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Invited Paper

Wildlife Conservation Planning Under the United States Forest Service's 2012 Planning Rule

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ABSTRACT In 2012, the United States Forest Service (USFS) promulgated new planning regulations in accordance with the National Forest Management Act (NFMA). These regulations represent the most significant change in federal forest policy in decades and have sweeping implications for wildlife populations. We provide a brief overview of the history of the NFMA planning regulations and their wildlife provisions and review the current science on planning for effective wildlife conservation at the landscape scale. We then discuss the approach to wildlife conservation planning in the 2012 rule and compare it to alternatives that were not selected and previous iterations of the planning rule. The new planning rule is of concern because of its highly discretionary nature and the inconsistency between its intent on the one hand and operational requirements on the other. Therefore, we recommend that the USFS include in the Directives for implementing the rule commitments to directly monitor populations of selected species of conservation concern and focal species and to maintain the viability of both categories of species. Additional guidance must be included to ensure the effective selection of species of conservation concern and focal species, and these categories should overlap when possible. If the USFS determines that the planning unit is not inherently capable of maintaining viable populations of a species, this finding should be made available for scientific review and public comment, and in such cases the USFS should commit to doing nothing that would further impair the viability of such species. In cases where extrinsic factors decrease the viability of species, the USFS has an increased, not lessened, responsibility to protect those species. Monitoring plans must include trigger points that will initiate a review of management actions, and plans must include provisions to ensure monitoring takes place as planned. If wildlife provisions in forest plans are implemented so that they are enforceable and ensure consistency between intent and operational requirements, this will help to prevent the need for additional listings under the Endangered Species Act and facilitate delisting. Although the discretionary nature of the wildlife provisions in the planning rule gives cause for concern, forward-thinking USFS officials have the opportunity under the 2012 rule to create a robust and effective framework for wildlife conservation planning.

KEY WORDS at-risk species, coarse-filter, fine-filter, focal species, forest planning, monitoring, viability.

In April 2012, the United States Forest Service (USFS) issued its final planning rule in accordance with requirements of the National Forest Management Act of 1976 (NFMA; 77 FR 21162). The 2012 rule took over 2 years to complete and included extensive public involvement, consultation through forums with scientists and policy experts, and environmental analysis conducted in accordance with the National Environmental Policy Act of 1969 (NEPA; USFS 2012). The new rule represents the most substantive change in federal forest policy in 30 years, with sweeping implications for wildlife. We review the administrative history of the planning rule, explore the provisions that affect the conservation of wildlife and biodiversity, and discuss how careful implementation could lead to more efficient and effective wildlife management. To provide a context for interpreting the changes that will come with implementation of the new rule, we begin with a short administrative history, and then provide a conceptual framework for interpreting the management implications of the rule. We also consider the intersection of the NFMA and the Endangered Species Act (ESA) and look at the implications of this rule change for ESA decision making. We conclude with a series of observations and recommendations for how the wildlife profession might help ensure that sound science and practical policy are effectively wed as the planning rule is implemented across the nation's public forest lands over the years to come.

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A BRIEF HISTORY OF THE 2012 PLANNING RULE

The NFMA created a 3-tiered, regulatory approach to planning. At the highest tier, national-level regulations govern the development and revision of second-tier forest plans. Site-specific plans for projects and other activities make up the third tier, and they must be consistent with both sets of higher-level regulations. Forest plans typically make zoning and suitability decisions and regulate various activities within a forest area, therefore acting as a gateway through which subsequent project-level proposals must pass. They do not, however, authorize or mandate site-specific projects. Instead, plans address issues such as the prioritization of various multiple-use goals, requirements for managing resources such as wildlife, watersheds, or soils, and the determination of which land is suitable for timber cutting, along with allowable volume and the choice of harvesting and regeneration methods.

Efforts to revise the rules governing Forest Service planning have been many, and debate has been intense, resulting in considerable confusion regarding the requirements, process, and legal provisions underlying recent forest planning and management. During development of the 2012 rule, the USFS operated under the 1982 planning rule (47 FR 43026), despite the issuance of more recent rules in 2000 (65 FR 67514), 2005 (70 FR 1023), and 2008 (73 FR 21468). The 2000 rule, developed by the Clinton administration with guidance from a Committee of Scientists (Committee of Scientists 1999), was deemed by the subsequent administration too "costly, complex, and procedurally burdensome" (77 FR 21162: 21164) to implement, and the USFS reverted to planning under the terms of the 1982 rule. Both the 2005 and the 2008 rules were enjoined by the courts because of a failure to meet legal requirements. The agency had argued that planning regulations did not have environmental impacts and thus did not require analysis under the NEPA and the ESA, but this argument failed to survive judicial review (*Citizens for Better Forestry v. USDA* 2007, 2009). A desire to address these persistent weaknesses and to avoid a similar judicial outcome is evident in the language of and justification for the 2012 rule.

One of the most controversial and highly litigated aspects of previous USFS planning rules has been the regulations written in accordance with the NFMA's requirement to "provide for a diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" (16 USC 1604[g][3][B]). To interpret the diversity provision and other requirements of the NFMA, a Committee of Scientists was convened in 1977, in accordance with requirements of the NFMA, to assist with the development of the first planning rule (issued in 1979 and revised in 1982). The diversity regulations in the 1982 rule required that "fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area" (36 CFR 219.19). The reference to "viable populations," drawn directly from fundamental principles of population biology, embedded specific, scientific intent into the Forest Service's planning and management responsibilities.

Subsequently, this provision caused significant controversy and drove change in forest management (Corbin 1999, Duncan and Thompson 2006). For example, compliance with the viability provision initiated litigation over the northern spotted owl (*Strix occidentalis caurina*), and led the courts to reject forest plans in the Pacific Northwest for failure to protect the viability, not only of the owl, but also of other species associated with late-successional forests (Duncan and Thompson 2006). Implementation of the 1982 rule relied primarily on the selection of management indicator species, like the northern spotted owl, meant to serve as surrogates to indicate management impacts on a broader suite of unmeasured species. Most forests indirectly assessed the status and trends of management indicator species by measuring habitat amount, a controversial practice that has been the subject of numerous court cases (Corbin 1999). Nonetheless, the use of habitat as a proxy for population status was established in court as not necessarily prohibited by the 1982 regulations (*Inland Empire Public Lands Council v. USFS* 1996).

In the 1990s, the USFS made several attempts to revise the planning rule, and in 1997 a second Committee of Scientists was convened. Its recommendations served as the basis for the 2000 rule, which maintained the viability requirement and extended it to all plant and animal species. The Committee of Scientists suggested a combination of coarse-filter approaches, which focus on the maintenance of ecosystems defined in terms of dominant vegetation types and their successional stages (see Hunter 1990), and fine-filter approaches, which involve direct species-specific measurements of population status and trends (Haufler et al. 1996, Committee of Scientists 1999). Specifically, the 2000 rule required that focal (see below) and at-risk species be monitored using fine-filter approaches. Diversity provisions of the 2000 rule were never implemented, because in 2001 the USFS reverted to the 1982 rule, using a transitional provision in the 2000 rule, while the Bush administration initiated revisions to the planning rule. Both the 2005 and 2008 rules relied entirely upon a coarse-filter approach to wildlife conservation. Contrary to assertions from the scientific community (Noon et al. 2003, 2005), the USFS argued that maintenance of broad ecosystem diversity (as represented by coarse-filter approaches) would adequately protect species and address their diversity obligations under the NFMA. These rules did not require any fine-filter, species-specific planning or monitoring. When the 2005 and 2008 rules were enjoined, the court gave the USFS the option of using the 2000 or the 1982 rule. The USFS chose to use the provisions of the 1982 rule, including the viability provision, through the transitional language in the 2000 rule. In its justification of the most recent planning effort, the USFS claims that the 1982 rule is out-of-date in its scientific foundations, planning procedures, and social values, and is too complex, expensive, and procedurally burdensome to implement (77 FR 21162).

CONCEPTUAL BASIS FOR WILDLIFE CONSERVATION PLANNING

In addressing asserted shortcomings of the 1982 rule, the Forest Service adopts an approach to wildlife conservation that hinges primarily on the assessment, analysis, management, and monitoring of habitat. The 2012 Programmatic Environmental Impact Statement for the planning rule states, "The best opportunity for maintaining species and ecological integrity is to maintain or restore the composition, structure, ecological functions, and habitat connectivity characteristics of the ecosystem. These ecosystem components, in essence, define the coarse-filter approach to conserving biological diversity" (USFS 2012:126). This contrasts with the 1982 and 2000 rules that emphasized population viability.

A Combined Coarse-Filter/Fine-Filter Approach

Most wildlife ecologists believe that effective biodiversity conservation planning requires an appropriate balance between habitat-based, coarse-filter approaches and insights from fine-filter, species-level assessment and monitoring (Noon et al. 2009). The 2012 Programmatic Environmental Impact Statement for the planning rule recognizes the limits of the coarse-filter approach stating, "initially at least, some amount of direct species measurement may be needed to assess the effectiveness of the ecological conditions provided under the coarse-filter approach in achieving the goal of conserving the biological diversity of the area" (USFS 2012:124). The impact statement goes on to propose that fine-filter strategies "can be focused on the few species of special concern whose habitat requirements are not fully captured by coarse-filter attributes." However, this language understates the importance of a complementary fine-filter approach. Research indicates that the coarse-filter approach is unlikely to provide a reliable basis for multispecies conservation planning (Cushman et al. 2008), only limited testing of the approach's validity has occurred (Noon et al. 2009), and the monitoring of a select group of species using a fine-filter approach is necessary to determine the efficacy of coarse-filter approaches (Committee of Scientists 1999, Flather et al. 2009). A recent review of the degree to which coarse-filter models can be used to infer animal occurrence concluded that "... the observed error rates were high enough to call into question any management decisions based on these models" (Schlossberg and King 2009:609). These authors went on to state, "... [coarse-filter] models oversimplify how animals use habitats, and the dynamic nature of animal populations" (Schlossberg and King 2009:609).

Defaulting to vegetation type as a descriptor of a species' habitat has a long history in ecology. It has been driven largely by pragmatism—vegetation is much easier to measure and characterize than prey resources or nest sites, for example. The practice continues because detailed vegetation maps exist for most of the United States based on either extensive ground-surveys or remotely sensed imagery (e.g., USFS LandFire Program). However, vegetation is often a poor proxy for more influential, but difficult to measure resources, and the frequent failure of vegetation-based habitat models to predict a species' distribution and abundance may be because of limitations of this assumed relationship (Van Horne 2002, Cushman et al. 2008). Even with more detailed data on habitat characteristics, unmeasured and unknown factors will still affect populations. For these reasons, population status of focal and at-risk species must be directly assessed. Therefore, a coarse-filter approach based primarily on dominant vegetation communities will have limited ability to predict the distribution and abundance of many wildlife species and effectively address the diversity provisions of the NFMA; this requires both coarse- and fine-filter approaches.

Selecting Species for Fine-Filter Assessment

Striking a balance between coarse-and fine-filter assessments of biological diversity has challenged forest managers for decades. Even if the fine-filter approach was restricted to vertebrates, monitoring the status of all species is not feasible, thus previous planning rules have restricted USFS requirements to an assessment of a small subset of species occurring across the planning area. This pragmatic constraint was recognized in the 1982 planning rule with the designation of management indicator species, species assumed to reflect the effects of management on their populations as well as the populations of many unmeasured species. However, the notion that a single species can serve as an indicator for a suite of species is an untested premise and generally not supported by research studies or ecological theory (Noon et al. 2009, Cushman et al. 2010). The concept that some species act as direct surrogates of others is untenable unless those species share similar population drivers (Cushman et al. 2010).

Instead of management indicator species, the second Committee of Scientists recommended the use of "focal species" (Committee of Scientists 1999) to evaluate status and trends of plant and animal diversity, generally. The Committee of Scientists proposed that focal species would commonly be selected on the basis of their functional role in ecosystems (e.g., they serve keystone functions [Mills et al. 1993], they are indicators of exposure to key stressors [Caro and O'Doherty 1999], they have a role as engineers of ecological processes [Jones et al. 1994], or play an important role in food web dynamics [Soule et al. 2005]). For federal public lands, Noon et al. (2009) suggest a combined coarse-filter and fine-filter approach, with the latter focusing on monitoring threatened, at-risk, and rare species, along with a modest number of focal species selected with complementary and comprehensive functional roles as described above. Systematic approaches exist for identifying and prioritizing an informative subset of species for fine-filter assessment and monitoring. For example, Regan et al. (2008) suggest selecting species based on existing schemes, such as The World Conservation Union (IUCN) Red List, Nature Serve, Partners in Flight databases, and federal or state listings, combined with an assessment of the degree and spatial and temporal characteristics of known threats. Nevertheless, uncertainties regarding the ability to generalize inferences drawn from any subset of species make the selection process

of fundamental importance to the successful implementation of the fine-filter approach.

Improved Techniques for Fine-Filter Monitoring

One argument against direct assessment of wildlife populations is that it is not financially feasible. Traditional monitoring programs and viability analyses have been based on estimates of demographic parameters such as abundance, density, survival, and reproductive rates (Beissinger and McCullough 2002). Estimates of these parameters are expensive, require extensive field surveys, often involve capture and marking of individual animals, and are available for only a small number of species. However, indirect estimates of a species' status and trend based on their spatial distribution can provide defensible surrogate measures (MacKenzie and Nichols 2004, Manley et al. 2004). Focusing on distribution, rather than traditional measures of population size and growth rate, greatly increases the efficiency of broad-scale monitoring programs (Noon et al. 2012). Advancements in wildlife monitoring, based on detection/non-detection data, including the use of sign surveys, genetic evaluation, and historical presence–absence survey data decrease the cost of monitoring changes in distribution, which can be inferred from the proportion of sample units at which the species is detected (MacKenzie et al. 2006). One of the most significant advances in detection/non-detection monitoring is the ability to confirm the presence of a species at a survey site based on its genetic signature (e.g., in hair or scat; Waits 2004, Schwartz et al. 2006). The July 2005 issue of the *Journal of Wildlife Management* devoted a special section to the application of presence–absence sampling in wildlife monitoring (Vojta 2005), including an application to National Forest System lands (Manley et al. 2005). One variable estimated by these models is the area occupied by a species, a measure of a species' spatial distribution. Temporal and spatial patterns in detection/non-detection monitoring data allow inference to changes in animal abundance (MacKenzie and Nichols 2004), the single most influential parameter that provides insights into likelihood of species persistence (Lande 1993). Thus, previous arguments citing the practical limitations of the fine-filter approach are blunted by recent technical and statistical research, much of it inspired by the difficulty and expense of implementing earlier approaches to fine-filter assessments under the 1982 planning rule.

Political and Administrative Barriers to Effective Biodiversity Conservation Planning

In the past, very few if any management indicator species have been monitored in a manner that would allow a reliable assessment of their response to management (Noon et al. 2009). Managers cite the lack of monitoring data as a critical limitation in understanding cumulative impacts to species (Schultz 2012). Aside from cost and the technical challenges discussed above, funding and implementation of reliable, species-specific monitoring has been a significant challenge on National Forest System lands because of political reasons. Maintaining the political and fiscal will to support long-term monitoring programs is difficult (Doremus 2008, Biber 2011). In addition to the challenges of chronic under-funding, management agencies face disincentives to implementing robust species-level monitoring plans because monitoring data may reveal the negative impacts of management. For example, documenting the impacts of timber harvest or fuels reduction activities on sensitive wildlife species often highlights conflicts between different agency mandates, each of which enjoys strong political and social support. In addition, funds allocated to monitoring may draw funds away from projects that result in immediate job creation, the provision of marketable goods such as timber, the attainment of fuels reduction and restoration goals, or other accomplishments that can be reported to Congress in a timely manner. Furthermore, an agency could face legal challenges if it makes enforceable monitoring commitments that it does not have the funding to implement. However, at least as they are typically drafted, monitoring plans are difficult to enforce in court, obviating the need to fully implement intended programs. The judiciary usually finds commitments to monitor land-use plans not subject to review under the parameters of administrative law, and even when reviewed in court, determinations regarding the adequacy of monitoring data are traditionally left to the expertise of administrative agencies (Biber 2011).

Several other issues make understanding management effects on wildlife populations problematic. For example, the USFS has often monitored impacts to species at the project level (Schultz 2010), a spatial scale with generally small population-level effects. Small effect sizes require high statistical power for their detection. The disparity between the scale at which population responses can be detected and the scale of individual management actions leads to persistent problems in assessing impacts to species viability (Ruggiero et al. 1994). Monitoring impacts to habitat must be done cumulatively and at multiple spatial scales to assess whether small-scale habitat changes affect individual organisms, interrupt landscape connectivity affecting multiple populations, or synergistically interact with other small-scale disturbances, resulting in broad-scale effects.

Finally, the integrity of any monitoring plan, coarse- or fine-filter, depends on the articulation of clearly stated objectives and triggers to management actions. A trigger point is a threshold value for a monitoring state variable (e.g., percent area occupied by a given focal species within a national forest planning area) that, when exceeded, triggers a particular management response. A monitoring program without triggers selected a priori to call attention to trends provides little more than a retrospective time series of data with no feedback—and therefore little value—to the management decision-making process (Noon 2003). Furthermore, the efficacy of a monitoring program cannot be assessed at adoption without pre-defined trigger points. Trigger points can be most objectively set up-front, before the difficult management changes that might result from crossing such points are proximate. This is especially true if effects are analyzed exclusively at project scales, masking broader trends. In such cases, declines in population size or habitat quality, for example, may occur incrementally with no recognition

of impact until a decline in species status is clearly established via listing under the ESA (Schultz 2010). To provide value to the forest planning process, a monitoring program must establish, a priori, the magnitude of change in the monitoring state variable that would trigger a review of management practices.

In summary, a comprehensive wildlife assessment framework would include a combination of both coarse- and fine-filter approaches. It would commit to monitoring at-risk and focal species using recent advances in monitoring approaches that make species-specific monitoring more financially feasible and efficient than it has been in the past (Noon et al. 2012). As required for effective and meaningful adaptive management, monitoring would occur at multiple spatial scales and use pre-defined triggers to meaningfully evaluate the consequences of management actions and to inform future management decisions.

AN OVERVIEW OF THE 2012 PLANNING RULE'S DIVERSITY PROVISIONS

The planning framework for the 2012 final rule involves a 3-step process: assessment; plan development, amendment, and revision; and monitoring (36 CFR §219.5 [2012]). It requires the use of the "best available scientific information to inform the planning process" (36 CFR §219.3 [2012]) and identifies restoration and watershed protection as agency priorities, while emphasizing the contributions of sound forest management to ecological, social, and economic sustainability (36 CFR §219.8 [2012]). Because restoration requires: 1) an assessment of the current system state relative to desired future conditions; 2) measurement of the system state subsequent to management activities; and 3) a comparison of the observed to desired state, restoration is critically dependent on monitoring. In this section, we discuss the approach in the 2012 rule and the alternatives that were considered but not selected in the agency's decision process.

Assessment and Planning

Section 219.9 outlines the approach for providing for diversity of plant and animal communities. It explains that the USFS is adopting "a complimentary ecosystem and species-specific approach," or a combined coarse- and fine-filter approach. Paragraph (a) outlines the coarse-filter requirements to maintain ecosystem integrity and diversity: plans "must include plan components . . . to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area" and "maintain or restore the diversity of ecosystems or habitat types throughout the plan area" (ecological integrity and diversity are defined in §219.19 of the 2012 rule). Plan components must function to maintain or restore ecosystem structure, function, composition, connectivity, key ecosystem characteristics, rare species communities, and native tree diversity. A commitment to restore or maintain landscape connectivity to facilitate movement, migration, and dispersal is a significant addition to the planning rule. Paragraph (b) outlines the fine-filter approach. It begins by explaining that the responsible official must determine whether the plan components under part (a), the coarse-filter requirements, will provide the necessary conditions to contribute to the recovery of species listed as threatened or endangered under the ESA, or species that are proposed or candidate species for listing. Additionally, the responsible official must determine whether the coarse-filter approach is sufficient for maintaining viable populations of "species of conservation concern." These are species known to occur in the plan area, other than those listed, proposed, or identified as candidate species under the ESA, that are selected by the Regional Forester based on "substantial concern about the species' capability to persist over the long-term in the plan area" (36 CFR §219.9[c] [2012]). If the coarse-filter is deemed to be insufficient, the responsible official must include species-specific plan components (e.g., buffer areas around nest sites), that will contribute to the recovery of populations of species of conservation concern, as well as federally listed, proposed, and candidate species. If the coarse-filter is assumed adequate, no further species-level consideration is employed in planning. Yet how responsible officials will be held accountable for such decisions is unclear. The burden of proof for determining the effectiveness of the coarse-filter approach is not addressed. These species-specific requirements represent the USFS commitment to the fine-filter approach in section 219.9.

Notably, the new rule eliminates the requirement for maintaining viable wildlife populations, in contrast to the 1982 rule's viability provision for vertebrates and the provisions of the 2000 rule that would have extended the requirement to other species. Since the agency only commits to maintaining the viability of species of conservation concern, under the 2012 rule the USFS has no obligation to address the decline of any species not listed, proposed, or a candidate under the ESA, unless the responsible official, in this case the Regional Forester, expresses substantial concern about its persistence. Thus, any number of species could pass from secure to endangered status before any federal intervention would be required. However, in contrast to the 1982 rule, the agency can commit to maintaining viable populations of non-vertebrates by identifying them as species of conservation concern.

Historically, the diversity provisions of the NFMA have been one of the most controversial aspects of the planning rule, and the issue of how the USFS should address the clearly established public values associated with wildlife conservation often has been overshadowed by legal and technical arguments about the practicality of specific approaches to viability assessment. For example, over the course of the drafting and judicial review of multiple rules, considerable disagreement existed as to whether a requirement to maintain viable populations of all species, or just vertebrate species, or just at-risk species was an attainable goal. Understandably, the USFS has been reluctant to commit the agency to a species viability standard with which demonstrating compliance is difficult. At any point in time, all species have some non-zero probability of extinction; thus, viability can never be guaranteed. Viability is a probabilistic concept that invokes a specific level of risk over a stated time

horizon, and proponents of the viability standard have had difficulty explaining to the public—and sometimes to their colleagues in wildlife management—how probabilistic events can be addressed in legally enforceable standards.

Nonetheless, in its 2012 record of decision, the agency commits to maintaining the viability of species of conservation concern, arguing that the combination of coarse- and fine-filter approaches it proposes are scientifically defensible, will adequately protect biodiversity on its lands, and will not be too costly to implement (77 FR 21162). However, the planning rule does not specify how viability will be assessed or what information will be used to assess a species' viability. Additionally, species identified as being of conservation concern could experience sharp range restrictions, since the regulations no longer require viable populations to be well-distributed, as was the case under the 1982 rule. Instead, the new rule defines of a viable population as one that "continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future events" (36 CFR §219.19 [2012]).

Finally, the USFS may absolve itself of responsibility for species-level conservation if the agency determines that maintaining a viable population of a species of conservation concern is beyond the capability of the plan area. In this case, which might result from stressors extrinsic to the planning area, such as climate change or the loss of habitat in other regions, the responsible official is required to document the basis for that decision and include plan components that contribute to the maintenance of a viable population across multiple land ownerships, in coordination with other managers and private parties working across jurisdictional boundaries, to the extent practicable.

Monitoring

Monitoring requirements are outlined in section 219.12. The planning rule requires a monitoring program for each National Forest, which can be developed jointly across forests and must be developed in coordination with the Regional Forester and the Research and State & Private branches of the agency. Plan monitoring programs must include questions and indicators; for diversity, these include indicators addressing the status of ecological conditions and the status of focal species, defined in the rule as "a small subset of species whose status permits inference to the integrity of the larger ecological system to which it belongs and provides meaningful information regarding the effectiveness of the plan in maintaining or restoring the ecological conditions to maintain the diversity of plant and animal communities in the plan area. Focal species would be commonly selected on the basis of their functional role in ecosystems" (36 CFR § 219.19 [2012]). Regional Foresters are to develop "broader-scale monitoring" for questions that are relevant at scales larger than the planning area. In all cases, monitoring information is to be compiled, evaluated, made available to the public, and used to inform adaptive management of the plan area. Thus, the new rule adopts, for the first time, a multi-scaled approach for monitoring and codifies the intent, although not the process, for implementing a transparent and data-driven approach to adaptive management. Although the adoption of a focal species approach based on functional roles in sustaining ecosystem processes reflects the logic of the 2000 rule, the 2012 rule draws no connection between the monitoring of focal species and the conservation of their roles in the ecosystem. The new rule does not include a requirement to maintain the viability of focal species, despite the fact that it is the status of these species that is meant to indicate whether the USFS is successfully maintaining and restoring ecosystem diversity and integrity. Additionally, the 2012 rule does not provide a requirement to monitor species of conservation concern, despite their established vulnerability to local extirpation. Consequently, the fine-filter approach to monitoring is explicitly separated from the fine-filter approach for biodiversity conservation.

Alternatives Not Selected

Although a review of the key provisions of the planning rule provides direct insight into the place of wildlife conservation in the future of forest planning and management, examination of the alternatives not selected reveals the underlying logic, pivotal choices, and philosophical foundations of the Forest Service's interpretation of the NFMA and reconceptualization of its institutional role and responsibilities to the public. The USFS considered several other alternatives in its Programmatic Environmental Impact Statement, in addition to the selected alternative (i.e., the final rule), which was a modified version of Alternative A. Alternative B closely followed the 1982 rule, notably in regards to the viability provision ("... fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area ..." [36 CFR 219.19]). The agency provides a lengthy rationale for not selecting Alternative B, focusing on the defects of the 1982 viability provision (see 77 FR 21162:21168). This rationale also pertains to the selection of the final rule (modified Alternative A), which dropped the 1982 viability provision with the exception of "species of conservation concern" (see below). The agency states the 1982 rule "included planning procedures that do not reflect current science or result in unrealistic or unattainable expectations because of circumstances outside of the Agency's control, particularly for maintaining the diversity of plant and animal species" (77 FR 21162:21169). The USFS further justifies dropping the requirement to maintain species viability by stating, "[T]here are limitations on the Agency's authority and the inherent capability of the land" (77 FR 21162:21169). It notes that forest clearing in South America and habitat fragmentation in the Rocky Mountains on private land affect the agency's ability to maintain viable populations on National Forest System lands. For reasons such as these, the agency notes, the USFS cannot ensure a species' existence in the planning area when circumstances outside of its control may be contributing to population declines. It also notes that managing for the habitat of a single species sometimes impinges on management requirements for a species listed under the

ESA, or on other necessary activities the agency must undertake to comply with statutory requirements. Furthermore, the agency writes, some forests simply cannot support viable populations of species that are rare and far-ranging, like wolverines (*Gulo gulo*), and require more habitat than is available on a single National Forest unit.

Alternative C included no specific provisions for biodiversity conservation beyond the minimum requirements of the NFMA. This alternative was highly discretionary, leaving decisions about the requirements for assessment, planning, and monitoring to the USFS Directives' System (i.e., the agency's handbook and manual), whose provisions are not legally binding. The high degree of discretion in this alternative, according to the agency, would have resulted in too much variation in implementation: "There would be no certainty with regard to the inclusion of any plan components beyond the minimum required by this Alternative, and a potential lack of consistency across the National Forest System" (77 FR 21162:21170).

Alternative D "was designed to evaluate additional protections for watersheds and an alternative approach to addressing the diversity of plant and animal communities" (77 FR 21162:21170). This alternative required watershed-scale assessments of climate change vulnerability and designation of key watersheds to anchor the assessment and maintenance of the ecological status of aquatic, riparian, and terrestrial components of watersheds (USFS 2012). Establishing connectivity between habitats and discrete populations of species would also have been required. The alternative maintained and extended the 1982 viability requirement, stating the National Forests would provide for viable populations of native and desired non-native species in each planning area. The USFS was required to use the best available science to determine ecological conditions necessary to support viable populations, as informed by the "current and likely future viability of focal species within the planning area" (USFS 2012:F-9). To address the agency's concern that it cannot ensure the viability of populations on its lands, Alternative D included language that required the Secretary of Agriculture to provide notice to the public and allow for public comment if the agency determined it could not provide for viable populations of native or desired non-native species in a plan area. Furthermore, the agency was required to provide for viability of such a population to the maximum extent practicable and to take no actions that would increase the likelihood of extirpation of a population in the planning area. As with the selected alternative, Alternative D required monitoring of the status and trends of focal species, but with the additional requirement that triggers be identified for focal species' monitoring that would initiate a review of planning and management decisions to achieve compliance with the viability standard. This alternative explicitly stated that population surveys of focal species would be conducted using presence–absence data, occupancy modeling, genetic monitoring, or count-based methods. Alternative D was not selected because of the high anticipated planning and monitoring costs (77 FR 21162). The record of decision states that many plans already incorporate elements of this alternative, but that it is too prescriptive to allow for efficient, effective, and flexible management of all National Forests (77 FR 21162).

Finally, Alternative E was highly prescriptive in terms of requirements for public notification, assessment, and monitoring. It would have required specific monitoring questions, indicators, and triggers for changes in management action. The diversity requirements would have been similar to those in the selected alternative, but with more emphasis on monitoring of species' status and trends. The alternative was rejected for the same reasons as Alternative D.

MANAGEMENT IMPLICATIONS AND RECOMMENDATIONS FOR IMPLEMENTING THE 2012 PLANNING RULE

In theory, the new planning rule could be implemented in a robust way, drawing on the best available science to protect plant and animal diversity on National Forest System lands. However, the primary change introduced by the 2012 rule is the considerable discretion afforded centralized authorities, particularly at the regional level, in how general provisions will be implemented. Based on the management history of the USFS, numerous aspects of the 2012 planning rule are of concern, primarily because they defer many fundamental details to the interpretation of officials who may lack scientific background and disciplinary depth in wildlife biology and may have disincentives to prioritize wildlife. A number of scientists and scientific societies (including The Wildlife Society) commented on the draft rule and noted that it leaves more decisions about diversity conservation to agency discretion than did the 1982 rule. Forest Service officials must strike a fine balance between prescriptive standards and discretion or flexibility in a rule that is meant to guide planning years into the future on the entire National Forest System. Although some discretion is necessary, a rule must be sufficiently prescriptive to ensure that the National Forests do not implement a loosely written and unenforceable standard with so much variability across management units as to compromise the conservation of biological diversity.

Discretion, Authority, and Responsibility in Wildlife Conservation

Highly discretionary mandates are especially problematic for protecting resources such as wildlife that, without clear substantive requirements, have historically received less attention in land management. The 1897 Organic Act gives the USFS wide discretion by providing an open-ended mandate to secure water flows and provide timber. The Multiple Use Sustained Yield Act (MUSYA), passed in 1960, expanded the factors that the USFS must consider in planning, including wildlife conservation. However, the language in the MUSYA does not require the USFS to conserve wildlife in any specific fashion, only to consider the wildlife resource when planning for multiple-use. The concept of multiple-use, according to the courts, "breathes discretion at every pore" (*Perkins v. Bergland* 1979). Wildlife never gained

serious consideration in forest management under the MUSYA, in part because of the agency's deference to state wildlife agencies, which have generally focused on game species and sport fisheries.

We have consistently heard many USFS personnel argue that their primary responsibility is to manage the habitat on USFS lands, whereas actual populations are the domain of the states. However, the USFS clearly has the power to manage wildlife on its lands. The United States Constitution's Property Clause (Art IV, section 3) gives Congress proprietary and sovereign powers over its property, and it may delegate decisions regarding federal lands to executive agencies. The Supreme Court has repeatedly observed that this power over federal land is "without limitations" (*United States v. San Francisco* 1940). The Court's expansive reading of the Property Clause also extends to managing wildlife on federal lands. The dispositive case is *Kleppe v. New Mexico* (1976), where the Court states, "the 'complete power' that Congress has over public lands necessarily includes the power to regulate and protect the wildlife living there" (426 U.S. 529: 541). Of course, the states also manage wildlife on federal lands, but as made clear in *Kleppe*, "those powers exist only in so far as [their] exercise may be not incompatible with, or restrained by, the rights conveyed to the Federal government by the Constitution." (426 U.S. 529: 545). Though the USFS seldom chooses to assert its full wildlife management powers, the Courts continue to emphasize the Property Clause's application to wildlife (see, e.g., *Wyoming v. United States* 2002).

Concerns about wildlife were one of the central factors precipitating the passage of the NFMA in 1976, and the USFS has a clear responsibility under the Act to manage for biodiversity. The Act's legislative history shows that its diversity provision was meant to require "Forest Service planners to treat the wildlife resource as a controlling, coequal factor in forest management and, in particular, as a substantive limitation on timber production" (Wilkinson and Anderson 1987:296). When the NFMA was passed, it included language stating that the USFS has a responsibility to be "a leader in assuring that the Nation maintains a natural resource conservation posture that will meet the requirements of our people in perpetuity" (16 U.S.C. §1600[6]) and an explicit requirement to protect plant and animal diversity. To ensure that the agency's new requirements were effectively translated into administrative regulations, Congress required the agency to convene a Committee of Scientists to inform the writing of these regulations, which were finalized in 1982 (16 U.S.C. §1604[h][1]).

Timber harvest on the National Forests, nonetheless, continued to increase steadily, until the late 1980s. At that time, citizen enforcement, frequently manifest through appeals and litigation based on substantive provisions like the 1982 rule's viability standard and the ESA, was a major factor that led to significant declines in timber production (from >13 million board feet/year in the late 1980s to <2 million in the early 2000s). Legal exposure created by the suite of substantive requirements to protect biological diversity under the NFMA and ESA forced the agency to address wildlife conservation, something that had not come to pass under the MUSYA. However, even in the 1990s, pressure to prioritize timber production over the protection of wildlife remained strong because of internal biases, financial incentives, and Congressional intervention (Wilkinson 1992, Government Accountability Office 1997, Corbin 1999).

Although agency culture and priorities have shifted over time, biodiversity conservation still may conflict with activities like timber harvest, fuels reduction, recreation, or energy development, all of which the USFS has strong economic and political incentives to promote. Literature in political science and economics predicts that when given conflicting tasks by Congress, such as the multiple use mandate, agencies systematically prioritize high incentive and measurable goals over those that are lower incentive and more difficult to measure (Biber 2009). A highly discretionary NFMA diversity regulation could lead the USFS to prioritize higher incentive and measurable goals that are supported by political interests.

Given this reality, even when regulations for protecting plant and animal diversity are well meaning and scientifically sound, if they are not specific, measurable, binding, and enforceable, history suggests that effective wildlife conservation planning will end up as a secondary objective (Houck 1997). Specific, mandatory language is needed to protect wildlife on the National Forests, a point not lost on the first Committee of Scientists, who wrote the following in 1979, "It is simply not possible to carry out the planning requirements of NFMA in accordance with a set of regulations that contain nothing but generalities" (44 FR 53967: 53968). Such specificity, said the Committee, is what the NFMA requires. Historically, the NFMA's diversity provision and its associated regulations have provided an effective counterbalance to competing agency demands and political pressures. However, without more specific requirements, the administrative discretion in the 2012 rule's diversity provisions will lead to varied implementation across management units, give managers who are not committed to wildlife conservation the leeway to pursue other management goals without concern for biodiversity, and leave managers who are committed to protecting biodiversity without a solid, legal framework to help them withstand internal and external pressures to prioritize other factors.

Although the diversity provisions in the 2012 planning rule itself are highly discretionary, the agency, through the Directives system, could adopt standards and practices for wildlife conservation that are more prescriptive and would help to ensure that the rule is implemented in a more robust fashion and informed by the best available science. We urge the agency to implement the rule in a manner that closes the gap between the stated purpose of maintaining ecological integrity and diversity, and the highly general and discretionary operational provisions in the rule that are meant to achieve these purposes. The Wildlife Society and other professional organizations can play an important role in guiding this process, and for this purpose, we offer a series of recommendations that would strengthen the key wildlife provisions in the 2012 rule.

Coarse-Filter Contributions

Coarse-filter approaches, typically focused at broader spatial scales than fine-filter strategies, are aimed at communities, ecosystems, or landscapes (Schwartz 1999). Their central role in the 2012 rule complements fine-filter provisions and commits the USFS to multi-scaled assessment and monitoring efforts. Coarse-filter conservation strategies often rely on habitat predictors (e.g., dominant vegetation and landform) derived from satellite imagery (e.g., the California Wildlife Habitat Relationships System, http://www.dfa.ca.gov/biogeodata/cwhr). Under this approach, all appropriate habitats within a planning unit that intersect the species' geographic range are typically assumed to support the species. This assumption is often based on anecdotal occurrence data because the spatial extent of coarse-filter strategies often constrains the agency's ability to implement probability-based survey designs. The consequence is that commission errors are likely, which can lead to the erroneous conclusion that animal diversity is being maintained when it is not. Although these concerns limit the ability the coarse-filter approach to serve as a substitute for fine-filter assessments, a management objective to sustain dominant vegetation communities and their successional stages at broad spatial scales is an essential aspect of a comprehensive approach for sustaining biological diversity. In the context of the diversity requirements of the 2012 rule, measures of the effectiveness of the coarse-filter are presented in terms of species' metrics (e.g., number of rare and imperiled species conserved, presence of apex consumers, species richness, etc.). Therefore, verifying the efficacy of the coarse-filter approach requires some level of direct species-level assessment, and a comprehensive diversity policy requires a carefully balanced coarse-filter/fine-filter strategy.

Implementing the Fine-Filter Approach

We are concerned with the limited commitment to conduct fine-filter (species-level) assessments in the new rule. We found little scientific evidence to suggest that maintaining the diversity and integrity of a combination of habitat types "will provide the ecological conditions for the long-term persistence of most species within the plan area" (36 CFR §219.9). The Committee of Scientists stated, "Habitat alone cannot be used to predict wildlife populations" and "diversity is sustained only when individual species persist; the goals of ensuring viability and providing for diversity are inseparable" (Committee of Scientists 1999, Chapter 3:19,38). For this reason, the fine-filter species assessment is critical.

The rule is inaccurate in the way it portrays its coarse- and fine-filter approaches. It claims that the coarse-filter approach, along with the inclusion of fine-scale habitat management requirements for species that are not adequately protected, constitutes a combined coarse-filter/fine-filter approach. This discussion misconstrues fine-filter species conservation approaches, which entail direct assessment at the species level, including monitoring state variables such as a species' abundance, density, survival, birth rate, or occupancy. Managing fine-scale habitat components for a given species is not the same as fine-filter assessment.

The USFS defines focal species, in part, based on their functional significance to ecosystem processes (36 CFR §219.19[2012]). The planning rule requires the selection and monitoring of focal species "to assess the ecological conditions required under §219.9 . . ." (§219.12[a][5][iii]), and it is this aspect of the rule that holds the most promise as a genuine, complimentary fine-filter approach to wildlife conservation planning. The USFS defines ecological conditions as "the biological and physical environment that can affect the diversity of plant and animal communities, the persistence of native species, and the productive capacity of ecological systems" (36 CFR §219.19[2012]). An emphasis on monitoring species with known or suspected functional significance to ecosystems process and sustainability is appropriate. Ecosystem resilience is strongly related to native species diversity and functional redundancy (the degree to which multiple species perform similar ecosystem functions [Naeem et al. 2009]). In general, ecosystems with greater native species diversity are more resistant to disturbance, recover more quickly following disturbance, and are less likely to experience irreversible changes than species-poor communities (Cottingham et al. 2001, Hooper et al., 2005, Naeem et al. 2009). Furthermore, species loss ranks among the most severe global change stressors, with effects comparable to those of climate warming, acidification, and elevated carbon dioxide (Hooper et al. 2012). Therefore, it is inconsistent with the stated intent of §219.9 to maintain or restore ecological conditions not to include a commensurate requirement to maintain viable populations of focal species.

Another central requirement of the 2012 rule is the mandate to contribute to the recovery of proposed, candidate, and listed ESA species and to protect viable populations of species of conservation concern. Section 219.9 requires that species-specific habitat management components be built into plans if the responsible official determines that coarse-filter approaches are insufficient for maintaining viable populations of species of conservation concern, and ESA species, within the plan area. We are concerned that, as presently construed, the rule does not require the monitoring of these species. Thus, it is unclear what information will be used to determine if a species maintains a viable population within the plan area, or if it requires additional species-specific conservation actions. Because the coarse-filter approach may be insufficient to provide insights into the status and trend of species (Cushman et al. 2008), some direct species-level monitoring is necessary. Without such monitoring, the USFS's approach is problematic; by the time evidence of further decline for these already at-risk species is found, threats may have significantly increased.

Ideally, the rule would have committed to population-level monitoring and viability for both focal species and species of conservation concern. Extending the viability requirement to focal species, selected in part because of their known or suspected functional significance, is a logical way to address the ecosystem integrity goals of the rule. Further, monitoring species of conservation concern will provide essential information to assess their viability. These changes, incorporated into the Directives, would connect the commitment to spe-

cies-level conservation with the mandate for adaptive management and bring greater cohesion to the disjointed diversity provisions in the 2012 rule. In addition, all species-level monitoring should include trigger points so that significant declines in either focal species or species of conservation concern would initiate reviews of management policies.

Selecting Species of Conservation Concern and Focal Species

The process for selecting focal species and identifying species of conservation concern, separately or in concert, is not detailed in the rule. The rule simply states that the selection of species of conservation concern will be based on the best available science and evidence of substantial concern about their long-term persistence in the plan area. The Record of Decision indicates that further guidance will be provided in the Directives, but that the Department of Agriculture expects species to be identified based on existing classifications of risk, such as NatureServe conservation status or those listed as threatened or endangered under state law (77 FR 21162:21218). In addition to referencing NatureServe and state law, we recommend the agency also consider IUCN red-list species that are not already listed under the ESA, and high priority species identified in State Wildlife Action Plans; if such species are not selected, a rationale for failing to designate them as species of conservation concern should be required.

Criteria for focal species selection include the species' functional roles in the ecosystem and sensitivity to changing conditions, management activities, particular threats, or desired ecological conditions (77 FR 21162). This is consistent with recommendations of the most recent Committee of Scientists' Report (Committee of Scientists 1999). Additional guidance in the Directives will be necessary to establish and maintain consistency and efficacy across management units in the selection of focal species. Noon et al. (2009) provide useful guidance on focal species selection for fine-filter assessments on federal public lands. Furthermore, we see no reason that species identified as species of conservation concern cannot also be identified as focal species, providing a ready avenue for conceptual integration of the fine-filter approaches under the new planning rule.

Establishing a step-down process to identify and prioritize species for fine-filter monitoring that reflects the reality of Forest Service monitoring budgets remains a major challenge. This topic goes beyond the scope of our paper, but to initiate discussion, we suggest that identifying the core species (Magurran and Henderson 2003) that are 1) persistent members of a given management unit; 2) functionally significant; and 3) at risk in that unit may be a first step in developing a manageable species set.

Developing Informative Monitoring Programs

The planning rule requires forests to develop monitoring programs that will include a set of questions and indicators to track change, measure management effectiveness, and assess progress towards desired future conditions. The rule only commits to monitoring focal species, which as mentioned above, may include species of conservation concern (the fine-filter approach). It also requires monitoring a select set of ecological conditions in accordance with the objectives of §219.9 (the coarse-filter approach). The Regional Forester is required to develop a broad-scale monitoring plan to address issues relevant at a scale larger than a single National Forest. The content of the broad-scale monitoring plan is at the discretion of the Regional Forester, and s/he is required to coordinate with other jurisdictions, other branches of the USFS, and the public. Additionally, monitoring plans may be coordinated across units. The responsible officials are to conduct biennial evaluations of monitoring information and adjust management activities as necessary.

At the outset, the discussion of species monitoring in the Record of Decision (77 FR 21162:21232–21233) is confusing and suggests a critical misunderstanding by the USFS of environmental monitoring. The Record of Decision (77 FR 21162:21233) states, "The final rule does not require monitoring species population trends. Species population trend monitoring is costly, time intensive, and may not provide conclusive or relevant information." This perspective is at odds with the general understanding in the scientific literature of environmental monitoring. For example, Suter (1993:505) states that monitoring is the "measurement of environmental characteristics over an extended period of time to determine status or trends in some aspect of environmental quality." Monitoring of an appropriate state variable (e.g., occupancy) is conducted at regular intervals to assess both the current state and time trend in some ecological resource (e.g., a species' population [Noon 2003, Nichols and Williams 2006])—that is, the stated purpose of monitoring is to estimate temporal trends.

Provisions in the rule encourage the development of robust monitoring strategies. However, our primary concern is whether these strategies will be developed, funded, implemented, and designed in such a way that they inform adaptive planning. As noted previously, monitoring has been chronically underfunded by federal agencies. The rule requires development of a monitoring plan but does not specify a particular standard of quality or utility of monitoring data. Since Congress annually sets the agency's budget, the USFS cannot commit to funding monitoring at a particular dollar amount. However, committing a certain percentage of planning dollars to monitoring may be possible so that the USFS can address its commitment to adaptive management.

Following the United States Supreme Court's decision in *Norton v. SUWA* (2004), enforcing monitoring requirements of federal land use plans is difficult. In language easily extendible to NFMA plans, that case held that commitments to monitor in Bureau of Land Management land use plans are not generally binding or reviewable under the parameters of administrative law. The Court noted that monitoring requirements could perhaps be written in such a way as to make them enforceable, if they were written as clear and binding commitments. In some cases, when monitoring activities are clearly required before undertaking certain activities, monitoring can be enforceable in court (Blumm and Bosse 2007). However, because requiring or enforcing

funding levels or data quality standards for monitoring programs is generally difficult, oversight will be necessary to ensure that monitoring occurs in a way that it clearly assesses management and restoration actions.

We recommend that multi-party oversight boards be established to aid in the design of monitoring programs, contribute to the selection and prioritization of monitoring state variables, provide science consistency checks, provide interpretations of the monitoring data, suggest when changes to management practices are needed, and advocate for consistent funding. Because monitoring data will unlikely be subject to judicial review, oversight from a multi-party stakeholder monitoring board could increase the likelihood that monitoring will provide reliable information and useful insights into future decision making (Nie and Schultz 2012). Such boards must consider how monitoring data will inform decision making and the level of statistical certainty required to trigger a change in management actions.

All species-level monitoring should include trigger points so that significant declines in either focal species or species of conservation concern will initiate reviews of management policies. If trigger points are not identified, monitoring data may not feed back into adaptive planning and decision making (Noon 2003). Triggers will be critical for species-level monitoring and for any evaluation of species viability. Monitoring enforceability also would be substantially increased if forest plans included requirements that before approving any major projects, such as those requiring an Environmental Impact Statement, the responsible official find that monitoring programs are being implemented and that no trigger points have been exceeded without corrective action.

Maintaining Current Populations and Adequate Distribution of Species

Whether the planning rule intentionally allows for local extirpation of species or range reductions in cases where this might be avoided is unclear, but the decline and loss of species from the planning area is an allowable outcome of USFS management under the new rule. Aside from the loss of a broader viability requirement, this is the most significant change from the 1982 rule: the replacement of language requiring that viable populations be well-distributed, with the definition of a viable population as one that "continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future events" (36 CFR §219.19 [2012]). The impact of the change stems from the fact that what constitutes a "sufficient distribution" is not defined in the rule, providing broad discretion to the responsible official and obfuscating the well-established relationship between geographic distribution and persistence likelihood (e.g., Harris and Pimm 2008).

Furthermore, the rule establishes that the USFS does not need to protect viable populations, as required in the 1982 rule, if this is not within the "inherent capability of the plan area," a vague concept that is never defined in measurable terms. In this case, the USFS is held to a much lower conservation standard: documenting the rationale for such a determination and working across land ownerships to create management standards and guidelines to maintain or restore conditions that will contribute to maintaining a viable population of the species within its range (36 C.F.R. §219.9(b)(2)(i) [2012]). The USFS also states, "the individuals of a species of conservation concern that exist in the plan area will be considered to be members of one population of that species" (77 FR 21162:21217). In light of this, whether the agency is committing to maintaining a viable population of a species of conservation concern when it is not within the inherent capability of a single plan area to protect a viable population is not entirely clear. Depending on how the agency interprets these standards, it might never have to commit to maintaining a viable population of a low-density, wide-ranging species, but it might have to commit to maintaining multiple viable populations of species with more constricted ranges.

To address ambiguities in the 2012 viability requirements, we recommend that the USFS explicitly recognize the importance of maintaining a wide geographic distribution for species viability. Species that are widely distributed across the landscape are much less likely to experience spatially correlated disturbance events (den Boer 1981). Maintaining the distribution and viability of rare or widely distributed species and populations will require close coordination among administrative units. Guidance should be included in the Directives indicating that the agency should assess viability (perhaps employing more efficient distributional analyses based on occupancy [Noon et al. 2012]) across ownerships and plan units, when this will enhance the likelihood of persistence for individual species. When the USFS determines that maintaining a viable population of a species is not within the inherent capability of the plan area, the agency should solicit scientific comment and review. This review will help ensure that the agency is aware of all relevant scientific information that may conflict with their determination and will better prepare the agency to defend its decisions against possible legal challenge. In cases where the USFS determines that providing for a viable population of a species that relies upon National Forest System lands for its habitat is not within the capability of the plan area, we recommend that the agency task itself with restoring populations, to the maximum extent practicable. At the least, a standard should be included in the Directives that directs the agency not to authorize or permit activities that reduce the viability of any species of conservation concern.

Development on private land and other activities external to National Forest System lands may affect species such that the USFS cannot alone ensure their viability. A critical question is to what extent should this compel the USFS to compensate for declines in species status due to factors outside of their control. Recall that the NFMA emphasizes the National Forests' role in conserving resources for the American people, in perpetuity. It does not imply that this objective is restricted to National Forest System lands. There is ample historical precedent for the USFS to consider what is happening outside of its jurisdiction and proactively respond on the National Forests (Nie and Miller 2010). In the

view of the first chief of the USFS, Gifford Pinchot, 1 rationale for establishment of the National Forests was to compensate for unsustainable management of resources on private lands (Wilkinson 1992). Pinchot was focused on unsustainable timber harvest at the time, but the reasoning applies widely to other natural resources on USFS lands based on changing public values and priorities. The USFS, in its 2012 rule, emphasizes its responsibility to maintain and restore ecosystem diversity and integrity, and diverse plant and animal communities are fundamental to ecosystem integrity (Naeem et al. 2009). If development on private land is adversely affecting biodiversity, the USFS has a greater, not lesser, responsibility to protect species on its lands. This compensation principle will become even more significant given predictions of private land development in the future, with much of this development projected in the wildland urban interface (Nie and Miller 2010). The National Forests, and federal lands in general, will become more important to wildlife in increasingly developed landscapes. Therefore, the "inherent capacity" clause of the 2012 rule should be used rarely, if at all, and if used, be subject to scientific and public review. The USFS must recognize its increasingly important mission to conserve the nation's forest and grassland ecosystems during the current period of rapid global change and species loss, when unpredictable transformations of ecosystems may be the "new normal" (Barnosky et al. 2012).

Considerations Regarding the Relationship Between the NFMA and the ESA

Important intersections exist between biodiversity conservation requirements under the NFMA and the ESA, which work together as part of this nation's biodiversity conservation policy. Wildlife provisions in forest plans are a significant factor in ESA decision making (see below), and ESA decisions have profound and far-reaching implications for forest management. Ideally, viability protection on National Forests would serve as an early warning signal that a species may be heading towards local extirpation or extinction. A proactive approach to address risks to a species' viability could avoid costly and polarizing ESA decisions that might limit management flexibility for the USFS.

On the National Forests, currently 430 species are listed under the ESA as threatened or endangered, and an additional 60 species are candidates for listing (USFS 2011:14). More than 647,000 ha of terrestrial habitat and 35,000 km of stream habitat on USFS lands are designated as critical habitat under the ESA (USFS 2011:14). For these and other reasons, the 2012 planning rule emphasizes the connections between forest planning and the ESA more than previous regulations:

> The [Department of Agriculture] 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. When implemented over time, these requirements would be expected to result in plans that will be proactive in the recovery and conservation of the threatened, endangered, proposed, and candidate species in the plan areas. These requirements will further the purposes of section 7(a)(1) of the ESA, by actively contributing to threatened and endangered species recovery and maintaining or restoring the ecosystems upon which they depend (77 FR 21162:21215).

One way in which the USFS can actively contribute to species conservation and recovery is by providing wildlife and habitat-based standards in individual National Forest plans. The NFMA requires the incorporation of standards and guidelines in land and resource management plans (16 U.S.C. 1694). Standards are mandatory constraints on USFS projects and activities and are used to achieve or maintain desired conditions and planning objectives, to avoid or mitigate undesirable environmental impacts, and to meet applicable legal requirements (76 FR 8480). Guidelines, as commonly applied, also constrain decision making but allow for some deviation from rules as long as the intent of the guideline is achieved (76 FR 8480).

The types of wildlife and habitat-based standards used in forest planning differ in scale, specificity, and complexity. Some standards cover multiple National Forests, such as the Northwest Forest Plan's Aquatic Conservation Strategy (discussed below) and the Inland Native Fish Strategy. The latter, covering at one point 22 National Forests, is used to protect native fish and their habitats in eastern Oregon and Washington, Idaho, western Montana, and portions of Nevada. It does so by using several riparian management objectives, standards, guidelines, and monitoring requirements (USFS 1995). The Inland Native Fish Strategy's standards and guidelines replaced conflicting direction in multiple National Forest plans, except when those forests provided for more protection for inland native fish habitat. Standards can also be applied forest-wide, such as requiring that all snags over a certain size be retained or that a specified percentage of old growth be maintained on a National Forest. Other standards apply to particular management areas or zones as delineated in a land use plan; they often permit or prohibit various uses, such as grazing or the application of herbicides in a municipal watershed zone.

An enduring debate continues over the appropriate role of standards in forest planning. The 2012 rule requires every plan to include standards as 1 of 5 plan components (36 C.F.R. §219.7), but it leaves their application to the discretion of the responsible official, with the expectation that further direction will be provided in the Directives system (77 FR 21162:21206). Regarding the diversity of plant and animal communities, the rule requires standards or guidelines be used "to maintain or restore ecological conditions within the plan area to contribute to maintaining a viable population of the species within its range" (36 C.F.R. §219.9). Standards for wildlife protections should play a significant role in the new forest plans that will be written under the 2012 regulations. Legally binding and enforceable standards promote accountability and provide increased certainty about future management actions. Without them,

there is an increased risk that wildlife protections will give way to other agency pressures and priorities.

Forest plan standards can play significant roles in decisions to list or delist a species under the ESA. One of the 5 factors to be considered by the wildlife regulatory agencies that enforce the ESA (the National Oceanic and Atmospheric Agency [NOAA] Fisheries and the U.S. Fish and Wildlife Service [USFWS]) in making ESA listing decisions is "the inadequacy of existing regulatory mechanism[s]" (16 U.S.C. §1533). Vague, voluntary, speculative, and unenforceable measures found in plans are generally not considered a sufficient regulatory mechanism (*Oregon Natural Resources Council v. Daley* 1998). Instead, federal wildlife agencies and the courts typically assess whether a plan contains specific and legally enforceable standards having regulatory force. Forest plan standards also can be relevant for determinations made by the wildlife regulatory agencies under section 7 of the ESA, which requires federal agencies to undergo consultation with the wildlife agencies to ensure their projects will not cause jeopardy to a listed species.

Several cases have been decided in which NOAA Fisheries and the USFWS made a no-jeopardy determination under section 7 of the ESA or decided not to list a particular species because a forest plan contained binding standards and other regulatory mechanisms to protect the petitioned species. One example is the decision not to list the Queen Charlotte goshawk (*Accipiter gentilis laingi*) in southeast Alaska. Roughly 80% of this region is managed by the Tongass National Forest, and petitioners argued that old-growth logging in the region posed a threat to goshawks. Standards and other regulatory mechanisms specified in the 2007 Tongass Land Management Plan were significant factors in the decision by the USFWS to not list the goshawk (72 FR 63133). The USFWS also emphasized the legally binding and enforceable nature of Tongass forest planning standards in its 1997 status review of the species (USFWS 2007), and the Department of the Interior asked the USFS to retain the Conservation Strategy in the 2008 Tongass Forest Plan Amendment. The USFS also recognizes the significance of these wildlife standards. Possible changes to the Strategy, according to Undersecretary of Agriculture Harris Sherman, "could hamper the plan's ability to maintain viable populations of plant and wildlife species [and] this could lead to the need for USFWS to reconsider its previous determinations regarding the goshawk . . ." (Sherman 2011:8).

The Aquatic Conservation Strategy, part of the Northwest Forest Plan, provides another example of the interactions between binding standards and the ESA (USFS and Bureau of Land Management 1994). The purpose of the Aquatic Conservation Strategy is to maintain and restore the ecological health of watersheds in the northwestern National Forests. The Strategy includes several binding standards and guidelines that apply to key watersheds, riparian reserves, required watershed analyses, and watershed restoration. In biological opinions written in accordance with section 7 of the ESA, NOAA Fisheries equates Aquatic Conservation Strategy consistency with no-jeopardy findings, a practice that has satisfied the courts (*Pacific Coast Federation of Fishermen's Associations v. National Marine Fisheries Service* 2001). Standards such as these can be used to protect wildlife while also achieving the restoration and watershed protection purposes of the 2012 rule.

The lack of enforceable standards and clear conservation commitments made in forest plans also has been a factor influencing decisions to list a species. In these cases, NOAA Fisheries and the USFWS determine that a forest plan fails to provide sufficiently certain, binding, and detailed protection to a species to count as an adequate regulatory mechanism. One of the most significant decisions in this regard is provided by the listing of Canada lynx (*Lynx canadensis*) as threatened in 2000 (65 FR 16052). The species was classified as a sensitive species by the USFS before listing, but most National Forests with lynx did not have population viability objectives or management standards and guidelines in place at the time (63 FR 37005). The fact that forest plans in effect at the time did not provide enough protection and guidance for the conservation of the lynx is a primary reason why the species was listed. The USFWS determined that these forest plans permitted several actions that cumulatively could cause a significant threat to lynx persistence across its range (63 FR 37005). The USFS responded to the listing by amending multiple national forest plans to incorporate various lynx standards and guidelines (USFS 2007). Currently, the USFS does not have to engage in ESA consultation with the USFWS on a project-by-project basis if these projects comply with these binding and enforceable lynx standards. Another prominent example is the 2010 decision to list the greater sage-grouse (*Centrocercus urophasianus*) as warranted-but-precluded, meaning the species is warranted for listing but precluded from actually being listed because of funding limitations (75 FR 13910). The USFS manages roughly 8% of the sagebrush habitat significant to the species. Greater sage-grouse were designated by the USFS as a sensitive species on USFS lands across the range of the species, and 14 of these forests designated the bird as a management indicator species (75 FR 13910:13979). But of the 33 National Forests managing greater sage-grouse habitat, "16 do not specifically address sage-grouse management or conservation in their Forest Plans, and only 6 provide a high level of detail specific to sage-grouse management" (75 FR 13910:13980). The lack of detailed protections and the variation among National Forest plans in the greater sage-grouse area was an important factor in making the warranted-but-precluded determination (75 FR 13910).

Enforceable wildlife standards and protections on the National Forests also play a role in delisting species from the ESA. One of the few species to be delisted under the ESA is the Robbin's cinquefoil (*Potentilla robbinsiana*), an endemic plant found in the White Mountains of New Hampshire, in areas managed exclusively by the White Mountain National Forest (67 FR 54968). The USFS was able to assist in the recovery of this species by restricting entry to particular areas of the National Forest, relocating trails, and entering into a Memorandum of Understanding with the USFWS. This Memorandum of Understanding included provisions related to habitat protection and monitoring,

and it served as a long-term commitment by the USFS to conserve this plant, irrespective of its status and potential delisting under the ESA (USFS and USFWS 1994). The USFS regulations also prohibited removing, destroying or damaging plants that are classified as threatened, endangered, rare, or unique (36 C.F.R 261.9). All of these specific actions and commitments—the protective actions taken by the White Mountain National Forest, the plant regulations, and the Memorandum of Understanding—served as an adequate regulatory mechanism for delisting the species by the USFWS.

A more controversial example is the proposed delisting of the Yellowstone distinct population segment of grizzly bears (*Ursus arctos horribilis*). The lack of regulatory mechanisms to protect grizzly bear habitat on National Forest System lands was 1 reason why the species was listed in 1975 (40 FR 31734). A conservation strategy for the bear was written pursuant to its recovery plan to provide adequate regulatory mechanisms after the bear's delisting. The USFS amended 6 forest plans to incorporate the habitat standards and other provisions in the conservation strategy. The USFWS considers these standards to be adequate regulatory mechanisms for the purpose of delisting grizzly bears, but much of the debate and litigation over the delisting decision centers on the sufficiency of these standards. A district court found the delisting impermissible, partly because the amended forest plans contained discretionary and legally unenforceable guidelines, rather than binding standards, in the bear's primary conservation area (*Greater Yellowstone Coalition v. Servheen* 2009). The Ninth Circuit disagreed with the lower court on this matter and found the standards, as applied by the USFS within the primary conservation area, to be sufficient under the ESA because they are a legally enforceable part of National Forest plans, and management of these forests must be consistent with their governing forest plans (*Greater Yellowstone Coalition v. Servheen* 2011).

The 2012 rule also requires that forest plans provide the ecological conditions to "contribute to the recovery" of listed threatened and endangered (T&E) species (77 FR 21162:21215, 36 C.F.R. §219.9). The USFS has an expectation that forest plans would use standards or guidelines "to address conservation measures and actions identified in recovery plans relevant to T&E species" (77 FR 21162:21215). Better use of ESA recovery objectives could lead to more proactive, integrated, and strategically coordinated forest plans.

We recommend that more guidance be provided as to how synergies might be developed between forest and ESA recovery planning. Scott et al. (2005:386) show that "most listed species will require continuous management action in order to maintain their recovered status." These "conservation-reliant species" can only be maintained as a self-sustaining population in the wild "if ongoing management actions of proven effectiveness are implemented" (Scott et al. 2005:386). The Memorandum of Understanding and revised forest plan for Robbin's cinquefoil provide this sort of ongoing protection to a conservation-reliant species, and similar standards in forest plans could do the same for other T&E species on the National Forests.

The number of ESA listing decisions will only increase in the future, given the September 2011 settlement between the USFWS and environmental groups requiring the agency to make listing decisions on over 800 species, including 262 candidate species, for which such decisions have been delayed (Center for Biological Diversity 2012). Altogether, another 1,000 listing decisions will possibly have to be made by 2020 (Rylander 2012:10018). Furthermore, conservation scientists, the IUCN, and the Intergovernmental Panel of Climate Change all predict increases in the number of species threatened with extinction (Scott et al. 2010). For these reasons, the impact of ESA listing decisions on National Forest management is likely to increase over time. The use of binding standards in forest plans would likely serve to decrease the number of species listed as threatened and endangered and promote delisting decisions in the future.

If implemented in a robust fashion, the NFMA's diversity mandate will serve as a precautionary and proactive approach to wildlife conservation. In contrast, the ESA provides a more reactive and crisis-based approach to decision making, since the law's protective measures are usually not initiated until a jeopardized species is listed, and by that time, it is already in the proverbial emergency room. Federal wildlife agencies take an average of 11 years to list species (Greenwald et al. 2006), frequently after their long-term viability is in doubt (Wilcove et al., 1993, Neel et al. 2012, Rylander 2012). Waiting until a species is on the brink of extinction before taking protective measures creates unnecessary risks to a species and increases the controversies, costs, and restrictions associated with their recovery. Furthermore, funding is inadequate to meet the needs of species that are already listed, are candidates for listing, or have been petitioned for listing (Scott et al. 2010). Strong wildlife provisions under the NFMA could provide an earlier, proactive response to species declines, lessening the trend for more listings under the ESA. Allowing populations to decline towards listing is not good policy ecologically, politically, or economically. It will only reduce management flexibility for states, private citizens, and federal agencies and will further burden managers implementing the already underfunded ESA.

CONCLUSIONS

Given clear guidance in the Directives and sufficient funding, the 2012 planning rule has the potential to be a highly effective framework for wildlife conservation on National Forest System lands. It commits the Forest Service to a formal adaptive management process, adopts a landscape perspective as the primary context for forest planning, strives to find an appropriate balance between coarse- and fine-filter approaches to the assessment of biological diversity, and codifies the need to monitor focal species at multiple spatial scales. These are all significant advances that signal the Forest Service's commitment to a new planning rule that is responsive to the status and trends of ecological systems, as well as the expectations of the nation for the wise stewardship and conservation of public lands and resources.

Although we are confident that the rule can be implemented so as to effectively conserve wildlife populations, we are concerned about the ambiguity of the plan's diversity provisions and the level of discretion permitted when interpreting and implementing the plan's most fundamental actions: identifying focal species, monitoring status and trends, establishing triggers for adaptive management, and taking action to sustain viable populations. Effective implementation of the rule will require a commitment to direct monitoring of focal species, species of conservation concern, and ESA species, as well as a commitment to maintaining their viability. Without this commitment, the provision to sustain biological diversity is incoherent and unlikely to be effective. Triggers will have to be established for monitoring of species to signal when a review of management approaches is necessary. Without an assessment of the effects of management actions via monitoring, the agency cannot fulfill its obligation to manage adaptively. When private land development or other more distant factors affect the viability of species, the USFS should place more, not less, emphasis on providing for viable populations to the extent practicable. The design of monitoring programs, determinations about the inherent capability of the land, and selection of focal and species of conservation concern should be based on the best available scientific information.

The language of the new rule is more discretionary than the 1982 rule, and it removes the requirement to maintain viable populations of all vertebrate species. Although this is unquestionably a significant change in regulatory language, some might argue the 2012 rule merely codifies the way the USFS has managed for diversity since 1982. In practice, management indicator species seldom have been monitored directly in a way that allowed for a clear understanding of their response to management actions, and the USFS has been managing for Regional Forester Sensitive Species by relying primarily on habitat measurements as proxies for the species' current status. In effect, the 2012 rule simply makes it more explicit that this relaxation of the standards established in the 1982 rule will be the USFS's accepted standard for managing for diversity—to focus primarily on coarse-filter approaches, with the expectation that currently abundant species will remain abundant, and that sensitive but stable wildlife populations will, by and large, persist. The problem with this approach is that the NFMA includes clear requirements to provide for a diversity of plant and animal species, not just a range of ecological conditions that may or may not support diversity. In the end, habitat is a meaningless concept if it is never occupied by actual individuals of the species in question.

With the new rule, the USFS faces a new set of decisions that it can address from a position of power, with greater discretion over its approach to wildlife, and forest management in general. It has the opportunity to improve upon past efforts to conserve wildlife and biological diversity, or it could retreat from the responsibilities established in the NFMA and the 1982 rule. At this juncture, the USFS and the broader community of foresters and wildlife managers should pause to consider whether a relaxation of standards—most notably with respect to population viability—and the consequent lessening of agency responsibility and authority is in the best interest of the nation or the agency itself. We respectfully argue that conservation of the nation's biological wealth, including the persistence of viable populations of wildlife species, is an important service that a strong and professional USFS can and should provide to the American public. To the extent that the agency uses its new discretion to lessen its responsibility to wildlife and its exposure to controversy and criticism, the 2012 rule is likely to represent a retreat from an essential public responsibility and a blow to the wildlife profession. But to the extent that the agency signals its leadership on these issues by voluntary committing itself to a nationwide, science-based, and outcome-oriented program of adaptive management of both forest ecosystems and their full complement of species, the 2012 rule will signal a new era of leadership, where increased discretion is used to elevate intent and expectations, accept greater responsibility, and provide energetic leadership in the conservation and management of the nation's public lands and wildlife.

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