and predictability in forest management. Standards also play a significant role in ESA decisionmaking, of which we believe will become an even more important part of forest management in the future.

To summarize, we hope that the USFS and planning participants consider the following recommendations as forest plans are revised in the future:

1. The USFS should provide national- or regional-level guidance in how to use and write standards in plan revisions.
2. Standards should not be written in a discretionary way. Other planning components should be used when discretion is warranted.
3. Some standards should be written so that they serve as a regulatory link and assist the USFS in achieving its legal mandates.
4. Attention should be paid to how certain standards will be measured, spatially and temporally, and what actions must be taken by the USFS if a standard is breached.
5. Standards should be linked to the proactive recovery and conservation of threatened, endangered, proposed, and candidate species as defined by the ESA.
6. When standards that compel an agency action are not warranted or feasible, the USFS should consider writing more specific, measurable, and proactive planning objectives.
7. The USFS should clearly document the scientific rationale for plan standards describing necessary background, assumptions, sources of information, and technical details so that the public can understand why a particular standard was used or not used.
8. The USFS should be transparent and explain to the public the science, and factors going beyond science, that were considered in using or not using a standard.
9. In cases where adaptive management is necessary, the USFS should try to anticipate possible changes to standards and provide mechanisms for their adjustment. In these cases, the question of how to plan for uncertainty should be considered early in the process. The use of default standards and tiering are two possible approaches to planning for uncertainty. Key to any adaptive management strategy in this context will be a funded and scientifically credible monitoring program in which monitoring information is tied back into the decisionmaking process.

211. Kootenai Plan 1987, *supra* note 143, at III-2.
212. *Id.* at III-3 to III-7.
213. Clearwater Plan 1987, *supra* note 52, at III-38.
214. Sawtooth Plan 2003, *supra* note 72, at III-51.

10. In some cases, the designation of management areas, especially when tied to suitability determinations, can provide a more efficient way of protecting resources than by relying upon standards.

Though necessary, we acknowledge the challenges that will be posed in writing standards in future plan revisions. Planning has undoubtedly become more complicated since first-generation plans were written in the 1980s. Issues like motorized recreation, oil and gas development, and fire management, among others, present a suite of issues that were not as dominant when NFMA was enacted in 1976. But there is also a lot that can be learned from the writing and application of standards in first-generation plans. We believe that our recommendations and list of considerations can facilitate the writing of plan revisions and alert planners and the public about possible opportunities, problems, and pitfalls associated with the use of standards in forest planning.

Table 1—Forest Plans, Amendments, and Strategies Included in Study Sample

Plan, Amendment, or Strategy	FS Region(s)	Year
Beaverhead Forest Plan	1	1986
Deerlodge Forest Plan	1	1987
Beaverhead-Deerlodge Forest Plan	1	2009
Boise Forest Plan	4	1990, 2003
Clearwater Forest Plan	1	1987
Flathead Forest Plan	1	1985
Gallatin Forest Plan	1	1987
Helena Forest Plan	1	1986
Idaho Panhandle Forest Plan	1	1987
Kootenai Forest Plan	1	1987
Lolo Forest Plan	1	1986
Nez Perce Forest Plan	1	1987
Payette Forest Plan	4	1988, 2003
Sawtooth Forest Plan	4	1987, 2003
Tongass Forest Plan	10	1979, 1997
Final Conservation Strategy for the Grizzly Bear in the Yellowstone Area	1, 2, 4	2007
Grizzly Bear Access Amendment (Selkirk/Cabinet-Yaak)	1	2011
Grizzly Bear Habitat Conservation Amendments (Greater Yellowstone)	1, 2, 4	2006
Inland Native Fish Strategy	1, 4, 6	1995
Northwest Forest Plan Aquatic Conservation Strategy	5, 6	1994
Northern Rockies Lynx Management Direction	1, 2, 4	2007
Region 1 Soil Quality Standards	1	1999

Grazing Capability Calculations for the Kaibab National Forest

Summary by Ariel Leonard

The 1982 Planning Rule requires that the capability for producing forage for grazing animals be determined for suitable rangelands during forest planning. Capability is the potential of an area of land to produce resources and supply goods and services. Rangeland capability depends upon conditions such as climate, slope, landform, soils, and geology.

On the Kaibab National Forest (NF), the capability of lands to produce forage for grazing animals is based on two criteria, slope and forage production. Lands with slopes less than 40 percent that have the potential to produce more than 100 pounds of forage per acre are considered to be capable of producing forage for grazing animals. The ability to produce more than 100 pounds of forage per acre is based on existing Terrestrial Ecosystem Survey (USDA Forest Service 1991) data which incorporates considerations of climate and soils. Soil characteristics are influenced by physical components including landform and geology, as well as biological and climatic components. These criteria for determining capability are consistent with the management direction provided in the Region 3 Rangeland Analysis and Management Training Guide (USDA Forest Service, 1999) and with recommendations for assigning grazing capacity found in "Range Management: Principles and Practices, Third Edition" (Holechek et al, 1998).

Capability determinations in forest plans are coarse in nature, focusing on landscape-scale goals and objectives and apply under all climate conditions. Capability is not a final decision about allocation of resources and does not authorize grazing on specific pieces of land. Subsequent site-specific analyses conducted consistent with the forest plan are used to make final decisions concerning the authorization of grazing activities. Subsequent site-specific analyses conducted consistent with the forest plan are used to make final decisions concerning the authorization of grazing activities.

Capability is just one range analysis used for range management decisions. The Kaibab NF uses other range analyses to determine annual stocking levels and needed changes in management.. Grazing allotments are inspected at the beginning and periodically during the grazing season by District Range Management Specialists to make annual adjustments in stocking levels. This monitoring approach, commonly referred to as "stock and monitor" involves observing actual production and measuring the effects of actual stocking levels over time on utilization and utilization patterns, composition, vigor, soil cover, and other factors (including wildlife) and adjusting levels when changes to stocking levels are needed (Smith et al. 2012).

Additionally, condition and trend analysis are completed periodically, and are typically associate with site specific grazing authorization decision documents in compliance with the National Environmental Policy Act. More information about specific considerations and techniques for rangeland monitoring and assessment can be found in the "Guide to Rangeland Monitoring and Assessment: Basic Concepts for Collecting, Interpreting, and Use of Rangeland Data for Management Planning and Decisions" (Smith et al. 2012).

References

Holechek, J.L., J.D. Pieper, C.H. Herbel. 2003. Range Management Principles and Practices. Prentice Hall Inc., Upper Saddle River, NJ. 501 p.

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USDA Forest Service. 1991. Terrestrial Ecosystem Survey of the Kaibab National Forest Albuquerque, NM: Southwestern Region. 319 p.

USDA Forest Service. 1999. Region 3 Rangeland Analysis and Management Training Guide. Albuquerque, NM: Southwestern Region.

From: Leonard, Ariel G -FS
To: jlininger@biologicaldiversity.org
Subject: RE: Grazing Capability Calculations
Date: Tuesday, April 29, 2014 1:42:21 PM

Jay,

It isn't on the web because it is in "draft" form. It is a pretty basic explanation of the capability calculation process. I will get with our range specialist to get it finalized and posted to the web. I'll let you know as soon as it is up. I should be able to get it reviewed and posted within the week.

Ariel

From: Jay Lininger [mailto:jlininger@biologicaldiversity.org]
Sent: Tuesday, April 29, 2014 1:19 PM
To: Leonard, Ariel G -FS
Subject: Grazing Capability Calculations

Hi Ariel,

I looked through the KNF website to find the white paper referenced on page 110 of the new Forest Plan entitled, "Grazing Capability Calculations for the Kaibab NF," but didn't find it there. Could you please send it to me?

My best,

Jay Lininger, Senior Scientist
Center for Biological Diversity
(928) 853-9929

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