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THE NATIONAL FOREST MANAGEMENT ACT OF 1976: A CRITICAL EXAMINATION

Timothy Pryor Mulhern*

I. INTRODUCTION

The National Forest System consists of approximately 188 million acres of federally-owned land divided into 155 National Forests.¹ The resources of the National Forests are managed by the United States Forest Service, a branch of the Department of Agriculture.² Recently, the Forest Service has been criticized for its management of National Forest resources. Critics have challenged Service decisions concerning timber harvesting,³ particularly clearcutting,⁴ and policies in areas such as road building⁵ and wildlife management.⁶ The courtroom has been the most visible of the dispute fora, but critics have also utilized legislative and public hearings to voice their opinions.⁷

¹ Staff Member, Boston College Environmental Affairs Law Review.
⁵ As the name implies, clearcutting involves the removal of all trees and other vegetation from a given area in one cutting. Clearcutting is favored by the timber industry because of its efficiency. Recreational users and environmental groups are opposed to the practice because it creates unsightly open spaces in forests and hastens soil erosion. The practice was first allowed on national forest properties in 1964; by 1969, over one-half of all timber cutting on federal timber land was done by clearcutting. See G. Robinson, The Forest Service 76 (1975).
⁶ See West Virginia Highlands Conservancy v. Island Creek Coal Co., 441 F.2d 232 (4th Cir. 1971).
⁷ See Wyoming Outdoor Coordinating Council v. Butz, 484 F.2d 1244 (10th Cir. 1973); Parker v. United States, 448 F.2d 793 (10th Cir. 1971), cert. denied, 405 U.S. 989 (1972).
⁸ In 1971, the Senate Subcommittee on Public Lands (the Church Subcommittee) held three days of public hearings on the use of clearcutting on federal timber lands. See generally, Clearcutting Practices on National Timberlands: Hearings Before the Subcomm. on Public Lands of the Senate Comm. on Interior and Insular Affairs, 92d Cong., 1st Sess. 1-3 (1971).
Until 1976, the statutory framework for management of the National Forests consisted of three acts: the Organic Act of 1897, the Multiple-Use Sustained-Yield Act of 1960, and the Forest and Rangeland Renewable Resources Planning Act of 1974. The Organic Act provides that National Forests are to be administered to control water supply and furnish a continuous supply of timber. To give effect to the latter purpose the Act authorizes the sale of timber under certain circumstances. The Multiple-Use Sustained-Yield Act of 1960 lists three additional uses for which National Forests are to be established and administered: fish and wildlife, outdoor recreation and range (grazing land). The 1960 Act also requires that the resources in National Forests be administered for high resource yield in "perpetuity."

The Forest and Rangeland Renewable Resources Planning Act of 1974 was the initial congressional response to criticism of National Forest management. A national planning and congressional oversight statute, it requires periodic preparation of Renewable Resource Assessments and Programs. In the Assessments, the Forest Service inventories available National Forest resources and evaluates their potential uses. The Programs provide comprehensive statements of Forest Service planning for the entire National Forest System. Both Programs and Assessments are to be sent to the President and Congress for review and revision.

After the hearings, the Church Subcommittee issued a set of guidelines to assist the Forest Service in determining when clearcutting should be allowed in National Forests. The Church Subcommittee guidelines which appear in full as an Appendix to this article were intended to rectify the problems raised at the hearings.

Three years later a Ralph Nader Study Group published a report on the National Forests. The Nader Study Group made twenty-eight individual recommendations. The recommendations focused on increased congressional and public participation in National Forest planning and increased attention to environmental protection in Forest Service practices. The Nader Study Group guidelines which appear in full as an Appendix to this article were intended to rectify the problems raised at the hearings.
planning objectives of the Program, the 1974 Act requires that land and resource management plans be prepared for each unit of National Forest land.19

Passage of the 1974 Planning Act apparently failed to assuage Forest Service critics20 who continued to press their claims in court.21 In 1975, the Fourth Circuit Court of Appeals finally decided one management issue in the critics’ favor in West Virginia Division of the Isaac Walton League of America v. Butz (the Monongahela case).22 The court permanently enjoined clearcutting in West Virginia’s Monongahela National Forest because the practice violated an Organic Act provision allowing only trees which were individually marked and “dead, mature or large growth” to be harvested.23 The Forest Service responded to the Monongahela decision by banning all clearcutting in the Fourth Circuit.24 When a Federal District Court in the Ninth Circuit followed the Monongahela holding in Zieske v. Butz,25 the Forest Service suspended clearcutting in that circuit as well.26 Congress responded27 with the National Forest Management Act of 1976.28

The National Forest Management Act of 1976 goes well beyond the problem of clearcutting and addresses several broad policy matters. It repeals the Organic Act provision on which the Monongahela decision was based. In addition, the Act reemphasizes the policies of multiple resource use and renewable resource management for sustained yield, alters the road building policy for National Forests and introduces a new policy emphasizing efficient wood utilization.

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19 Id. §§ 1604(a), (b).
22 522 F.2d 945 (4th Cir. 1975).
24 See Comment, Fourth Circuit Affirms Ban on Clearcutting in Monongahela National Forest, 5 ENVIR. REP. 10175, 10176 (BNA 1975).
27 Since the states in the Ninth Circuit contain the bulk of the harvestable timber in the National Forest System, the timber industry was understandably alarmed by the latter decision. Pressure from a well-organized and liberally funded industry group, the National Forest Products Association, brought the issue before Congress. Id.
The new Act also requires several specific changes in Forest Service practices: it details standards for timber harvesting as well as procedures for preparation of land management plans for individual forests. Increased public participation in Forest Service planning is also required.

This article will analyze the Management Act and its effect on both National Forest policy and Forest Service practices. The first section describes the policy direction brought about by the new Act. The second section analyzes the changes in Forest Service practices related to timber harvesting. Next, revised standards for clearcutting and related harvesting methods are discussed. Finally, the article discusses the Act's provision for public participation in Forest Service planning.

II. POLICY DIRECTIONS—GUIDANCE FOR DISCRETIONARY FOREST SERVICE DECISIONS

Like the Organic Act of 1897 and the Multiple-Use Sustained-Yield Act of 1960, the 1976 Act contains several sections directed at Forest Service policy. The changes in policy include a renewed emphasis on multiple resource use, renewed attention to reforestation, a new Forest Service cognizance of efficiency considerations in wood resource use, and new priorities for road construction decisions.

A. Multiple Use vs. Preservation

As previously mentioned, the Management Act repealed the section of the Organic Act on which the *Monongahela* decision was based, that is the section allowing only trees which were individually marked and "dead, mature or large growth" to be harvested. The repeal was broadly supported; indeed, the court in *Monongahela* applied the Organic Act reluctantly, urging legislative action on the matter. In hearings before the House Committee on Agriculture, "only one environmentally oriented witness called for a continuation of the Organic Act of 1897 as interpreted by the 4th Circuit, while others recognized the need for some change."

[33] See notes 33-53, infra, and accompanying text.
[35] Id. § 1601(b). See notes 67-75, infra, and accompanying text.
[36] Id. §§ 1608(b), 1608(c). See notes 76-83, infra, and accompanying text.
[38] 522 F.2d 945, 955 (4th Cir. 1975).
It is unfortunate that this provision was not debated more thoroughly, since the repeal represents a significant National Forest policy change. Originally, the system of Forest Reserves which became the National Forest System was set aside in response to the abandon with which private forest land was being harvested. The Monongahela opinion quotes language from the Congressional Record which indicates that the Organic Act of 1897 was passed largely as a forest preservation measure. By repealing the timber sale section of the Organic Act, Congress reversed its original preservationist aim.

The removal of the preservationist language elevates “multiple use” to primacy in National Forest policy. The term’s significance is underscored by its repetition throughout the 1976 Management Act. “Multiple use” is used in sections describing resource programs, reforestation, land management plans and timber sales. Renewable Resource Programs must include recommendations which “evaluate objectives for the major Forest Service programs in order that multiple-use and sustained-yield relationships . . . can be determined.” Treatment of lands needing reforestation must be done to “secure the maximum benefits of multiple-use sustained-yield management.” In preparing land management plans the Forest Service must “determine forest management systems, harvesting levels and procedures in the light of . . . the definition of the terms ‘multiple use’ and ‘sustained yield’ as provided in the Multiple-Use Sustained-Yield Act of 1960.” Standards for timber

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37 522 F.2d 945, 951 (4th Cir. 1975).

38 16 U.S.C. § 1602(5)(A) (1976). See also Id. § 1600(3), where Congress noted that the Renewable Resource Programs should be based on a “coordination of multiple use and sustained yield opportunities.” Id. The term “sustained yield” presents a slightly different problem. Like “multiple use,” it is used copiously throughout the 1976 Act, but unlike “multiple use” it is fairly succinctly defined. Under the Multiple-Use Sustained-Yield Act of 1960, sustained yield means a “high level annual or regular periodic output” of resources in “perpetuity.” Id. § 531(b). The new Act has defined sustained yield by limiting the area managed to “each national forest” and by imposing a time limitation of one year. Id. § 1611(a). In so doing, Congress has adopted the so called “even-flow” approach by statute. See generally G. Robinson, The Forest Service 64, 95-97 (1976), and S. Spurr, American Forest Policy in Development 50-51 (1976).


40 Id. § 1604(e)(2). See also id. § 1604(e)(1) (assurance that land management plans “provide for multiple use and sustained yield of products and services obtained therefrom”); Id. § 1604(g)(3)(B) (animal and plant diversity provided “in order to meet overall multiple use
harvests must be "compatible with multiple-use resource management objectives in the affected area."41

Three provisions of the 1976 Act employ "multiple use" to define permissible exceptions to the standards otherwise established in the Act.42 Tree harvesting in National Forests is to take place only when the trees have reached maturity, except for the harvesting of particular species "after consideration has been given to the multiple uses of the forest, including but not limited to recreation, habitat and range."43 Contracts for the sale of timber are not to exceed ten years in duration unless the Secretary of Agriculture finds that some other period will result in better utilization of the various forest resources "consistent with the provisions of the Multiple-Use Sustained-Yield Act of 1960."44 The requirement that harvesting be done only at a level that can be maintained annually in perpetuity may be dispensed with "in order to meet overall multiple-use objectives."45

Despite the ad nauseum repetition of the term, and notwithstanding its use to define statutory exceptions, "multiple use" is not defined in either the 1976 Act or its legislative history and is only loosely defined in the Multiple-Use Sustained-Yield Act of 1960.46 Perhaps because of this lack of clarity, the judiciary has failed to apply the term as a standard by which Forest Service actions might be limited.47

"Multiple use, according to the 1960 Act, means:

the management of all the various renewable surface resources of the national forests so that they are (a) utilized in the combination that will best meet the needs of the American people; (b) making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; (c) that some land will be used for less than all of the resources; and (d) harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

Id. § 531(a). The Act and its legislative history offer no indication of how one decides what constitutes the "needs of the American people" or what would be considered "harmonious and coordinated management." Clearly, however, the definition gives the Forest Service broad discretion as to National Forest uses. See D. Barney, THE LAST STAND 80 (1974).

See, e.g., Sierra Club v. Hardin, 325 F. Supp. 99, 123 (D. Alas. 1971). Since the Forest Service was transferred to the Department of Agriculture in 1905, the agency has attempted to manage the National Forest Resources for "the greatest good of the greatest number in
The 1960 Act lists several purposes for which National Forests are to be administered: "outdoor recreation, range, timber, watershed, and wildlife and fish."\textsuperscript{10} The list is reiterated in the 1976 Act.\textsuperscript{11} Some courts have attempted to use this list to give meaning to the term "multiple use."\textsuperscript{12} Yet, because no relative weights are assigned to the listed uses, the decision as to which use or uses should predominate in a particular area is left to the discretion of the Forest Service. In \textit{Sierra Club v. Hardin},\textsuperscript{51} plaintiffs contended that Tongass National Forest in Alaska was being managed predominantly for timber production in violation of the Multiple-Use Sustained-Yield Act of 1960. The court held that, absent a showing that no actual consideration was given to other uses, the statute required only "some consideration"\textsuperscript{52} of the other uses. The decision to commit over one million acres of National Forest land to be harvested over a fifty year period was upheld as within the Forest Service's discretion.\textsuperscript{53}

In view of the discretion which "multiple use" has been held to grant, the 1976 Act's repetition of this phrase is ill-advised and could be detrimental to the otherwise clearly stated aims of the Act. By referring to "multiple use" in descriptions of and standards for the Renewable Resource Program, reforestation, the land management plans, and timber sales, Congress has added no new restrictions to the broad mandate bestowed upon the Forest Service by the 1960 Act. Where the term defines a permissible exception to a specific standard, its use is particularly unfortunate. The Secretary may, in the name of "multiple use," contravene the 1976 standards to authorize the harvesting of immature trees, to make contracts of

\textsuperscript{11} Id. § 1604(e)(1), (g)(3)(A), (m)(2).
\textsuperscript{52} Id. at 123. In \textit{Dorothy Thomas Foundation v. Hardin}, 317 F. Supp. 1072 (W.D. N.C. 1970), the court rejected a neighboring landowner's contention that the recreational qualities of the proposed timber sale area and the potential adverse environmental effects of the sale were not considered. Denying a motion for a preliminary injunction, the court held that the plaintiff failed to establish by "clear and convincing proof" that the decision to sell timber was "arbitrary, capricious, an abuse of discretion or otherwise not in accordance with law." Id. at 1076.
\textsuperscript{53} 325 F. Supp. at 123.
a duration greater than ten years, and to permit timber cutting beyond a level which can be maintained over time.

In sum, the National Forest Management Act of 1976 does not drastically change the broad policy mandates under which the Forest Service has labored since the passage of the Multiple-Use Sustained-Yield Act of 1960. To the contrary, the importance of the 1960 Act is increased by the repeal of the one preservation-oriented paragraph of the Organic Act and the frequent repetition of the term “multiple use” in the 1976 Act. Considering the problems in application of the term and the fact that the latest Act does nothing to clarify its meaning, the term’s continued use is disappointing. Critics of Forest Service practices will be little appeased by this aspect of National Forest policy. Several other policy aspects of the Management Act appear more responsive to past criticisms. A major commitment to reforestation, a new emphasis on efficiency in wood utilization and a road building policy which is less biased toward timber harvesting all meet complaints about the management of the National Forest System.

B. Reforestation

The Forest Management Act establishes a congressional policy “that all forested lands in the National Forest System shall be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans.”54 To accomplish the reforestation policy, the Act authorizes a $200 million per year appropriation55 and establishes a scheme to eliminate the backlog of lands needing treatment in eight years and to keep reforestation pace with harvesting thereafter.56 Further, the Secretary is directed

54 16 U.S.C. § 1601(d)(1) (1976). Perhaps it is fortunate that this provision contains no specific standards because the semantic problem caused by the fact that “forested” lands are to be maintained in “appropriate forest cover” would doubtless be a source of confusion.

55 Id. § 1601(d)(3).

56 Id. § 1601(d)(2). In the eight years following enactment, i.e., until 1985, the Secretary’s annual budget request is to include amounts sufficient to reforest areas cut-over in that year and to eliminate the backlog of areas needing treatment within eight years. For this purpose, $200 million annually is authorized to be appropriated for reforestation and treatment of National Forest lands. After 1985:

the Secretary must transmit annually to the Congress an estimate of the sums necessary to replant all lands being cut-over and to maintain planned timber production on all other forested lands in the National Forest System so as to prevent the development of a backlog larger than the needed work at the beginning of the fiscal year.

to make annual reports on reforestation, to periodically examine lands reforested, and to return lands not properly restocked to the backlog of lands needing treatment.\textsuperscript{57}

Recent estimates put the total backlog of lands needing reforestation at about five million acres.\textsuperscript{58} The backlog exists because funds derived from timber sales have been insufficient to cover reforestation on all lands.\textsuperscript{59} In 1974, reforestation costs for one half (the more easily treated half) of the backlog was estimated at $315.6 million.\textsuperscript{60}

If appropriated, the congressional authorization of $200 million a year for eight years might substantially eliminate the backlog. However, an authorization does not guarantee appropriation,\textsuperscript{61} and there is some indication that Congress will not appropriate those funds. Independent budget requests for reforestation have been reduced more than those for any other timber related Forest Service program.\textsuperscript{62} For example, in Fiscal 1973, the Forest Service received only 41.5\% of its projected reforestation budget.\textsuperscript{63} Against this background it is unrealistic to assume that any more than a fraction of such a large authorization will be appropriated in any given year. At most one hopes that the size of the authorization will give reforestation some priority in future appropriations.

The primary objective of the reforestation provision is the elimination of the backlog of lands in need of reforestation in eight years and the treatment of such lands on a current basis thereafter.\textsuperscript{64} However, the Act does not require that reforestation actually take place. Despite a comprehensive section on the subject, a phrase such as "the Secretary \textit{shall cause} reforestation to occur" is nowhere to be found. Instead, the Act authorizes $200 million a year "for the purpose of reforesting and treating lands . . . to meet the requirements of subsection (d)."\textsuperscript{65} Subsection (d) requires reports on lands needing reforestation, periodic examinations of areas already reforested, and budget requests.\textsuperscript{66} The monies are for the purpose of

\textsuperscript{58} G. ROBINSON, THE FOREST SERVICE 75 (1975).
\textsuperscript{60} D. BARNEY, THE LAST STAND 8 (1974).
\textsuperscript{61} \textit{See} T. CUMMINGS, CAPITOL HILL MANUAL 97-101 (1976).
\textsuperscript{63} \textit{Id.} at 114.
\textsuperscript{64} H.R. REP. No. 1478, 94th Cong., 2d Sess. 29 (1976).
\textsuperscript{66} \textit{Id.} § 1601(d).
“reforesting” and “treating,” but these words are nowhere defined." Ultimately, then, the amount of reforestation which occurs will depend on the devotion of the Forest Service to the task and the vagaries of annual appropriations.

C. Improved Efficiency in Wood Use

The 1976 Act manifests a new congressional concern with efficiency in the utilization of wood. Like the reforestation section, however, the wood utilization provision fails to require action; it merely expresses a congressional desire that the Forest Service work to eliminate inefficiency in wood uses. The Renewable Resource Assessments requirement of the Planning Act of 1974 is amended to include reports on “additional wood fiber potential” within the National Forest System, on waste in wood uses, including wood recycling, and on improvement of technologies to reduce waste in wood processing. The section authorizing timber sales requires the Secretary to develop “utilization standards, methods of measurement, and harvesting practices . . . to provide for the optimum practical use of wood material.”

Improved efficiency in wood use could reduce the demand for timber cutting in National Forests. Technological changes such as use of mathematical solutions to sawing problems, increased use of cutting residues (branches and stumps) as chips for wood byproducts, and the full utilization of each tree, could reduce pressure to harvest standing timber. In 1972, the Forest Service estimated that improved technology would increase product output from any given volume of harvested timber by four percent per decade.

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67 Some further indication about what the Secretary is to do with the monies requested is provided when the phrase “sums estimated as necessary for reforestation and other treatment” is defined as including “moneys needed to secure seed, grow seedlings, prepare sites, plant trees, thin, remove deleterious growth and underbrush, build fence to exclude livestock and adverse wildlife from regeneration areas and otherwise establish and improve growing forests to secure planned production of trees and other multiple use values.” 16 U.S.C. § 1601(d)(2) (1976).

68 Id. § 1601(b). The Secretary of Agriculture is further required to “set forth a program to encourage” wood product processors to adopt “technologies for improving wood fiber utilization.” Id. § 1601(b)(3).

69 Id. § 472a(h).


71 All of these methods may not be environmentally desirable. Critics point out that insofar as these methods call for removal of added biological material from the harvest site, they could further deplete available nutrients, thus forcing costly artificial replacements. See S. SPURR, AMERICAN FOREST POLICY IN DEVELOPMENT 36 (1976).

The wood utilization provisions are the least expensive and least controversial of the various 1976 revisions. The cost of added reporting in the Assessment was estimated at one half of one million dollars per year, and the House Committee report on the bill indicates no opposition.\textsuperscript{73} Prior to the Management Act, regulations required timber sales contracts to provide for as "complete utilization of the timber as may be attained with available technology."\textsuperscript{74} The added requirements for the Assessments are not likely to be contested since they involve no change in the use of the National Forests. The added "standards, methods and practices"\textsuperscript{75} will be part of the policy to which buyers assent when making contracts to purchase National Forest timber. Presumably the strictures imposed by these stipulations will be anticipated in the bid calculation.

\textbf{D. Restoration of Vegetative Cover on Unnecessary Roads}

Critics of Forest Service practices have cited improper construction of logging roads as a major cause of erosion and water pollution.\textsuperscript{76} The Forest Service has also been accused of building roads and opening areas for timber harvesting that might otherwise receive a wilderness designation.\textsuperscript{77} In fact, dissatisfaction with Forest Service road construction policy and its detrimental environmental impacts was significant enough in 1973 to cause the General Accounting Office to review the policy and make recommendations for improvement.\textsuperscript{78} Two subsections of the 1976 Act amend existing national forest road construction policy. Subsection 8(c) requires that roads be "designed to standards appropriate for the intended uses, considering safety, cost of transportation, and impacts on land and resources."\textsuperscript{79} Subsection 8(d) requires that roads be designed "with the goal of reestablishing vegetative cover . . . within ten years . . . through artificial or natural means."\textsuperscript{80} Exceptions are allowed if the necessity for a permanent road is set forth in the forest

\begin{itemize}
\item \textsuperscript{73} H.R. Rep. No. 1478, 94th Cong., 2d Sess. 35, 43 (1976).
\item \textsuperscript{75} 16 U.S.C. § 472a(h) (1976).
\item \textsuperscript{76} D. Barney, The Last Stand 8 (1974); G. Robinson, The Forest Service 80-81 (1975).
\item \textsuperscript{77} D. Barney, The Last Stand 96, 99 (1974). For example, plaintiffs in a West Virginia suit sought to enjoin the completion of a road in Monongahela National Forest, arguing that the completed road would increase traffic into a relatively wild area and disturb a rare black bear habitat. See Kisner v. Butz, 350 F. Supp. 310 (N.D. W. Va. 1972).
\item \textsuperscript{78} D. Barney, The Last Stand 9 (1974).
\item \textsuperscript{79} 16 U.S.C. § 1608(c) (1976).
\item \textsuperscript{80} Id. § 1608(b).
\end{itemize}
development road system plan. Unless there is a later determination that the road is required by the National Forest Transportation System, the goal of reestablishing vegetative cover is to be carried out.

The added subsections significantly change the legislative policy with respect to National Forest roads. A 1964 statute set forth a policy of increased road construction for “intensive use” and “development” of national forests. By setting a goal of restoration of vegetative cover within ten years, Congress has reversed that policy. The policy of the Resources Planning Act of 1974 to plan roads comprehensively is complemented by the latest provision requiring restoration of vegetative cover. Thus, the new roads policy directly addresses the complaints of improper and unplanned road development raised by Forest Service critics.

Congress stopped short of enacting reforestation, wood utilization, or road construction standards. Nevertheless, each provision contains a pronouncement of intention which should guide the work of the Forest Service. By expressing its intention that the Forest Service reforest the backlog and prevent its recurrence, by ordering the Service to monitor new harvesting for increased efficiency in timber use, and by directing the Service to restore vegetation to unnecessary roads, Congress has provided broad answers to problems raised by critics of National Forest management.

III. STANDARDS FOR TIMBER HARVESTING

Before 1976, the only statutory provision which contained timber harvesting standards was the now-repealed section of the Organic Act. The National Forest Management Act of 1976 introduces standards for regulations to guide the preparation of land management plans, and the bulk of these new guidelines relate to timber har-
vesting. The new section authorizing timber sales also contains certain timber harvesting standards. The standards are the most comprehensive changes instituted by the 1976 Act. Unlike the more general policy formulations discussed previously, these changes will directly affect Forest Service practices. The Act's timber harvesting standards include a requirement that only lands suited to the purpose be harvested; a prohibition of harvesting beyond sustainable levels; a tree stand maturity requirement; several provisions for the protection of non-timber resources in timber harvesting areas; a provision limiting harvests to areas that can be restocked within five years; and a provision to retain natural species diversity in harvested areas.

A. Suitability and Sustained Yield Limitations—The Marginal Land Problem

Under the scheme adopted by the Management Act, the decision to harvest timber from a National Forest is subject to two general limitations. First, the proposed harvest area must have been found "suited for timber production."86 Second, sales from "each National Forest"88 are limited to a quantity which is "equal to or less than a quantity which can be removed from such forests annually in perpetuity on a sustained yield basis."87 A negative determination on either of these limitations is fatal to a proposed timber sale.

The suitability decision is to be based on "physical, economic and other pertinent factors to the extent feasible as determined by the Secretary."88 The combined Senate and House Conferees on the legislation defined the "other pertinent factors" as "advances in logging techniques, [and] improved knowledge about the relationship between the resource components of the general land area."89 Although a negative suitability determination removes the area under consideration from timber harvesting,90 the Secretary is required to review these decisions "at least every ten years . . . [and

87 Id. § 1611(a).
88 Id.
89 Id. § 1604(k).
90 H.R. REP. No. 1735, 94th Cong., 2d Sess. 28 (1976). The conferees also pointed out that the list was not exhaustive and called for the Secretary to "review and keep abreast of all developments in the field of forestry and its related sciences and to refer to these developments as necessary in making the determination required by this section." Id. at 29.
to return these lands to timber production whenever he determines that conditions have changed so that they have become suitable for timber production.”

This suitability requirement is new. It seems to answer allegations that the Forest Service has allowed harvesting even on lands where the costs (either economic or environmental) of allowing harvesting outweigh the benefits derived from the harvest itself. Under practices detailed in the Forest Service Manual, the Service allows harvesting from several categories of commercial forest land, including “marginal lands.” Yet, marginal lands, by definition, are not harvestable because of “excessive development cost, low product values, or resource protection constraints;” that is, because either the cost of sale preparation exceeds the dollar return from the trees or the returns from the sale would be inadequate to compensate non-timber resource damage.

The 1976 Act responds to the marginal lands problem by requiring that the Secretary “identify lands within the management area which are not suited to timber production.” This language obscures the original intent of the subsection. The Senate bill required that the Secretary “identify the relative productivity of land for timber production and assure that timber production is not a management goal on lands where the estimated cost of production will exceed the estimated economic return.” Without a definition of the term, it is difficult to identify the problems the “suitability” requirement addresses. If the problem is the sale of timber which costs more to sell than it returns, then the subsection should have expressly forbidden that practice. If the problem is that certain areas are physically unharvestable, as, for example, where harvesting would cause excessive erosion, then Congress should have forbidden ecologically unsound harvesting practices. In view of its origin and the wording of the early version, the definition of “suitable” should be equated with the Forest Service’s definition of “marginal.” In the absence of a definition, it is unclear what percentage of “marginal” lands will be removed from harvesting.

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91 Id.
94 Id.
Not only is the suitability language vague, but the relationship between that requirement and the other general limitation on harvesting, the sustained yield provision, is also not clear. The Management Act's sustained yield provision attempts to bring about an even flow of timber from National Forests by requiring that the tree harvest in each National Forest be limited to an amount that can be removed annually in perpetuity. The composition of the base from which the maximum amount of harvesting is calculated is critical to achieving an even flow, but the Act says only that yield will be calculated for "each national forest." Harvesting unsuitable lands is forbidden by the Act. Consequently, logic dictates that unsuitable lands should not be included in the base figure for calculations of potential yield. If they are included, unsuited lands will have to be harvested at some time after all suitable areas have been harvested in order to maintain the flow of timber from the national forest.

The failure to define suitability to encompass the marginality concept, coupled with the failure to limit sustained yield computations to suitable lands, are serious defects in the 1976 Act. There is nothing in the Act's language which specifically prohibits harvesting on marginal, but "suitable," lands or prevents the use of unsuited and/or marginal lands in calculation of potential yield. In short, Congress left these problems to Forest Service discretion, which is where they originated.

B. Maturity—The Mean Annual Increment of Growth

The Management Act precludes the harvest of any single stand of trees before it has reached maturity. Maturity is defined as the point when the trees have reached the "mean annual increment of growth."
The addition of the maturity provision is apparently a response to objections by a Nader Study Group and other Forest Service critics that timber was being harvested on a less than sustained yield basis. Specifically, the objections focused upon a rotation age standard added to the Forest Service Manual in 1965. That standard allowed the practice of setting rotation ages on the basis of economic demand. The Nader Group recommended the standard "culmination of mean annual increment of growth." The Act's adoption of this standard is important because it sets out a specific, enforceable maturity objective. Forest Service sales of timber will be limited by the maturity requirement, and critics of Forest Service practices who dispute the sale of particular stands of trees now have a standard by which a court can judge the propriety of the sale.

C. Protection for Non-Timber Resources in the Harvest Area

The Management Act's non-timber resource protection restrictions also provide standards by which Forest Service activities may be judged. The statute requires that guidelines for land management plan preparation ensure that timber is harvested "only where soil, slope, and watershed conditions will not be irreversibly damaged," and that "protection is provided for . . . bodies of water from detrimental changes in water temperature, blockages of watercourses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or habitat."

The prohibition against irreversible damage to soil, slope, and watershed is derived from the Church Subcommittee guidelines which proscribed clearcutting when soil, slope, and water conditions...

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103 A term used by foresters to describe when the stand of trees, not the individual trees, reaches the point of growth when the annual additions began to taper off. . . . [The Act] provides a different test than the provision in the 1897 Organic Act which requires that timber sales be made only of mature trees and was not designed to preclude clearcutting which comported with other requirements of the Act. H.R. REP. NO. 1478, 94th Cong., 2d Sess. 31 (1976).


105 Id.

106 Id.

107 See discussion of mechanics of guidelines, supra note 86.


109 Id. § 1604(g)(3)(E)(iii). Neither of these provisions received much attention in the legislative history of the Management Act. The Conference adjusted the protection of bodies of water provision to include only detrimental changes and only those which are likely to have a serious and adverse effect. H.R. REP. NO. 1735, 94th Cong., 2d Sess. 30 (1976). None of the House and Senate reports on the Act contains any further explanation of the wording of these sections.

110 See discussion of Church Subcommittee, supra note 13.
are "fragile and subject to major injury." The Act's provision concerning the protection of bodies of water answers many specific criticisms which are usually directed at clearcutting. By opening the forest canopy, clearcutting increases the temperature in streams, causing a decline in fish life. Clearcutting is also frequently blamed for erosion which can cause an increase in the sediment level in streams. Increases in sediment levels may have many adverse effects, including an increase in detrimental algal growth and contamination of drinking water. Any cutting which is not carried out properly may result in slash being deposited in streams, thus disturbing stream ecology and causing erosion by diversion of water flows. The water protection section seeks to prevent these harms by controlling the harvesting that causes them.

Nevertheless, the non-timber resource protection provisions may allow too much damage. Soil, slope, and watershed conditions still may be damaged; harvesting is forbidden only when they will be "irreversibly damaged." Changes in water temperature, blockages of water courses, and deposits of sediment still may occur, provided they are not likely to "seriously and adversely" affect water conditions and habitat. One hopes that the length of time over which the allowable harm is expected to be reversed will be relatively finite and that either the Forest Service or the courts will define "serious and adverse" in a way which provides for something less than the grossest water condition and habitat damage. Notwithstanding these problems, the standards should at least force the Forest Service to evaluate and perhaps to abate the non-timber effects of a proposed sale.

D. The Restocking Assurance

The 1976 Act forbids timber harvesting until there has been an assurance that the land can be "adequately restocked within five years of harvest." The provision comes verbatim from the Church Subcommittee guidelines, which prohibited clearcutting without such an assurance. The language was adopted by the Senate and
in turn by the Conference Committee without discussion.\textsuperscript{118}

One of the strong scientific arguments made against clearcutting is that reforestation is virtually impossible or prohibitively expensive in many areas.\textsuperscript{119} The Nader Study also pointed out that the Forest Service in fact allows cutting on lands which cannot support regeneration.\textsuperscript{120} An assurance that lands to be harvested may be restocked within five years should curtail these problems. The requirement of an assurance that an area \textit{can} be restocked, however, does not guarantee restocking. Like the general reforestation provisions,\textsuperscript{121} the statutory language here does not require an actual attempt. However, it should curb the practice of authorizing harvesting on land without first considering its regenerative capacity.

\textbf{E. Retaining Species Diversity in the Harvest Area}

The Act requires that guidelines for land management plans "provide . . . for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the plan."\textsuperscript{122} Forest Service critics have frequently pointed out that naturally diverse stands of timber are being cut-over and replaced with faster growing species.\textsuperscript{123} Timber production advocates claim that a forest is most efficient when restocked with a genetically superior strain of fast-growing, commercially valuable tree species.\textsuperscript{124} Because they grow quickly and are used in plywood and most other building materials, softwoods tend to be developed for this type of reforestation.\textsuperscript{125} Thus the controversy is particularly acute where mixed hardwood and softwood forests are replaced entirely with softwoods.\textsuperscript{126}

\begin{footnotes}
\item[118] H.R. REP. No. 1735, 94th Cong., 2d Sess. 29-30 (1976).
\item[121] See text accompanying notes 56-68, supra.
\item[123] The regulations shall include . . . guidelines . . . which . . . 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.\textsuperscript{127}
\item[124] Id.
\item[125] See, e.g., Texas Committee on Natural Resources v. Bergland, 433 F. Supp. 1235, 1239 (E.D. Tex. 1977) \textit{appeal docketed}, No. 77-2671 (5th Cir. August 17, 1977).
\end{footnotes}
One approach to the diversity problem is to maintain the integrity of cut-over areas by requiring reforestation with tree species previously distributed in the area. This approach was rejected by the House Committee on Agriculture for fear of diminishing Forest Service management flexibility.\textsuperscript{127} Apparently, the same proponents of management flexibility also added three qualifications to the Act's diversity measure: species diversity need only be preserved where it is "practicable, . . . within the multiple use objectives of the land management plan . . . [and] . . . appropriate."\textsuperscript{128} Thus, the Forest Service could justify a refusal to retain diversity in a harvested area by claiming it was impracticable or inappropriate, or that it was not within the multiple use objectives of the area's land management plan. Considering the subjective nature of these qualifications, one must conclude that species diversity remains largely a matter of Forest Service discretion.

Despite their individual difficulties, the new timber harvesting standards established in the Act collectively represent a major change in Forest Service practices. Although these standards may have existed before, either as Church Subcommittee guidelines or as internal Forest Service policy, passage of the National Forest Management Act of 1976 makes timber harvesting practices in National Forests legally assailable. Forest service regulations incorporating the Act's standards as guidelines will be used to write land management plans,\textsuperscript{129} and tree harvesting must be consistent with the plans.\textsuperscript{130} Plaintiffs aggrieved by the resultant tree harvesting practices may use these standards to measure Forest Service activities. Unlike the broadly worded Multiple-Use Sustained-Yield Act of 1960 and the narrow restrictions of the Organic Act of 1897, the new standards are worded with sufficient specificity to be judicially applied without frustrating plaintiffs or grinding the Forest Service timber sale program to a halt.

IV. CLEARCUTTING AND EVEN-AGED MANAGEMENT—STRICTER STANDARDS

In addition to general harvesting standards, the new statute provides standards which apply specifically to even-aged cutting tech-
Among these techniques, clearcutting is to be used only when it "is determined to be the optimum method." Seed tree cutting, shelterwood cutting, and "other cuts designed to regenerate an even-aged stand" are to be used only when they are determined to be appropriate, to meet the objectives and requirements of the relevant land management plan. The Senate Committee gave several reasons for placing special restrictions on even-aged management techniques and particularly on clearcutting. Even-aged management techniques were described as bringing about a "sudden ecological change." Impacts on aesthetics and other forest values were also considered more significant when even-aged management is applied.

Both scientific and emotional arguments against clearcutting can be found. Erosion and the attendant soil nutrient loss problems, stream temperature changes, and destruction of regenerative capacity have been found to accompany clearcutting. Particularly vocal opponents to clearcutting have been those who oppose its aesthetic effects; even those who support the practice recognize that it is aesthetically unpleasant. Supporters, however, claim that clearcutting is efficient, allows regeneration of shade-

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118 Id. § 1604(g)(3)(F). The Forest Service allows four types of logging cuts. "Selective cutting involves removal of individual trees at repeated intervals, yielding an all-aged stand." G. Robinson, The Forest Service 68 (1975). The other three types of cuts regenerate even-aged stands.

Seed tree cutting calls for successive cuts, with the first cut leaving enough trees to provide seed for the cut area and the second removing the seed trees after regeneration has been established. Shelterwood cutting is essentially similar to seed tree cutting except that it leaves sufficient trees to provide shade for part of the area as well as a future seed source. Clearcutting calls for a one-cut removal of all trees in a defined patch, strip or block of varying size. The cut over area is either prepared for natural regeneration, artificial seeding or planting.

Id. § 1604(g)(3)(F)(i) (1976).

119 Id. The Senate Committee which drafted this provision explained that "optimum method" was chosen over "silviculturally essential" and "desirable" because "[o]ptimum method is a broader concept than either of the latter terms." The Committee explained that "optimum method means it must be most favorable or conducive to reaching the specified goals of the management plan." S. Rep. No. 588, 94th Cong., 2d Sess. 39 (1976), reprinted in [1976] U.S. Code Cong. & Ad. News 6698.

Id.

118 Id.

119 Id.


122 "Clear-cutting" Practices on National Timberlands: Hearings before the Subcomm. on
intolerant species,\textsuperscript{142} and requires less road building than other harvesting methods.\textsuperscript{143} Foresters analogize clearcutting with forest fires.\textsuperscript{144} While the debate over the effects of clearcutting is far from over,\textsuperscript{145} Congress has made a definitive policy choice in the 1976 Act. The requirement that clearcutting be the “optimum method” ensures that the Forest Service will be circumspect in its allowance of the technique.

A challenge to clearcutting under the Management Act will force courts to determine the scope of review for a Forest Service determination that clearcutting is the “optimum method.” The use of the term “optimum” implies a silvicultural judgment requiring agency expertise; hence the Act could be read to give the Forest Service a broad power which should be overturned only when exercised arbitrarily.\textsuperscript{146} However, since the Act was written in response to alleged abuses of agency discretion in clearcutting decisions, a better, albeit unusual approach would allow a complete review of the factors involved in the Forest Service decision. Under this approach, a court would substitute its judgment for that of the Forest Service when necessary.\textsuperscript{147} While this type of judicial review would be costly in both dollars and court resources, the origins of the Management Act demand such review.

Even-aged management techniques other than clearcutting must meet the standard of “appropriate, to meet objectives and requirements of the relevant land management plan.”\textsuperscript{148} By setting a broader standard than “optimum method,” Congress has recognized that these systems are less controversial than clearcutting.\textsuperscript{149} The effect of this broader standard, however, is unclear. All timber

\textsuperscript{112} G. ROBINSON, THE FOREST SERVICE 76 (1975).

\textsuperscript{113} Some evidence suggests that it is the road building, not the cutting method, that causes erosion. Since roads for clearcutting are used all at once, it usually requires less disturbance of the land than all-aged management through selective cutting. \textit{Id.} at 83.

\textsuperscript{114} D. SMITH, THE PRACTICE OF SILVICULTURE 409 (1962).

\textsuperscript{115} For example, a recently published study of two Oregon watersheds shows that the effect of clearcutting on stream runoff disappeared after seven years. \textit{8 ENVIR. REP.} 531 (BNA 1977).

\textsuperscript{116} See generally K. DAVIS, ADMINISTRATIVE LAW TEXT 539-57 (1972).

\textsuperscript{117} \textit{Id.}


\textsuperscript{119} Seed tree cutting, shelterwood cutting and “other cuts designed to regenerate even-aged stands” received little attention in debates about Forest Service practices. Clearcutting is the only harvest method which was specifically limited by the Church Subcommittee. In fact, the Nader Study Group recommended the application of seed tree and shelterwood cutting as more acceptable alternatives to clearcutting. \textit{See D. BARNEY, THE LAST STAND} 43, 67 (1974).
sale contracts must conform to land management plans. It is difficult to imagine a timber sale contract which conforms to the land management plan but is inappropriate, that is, one which does not meet the "objectives and requirements of the land management plan." Thus the standard for even-aged methods other than clearcutting appears to be no more stringent than the standard for any type of timber harvesting.

Even if the Forest Service accepts a particular cutting method under the above standards, it must apply additional, special standards which apply to all even-aged cutting methods. Cutting to regenerate even-aged stands will be allowed only on completion of an "interdisciplinary review . . . of potential environmental, biological, aesthetic, engineering, and economic impacts on each advertised sale area." The legislative history of the Management Act indicates that the Secretary may "determine the parameters and scope of such review and limit its application to advertised sales." The provision is an answer to the charge that some lands in the forest system are being managed solely for timber without consideration of other values.

Interdisciplinary review is already required before the sale of timber. The National Environmental Policy Act of 1969 requires a systematic interdisciplinary review of major federal actions. In addition, land management plans are to be prepared using a systematic interdisciplinary approach, and an interdisciplinary team of scientists is to assist in drafting the regulations establishing the guidelines for preparation of land management plans. Despite this proliferation of interdisciplinary reviews, the review required specifically for even-aged cutting is a positive addition to Forest Service practices. By requiring that each advertised sale be reviewed separately, the 1976 Act ensures that all points of view will be considered before every sale of timber.

Another provision of the statute regulating all even-aged cutting requires that cut-over areas be "shaped and blended to the extent practicable with the natural terrain" and further establishes "maximum size limits for areas to be cut in one harvest operation,"
... [based upon] ... geographic areas, forest types, and other suitable classifications. These regulations should curtail recurring abuses associated with clearcutting. One frequent complaint about clearcutting is that, for economic reasons, clearcuts frequently exceed a size which allows remaining timber to provide natural reseeding and seedling protection. Also, early clearcuts allowed by the Forest Service were often square or rectangular, although recently the Forest Service has shown more concern for shaping cuts to conform to the geography.

The literature is devoid of similar complaints about seed tree or shelterwood cutting. The Church Subcommittee, which originated these requirements, did not mention other methods than clearcutting in their recommendations. In fact, seed tree cutting and shelterwood cutting have been advanced as less drastic substitutes for clearcutting. It is thus difficult to understand why the size, shaping, and blending requirements have been made uniformly applicable to all even-aged cutting methods.

V. PUBLIC PARTICIPATION

The even-aged management provisions answer popular criticisms by establishing a preference for selective cutting, but some evidence suggests that the preference is unfounded. One study points out that the construction and maintenance of roads required for permanent access to selective cutting areas actually causes more erosion over time than a single even-aged cut after which roads may be reforested immediately. Thus, Congress might better have restricted the effects allowable under any timber harvest use rather than restricting certain cutting methods which allegedly produce the undesirable effects. Still, since public opinion seems to be decidedly against even-aged cutting generally and clearcutting in partic-

159 See generally J. SHEPARD, THE FOREST KILLERS ch. 6 (1975).
164 See generally Note, Man’s Activities in Watershed Areas—A Need for Planning 4 ENVT’L. L. 229 (1974).
ular, and since the scientific evidence is far from clear, the new standards are a positive addition. If further studies prove that the legislative distinction between even- and uneven-aged management techniques is unfounded, then Congress may make these restrictions equally applicable to all cutting or repeal the provisions altogether.

Under the National Forest Management Act of 1976, policy decisions by the Forest Service are now to be made with outside participation. As a general mandate, section fourteen provides that “the Secretary, by regulation, shall establish procedures, including public hearings where appropriate, to give the Federal, State, and local governments and the public adequate notice and opportunity to comment upon the formulation of standards, criteria, and guidelines applicable to Forest Service programs.”165 Moreover, land management plans, including planned timber sale programs and probable methods of harvest,166 must be integrated into one document or set of documents which must be available to the public at convenient locations in the vicinity of the affected area “at least three months before final adoption.”167 Amendments and periodic revisions of land management plans are also to be carried out with public participation.168

The Forest Service has been accused of ignoring public opinion in making policy decisions.169 Eleven of the twenty-eight recommendations of the Nader Study Group concerned congressional, governmental, and public participation in reviews of Forest Service decisions.170 In one case, the public remained unaware of a timber sale until the vendee began performance under a six-year-old contract.171 Congress seems to have considered this to be one of the Forest Service's most serious problems. Indeed, every proposed House and Senate provision concerning outside participation was adopted in the final version of the Act.172 The general congressional view of public participation is summarized in this passage about one of the Senate public participation provisions: “The Committee intends

165 16 U.S.C. § 1612(a) (1976). The public and governmental bodies are also to be consulted in drafting the part of the Renewable Resource Assessment which concerns wood wastes. Id. § 1601(c).
166 Id. § 1604(f)(2).
167 Id. § 1604(d).
168 Id. § 1604(f)(4), (5).
170 Id. at 134-140.
171 Sierra Club v. Hardin, 325 F. Supp. 99 (D. Alas. 1971). Ironically, the request for injunctive relief, which was filed as performance on the contract became obvious, was held barred by laches. Id. at 105.
that... planning... shall be accomplished with improved opportunity for public participation at all levels.\textsuperscript{173}

The rash of suits seeking to enjoin timber harvesting demonstrates a public concern with forest policy and a general public sentiment that the Forest Service is unable to manage forests for uses other than timber production.\textsuperscript{174} The Act's public participation provisions allow for administrative input which may prove more accessible and more prophylactic than litigation. To the extent that policy can reflect the will of the public, participation in drafting individual land management plans is probably the best way to divine and apply that will. Local residents are the most likely participants because they represent a relatively finite group, and they have the most at risk.\textsuperscript{175}

In a sense the public participation provisions of the 1976 Act represent a total reversal of National Forest policy. The system of National Forests was originally established to save forests from the timber industry which was buying and cutting over Federally-owned lands at a rapid pace.\textsuperscript{176} The Forest Service has historically been dedicated to conservation and has been free of interference from the Department of Agriculture and the public.\textsuperscript{177} With the addition of the outside participation requirement, it is not the Forest Service but the public and the Forest Service that now stand between use and abuse of National Forests. Now, should the public in the vicinity of a National Forest adopt a timber harvesting bias, that bias could be reflected in land management plans as easily as the conservation bias which presently exists. Thus, the public participation right carries a corresponding responsibility to future generations.

VI. CONCLUSION

Forest Service critics gained a sweeping change with the passage of the National Forest Management Act of 1976. The Forest Service has new congressional mandates to guide discretionary decision-making in reforestation, wood use, and road building. The new Act


\textsuperscript{174} See, e.g., Minnesota Public Interest Research Group v. Butz, 541 F.2d 1292, 1301 n.16 (8th Cir. 1976), cert. denied, 429 U.S. 935 (1977).

\textsuperscript{175} Plaintiffs in suits against the Forest Service are frequently local residents. See, e.g., Sierra Club v. Hardin, 325 F. Supp. 99 (D. Alas. 1971); Wyoming Outdoor Coordinating Council v. Butz, 484 F.2d 1244 (10th Cir. 1973).

\textsuperscript{176} M. Frome, The Forest Service 3-5 (1971).

\textsuperscript{177} D. Barney, The Last Stand 52, 106-7 (1974).
limits the quantity and quality of National Forest timber harvesting by imposing specific standards to ensure protection for non-timber resources and relatively even yields of mature trees. Further, Congress added standards designed to alleviate problems specific to even-aged management techniques. Moreover, decisions concerning timber harvests and most other aspects of National Forest management must now be made with public participation.

Nonetheless, some problems will impede the interpretation of the Act. Congress failed to define many of the key terms in the Act—a glaring problem with such terms as “multiple use” and “suitable.” Also, Congress provided little guidance on the resolution of the marginal lands problem; a narrow reading of the non-timber resource protection and diversity provisions could make those provisions wholly ineffective. Provisions dealing with reforestation evince congressional ambivalence on the subject. Finally, Congress failed to clarify the scope of review to be accorded standards for even-aged management.

National Forest management will probably continue to be a controversial subject. The many users of National Forest land, from ichthyologists to timber companies, will still press for management which reflects their special interests. By directing Forest Service policy, by imposing standards on timber harvesting, and by permitting outside participation in planning, the Management Act of 1976 should bring some order to the varied conflicts between National Forest users.
APPENDIX

The Church Subcommittee Guidelines:

[T]he Subcommittee believes timber management activities on Federal lands should be subject to the following policy guidelines:

1. Allowable harvest levels
   
   a. Allowable harvest on Federal forest lands should be reviewed and adjusted periodically to assure that the lands on which they are based are available and suitable for timber production under these guidelines.
   
   b. Increases in allowable harvests based on intensified management practices such as reforestation, thinning, tree improvement and the like should be made only upon demonstration that such practices justify increased allowable harvests, and there is assurance that such practices are satisfactorily funded for continuation to completion.
   
   c. If planned intensive measures are inadequately funded and thus cannot be accomplished on schedule, allowable harvests should be reduced accordingly.

2. Harvesting limitations

   Clear-cutting should not be used as a cutting method on Federal land areas where:
   
   a. Soil, slope or other watershed conditions are fragile and subject to major injury.
   
   b. There is no assurance that the area can be adequately re­stocked within five years after harvest.
   
   c. Aesthetic values outweigh other considerations.
   
   d. The method is preferred only because it will give the greatest dollar return or the greatest unit output.

3. Clear-cutting should be used only where:

   a. It is determined to be silviculturally essential to accomplish the relevant forest management objectives.
   
   b. The size of clear-cut blocks, patches or strips are kept at the minimum necessary to accomplish silvicultural and other multiple­use forest management objectives.
   
   c. A multidisciplinary review has first been made of the potential environmental, biological, aesthetic, engineering and economic impacts on each sale area.
d. Clear-cut blocks, patches or strips are, in all cases, shaped and blended as much as possible with the natural terrain.

4. Timber sale contracts

Federal timber sale contracts should contain requirements to assure that all possible measures are taken to minimize or avoid adverse environmental impacts of timber harvesting, even if such measures result in lower net returns to the Treasury.178