

B. MODERN NATIONAL FOREST MANAGEMENT

Charles F. Wilkinson & H. Michael Anderson, *Land and Resource Planning in the National Forests**

64 Or.L.Rev. 1, 10-12, 69-70, 74 (1985).

* * * By 1976 the mood of Congress had shifted dramatically in the wake of the clearcutting controversy. Upon introducing his bill, [Minnesota Senator Hubert] Humphrey observed that the MUSY Act had not succeeded and that a "fundamental reform" was needed. Humphrey stated: "We have had 15 years since the 1960 Multiple Use and Sustained Yield Act was passed. Much has happened, and as we look at what has transpired, the need for improvement is evident." He identified the central problem as the predominance of timber production over protection of other resources. Humphrey declared: "The days have ended when the forest may be viewed only as trees and trees viewed only as timber. The soil and the water, the grasses and the shrubs, the fish and the wildlife, and the beauty that is the forest must become integral parts of resource managers' thinking and actions." During the Senate hearings Humphrey observed that the Forest Service's record had brought into question the extent to which the agency could be trusted to guard and manage public resources. He proposed that the NFMA legislation be shaped to prevent the Forest Service from "turning the national forests into tree production programs which override other values." Senator Randolph and other members of Congress shared Humphrey's views. * * *

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* The NFMA will require courts to scrutinize forest plans, and activities based on those plans, on both procedural and substantive grounds. The 1976 Act contains several substantive guidelines that are markedly more specific than the broad multiple-use language [of the MUSY Act], although less absolute than the Organic Act provision in *Monongahela*. In addition, the NFMA requires forest plans to be developed in accordance with NEPA's procedural requirements. The Forest Service has correctly stated the controlling law in advising its planners that reviewing courts are likely to conduct a "searching inquiry" into the procedural adequacy of forest plans and to require "full, fair, and bona fide compliance" with the NFMA. Once the plans become final and are determined to be valid, they themselves become law. Much like zoning requirements or administrative regulations, the plans are controlling and judicially enforceable until properly revised.

TIMBER PLANNING UNDER THE NATIONAL FOREST MANAGEMENT ACT*

In broad and somewhat oversimplified terms, timber harvests for a national forest are calculated in this manner. First, planners determine

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* An overview of planning on the national forests, as well as on other federal lands, was set out in Chapter 5, *supra* pp. 427-34.

what land is suitable for timber management. They must exclude, for example: (a) land allocated to other uses (such as wilderness); (b) noncommercial timberland (traditionally defined as land growing less than twenty cubic feet of wood per acre annually) and (c) land not suitable for harvesting due to inaccessibility or to fragile slope or soil conditions. The land left available for harvest after such exclusions is the suitable land base, or inventory.

Second, the Forest Service must calculate the amount of timber that may be harvested from the inventory. This is the "allowable cut," usually expressed as an annual volume harvesting target. The two primary factors used to calculate the allowable cut are (a) the volume of timber available in the inventory, and (b) the rotation period, i.e., the time over which a stand will be harvested before a second harvesting schedule can begin. If, for example, estimated volume is 500 million board feet (mmbf) and a conservative rotation period of 100 years is used, the annual allowable cut will be 5 mmbf. The volume and rotation period calculations both depend in part upon the estimated rate of growth in the future. If optimistic projections for stand management (e.g., thinning, fertilization, reforestation, and use of genetically superior stocks) are used, the volume will be higher, and so will be the resulting harvest level. Thus, if substantial stand improvement measures are assumed, this might lead to a timber volume estimate of 750 mmbf, which means that the annual cut can be set at 7.5 mmbf, still using the same rotation period of 100 years. In the same way, if a broader definition of suitability is used, more timber may be included in the inventory, which will make the volume higher, and the annual allowable cut higher. Shortening the rotation period has the same effect; i.e., the allowable cut increases.

After the allowable cut is set, planners must determine harvesting methods (clearcutting or selective cutting; timber removal by tractor, cable, balloon, or helicopter) and the process for regenerating the stand.

It should not be surprising that the calculation of the allowable cut is an issue often contested in the planning process. The allowable cut has historically tended to be a central premise for managing national forests, and the central organizing principle for many Forest Service field offices. Acre for acre, commercial timber is the most valuable commodity resource in the National Forest System. Even as emphasis on the wildlife, recreation, and preservation resources was growing, the operative slogan of many forest rangers was still GOTAC ("get out the allowable cut"). This attitude has been changing considerably, from within and without the agency, as the materials that follow reflect.

Very few lawsuits have involved direct challenges to allowable cut determinations. These matters are inordinately complex due to the quantity of data, the imprecision of projections of future timber growth, the necessity for numerous professional judgments on economic and silvicultural issues, and the intricacies of computer programs. Lawyers must develop legal arguments and marshal the evidence, but the work of foresters and

✓ Key Issue

NEPA
economists is more likely to determine the outcome of litigation. NFMA planning does not displace NEPA; the NFMA requires forest plans to be prepared "in accordance with" NEPA, 16 U.S.C. § 1604(g)(1); and Forest Service regulations provide that, "[t]o the extent feasible, a single process shall be used to meet planning and NEPA requirements." 36 C.F.R. § 219.12(a) (1991).

Q- What follows is a brief examination of the NFMA provisions relating to these three central elements of timber planning: determining the suitable land base, or inventory; calculating the allowable cut; and deciding upon the appropriate methods for harvesting and regenerating the timber. In examining the sometimes remarkable specificity in the statute, a central question is whether—underneath this bristling detail—genuine standards exist to control the Forest Service's discretion, and to provide a basis for meaningful judicial review. For example, a number of the seemingly "bright-line" rules in the statute have exceptions, and the exceptions might operate in practice to swallow the rules. The discussion below raises a number of interpretive questions about the meaning of these provisions, and examines how the courts so far have dealt with them. For additional general analysis of the issues raised here, see generally Wilkinson & Anderson, *supra*.

The first step towards fully implementing NFMA was for the Forest Service to prepare detailed regulations. The statute created a Committee of Scientists to play a significant role in that process, and final regulations were promulgated in 1979. During much of the 1980s, the Forest Service was engaged in preparing the first generation of forest plans for most of the National Forest System. These plans involved extensive public participation, and many of them were subject to appeals on various issues by various interests up through the agency's administrative appeals system. A number of these plans were challenged in federal court, usually (but not always) by environmental protection advocates. These challenges typically alleged violations of the NFMA, NEPA, the Administrative Procedure Act and the Endangered Species Act.

The Supreme Court, in *Ohio Forestry Ass'n v. Sierra Club*, 523 U.S. 726 (1998), *supra* at Chapter 4, p. 294, put a stop to most but not all "pre-implementation" challenges to Forest Service land use plans by ruling them unripe for review. Some of the pre-*Ohio Forestry* cases discussed further below in this section might well have been dismissed on ripeness grounds if they had been brought later. Although their precedential value is thereby somewhat weakened, they still contain valuable indicia of judicial attitudes toward forest planning.

See CRS Report
In the late 1990s, the Forest Service undertook a major overhaul of its planning process to give ecological sustainability a higher priority. See 65 Fed. Reg. 67514 (Nov. 9, 2000). The Bush Administration has delayed implementation of these rules pending further study. See 66 Fed. Reg. 27,552 (May 17, 2001). See generally Chapter 5, *supra* pp. 427-34.

1. PHYSICAL SUITABILITY

The NFMA gives special attention to the kinds of lands on which timber may be harvested, including especially impacts on watersheds. The

"physical suitability" provision, 16 U.S.C. § 1604(g)(3)(E), requires that the regulations and the forest plans shall:

insure that timber will be harvested from National Forest System lands only where—

(i) soil, slope, or other watershed conditions will not be irreversibly damaged;

(ii) there is assurance that such lands can be adequately restocked within five years after harvest; [and]

(iii) protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat * * *

Land that does not meet these standards must be classified as unsuitable and excluded from the inventory. The provision extends to logging road construction, a major cause of erosion.

Does this provision provide a basis for searching judicial review? Is it significant that each criterion must be met separately? For example, what might "irreversible" damage [subsection i] be? Can subsection (iii) be read literally to prohibit all logging that results in "detrimental" sediment deposits in streams? What does "assurance" that the lands "can be adequately restocked within five years" mean? The Knutson-Vandenberg Act of 1930, 16 U.S.C. §§ 576a-c, authorizes the Forest Service to require deposits from timber operators to cover reforestation costs. That program has been less than entirely successful: For a long time there has been a backlog of millions of national forest acres that have not been restocked. Although the NFMA authorized an expenditure of \$200 million per year to eliminate the backlog, in subsequent years Congress has not appropriated sufficient funds to do this. If Congress fails to make funds available for this purpose, could a court use this section to enjoin further timber sales until the backlog has been eliminated?

Matters of physical suitability (and many other forestry issues under the NFMA) almost always involve extensive factual records and silvicultural expertise, so that agency discretion is a formidable obstacle to parties challenging Forest Service decisions on judicial review. See generally Federico Cheever, *Four Failed Forest Standards: What We Can Learn from the History of the National Forest Management Act's Substantive Timber Management Provisions*, 77 Ore. L. Rev. 601 (1998). In *Sierra Club v. Peterson*, 185 F.3d 349 (5th Cir.1999), the circuit court affirmed a sweeping lower court injunction against a Forest Service logging program, finding, among other things, that the NFMA physical suitability provisions were substantive and that the agency-sponsored logging practices were causing substantial and permanent soil damage. Later, in en banc review, the court vacated the decision on the ground that no final agency action existed. *Sierra Club v. Peterson*, 228 F.3d 559 (5th Cir.2000). One procedural judicial check on physical suitability issues is to remand for further Forest Service analysis and explanation. See *Citizens for Environmental Quality v.*

United States, 731 F.Supp. 970 (D.Colo.1989). On the five-year restocking provision of § 1604(g)(3)(E)(ii), the decision in *Big Hole Ranchers Ass'n v. U.S. Forest Service*, 686 F.Supp. 256 (D.Mont.1988), gave the agency broad discretion, finding that the issue was not whether restocking "would" occur within five years but rather whether it "could" occur, while *Ayers v. Espy*, 873 F.Supp. 455 (D.Colo.1994), found that a Forest Service harvesting program violated the five-year restocking requirement.

2. ECONOMIC SUITABILITY: THE "BELOW-COST TIMBER SALES" ISSUE

Considered as a whole, annual timber sale revenues from the national forest system usually exceed the costs of managing the system. Most of the profitable sales, however, take place in the humid, timber-rich Pacific Northwest. Sales in other regions, especially in the Rocky Mountains, are often below-cost—the government's costs of growing and selling trees exceed revenues from timber sales—due to a more arid climate and lower-quality commercial timber land. Roadbuilding is a large cost constituent. But roads can be used for nontimber purposes such as recreation and wildlife management as well. Many studies have found, however, that even when appropriate portions of road costs are allocated to nontimber benefits, many timber sales still fail to pay their way. See, e.g., General Accounting Office, *Congress Needs Better Information on Forest Service's Below-Cost Timber Sales* (GAO/RCD-84-96, 1984) (costs exceeded revenues in 27% of all sales in 1981 and in 42% of all sales in 1982). Fiscal conservatives, who dislike subsidies, and environmentalists, who oppose extending road systems into roadless areas where many of the proposed below-cost sales are proposed, join in objecting to the practice. Industry argues that below-cost sales are necessary to support local communities dependent on a continuing flow of timber from national forests. See James F. Morrison, *The NFMA and Below-Cost Sales: Determining the Economic Suitability of Land for Timber Production*, 17 *Env't'l L.* 591 (1987).

During the congressional hearings leading to the NFMA, eminent economist Dr. Marion Clawson and others objected to uneconomical sales. The Senate bill included a reasonably strict cost-benefit analysis, the House version did not directly deal with the issue, and the conference of the two chambers mediated the differences by drafting an "economic suitability," or "marginal lands" provision, which became 16 U.S.C. § 1604(k):

In developing land management plans pursuant to this [Act], the Secretary shall identify lands within the management area which are not suited for timber production, considering physical, economic, and other pertinent factors to the extent feasible, as determined by the Secretary, and shall assure that, except for salvage sales or sales necessitated to protect other multiple-use values, no timber harvesting shall occur on such lands for a period of 10 years. Lands once identified as unsuitable for timber production shall continue to be treated for reforestation purposes, particularly with regard to the protection of other multiple-use values. The Secretary shall review his decision to classify these lands as not suited for timber production at least every

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10 years and shall return these lands to timber production whenever he determines that conditions have changed so that they have become suitable for timber production.

Section 1604(l) directs the Forest Service to establish a process for comparing costs and receipts for timber sales and to report annually to Congress on below-cost sales—but sets no substantive standards. Following enactment, the Committee of Scientists, a group of leading experts designated by Congress to propose NFMA rules to the Forest Service, concluded that below-cost sales must be limited by some “rules of reason.” See generally Denny LeMaster, *DECADE OF CHANGE: THE REMAKING OF FOREST SERVICE STATUTORY AUTHORITY DURING THE 1970’s*, at 77 (1984). The Forest Service has continued making below-cost sales in areas of marginally productive timber, although it has taken steps to reduce the practice, which remains a point of significant controversy. In its 1998 report to Congress, the Forest Service calculated that timber sales lost \$88.6 million during 1997. About 60% of this loss was the result of road construction, as this was the first year the Forest Service included the costs of building logging roads in calculating losses from timber sales. But there was more:

House Republicans also cited Forest Service mismanagement as a reason for the huge loss reported in 1997. In fact, from 1989 to 1996, Forest Service overhead increased by 46 percent, while revenues decreased by 59 percent. But, in a statement accompanying the Forest Service report, Forest Service Chief Mike Dombeck explained that the remaining loss, which was not accounted for by road construction, was the result of transforming forest practices to improve the overall health of U.S. national forests. He stated that the Forest Service has reduced timber harvest levels by 8 billion board feet since the 1980s. According to Dombeck, the long-term benefits of clean water, plentiful fish and wildlife habitats, and increased recreational opportunities “will far outweigh any short-term losses in financial profitability.”

28 *Env’tl. L. Rptr.* 10466C (1998).

Questions: Section 1604(k) requires the Secretary to consider “economic * * * factors to the extent feasible” in determining what national forest lands are unsuitable for timber production. Does it require a cost-benefit analysis? Does it prohibit making lands available for timber harvest where the cost of preparing for the sale and extracting the timber exceed the value of the timber? Does it contain enough “meat” to provide for meaningful judicial review, or is the matter left to the discretion of the U.S. Forest Service?

In *Thomas v. Peterson*, 753 F.2d 754 (9th Cir.1985), the court rejected the argument that federal law prohibited timber harvesting and associated road construction where the value of the timber to be harvested is less than the cost of the road construction. The court did not address § 1604(k), but examined a provision of the RPA of 1974, which contained a congressional declaration that the national forest transportation system should “meet anticipated needs on an economical and environmentally sound basis.” 16 U.S.C. § 1608(a). The court said:

Plaintiffs * * * cite Forest Service regulations, Congressional committee reports, Congressional testimony, unenacted bills, and Forest Service practices, all of which evince a concern for economically efficient management of the National Forests, for avoiding costs not justified by benefits, for obtaining fair market value in the sale of National Forest resources, and for recovery of the costs of National Forest roads and other management expenses. These sources merely counsel economic prudence. They do not evidence a statutory requirement that timber roads be built only when the proceeds of the timber sales will defray construction costs.

The Forest Service interprets "economical" to permit consideration of benefits other than timber access, such as motorized recreation, firewood gathering, and access to the area by local residents. An agency's interpretation of the statute that it is charged with administering is entitled to substantial deference, see *Udall v. Tallman*, 380 U.S. 1, 16 (1965), and will be upheld unless unreasonable, see *id.* at 18. Here it is clearly reasonable.

This ruling was followed in *Big Hole Ranchers Ass'n v. U.S. Forest Service*, 686 F.Supp. 256 (D.Mont.1988). In *Citizens for Env't Quality v. United States*, 731 F.Supp. 970 (D.Colo.1989), the court remanded a plan to the Forest Service to explain more fully why it allowed timber production goals to play a heavy role in determining the suitability of lands for timber production. The court said that § 1604(k) "provides the Forest Service with ample discretion to consider both economic and other pertinent factors in identifying land suitable for timber production. * * * However, * * * if production goals are to be given greater weight in the suitability analysis, then adequate reasons must be set forth for so doing. * * * In the instant case, no such justification has been set forth." Cf. *Sierra Club v. Robertson*, 845 F.Supp. 485 (S.D. Ohio 1994) (the lower court decision that was vacated by the Supreme Court on ripeness grounds sub nom.) *Ohio Forestry Ass'n v. Sierra Club*, Chapter 4, supra p. 294, where the court said that "Section 1604(k) does not impose a strict economic test for the suitability of timbering [but] vests the Secretary with broad discretion to consider a variety of possibly conflicting factors in determining whether an area is suitable for timber production."

Should § 1604(k) be construed to reach a result different from this one? Might some timber sales be so uneconomic that the courts are justified in stepping in?

As a matter of policy, should Congress prohibit or more directly limit below-cost timber sales on the national forests? Should an exception be made for timber-dependent communities, where local mills need a relatively continuous supply of timber or they will shut down?

3. DIVERSITY

This is one of the most hotly contested provisions of the NFMA. To some extent its thrust is similar to, and overlaps with, the objectives of the

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Endangered Species Act. Section 1604(g)(3)(B) requires that Forest Service land management plans shall

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, and within the multiple-use objectives of a land management plan adopted pursuant to this section, provide, where appropriate, to the degree practicable, for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the plan. * * *

The Act does not define diversity, but the regulations define it as "the distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan." 36 C.F.R. § 219.3 (1991). Does this faithfully carry out the statute? *defined* No

To preserve diversity of species, the Forest Service has designated "indicator species" that serve as proxies for large numbers of species; in other words, rather than inventorying all species—which would be impossible—planners attempt to assure suitable habitat for the indicator species. Especially controversial was the designation of the northern spotted owl, which uses old-growth Douglas fir as a preferred habitat, as an indicator species in the Pacific Northwest. The timber industry argued that proposed forest plans may remove too much valuable timber land from the inventories in order to protect the spotted owl; environmentalists believed that more land should be set aside. This has led to much litigation, proposals for legislative "fixes," and public controversy. Although the dispute was enmeshed in the Endangered Species Act once the owl was listed as endangered, a good deal of the litigation actually centered on the "diversity" requirement of the NFMA more than the ESA. The northern spotted owl saga is discussed in Chapter 5, *supra* pp. 502-03.

Sierra Club v. Marita

United States Court of Appeals, Seventh Circuit, 1995.
46 F.3d 606.

■ FLAUM, CIRCUIT JUDGE.

* * * The present case concerns management plans developed for two forests: Nicolet National Forest ("Nicolet") and Chequamegon (She-WA-me-gon) National Forest ("Chequamegon"). Nicolet spreads over 973,000 acres, of which 655,000 acres are National Forest Land, in northeastern Wisconsin, while Chequamegon encompasses 845,000 publicly-owned acres in northwestern and north-central Wisconsin.¹ Collectively, the Nicolet and the Chequamegon contain hundreds of lakes and streams, thousands of

1. Until the mid-1800s, both the Nicolet and Chequamegon were old-growth forests consisting primarily of northern hardwoods. Pine logging around 1900, hardwood logging in the 1920s, and forest fires (caused by clear cutting) significantly affected the landscape. Government replanting and for-

est-fire control efforts beginning in the 1930s have reclaimed much of the land as forest. The forests now contain a mixture of trees that markedly differs from the forests' pre-1800 "natural" conditions but is also more diverse in terms of tree type and age.

miles of roads and trails, and serve a wide variety of uses, including hiking, skiing, snowmobiling, logging, fishing, hunting, sightseeing, and scientific research. The forests are important for both the tourism and the forest product industries in northern Wisconsin.

In the late 1970s and early 1980s, the Nicolet and Chequamegon Forest Supervisors and interdisciplinary teams each began drafting a forest management plan for their respective forests. These plans were expected to guide forest management for ten to fifteen years beginning in 1986. Drafts of the Nicolet plan and an EIS comparing the proposed plan to several alternatives were issued on November 9, 1984, while similar drafts of the Chequamegon plan were issued on March 29, 1985. Both plans were followed by a period of public comment, pursuant to 16 U.S.C. § 1604(d), which resulted in a number of changes to both plans.

The Regional Forester issued final drafts of both plans on August 11, 1986, as well as final environmental impact statements ("FEIS") and RODs ["records of decision"] explaining the final planning decisions. [Following exhaustion of administrative remedies, plaintiffs sued.] The Sierra Club's primary contention concerned the Service's failure to employ the science of conservation biology, which failure led it to violate a number of statutes and regulations regarding diversity in national forests. Conservation biology, the Sierra Club asserted, predicts that biological diversity can only be maintained if a given habitat is sufficiently large so that populations within that habitat will remain viable in the event of disturbances. Accordingly, dividing up large tracts of forest into a patchwork of different habitats, as the Nicolet and Chequamegon plans did, would not sustain the diversity within these patches unless each patch were sufficiently large so as to extend across an entire landscape or regional ecosystem. See, generally, Reed F. Noss, *Some Principles of Conservation Biology, As They Apply to Environmental Law*, 69 Chi.-Kent L.Rev. 893 (1994). Hence, the Sierra Club reasoned, the Service did not fulfil its mandates under the NFMA, NEPA and MUYSA to consider and promote biological diversity within the Nicolet and the Chequamegon.

[The court of appeals found the claim ripe, an outcome that now likely would be different in *Ohio Forestry*, supra p. 294.] * * *

The Sierra Club claims that the Service violated the NFMA and NEPA by using scientifically unsupported techniques to address diversity concerns in its management plans and by arbitrarily disregarding certain principles of conservation biology in developing those plans. The Sierra Club asserts that the Service abdicated its duty to take a "hard look" at the environmental impact of its decisions on biological diversity in the forests on the erroneous contentions that the Sierra Club's proposed theories and predictions were "uncertain" in application and that the Service's own methodology was more than adequate to meet all statutory requirements. According to the Sierra Club, the Service, rather than address the important ecological issues the plaintiffs raised, stuck its head in the sand. The result, the Sierra Club argues, was a plan with "predictions about diversity directly at odds with the prevailing scientific literature."

Several statutes and regulations mandate consideration of diversity in preparing forest management plans. Section 6(g) of the NFMA, the primary statute at issue, directs the Secretary of Agriculture in preparing a forest management plan to, among other things,

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, and within the multiple-use objectives of a land management plan adopted pursuant to this section, provide, where appropriate, to the degree practicable, for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the plan[.]

16 U.S.C. § 1604(g)(3)(B).

A number of regulations guide the application of this statute. The most general one stipulates that:

Forest planning shall provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area. Such diversity shall be considered throughout the planning process. Inventories shall include quantitative data making possible the evaluation of diversity in terms of its prior and present condition. For each planning alternative, the interdisciplinary team shall consider how diversity will be affected by various mixes of resource outputs and uses, including proposed management practices.

36 C.F.R. § 219.26. Another regulation addresses the substantive goals of the plan:

Management prescriptions, where appropriate and to the extent practicable, shall preserve and enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species, so that it is at least as great as that which would be expected in a natural forest and the diversity of tree species similar to that existing in the planning area. Reductions in diversity of plant and animal communities and tree species from that which would be expected in a natural forest, or from that similar to the existing diversity in the planning area, may be prescribed only where needed to meet overall multiple-use objectives * * *.

36 C.F.R. § 219.27(g); see also 36 C.F.R. § 219.27(a)(5) (requiring that all management prescriptions "provide for and maintain diversity of plant and animal communities to meet overall multiple-use objectives"). Diversity is defined for the purposes of these regulations as "[t]he distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan." 36 C.F.R. § 219.3.

Regulations implementing the NFMA with regard to the management of fish and wildlife resources are more specific still. First,

[f]ish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area * * *. In order to ensure that viable populations will be

maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area.

indicator species

36 C.F.R. § 219.19. In order to perceive the effects of management on these species, the Service must monitor the populations of specially selected "management indicator species" ("MIS"). 36 C.F.R. § 219.19(a)(1). The selection of MIS must include, where appropriate, "endangered and threatened plant and animal species" identified on state and federal lists for the area; species with "special habitat needs that may be influenced significantly by planned management programs; species commonly hunted, fished or trapped, non-game species of special interest; and additional * * * species selected because their population changes are believed to indicate the effects of management activities on other species * * * or on water quality." Id.

✓ (end.)

The NFMA diversity statute does not provide much guidance as to its execution; "it is difficult to discern any concrete legal standards on the face of the provision." Wilkinson and Anderson, *supra* at 296. However, "when the section is read in light of the historical context and overall purposes of the NFMA, as well as the legislative history of the section, it is evident that section 6(g)(3)(B) requires Forest Service planners to treat the wildlife resource as a controlling, co-equal factor in forest management and, in particular, as a substantive limitation on timber production." Id. * * *

The Service addressed diversity concerns in the Nicolet and Chequamegon in largely similar ways * * *. The Service defined diversity as "[t]he distribution and abundance of different plant and animal communities and species within the area covered by the Land and Resource Management Plan." The Service assumed that "an increase in the diversity of habitats increases the potential livelihood of diverse kinds of organisms."

The Service focused its attention first on vegetative diversity. Diversity of vegetation was measured within tree stands as well as throughout the forest, noting that such diversity is "desirable for diverse wildlife habitat, visual variety, and as an aid to protecting the area from wildfire, insects, and disease." The Service assessed vegetative diversity based on vegetative types, age class structure of timber types, within-stand diversity of tree species, and the spacial distribution pattern of all these elements across the particular forest. The Service also factored in other considerations, including the desirability of "large areas of low human disturbance" and amount of "old-growth" forest, into its evaluations. Using these guidelines, the Service gathered and analyzed data on the current and historical composition of the forests to project an optimal vegetative diversity.

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The Service assessed animal diversity primarily on the basis of vegetative diversity. Pursuant to the regulations, the Service identified all rare and uncommon vertebrate wildlife species as well as those species identified with a particular habitat and subject to significant change through planning alternatives. The Service grouped these species with a particular habitat type, identifying 14 categories in the Nicolet and 25 (reduced to 10 similar types) in the Chequamegon. For each of these habitat types, the

Service selected MIS (33 in the Nicolet and 18 in the Chequamegon) to determine the impact of management practices on these species in particular and, by proxy, on other species in general.⁸ For each MIS, the Service calculated the minimum viable population necessary in order to ensure the continued reproductive vitality of the species. Factors involved in this calculation included a determination of population size, the spatial distribution across the forest needed to ensure fitness and resilience, and the kinds, amounts and pattern of habitats needed to support the population.

Taking its diversity analysis into consideration, along with its numerous other mandates, the Service developed a number of plan alternatives for each of the forests (eight in the Nicolet and nine in the Chequamegon). Each alternative emphasized a different aspect of forest management, including cost efficiency, wildlife habitat, recreation, and hunting, although all were considered to be "environmentally, technically, and legally feasible." In the Nicolet, the Service selected the alternative emphasizing resource outputs associated with large diameter hardwood and softwood vegetation; in the Chequamegon an alternative emphasizing recreational opportunities, quality saw-timber, and aspen management was chosen.

The Sierra Club argues that the diversity statute and regulations * * * required the Service to consider and apply certain principles of conservation biology in developing the forest plan. These principles, the Sierra Club asserts, dictate that diversity is not comprehensible solely through analysis of the numbers of plants and animals and the variety of species in a given area. Rather, diversity also requires an understanding of the relationships between differing landscape patterns and among various habitats. That understanding, the Sierra Club says, has led to the prediction that the size of a habitat—the "patch size"—tends to affect directly the survival of the habitat and the diversity of plant and animal species within that habitat.

A basic generalization of conservation biology is that smaller patches of habitat will not support life as well as one larger patch of that habitat, even if the total area of the smaller patches equals the total area of the large patch. This generalization derives from a number of observations and predictions. First, whereas a large-scale disturbance will wipe out many populations in a smaller patch, those in a larger patch have a better chance of survival. Second, smaller patches are subject to destruction through "edge effects." Edge effects occur when one habitat's environment suffers because it is surrounded by different type of habitat. Given basic geometry, among other factors, the smaller the patch size of the surrounded habitat, the greater the chance that a surrounding habitat will invade and devastate the surrounded habitat. Third, the more isolated similar habitats are from one another, the less chance organisms can migrate from one habitat to another in the event of a local disturbance. Consequently, fewer organisms will survive such a disturbance and diversity will decline. This third factor is known as the theory of "island biogeography." Thus, the mere fact that a given area contains diverse habitats does not ensure diversity at all; a

8. A number of the MIS selected were also chosen because their endangered status required the Service to monitor them directly.

"fragmented forest" is a recipe for ecological trouble. On the basis of these submissions, the Sierra Club desires us to rule that

[t]o perform a legally adequate hard look at the environmental consequences of landscape manipulation across the hundreds of thousands of hectares of a National Forest, a federal agency must apply in some reasonable fashion the ecological principles identified by well accepted conservation biology. Species-by-species techniques are simply no longer enough. Ecology must be applied in the analysis, and it will be used as a criterion for the substantive results. (Nicolet Appellant's Br. at 7)

As a way of putting conservation biology into practice, the Sierra Club suggested that large blocks of land (at least 30,000 to 50,000 acres per block), so-called "Diversity Maintenance Areas" ("DMAs"), be set aside in each of the forests. The Sierra Club proposed and mapped three DMAs for the Nicolet and two for the Chequamegon. In these areas, which would have included about 25% of each forest, habitats were to be undisturbed by new roads, timber sales, or wildlife openings. Neither forest plan, however, ultimately contained a DMA; the Chequamegon Forest Supervisor initially did include two DMAs, but the Regional Forester removed them from the final Chequamegon plan.

The Sierra Club contends that the Service ignored its submissions, noting that the FEISs and RODs for both the Nicolet and the Chequamegon are devoid of reference to population dynamics, species turnover, patch size, recolonization problems, fragmentation problems, edge effects, and island biogeography. According to the Sierra Club, the Service simply disregarded extensive documentary and expert testimony, including over 100 articles and 13 affidavits, supporting the Sierra Club's assertions and thereby shirked its legal duties.

The Service replies that it correctly considered the implications of conservation biology for both the Nicolet and Chequamegon and appropriately declined to apply the science. The Service asserts that it duly noted the "concern [of the Sierra Club and others] that fragmentation of the * * * forest canopy through timber harvesting and road building is detrimental to certain plant and animal species." The Service decided that the theory had "not been applied to forest management in the Lake States" and that the subject was worthy of further study. However, the Service found in both cases that while the theories of conservation biology in general and of island biogeography in particular were "of interest, * * * there is not sufficient justification at this time to make research of the theory a Forest Service priority." Given its otherwise extensive analysis of diversity, as well as the deference owed its interpretation of applicable statutory and regulatory requirements, the Service contends that it clearly met all the "diversity" obligations imposed on it. * * *

The Sierra Club's arguments regarding the inadequacy of the Service's plans and FEISs can be distilled into five basic allegations, each of which we address in turn. First, the Sierra Club asserts that the law "treats ecosystems and ecological relationships as a separately cognizable issue from the species by species concepts driving game and timber issues." The Sierra Club relies on the NFMA's diversity language to argue that the

NFMA treats diversity in two distinct respects: diversity of plant and animal communities and diversity of tree species. See 16 U.S.C. § 1604(g)(3)(B). * * * The Sierra Club concludes from these statutes and regulations that the Service was obligated to apply an ecological approach to forest management and failed to do so. In the Sierra Club's view, MISs and population viability analyses present only half the picture, a picture that the addition of conservation biology would make complete. *1st August*

The Sierra Club errs in these assertions because it sees requirements in the NFMA * * * that simply do not exist. The drafters of the NFMA diversity regulations themselves recognized that diversity was a complex term and declined to adopt any particular means or methodology of providing for diversity. Report of the Committee of Scientists to the Secretary of Agriculture Regarding Regulations Proposed by the United States Forest Service to Implement Section 6 of the National Forest Management Act of 1976, 44 Fed.Reg. 26,599, 26,609 (1979). We agree with the district court that "[i]n view of the committee's decision not to prescribe a particular methodology and its failure to mention the principles that plaintiffs claims were by then well established, the court cannot fairly read those principles into the NFMA * * *." Nicolet, 843 F.Supp. at 1542; Chequamegon, 845 F.Supp. at 1330. Thus, conservation biology is not a necessary element of diversity analysis insofar as the regulations do not dictate that the service analyze diversity in any specific way. *Handwritten: 8, nlu, cond.*

Furthermore, the Sierra Club has overstated its case by claiming that MIS and population viability analyses do not gauge the diversity of ecological communities as required by the regulations. Except for those species to be monitored because they themselves are in danger, species are chosen to be on an MIS list precisely because they will indicate the effects management practices are having on a broader ecological community. Indeed, even if all that the Sierra Club has asserted about forest fragmentation and patch size and edge effects is true, an MIS should to some degree indicate their impact on diversity. See Report of the Committee of Scientists, 44 Fed.Reg. at 26,627 (noting that MIS are chosen "because they indicate the consequences of management on other species whose populations fluctuate in some measurable manner with the indicator species"); Judy L. Meyer, *The Dance of Nature: New Concepts in Ecology*, 69 Chi.-Kent L.Rev. 875, 885 (1994) (noting that the most sensitive indicator of environmental stress is the population level). While the NFMA would not permit the Service to limit its choices to either enhancing diversity or protecting a particular species, see *Seattle Audubon Society v. Evans*, 952 F.2d 297, 301-02 (9th Cir.1991)* such is not the case here. The Sierra Club may have wished the Service to analyze diversity in a different way, but we cannot conclude on the basis of the records before us that the Service's methodology arbitrarily or capriciously neglected the diversity of ecological communities in the two forests. *(nlu)*

* [Eds. *Seattle Audubon* held that the northern spotted owls did not cease when the Forest Service's duty under 36 C.F.R. owl was listed under the Endangered Species Act.] § 219.19 to maintain a viable population of

2nd argument
In a second and related argument, the Sierra Club submits that the substantive law of diversity necessitated the set-aside of large, unfragmented habitats to protect at least some old-growth forest communities. The Sierra Club points out that 36 C.F.R. § 219.27(g) requires that "where appropriate and to the extent practicable" the Service "shall preserve and enhance the diversity of plant and animal communities * * * so that it is at least as great as that which would be expected in a natural forest * * *." Furthermore, "[r]eductions in diversity of plant and animal communities and tree species from that which would be expected in a natural forest or from that similar to the existing diversity in the planning area[] may be prescribed only where needed to meet overall multiple-use objectives." Id. Diversity, the Sierra Club asserts, requires the Service to maintain a range of different, ecologically viable communities. Because it is simply not possible to ensure the survival of any old-growth forest communities without these large, undisturbed patches of land, the Service has therefore reduced diversity. The Service was thus bound to protect and enhance the natural forest or explain why other forest uses prevented the Service from doing so. The Sierra Club believes the Service did neither.

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The Sierra Club asserts that the diversity regulations require a certain procedure and that because the substantive result of the Service's choices will produce, in the Sierra Club's view, results adverse to "natural forest" diversity, the Service has violated its mandate. However, as the Service points out, the regulations do not actually require the promotion of "natural forest" diversity but rather the promotion of diversity at least as great as that found in a natural forest. The Service maintains that it did provide for such diversity in the ways discussed above. Additionally, the Service did consider the maintenance of some old-growth forest, even though the Sierra Club disputes that the Service's efforts will have any positive effects. And to the extent the Service's final choice did not promote "natural diversity" above all else, the Service acted well within its regulatory discretion. See *Sierra Club v. Espy*, 38 F.3d 792, 800 (5th Cir.1994) ("That [NFMA diversity] protection means something less than the preservation of the status quo but something more than eradication of species suggests that this is just the type of policy-oriented decision Congress wisely left to the discretion of the experts—here, the Forest Service.") * * *

4th argument
Fourth, the Sierra Club contends that the rejection of its "high quality" science argument on the basis of "uncertainty" in the application of conservation biology was unscrupulous. The Sierra Club asserts that conservation biology represented well-accepted and well-respected science even at the time the Service developed its management plans in the mid-1980s and that this evidence was before the Service when it drafted the forest plans. Thus, if the Service's only argument against applying the "high quality" science of conservation biology was its uncertainty, the Service has utterly failed to respond to the challenge of conservation biology.

A brief look at available evidence suggests that the district court's understanding of uncertainty was correct and the Service's explanation

principled. The Service, in looking at island biogeography, noted that it had been developed as a result of research on actual islands or in the predominantly old-growth forests of the Pacific Northwest and therefore did not necessarily lend itself to application in the forests of Wisconsin. Literature submitted by the Sierra Club to the Service was not unequivocal in stipulating how to apply conservation biology principles in the Nicolet and Chequamegon. Likewise, a Sierra Club group member suggested during meetings regarding the Chequamegon that "the Forest Service should be a leader and incorporate this concept into the Plan. He indicated that it would set a precedent for other Forests and Regions." The Chequamegon Forest Supervisor also originally decided to include the DMAs in his forest plan not because science so compelled but as a way to research an as yet untested theory. Even recent literature has recognized that "new legislation may be necessary" in order to force the Service to adopt conservation biology. Robert B. Keiter, *Conservation Biology and the Law: Assessing the Challenges Ahead*, 69 Chi. Kent L. Rev. 911, 916 (1994). Perhaps the Service "ha[s] the ability to reinterpret [its] own governing mandates to give species protection priority over visitor services and other concerns," *id.* at 921, but that is not and was not required.

The amici scientific societies suggest that the district court misunderstood the nature of scientific uncertainty. Their argument on this point boils down to the assertion that all scientific propositions are inherently unverifiable and at most falsifiable. Hence, amici argue, allowing the Service to ignore the theories of conservation biology because they are "uncertain" would, on the same logic, allow the Service to ignore the theory of gravity.

Amici, like the Sierra Club, misapprehend the "uncertainty" of which the Service and the district court spoke. We agree that an agency decision to avoid a science should not escape review merely because a theory is not certain. But, however valid a general theory may be, it does not translate into a management tool unless one can apply it to a concrete situation. The Service acknowledged the developments in conservation biology but did not think that they had been shown definitively applicable to forests like the Nicolet or the Chequamegon. Thus, circumstances did not warrant setting aside a large portion of these forests to study island biogeography and related theories at the expense of other forest-plan objectives. Given that uncertainty, we appropriately defer to the agency's method of measuring and maintaining diversity. * * *

The creation of a forest plan requires the Forest Service to make trade-offs among competing interests. See *Sierra Club v. Espy*, 38 F.3d at 802. The NFMA's diversity provisions do substantively limit the Forest Service's ability to sacrifice diversity in those trades * * *.

Affirmed.

NOTES AND QUESTIONS

1. The large record on the science of conservation biology compiled by the plaintiffs and the participation of scientific societies as amici give this

the feel of a test case where plaintiffs sought to reorient national forest management. Was it a good litigation strategy to ask the courts in effect to bless a specific scientific school of thought and mandate its use in managing national forests? Was the court being asked to act as a "science court," and decide among differing scientific theories? Can courts do that easily? Should they? Should the courts have applied the standard test for determining the admissibility of scientific evidence? See *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 592-95 (1993); see Patricia Smith King, Applying Daubert to the "Hard Look" Requirement of NEPA: Scientific Evidence Before the Forest Service in *Sierra Club v. Marita*, 2 *Wis. Env'tl. L.J.* 147 (1995).

2. Or did the plaintiffs pick the wrong place to litigate this? Regardless of the acceptance and credibility of conservation biology as a general school of thought, what does the court's opinion indicate about the state of knowledge and analysis of that school of thought as applied to the forests of the upper Midwest?

3. What are the legal footholds for incorporating the science of conservation biology into national forest management? Look first at the "diversity" provision of the NFMA, 16 U.S.C. § 1604(g)(3)(B). Does it require that the U.S. Forest Service should obey, or try to mimic, the laws of nature in managing the forests? Or does management mean, inevitably, some manipulation of the natural world that will change the mix and diversity of species found there?

4. Now look at the various regulations quoted by the court. How much flesh do they put on the bones of the statute? Do they embrace the principles of conservation biology? To the extent plaintiffs seek to enforce the regulation, as opposed to the statute, the Forest Service retains the authority to change the regulation if it doesn't like the way the courts interpret it.

5. Was this really a dispute about two competing scientific theories? What scientific school of thought did the Forest Service follow, if any? Was the Forest Service position that it rejected the teachings of conservation biology, or was it that it wanted to apply those teachings in a way the plaintiffs disagreed with? From the standpoint of legal strategy, which would be the best course?

6. Does the Forest Service ever have a legal (and judicially enforceable) obligation to conduct experiments on alternative management strategies to help advance science?

7. For more commentary, see Julie A. Weis, Eliminating the National Forest Management Act's Diversity Requirement as a Substantive Standard, 27 *Env'tl. L.* 641 (1997); Greg D. Corbin, The United States Forest Service's Response to Biodiversity Science, 29 *Env'tl. L.* 377 (1999).

4. DIVERSITY II: MUST POPULATION DATA BE GATHERED?

Beyond the large question about the acceptability of conservation biology addressed in *Marita*, the methodology the Forest Service has used

to assess and conserve biodiversity has been much litigated, as illustrated the following materials.

Inland Empire Public Lands Council v. U.S. Forest Service

United States Court of Appeals, Ninth Circuit, 1996.
88 F.3d 754.

■ Before: WRIGHT, HALL and TROTT, CIRCUIT JUDGES.

■ CYNTHIA HOLCOMB HALL, CIRCUIT JUDGE:

The United States Forest Service proposed eight timber sales in the Upper Sunday Creek Watershed region of the Kootenai National Forest in northwest Montana. * * * Plaintiffs, a number of environmental groups, challenged the sale first in administrative hearings and ultimately in district court, claiming that the Service's analysis of the sale's impact on seven species—the lynx, boreal owl, flammulated owl, black-backed woodpecker, fisher, bull charr, and wet-sloped cutthroat trout—was inadequate under both the National Forest Management Act, 16 U.S.C. §§ 1600, et seq., and the National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321 et seq. The district court concluded that the Service's analysis was sufficient and thereafter granted summary judgment for the Service and refused to enjoin the sales. In this expedited appeal, Plaintiffs now argue [that NEPA was violated and that] the Service failed to comply with 36 C.F.R. § 219.19, which requires a minimum level of population viability analysis * * *. [The court's discussion of NEPA is omitted.]

* * * Plaintiffs claimed that the Service fell short of what the NFMA required because it never examined the species' population size, their population trends, or their ability to interact with other groups of the species living in neighboring patches of forest. The district court rejected this argument on summary judgment, reasoning that Plaintiffs were quibbling over the choice of scientific methodologies, a decision to which a reviewing court should defer.

* * * As noted above, the NFMA imposes substantive duties on the Forest Service, one of which is the duty to "provide for diversity of plant and animal communities." 16 U.S.C. § 1604(g)(3)(B). Regulation 219.19, one of the many regulations promulgated to ensure such diversity, states in relevant part 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. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area.