Society for Conservation Biology

Ecological Society of America

February 12, 2010

Forest Service Planning NOI
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Submitted by email: fspr@contentanalysisgroup.com

Re: Comments on National Forest System Land Management Planning NOI submitted on behalf of the Society for Conservation Biology and the Ecological Society of America (74 Federal Register 67165-67169, December 18, 2009)

Please enter into the administrative record these comments submitted on behalf of the Society for Conservation Biology (www.conbio.org)[1] and the Ecological Society of America (www.esa.org) [2] in response to the Notice of Intent (NOI) to prepare a new planning rule governing management of the National Forest system. Our comments underscore the merits of a scientifically credible rule change that integrates ecological sustainability with well-accepted approaches in climate change planning. As such, we urge the Forest Service to use the best available science in meeting its stated objectives with respect to restoration, watershed protection, climate change resilience, and wildlife conservation. The agency also can best meet its stated goal of enhancing ecosystem services if ecological sustainability and climate change preparation become the overarching principles in planning across the National Forest system. Our comments reflect four core planning principles that should be included in all planning alternatives: (1) population viability assessments (PVA) for focal species and other target species in order to help meet the agencies' obligation to sustain diversity and reduce impacts from forest

[1] The Society for Conservation Biology (SCB) is a global community of conservation professionals. The SCB's mission is to advance the science and practice of conserving Earth's biological diversity. The organization's members comprise thousands of resource managers, educators, government and private conservation workers, and students in the United States and around the world.
[2] Founded in 1915, the Ecological Society of America represents 10,000 researchers, educators, natural resource managers, and students in North America and over 90 countries around the world.

management and climate change; (2) plan for ecological sustainability using a broad suite of measurable biological indicators such as ecological integrity; (3) prepare for climate change by protecting intact ecosystems (e.g., roadless areas) to facilitate climate-forced wildlife migrations and carbon dense ecosystems (e.g., mature forests) for long-term carbon storage while reducing existing stressors to enable adaptation of species (and, in the aggregate, ecosystems); and (4) conduct effectiveness monitoring using a rigorous approach.

Population Viability Assessments of Focal Species and Planning for Uncertainty

The statutory language of the National Forest Management Act (NFMA) requires the Forest Service to “provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives” (16 US Code 1604[g][3][B]). Consequently, since 1982, the regulations governing implementation of NFMA have addressed this provision by requiring that lands and waters be managed to *maintain viable populations* (emphasis added) of existing native and desired non-native vertebrate species in the planning area. The proposed rule change should clarify and extend the viability concept in forest planning using well-recognized concepts in population viability assessments such as focal species planning (see Noon et al. 2003, Sjögren-Gulve and Ebenhard 2000, Beissinger and McCullough 2002). As an example, a given area within which a focal species could, with appropriate management, persist should be recognized explicitly in any viability determination. Viability in a previously managed landscape also may require re-establishment of historic range. When reliable data on population dynamics (e.g., rates of birth, death, emigration, and immigration) are unavailable, viability assessments should be extended to include those based on analyses of geographic distribution as a proxy for viability under the well-established relationship between a species’ abundance and its distribution. This would allow PVA to be based on well-designed monitoring programs (as also noted below).

The 2000 planning rule clarified that focal species used in the evaluation of viability do not directly represent the population dynamics of another species. This distinguishes the focal species concept from management indicator species (MIS) in the 1982 regulations. Unambiguous criteria for acceptable levels of reduction in viability have yet to be articulated by the Forest Service. The agency should make use of "high likelihood" functions that express a level of belief that viability will be maintained within a planning area and within the extent of the agency’s authority to affect the ecological conditions needed by the species. An example of such a process was used by FEMAT (1993) in assessing planning alternatives under the Northwest Forest Plan.

PVAs have matured dramatically in the last decade. The scientific community has developed cost effective approaches (e.g., genetic monitoring along with modeling occupancy on the basis of presence/non-detection data) in this regard. While it is impossible to assess the population viability of all species, the majority of conservation scientists acknowledge that some sort of surrogate-based approach is effective, particularly when it is integrated with broader metrics of ecological sustainability (see below). As such, there are statistical and sampling methods for estimating viability parameters (e.g., survival and birth rates, population size and distribution, habitat condition) of various focal species and how these species co-occur with other species of concern. PVAs can now be directly integrated into forest management models and the effects of different management options on focal species can be ordinally ranked. Such assessments also satisfy the criteria for credible science: they are based on sound theory, are testable, can be peer reviewed, have an estimable rate of error and methods for calculating error terms, and have general acceptance in the scientific community. Rigorous methods to identify focal species have been published in the scientific literature, including species with distinct taxonomy (e.g., endemics, unique subspecies), those associated with particular vegetation communities, those that perform important ecological functions (e.g., Zavaleta et al. 2010), those considered keystone or umbrella species (Roberge and Angelstam 2004), and those sensitive to climate change.

We also recognize that while it is impossible to plan for all species, the Forest Service should adopt the "precautionary principle" as a means for planning for uncertainty. For instance, in 1992, the global conservation community, including the United States, expressed agreement on this principle through the Rio Declaration on Environment and Development**,** a short document produced at the United Nations Conference on Environment and Development ("UNCED").3[1] The Precautionary Principle provides as follows:

3[1] Subsequent to the UNCED, a number of scientific authors elaborated on the subject, including: C. Raffensberger & J. Tickner, *Protecting Public Health and the Environment: Implementing the Precautionary Principle* (1999), and R.B. Stewart, *Environmental Regulatory Decision Making Under Uncertainty*, Research in Law and Economics, Vol. 20 at p.76 (2002).

> In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Ecological Sustainability and Ecological Integrity

The NOI refers to the importance of sustainability as the foundation for National Forest system planning and management. Similarly, in reinstating the 2000 planning rule (36 CFR Part 219) as a temporary measure until a new planning rule is approved, the Forest Service noted that the first priority for planning on the National Forest system is to guide management in a way that maintains or restores *ecological sustainability* (emphasis added) (§ 219.2 Principles). In these comments, we define ecological sustainability as maintaining the composition, structure, and processes of an ecological system (see Committee of Scientists 1999), considered the foundation upon which human social and economic systems depend (see Karr 2009). The Forest Service is charged with maintaining the "...productive capacity of ecological systems" (USDA Forest Service 2000:67580). However, the concept of "productive capacity" as an attribute of ecological systems is embedded within the ecosystem and species diversity components of ecological sustainability. Any failure to restore or maintain the productive capacity of ecosystems in any ecological respect will likely be reflected in changes to species composition and population viability.

An ecological sustainability approach was previously proposed in 2000 but deemed too costly, complex, and procedurally burdensome by the Bush administration. However, at the time, the Forest Service did not consider the benefits of ecological sustainability in its assumptions of costs. We recommend that the Forest Service make use of proactive planning to avoid costly Endangered Species listings and the consequences of diminished ecosystem services from intensive land use. When viewed in this context, managing for ecological sustainability is very likely to be more cost-effective than managing species that are listed under the Endangered Species Act or restoring highly degraded systems.

Ecological sustainability can be assessed using a broad suite of measures of ecosystem composition, structure, and processes (Committee of Scientists 1999, Pimentel et al. 2000). In particular, the Forest Service should make use of concepts in ecological integrity (Pimentel et al.

2000) and ways to measure it (Ulanowicz 2000, Karr 2000, 2006) in forest planning. In this case, integrity is associated with having the full elements (genes, species, and assemblages) and processes (e.g., pollination, demography, biotic interactions, nutrient and energy dynamics, and metapopulation processes) expected in the natural habitat of a region (using wilderness or roadless areas as a benchmark, see Karr and Chu 1995, Pimentel 2000). Such an approach would allow the agency to integrate PVAs within a broader biological framework as well as connect both approaches to ecosystem management planning efforts. Meeting the core requirements of the Clean Water Act would also allow the agency to address ecological sustainability within a legal framework as part of the Act's requirement is to restore and maintain the chemical, physical, and *biological integrity* (emphasis added) of the nation's waters.

Climate Change Mitigation And Adaptation

The rate of climate change is accelerating (see IPCC 2007). Effects vary regionally, but generally include more floods (from storms and rising sea level), droughts, wildland fires, intense storms, outbreaks of insects considered pests; and changes in the distributions and population viability of animals and plants. In response to regionally specific threats, we recommend that management alternatives include both climate change mitigation and adaptation measures as follows.

Mitigation – planning for climate change mitigation on federal lands should include biological sequestration, protection of existing carbon stores in vegetation (e.g., mature and old-growth forests), and reduction of greenhouse gas emissions produced by forest (e.g., clearcutting and harvest of older forests) and rangeland management practices (e.g., livestock). Planting trees increases carbon sequestration on public lands, but does not substitute for protecting existing carbon stores in older forests. As an example, coastal mature and old-growth forests in the Pacific Northwest are among the most carbon dense ecosystems in the world (Smithwick et al. 2002, Luyssaert et al. 2008, Hudiburg et al. 2009, Keith et al. 2009). When these forests are cut down, as much as 40% of their carbon stores are emitted as carbon dioxide through site preparation and manufacturing of wood products (Harmon et al. 1990, Harmon 2001). Losses of carbon from logging typically exceed those from even forest fires (Depro et al. 2008, Mitchell et al. 2009, Meigs et al. 2009). Recent development of methods to facilitate mapping of the carbon stored by alternative forest management scenarios (Turner et al. 2004) allow the agency to incorporate mitigation into forest plan revisions. Other recent studies have found that jointly optimizing carbon storage goals and species retention goals can result in management plans that are more efficient in meeting both goals than pursuing either goal separately (Venter et al. 2009). Due to the challenges posed by rapid climate change, such spatially explicit and multi-criteria planning may need to occur both at the scale of individual management units (e.g., in forest plan revisions) and as part of a regionally coordinated planning process, similar to those that occurred under the Northwest Forest Plan and Sierra Nevada Framework. In general, due to emerging broad-scale threats to native species, ecological function, and other values, regional planning should become an institutionalized element of the agency planning process codified by the proposed regulations.

In addition, we are concerned that the current emphasis on conversion of cellulosic fiber to liquid fuels ("biofuels") is accompanied by increased greenhouse gas emissions from the processing of fuels and reduction of stored carbon pools on site; full carbon accounting is seldom considered in forest planning (Searchinger et al. 2009) and should be part of the proposed regulations by treating CO_2 and other greenhouse gasses as a metric in NEPA analysis.

Adaptation –we recommend four steps to maximize the probability that desired species and other valued elements of National Forests, such as those associated with high levels of ecological integrity (Pimentel et al. 2000), will adapt to climate change in ways beneficial to society. First, reduce the existing stressors that may be exacerbated by climate change. Examples of stressors (many of which are cumulative) that should be reduced include logging of older forests, road building, livestock grazing, use of off-highway vehicles, fire exclusion, mining, and the spread of invasive species. Second, manage ecosystems by maintaining or restoring properties that allow ecosystems and species to resist disturbance (i.e., withstand disturbance without considerable change in structure, composition, or function) or be resilient to disturbance (i.e., recover pre-disturbance structure, composition, and function following disturbance). Examples of attributes that are associated with resistance include thick fire-resistant bark on mature pines in fire adapted regions and species-rich native communities that are more likely to withstand invasions (see Gelbard and Harrison 2005 for examples of weed resistance in roadless areas). Examples of attributes that are associated with resilience include seritonous cones in some pines that release large seed crops following intense fire, and intact floodplains that ameliorate peak flows during floods. Again, such properties tend to be more functional in areas with limited past human activity than in areas with a history of intensive human use. We request that the Forest Service clearly define what is meant by these terms and how they will manage them, ideally based on the concepts provided herein. Third, to address the increase in management uncertainty driven by climate change, we recommend that the Forest Service increase the level of redundancy of ecosystem types included in protected areas and manage for connectivity among reserves to facilitate dispersal of wildlife. Redundancy, in the form of multiple protected area units, can best confer both resistance and resilience to major changes within a management area. Planning is predicated on conserving a sufficient number of ecosystem replicates within protected areas in order to meet representation targets fundamental to conservation of species and ecological sustainability (see Noss and Cooperrider 1994). Fourth, the Forest Service should make use of new tools for spatially explicit analysis and identification of key climate-change refugia and wildlife corridors (areas where species' habitat is likely to remain relatively contiguous as climate changes). This would allow climate change adaptation to be considered in forest plan revisions and regional planning, either integrated within single-species PVAs or as part of a broader multi-species planning framework (Carroll et al. 2009). In the meantime, already identified regional wildlife corridors, especially roadless areas, should be protected to accommodate climate-forced wildlife migrations and protect critical ecosystem services like clean water and carbon stores (consult Strittholt and DellaSala 2001 and State Wildlife Action Plans for examples).

Effectiveness Monitoring

Several federal laws that govern the management of federal lands require an assessment of the effects of management practices on natural resources (e.g., fish, terrestrial animals, timber, water). Specifically, the Forest Service needs information on the status and trend of managed ecosystems to design, implement, and compare management options. Monitoring is an essential, not discretionary, component of adaptive management that provides the information needed to learn how to more effectively manage ecological systems and to avoid unintended consequences of management. It is essential to evaluate ecosystem responses to disturbances such as fire, insect outbreaks, climate change, and land management. Optimal management decisions require knowledge of the current state of the ecological system (state-dependent decision-making). Ecological systems often respond abruptly to changing conditions (i.e., a threshold associated with a change in system state may be reached), leading unexpectedly to undesirable conditions

(Paine et al. 1998). Well-designed monitoring can allow for prompt detection of unexpected consequences with management response adjusted accordingly.

Monitoring of any complex system requires the integration of surrogate species-based approaches with more comprehensive planning for ecological sustainability. For instance, monitoring abundance and distribution of target species is a proactive approach to detect and, ideally, reverse declines before a species warrants reactive listing under the Endangered Species Act. When combined with measures of ecological integrity, management can be adjusted in an adaptive sense to avoid unintended consequences to critical ecosystem services such as clean water.

The data obtained from coarse filter approaches based on dominant vegetation communities and their successional stages are often poor predictors of the status and distribution of animal species (Noon et al. 2003). Because not all species contribute equally to ecosystem processes (Zavelata et al. 2010), it is possible to monitor a small subset of species (i.e., a fine filter or focal species approach). Thus, as noted above, we recommend that the Forest Service monitor focal species that are strongly associated with specific management questions and objectives or that are essential in ecosystem processes or functions. By doing so, the agency can best monitor how species respond to management, natural disturbance, or climate change (i.e., manage adaptively by using monitoring data to compare expected management outcomes to observed outcomes, and adjusting management actions as necessary). To accomplish this, the agency should base monitoring on sound survey and statistical designs, including evaluation of sample size needed to detect a treatment effect. Metrics that are monitored should be selected on the basis of a conceptual model of how the ecosystem works and what attributes reflect the status and trend of natural and anthropogenic drivers and ecological responses. Selection of metrics should also be based on the empirical demonstration that those measures actually reflect changing conditions connected to the natural or anthropogenic events in a planning area. And monitoring should be conducted as a component of adaptive resource management that facilitates both learning and decision-making in the context of uncertainty about outcomes.

Managing for ecological sustainability, particularly in the face of climate change, requires an enforceable commitment to monitor trends and impacts, and to adjust management assumptions and plans on a regular basis. The Forest Service should make an institutional commitment to sustain any adaptive management program (which necessarily includes monitoring) by putting rigorous monitoring on par with its commitment to research stations and its participation in long-term ecological research sites (LTER program) and the National Ecological Observatory Network (NEON).

Overall Role of Science In Planning

In response to the request to help the Forest Service determine the appropriate role of science and scientists in planning, we recommend that the agency reconstitute a committee of scientists similar to the 1999 Committee of Scientists and consider more inclusive scientific input on the question of consistency with best available science. In addition, we recommend that scientists work directly with or advise the Forest Service team drafting the new regulations and provide input on effectiveness monitoring pursuant to the Federal Advisory Committee Act (FACA). Several professional societies might be willing to provide such services among a number of who include The Wildlife Society, Society for Conservation Biology, American Fisheries Society, and Ecological Society of America.

Other Specific Comments

The following comments build on the general principles stated above and are specific to key sections of the NOI.

- Page 6, middle of page: Clean Water Act is a key mandate that should be made explicit here. All actions should meet the requirements of this act.
- Page 7, item 1: land pollutants too should be of concern, not just air and water pollutants.
- Page 9, just before specific questions: Catastrophic wildfire implies destruction and does not allow for the fact that fire is a natural process in many ecosystems. While we recognize that the length of the fire season and size of fires has increased recently (30 years) in some regions (Westerling et al. 2006), we are concerned that the response to these changes has included a substantial increase in post-fire (salvage) logging, which nearly always reduces ecosystem resilience (for review of impacts see Karr et al. 2006, Donato et al. 2006, Lindenmayer et al. 2008). Thus, the Forest Service needs to more carefully evaluate post-disturbance logging, particularly in relation to its effects on ecological sustainability, resilience, and population viability of species of concern.
- Page 10, Best Management Practices (BMP) concept: Each of us has been involved in studies of the effects of land management on ecosystems. Lists of BMPs often include practices believed to ameliorate undesirable effects of land management, such as soil

erosion or reductions in water quality, which have not been shown empirically to actually ameliorate those effects. Thus, BMPs should be a target of monitoring in the context of adaptive management. Equally important is the concept of best management systems in which multiple BMPs are selected for implementation in a given location on the basis of an assumption that collectively they will enhance the effectiveness of each BMP. However, individual BMPs might actually negate each other's positive effects in a given location if not carefully monitored.

- Page 12, several bullets: Measures of diversity vary as a function of spatial and temporal extent and resolution. Diversity concepts should be defined in clear, quantitative terms.
- Page 13, first bullet under specific questions: There is casual mention here of the need to consider social, economic, and ecological relations. We applaud the agency for raising this issue and note that in the past this has been an area where agency planning and/or regulations have been particularly deficient. Karr (2009) provides an explicit discussion of those relationships within the context of ecological sustainability and integrity that should provide useful to the Forest Service in its emphasis on ecological sustainability, the intent of the proposed rule change.
- Page 14, mention of collaborative efforts: We recommend the Forest Service make use of a recent book by Layzer (2008) on attributes of successful ecosystem-based management.
- Page 15, just before specific questions: This is similar to the concept that the Fish and Wildlife Service is currently pursuing through its Landscape Conservation Cooperatives (LCCs). The Forest Service should coordinate its approach with that of the Fish and Wildlife Service to ensure planning across jurisdictions. Several organizations already are conducting climate-change planning across extensive areas and it would be prudent for the agency to examine existing approaches and learn from them. Examples of relevant planning efforts include the Western Governors Climate Change Initiative and Corridors Initiative and several climate change planning processes or planning tools in application by non-government agencies (e.g., National Center for Conservation Science & Policy, The Nature Conservancy, NatureServe, and EcoAdapt).
- Page 16, bullet 1: We urge caution because a shared vision process can dilute ecological goals (Layzer 2008). Any shared vision should be consistent with maintaining ecological sustainability and capacity to adapt to climate change.

Conclusions

The Forest Service has an opportunity to improve the scientific basis of its multiple use management mandate. In addition to the above recommendations, we also recommend that the agency: (1) make use of the best science and include a committee of scientists in the development and implementation of the rule change and follow up effectiveness monitoring; (2) conduct planning around fundamental concepts such as ecological sustainability, population viability of focal species, ecological integrity, and climate change mitigation and adaptation that includes protection of existing carbon stores (e.g., older forests) and intact areas (e.g., roadless areas); (3) develop a comprehensive approach for assessing ecological condition of aquatic and terrestrial systems as a baseline for planning; and (4) clearly and quantitatively define terms like diversity, sustainability, resiliency, catastrophic, and restoration. In addition, the Forest Service should collaborate with other organizations employing climate change approaches at large spatial scales such as the Western Governors Climate Change and Corridor Initiatives, Landscape Conservation Cooperatives of the Fish and Wildlife Service, and science-based nongovernmental organizations.

Sincerely (affiliations listed for identification only),

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