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Developments in Forest and Environmental Law Influencing Natural Resource Management and Forestry Practices in the United States of America and Canada

Editors: Franz Schmithüsen and William C. Siegel

Selected Contributions submitted to the
IUFRO Research Group 6.13.00
Forest Law and Environmental Legislation

IUFRO Secretariat Vienna and
Chair of Forest Policy and Forest Economics, ETH Zurich
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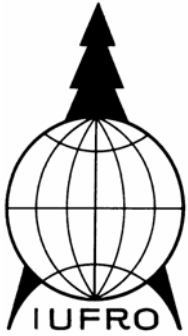
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PREFACE / AVANT PROPOS

The work which has been undertaken by the IUFRO Research Group on forest law and environmental legislation during the last decade reflects the increasing importance of policy and legislation in forest resource conservation and management. It confirms the interest of both lawyers and foresters in exchanging experience and information on the dynamic evolution of relevant law in various countries. As the momentum of research efforts continues to expand, it is expected to encourage analytical and comparative studies on the application of law to the protection and sustainable management of forests.

The widening agenda of the research group is being determined by the interaction of law with a variety of social, political, economic, and cultural conditions that affect forestry in the different countries and regions of the world. Persons with an interest in the challenging subject are invited to join the group. The invitation is extended not only to those in research, but also to those in academic, executive and managerial positions. A significant reason for the group's success has been the variety of outlooks, approaches and backgrounds offered by its members.

Le travail entrepris par le groupe de recherche de l'IUFRO sur le droit forestier et la législation environnementale durant la dernière décennie reflète l'importance croissante de la politique et de la législation pour la conservation et la gestion des ressources forestières. Cela confirme l'intérêt des juristes et des forestiers lors de leurs échanges d'expériences et d'informations sur l'évolution dynamique des lois y afférentes dans divers pays. Comme les efforts de recherche actuelle continuent à se développer, il est souhaitable d'encourager des études analytiques et comparatives sur l'application des lois concernant la protection et la gestion durable des forêts.

L'agenda du groupe de recherche en expansion est déterminé par l'interaction des lois et de la diversité des conditions sociales, politiques, économiques et culturelles qui affectent les sciences forestières dans divers pays et régions du monde. Les personnes ayant un intérêt dans ce domaine de pointe sont invitées à se joindre au groupe. Cette invitation est ouverte non seulement aux chercheurs, mais également aux personnes qui occupent des postes académiques, de gestion et de direction. Une raison importante du succès du groupe a été la variété des perspectives, des approches, des connaissances et des expériences de ses membres.

*Prof. Jeff Burley
IUFRO President*

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SUMMARY

The collection of 28 research papers provides an overview of the dynamic and multifaceted development of forest and environmental law in North America and its impact on forest conservation, forestry practices and sustainable resources management. The majority of the contributions deal with legislative and regulatory changes in the United States, and several others address public land tenure and timber allocation procedures in Canada. They have been selected from the proceedings published in 1990, 1992 and 1996 by the Research Group S 6.13.00 Forest Law and Environmental Legislation of the International Union of Forestry Research Organizations, IUFRO. The collection of texts provides a source of information set in an international and interregional perspective, and a useful reference for comparative analysis.

Key Words: Forest Law; Environmental Law; Forest Resources Management; Public Land Tenure; Private Forest Sector; Forest Practices Regulation

RESUME

Le recueil de 28 publications de recherche offre une vue d'ensemble du développement dynamique et à plusieurs facettes du droit forestier et environnemental en Amérique du Nord, ainsi que de son impact sur la conservation des forêts, les pratiques forestières et la gestion durable des ressources. La majorité des contributions concerne des changements législatifs et administratifs aux Etats-Unis; d'autres traitent du régime foncier public et des procédures d'allocation pour les exploitations au Canada. Elles ont été sélectionnées parmi les actes publiés en 1990, 1992 et 1996 par le groupe de recherche S 6.13.00, Droit forestier et législation environnementale, de l'IUFRO (Union Internationale des Instituts de Recherches Forestiers). Ce recueil de textes est une source d'informations, s'inscrivant dans une perspective internationale et interrégionale, et une référence utile pour des analyses comparatives.

Mot-clés: droit forestier; législation environnementale; gestion des ressources forestières; régime foncier public, secteur forestier privé; réglementation forestière

ZUSAMMENFASSUNG

Die Sammlung von 28 Forschungsbeiträgen bietet ein Überblick über die dynamische und vielfältige Entwicklung des Forst- und Umweltrechts in Nordamerika und ihre Auswirkungen für Walderhaltung, Forstwirtschaft und nachhaltige Ressourcenbewirtschaftung. Die überwiegende Zahl der Beiträge behandelt Veränderungen der Gesetzgebung und ihrer Anwendung in den Vereinigten Staaten von Amerika, während sich andere mit öffentlichem Waldeigentum und Verleihung privater Nutzungsrechte in Kanada befassen. Sie wurden aus Forschungsberichten ausgewählt, die von der Gruppe S 6.13.00 Forstrecht und Umweltschutzgesetzgebung der IUFRO in den Jahren 1990, 1992 und 1996 publiziert worden sind. In einer internationalen und interregionalen Perspektive ist die Textsammlung eine Informationsgrundlage und eine nützliche Referenz für vergleichende Studien zur Entwicklung forstlich relevanter Rechtsgrundlagen.

Key Words: Forstrecht; Umweltschutzgesetzgebung; Bewirtschaftung forstlicher Ressourcen; Öffentliches Waldeigentum; Private Waldeigentümer; Regelung der Waldnutzung

SUMARIO

La presente recopilación de 28 publicaciones científicas ofrece una amplia visión sobre la evolución dinámica y multifacética del derecho forestal y ambiental en EE.UU. y Canadá y sus repercusiones sobre la conservación de los bosques. La mayoría de publicaciones abordan los cambios legislativos y administrativos en EE.UU. mientras que otras tratan el régimen de propiedad pública de los bosques y la concesión de derechos privados de aprovechamiento en Canadá. Se trata de publicaciones seleccionadas publicadas en las actas del Grupo de Investigación de Legislación Forestal y Ambiental S6.13.00 de la Unión Internacional de Centros de Investigación Forestal (IUFRO). Tanto desde una perspectiva internacional como interregional, esta recopilación constituye una fuente de información y una referencia obligada para estudios comparativos sobre legislación de relevancia forestal.

Key Words: Ley Forestal; Legislación Ambiental; Manejo de Recursos Forestales; Propiedad Pública de Tierras; Sector Privado Forestal; Reglamento de Uso Forestal

THE INTERACTIONS OF FOREST AND ENVIRONMENTAL LAW AND THEIR IMPACT ON FOREST RESOURCES CONSERVATION AND MANAGEMENT

Franz Schmithüsen and William C. Siegel

Forest law in North America has a long history and has evolved through a number of distinct stages, in the United States as well as in Canada. Its roots in each country can be traced to the early 17th century, when both were British colonies. At that time numerous statutes were passed that regulated the cutting of trees and timber harvesting practices. The purpose was principally to insure an adequate supply of shipbuilding timber for the royal navy. Once the United States became an independent nation, however, the paths of the two countries began to diverge with respect to the further development of forest law.

During the first century of its independence, forestry legislation in the United States faded. This era was marked by extensive forest exploitation on both public and private lands, with little legislative activity.

The next distinct stage in the United States began in the late 19th century and continued into the 1930's. It largely encompassed the enactment of federal statutes and was directed to public forest lands. In 1876 a federal Division of Forestry was established. A system of forest reserves was authorized in 1891 when Congress passed the first law setting aside federal lands as reserves. This was followed in 1897 by enactment of the Organic Administration Act which gave the President the power to designate federally owned lands as national forests. In 1905 the U.S. Forest Service was created. During the next decades Congress passed dozens of laws authorizing the Forest Service to manage the national forests for various uses, allocating funds for the purchase of private lands for new national forests, and providing for funding and the disposition of revenues generated from the forests.

Another era of forest law in the United States began in the late 1930's and continued through the 1950's. The major concern was insuring that an adequate supply of timber would be sustained and therefore many state laws were enacted that regulated private forestry practices. Five western states and ten eastern states passed regulatory laws between 1937 and 1949, and additional state legislation was enacted in the early 1950's. Most of these laws addressed reforestation following harvest.

The drive for regulation slowed down somewhat during the 1950's and 1960's, but was supplanted on the legislative front by a multitude of new forestry statutes in the late 1950's and the 1960's, at both the federal and state level. The federal forestry statutes enacted during this time primarily addressed the management of federal lands. In 1960 the Multiple-Use Sustained Yield Act provided for five basic uses of the national forests on a sustained basis. The 1964 Wilderness Act provided that certain areas in the national forests could be set

aside as wilderness, thereby precluding all future development - including timber harvesting. In 1968 the Wild and Scenic Rivers Act was passed to stop impoundment of certain free-flowing rivers and to preserve scenic and natural values along the shores. During those same years many states enacted special property tax laws for private forest lands and other statutes that provided for public financial assistance for private forestry practices.

The current stage of forestry law development in the United States largely encompasses environmental protection legislation enacted at both the federal and state levels, as well as federal and state forestry cost-sharing and tax legislation. The environmental laws, mostly passed in the 1970's, generally do not address forestry per se but nevertheless are having significant impacts on the practice of forestry - both on public and private lands.

At the federal level the statutes include, among others, the Environmental Policy Act of 1970; the Clean Air Act Amendments of 1970; the Clean Water Act of 1972; and the Endangered Species Act of 1973. Many counterparts to these federal laws have also been passed at the state level. Litigation concerning the interaction of environmental legislation with forestry practices began soon after the statutes began to be enacted and has continued unabated to the present. During these same years several types of financial assistance and cost-sharing programs for nonindustrial private woodland owners were put in place by the federal government. Similar statutes have also been enacted by many of the individual states.

Federal tax legislation directed to forestry occupies a special niche in forest law in the United States. Timber income tax provisions were first enacted early in the 20th century and have been followed through the years with additional amendments to the Internal Revenue Code that are directed to timber and forest land. The federal estate tax provisions, in place since 1916, have had a significant impact on timberland management. It was not until 1976, however, that specific timber provisions, amended several times since, were made a part of the estate tax legislation.

The development of forest law in Canada has occurred on a somewhat different path than in the United States. Most forest land in Canada is publicly owned, primarily by the provincial governments, and is referred to as "Crown Land". Therefore, the evolution of forest law since Canada's creation in 1867 has centered largely on the management of the Crown forests and the issuance of cutting licenses on these lands to private individuals and companies. The granting of cutting licenses actually began in the early 1800's. Since Canada's formation as a country, however, there have been many legislative changes concerning the forest tenure systems in the various provinces. These have led to a wide range of different types of forest tenure that exist today.

In recent years in Canada, as in the United States, environmental concerns - and environmental protection legislation enacted as a result - have impacted timber production and management, primarily on Crown lands. Generally, however, these concerns began to manifest themselves somewhat later than in the United States. Most of Canada's privately owned

forest is in eastern Canada. Laws directed to these holdings are few compared to the United States. Those that have been enacted deal with taxation, public forestry assistance, and some regulatory control.

It is recognized in both the United States and Canada that appropriate and well-directed forest legislation is an essential requirement for the adequate protection and conservation of forests, and for sustainable forest resource development. In keeping with this increasing realization, the process in both countries to revise and amend forest laws has gained momentum in recent years. Changes during the last two decades to improve the legal framework for forestry have been greatly influenced by the growing political and social concerns related to forest management that are occurring at the local, regional and national levels. The influence of societal demands on private as well as public forests, together with responses from within the forestry community and from the public at large, have received attention within the legislative halls of both the United States and Canada. Worldwide forestry developments, and political and social factors in the international community, are also playing a significant role.

It was at this juncture in the development of forest law that the IUFRO Research Group 6.13.00 was established and a North American sub-group formed. From the beginning it was evident that legislation which specifically addresses forests and forestry would be the focus of the work. It was also evident, however, that activities would not be limited to forest law alone. Many sectoral and cross-sectoral laws deal directly, and more often, indirectly, with forest conservation and development. This network of laws, regulations and court decisions; and the linkages among them - as well as the impacts that result from them - have found increasing attention within the Research Group and have been reflected in many of the specific contributions of the North American members.

Thus a considerable number of the contributions examine the impact of laws and regulations that deal with environmental protection, ecosystem and landscape conservation, wildlife, water and soil conservation, and rural development. Other important segments of research pertaining to sustainable forest resource use include forest and timber tenure systems; joint public and private timber utilization and management systems; forest revenue assessments on public lands; financial incentive and tax laws to promote management of private forests; and the role of forest practice regulatory laws for forest management and timber production on private holdings.

The papers that follow are selected contributions from among those that were published in the Research Group's seven research proceedings. They were submitted by authors in both the United States and Canada.

The first section of the publication addresses law developments that pertain to the management of forests as national and local renewable resources. The contribution of *Snow*, and that of *Beuter*, examine such management in the United States on a broad scale in the con-

text of federal lands. The paper by *Isherwood and Verheggen* discusses the same subject on a regional basis in terms of a large Canadian province. The contributions of *Le Master et al.*, and *Beasley* present the responses of the U.S. Forest Service, the largest forest resource management agency in the United States, to newly emerging social and environmental demands of the public. *Granskog's* contribution deals with national efforts in the United States to promote the export of forest products.

The second section contains papers that address the interaction of forest law in the United States with environmental protection legislation. The papers of *Cubbage and Siegel*, *Siegel* (1992), and *Hickman* discuss the impact of federal environmental law on forest management, both in general terms and also with regard to specific subject-matter legislation. The following papers by *Siegel* (1988), *Gaddis and Cubbage*, and *Hodges* focus on the impacts generated by the merger of both state and federal environmental laws on either a national or a regional basis.

The contributions presented in the third section examine more specifically management programs on public forest lands. The papers by *Wear and Stewart*, *Flick*, *Pearse*, and *Luckert and Haley* address particular public land management issues for both the United States and Canada as a whole. Those by *Price*, *Huebner*, and the two by *Wallace*, on the other hand, are concerned with specific programs in individual states or provinces.

Section four deals with the law concerning forestry practices on private lands in the United States, a subject of major importance in that country. The contributions of *Hickman and Hickman*, *Siegel* (1990), *Siegel* (1996), and *Kaiser and Royer* examine both the basic legal framework, and specific statutes emanating from the general law, in a national context. The paper by *Siegel and Martus* analyzes the impact on private forestry of local government regulatory ordinances. Those by *Steele and Stier*, *Dennis and Sendak*, and *Stier*, in turn, examine specific legislation enacted by individual states.

No claim is made that the selected papers present a systematic analysis of the many significant legal issues during the last decade that are applicable to forest resource protection and development in the two countries. The themes and problems reflected among the various papers do, however, show the widening research agenda, and the increasingly interrelated body of legislation that has to be taken into account in dealing with sustainable forest resource management. Altogether the contributions offer a broad and informative picture of the different stages of forest and environmental law developments in the United States and Canada. These reflect profound changes not only in economic terms, but even more in social terms as a portrayal of society's perception and understanding of the public role of forests as natural surroundings and cultural heritage.

From a North American perspective, the collection of texts that follows should prove useful as a reference source since it brings together a number of research contributions in subject areas which are usually examined separately in specialized journals. From a European

perspective it provides an interesting overview of common trends and highlights at the same time the considerable differences in the legal frameworks that govern the use and management of forest resources. In the international context, the selected papers are a valuable source of information for comparative studies on forest policy and legislation as these impact the protection, conservation and management of forests.

Our thanks go to the authors who have agreed to make their papers available for this collection and to undertake the necessary revisions for republication. Special thanks are due to Mrs. Doris Kohler for her help in preparing this volume.

LEGAL ASPECTS OF PUBLIC FOREST MANAGEMENT IN THE UNITED STATES

James B. Snow

1. PUBLIC LAND OWNERSHIP IN THE UNITED STATES

This paper provides an overview of the laws affecting publicly owned lands and forests in the United States, and illustrates those factors which historically and currently affect policies governing forest management.

The Federal Government owns approximately one-third of the land area of the United States.¹ Of the Nation's total land area of approximately 2.3 billion acres (930 million hectares), the Federal Government owns and administers approximately 755 million acres (305 million hectares). The remaining two-thirds of the United States are privately owned by persons or corporations, or owned by states or local governments. In discussing forest management in the United States, it is necessary to distinguish between the management of "public" land as opposed to management of "private" land. While public and private lands may have similar resource management issues, they are not subject to all the same legal requirements.

The federally owned lands comprise a large portion of the Nation's wildlife and forest resources, the management of which are divided among numerous departments and agencies of the Federal Government. For example, 91 million acres (37 million hectares) are set aside as National Wildlife Refuges; 75 million acres (30 million hectares) as National Parks; and 191 million acres (77 million hectares) as National Forests. Each type of area is governed by its own set of laws which prescribe management. This paper focuses primarily on the laws pertaining to the Nation's 155 National Forests.

2. LEGAL FRAMEWORK FOR MANAGING THE PUBLIC FORESTS

Historically, the laws affecting forest resource management have evolved over two centuries to reflect changing public attitudes and national priorities. These laws are derived from several sources including the Constitution, statutes enacted by Congress, and agency regulations.

The Constitution of the United States is the supreme law of the Nation, and all authorities of the Federal Government are derived from it.² When adopted in 1789, the Constitution established a federal system of government with governmental powers shared among a strong central Federal Government and the various states. The Constitution established three branches of the Federal Government: the legislative branch which is the Congress; the ex-

¹ See: One Third of the Nation's Land: A Report to the President and to the Congress by the Public Land Law Review Commission, Public Land Law Review Commission, Washington, D.C. June, 1970.

² U.S. Const., Art. VI, Cl. 2.

ecutive branch which is the President and executive departments and agencies; and the judicial branch consisting of the Supreme Court and lower federal courts. For federal forest management, Congress legislates policy and grants management authorities to the executive agencies; the executive agencies of the Federal Government implement the laws through regulations and policy direction to field managers. The federal courts are sometimes called upon to interpret the laws and resolve disputes over their implementation.

The Constitution enumerates specific powers of the Federal Government which directly affect forest management. The Property Clause of the Constitution grants exclusive power to the Congress to determine the management of federal lands.³ In turn, Congress has enacted laws which delegate specific management authorities to various federal departments and agencies depending on the functions and the land involved. For example, the Secretary of Agriculture is empowered by Congress to manage the National Forests, and this authority is exercised for the Secretary by the Forest Service.

The Commerce Clause of the Constitution empowers Congress to regulate all commerce among the states.⁴ This power is also the basis for the enactment by Congress of environmental protection laws. Such laws regulate activities which pollute the water and air as well as regulate the disposal of toxic and hazardous materials.

The Constitution recognizes private property rights. However, the government has the power to take private property for public purposes as long as just compensation is paid to the property owner.⁵

Powers not specifically granted to the Federal Government under the Constitution are reserved to the states.⁶ These reserved powers give states considerable authority to enact laws governing land uses, public health and safety. State laws have the most impact on the management of private forest lands. State laws may have some application to the management of the National Forests in those subject areas where Congress has consented to the application of state laws. The interrelationships between state and federal law are complicated and beyond the scope of this paper, but it is sufficient to note that federal law prevails over conflicting state laws.

Thus, acting under its Constitutional authority, the Congress prescribes laws governing the management of the Nation's forests. Laws define the basic elements of ownership of forest resources including the acquisition and disposal of the land as well as water, timber, minerals, oil and gas. Laws also prescribe general principles of forest management, including planning, commodity production, preservation of specific resource values, and the proce-

³ "The Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States..." U.S. Const., Art. IV, §3, Cl. 2.

⁴ U.S. Const., Art. I, §8.

⁵ U.S. Const., Amendment V.

⁶ U.S. Const., Amendment X.

dures that must be followed by resource managers. Laws give the public the right to participate in the planning decisions affecting forest management and, significantly, laws give the public judicial remedies for insuring that resource management decisions are made in conformity with legal requirements. Since the National Forests were established in 1891, the laws dealing with federally owned forests have provided the link between forest science and forest management with the policy objectives of achieving managed sustained uses of multiple forest resources.

3. THE DISPOSAL OF PUBLIC LANDS AND THE ESTABLISHMENT OF PARKS AND FORESTS - ACTIONS AND REACTIONS

Upon gaining independence from Britain in 1789 as a result of the American Revolution, the United States became the owner of all lands within the thirteen original colonies except for those lands already granted to private owners. This federally owned land was a seemingly endless forest wilderness. Since the Federal Government then lacked major sources of revenue, the public lands were a major asset to be sold or bartered for services. For example, during the 19th century, federal land was often granted to military veterans as payment for military services.

With the westward expansion of the Nation by the annexation of lands ceded from France, Britain, Spain and Mexico, the national goals were to explore and to develop the newly acquired lands. Federal laws enacted in the 19th Century reflected these goals; forest management and resource conservation were not issues. Thus, laws authorized and encouraged the granting of land to persons who would settle and cultivate crops. These early pioneers who tamed the wilderness and opened lands for settlement now occupy a major place in American history and folklore.

The types of public land dispositions which were authorized by Congress in the mid-19th Century were many and varied. Millions of acres were granted to railroad companies to encourage the construction of railroads. To encourage the discovery and development of mineral resources, other laws granted land to anyone who discovered valuable minerals on the public lands. Congress also granted rights to construct roads, to build canals and ditches to carry water, and to graze cattle on the public lands. The intent behind all of these laws was to transfer lands and resources from public to private ownership and thereby stimulate economic growth and development.

The granting of public lands for private uses was generally successful in opening millions of acres for development. By 1869, railroads crossed the entire continent. Vast areas were opened to farming and the grazing of cattle. But, the land grant policies also had some very negative effects. The granting of land was poorly regulated and many persons got wealthy through fraud and other illegal means of securing land. Corruption in the Public Land Office was a common occurrence. More significantly, the subsequent private development was unregulated and often resulted in resource depletion and environmental degradation.

One early federal response to some of these land use problems was the establishment in 1876 of a Division of Forestry in the Department of Agriculture primarily for study and research purposes. The Division of Forestry was able to document the rapid deforestation of parts of the nation due the fires and logging. For example, by 1900 almost 95 percent of the entire State of Michigan had been deforested.

The realization that natural resources were not unlimited developed slowly throughout the late 19th century. In 1872, Yellowstone National Park was established in Wyoming as our first National Park. The National Forests were established in 1891 when Congress passed the first law setting aside federal lands as forest reserves. In 1897, Congress passed the Organic Administration Act for the National Forests which gave the President the power to set aside federally owned lands as National Forests.⁷ The law further provided that these National Forests were to be managed, not merely exploited:

All public lands set aside and reserved as national forests shall be administered to improve and protect the forest for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States (Title 16, United States Code, section 475).

In 1905, Congress transferred the administration of the National Forests from the Department of the Interior to the Department of Agriculture.⁸ This was a significant change in federal policy since it transferred forest management authority to the newly established Forest Service which consisted of the relatively small number of professionally trained foresters in the country at that time.

To ensure that the objectives of the National Forests are met, Congress also empowered the Secretary of Agriculture to regulate the uses of the National Forests:

The Secretary of Agriculture shall make provisions for the protection against destruction by fire and depredations upon the national forests, and may make such rules to regulate their occupancy and use and to preserve the forests thereon from destruction. Any violation of such rules shall be punished by a fine or imprisonment (Title 16, United States Code, section 551).

Virtually all the newly established National Forests were in the western states, but there was a growing recognition of the need for forest management in the eastern states. Much of the Appalachian mountains had been deforested by two centuries of continual logging. The resulting loss of watershed caused severe flooding with much loss of life and property. Unlike the west where the vast forests were federally owned, the eastern forest areas were primarily privately owned. Thus, to restore and manage these forest resources, the Federal Government had to buy the land.

⁷ Act of June 4, 1897 (Ch. 2, 30 Stat. 11).

⁸ Act of February 1, 1905 (Ch. 288, 33 Stat. 628).

In 1911, Congress authorized the Secretary of Agriculture to acquire lands needed for watershed protection.⁹ Over the next four decades, 35 million acres (14 million hectares) were bought from private landowners in the eastern United States and incorporated into 26 new National Forests located primarily in the Appalachian mountains.¹⁰

During the severe economic depression of the 1930's, millions of acres of submarginal farmlands were damaged by erosion, drought, and overuse. In 1937, Congress directed the Secretary of Agriculture to purchase such lands.¹¹ Four million acres (1.6 million hectares) of these lands are now administered by the Forest Service as National Grasslands predominantly for the grazing of livestock.

4. SUBSTANTIVE AND PROCEDURAL LAWS GOVERNING FOREST MANAGEMENT IN THE UNITED STATES

Establishing a public forest reserve is one thing; managing it is another. The Organic Administration Act of 1897 provided the Secretary of Agriculture broad discretion to manage the "occupancy and use" of the forests and to protect them from fire and other depredations. Over the next 60 years, Congress passed dozens of laws authorizing the Forest Service to manage the forests for various uses and providing for funding and disposition of revenues generated from the lands. Some of the more significant laws included:

1908 - Laws provided that the Federal Government would share with the states 25 percent of all revenues generated from the use and management of each National Forest.¹² States are required to use these revenues for public roads and schools.

1915 - A law authorized the issuance of permits for private uses of the forests.¹³

1920 - A law allowing the exploration and development of oil and gas and certain kinds of minerals.¹⁴

1930 - A law requiring that those who harvest timber from the National Forests pay to provide for reforestation of the land.¹⁵

From its beginnings, the basic management philosophy of the Forest Service has been that the National Forests can provide for a multiple of uses on a sustained yield basis in perpetuity. Interestingly, it was not until 1960 that Congress embodied these forest science principles into law. The Multiple Use-Sustained Yield Act of 1960 provided for five basic uses of

⁹ Act of March 1, 1911 (Ch. 186, 36 Stat. 961).

¹⁰ See: William E. Shands and Robert G. Healy, *The Lands Nobody Wanted*, (Washington, D.C., The Conservation Foundation, 1977).

¹¹ Bankhead-Jones Farm Tenant Act; Act of July 22, 1937 (Ch. 517, 50 Stat. 522).

¹² Act of May 23, 1908 (Ch. 192, 35 Stat. 260).

¹³ Act of March 4, 1915 (Ch. 144, 38 Stat. 1101).

¹⁴ Act of February 25, 1920 (41 Stat. 437).

¹⁵ Act of June 9, 1930 (Ch. 416, 46 Stat. 527).

the National Forests on a sustained basis: outdoor recreation, range, timber, watershed, and fish and wildlife habitat.¹⁶ Under that Act, "Multiple Use" is defined as:

... the management of all the various renewable surface resources of the National Forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related service over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions... (Title 16, United States Code, section 531).

"Sustained Yield" is defined as:

... the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forests without impairment of the productivity of the land. (Title 16, United States Code, section 531).

Enactment in 1960 of the Multiple Use-Sustained Yield Act marked a turning point in forest management policy for the United States. Thereafter, in response to changing public attitudes about environmental issues, most laws passed by Congress have been to constrain and limit the discretion of the Forest Service. These laws fall into several categories.

A. Laws setting aside lands for special management

Since 1964, approximately 42 million acres (17 million hectares) comprising approximately 22 percent of the National Forests have been legally set aside for special management primarily for recreation and resource conservation.

The Wilderness Act of 1964 provided that certain areas could be set aside as wilderness thereby precluding all future development.¹⁷ In wilderness areas, all forms of structures, facilities, and motorized equipment are prohibited. Today, over 35 million acres (14 million hectares) of National Forest are designated as wilderness.

In 1968, the Wild and Scenic Rivers Act was enacted to stop impoundment of certain free flowing rivers and to preserve scenic and natural values along the shores.¹⁸ Also in 1968, the National Trails System Act was enacted to establish long distance hiking trails for public recreation.¹⁹ In 1980, over 100 million acres of Alaska were set aside for conservation and public recreation.²⁰ There are also numerous laws establishing special scenic and recreation areas.

¹⁶ Act of June 12, 1960 (74 Stat. 215).

¹⁷ Wilderness Act; Act of September 3, 1964 (78 Stat. 890).

¹⁸ Wild and Scenic Rivers Act; Act of October 2, 1968 (82 Stat. 906).

¹⁹ National Trails System Act; Act of October 2, 1968 (82 Stat 919).

²⁰ Alaska National Interest Lands Conservation Act; Act of December 2, 1980 (94 Stat. 2371).

B. Laws protecting special resources

The Endangered Species Act was passed in 1973 to protect animal and plant species threatened with extinction.²¹ This law makes it a criminal offense to kill or harm an endangered species on public or private lands. Forest managers are required to protect the habitats of endangered species. As noted below, this law has had a profound effect on forest management policies.

The National Historic Preservation Act was enacted in 1966 to protect sites and structures of significant historic importance.²² Federal agencies are required in all planning and undertakings to minimize harm to such sites or structures. Similarly, the Archaeological Resources Protection Act was enacted in 1979 to protect sites with archaeological significance.²³ The law restricts the excavation of archaeological resources on publicly owned lands.

C. Laws for environmental protection

Several laws of national application apply to forest management. The purpose of the Clean Water Act is to reduce water pollution.²⁴ No one is allowed to discharge pollutants into a waterway without a permit. Non-point discharges, such as from agricultural fields or timber harvested areas, are governed by best management practices intended to reduce pollutant runoff.

The Clean Air Act regulates the discharge of pollutants into the air, and provisions may require permits for the burning of agricultural waste and timber slash.²⁵ There are also numerous laws regulating the use and disposal of hazardous wastes and materials.²⁶ Generally, the owner of the land is responsible to pay for the clean-up and proper disposal of hazardous wastes.

D. Laws imposing procedural and administrative requirements

The most significant change in the last 30 years in the way that American public forests are managed has been in the various procedural requirements imposed by law regarding the formulation and implementation of forest policy and management actions.

The National Environmental Policy Act of 1970 requires that federal government officials proposing to take "any major federal action significantly affecting the quality of the human environment" must first consider the impacts of such an action on the environment and consider reasonable alternatives to the action.²⁷ This analysis is done in the form of a document called

²¹ Endangered Species Act of 1973; Act of December 28, 1973 (87 Stat. 884).

²² National Historic Preservation Act; Act of October 15, 1966 (80 Stat. 915).

²³ Archaeological Resources Protection Act; Act of October 31, 1979 (93 Stat. 721).

²⁴ Clean Water Act; Act of June 30, 1948 (62 Stat. 1155, as amended).

²⁵ Clean Air Act; Act of July 14, 1955 (69 Stat. 322, as amended).

²⁶ E.g. Comprehensive Environmental Response, Compensation, and Liability Act of 1980; Act of December 11, 1980 (94 Stat. 2767).

²⁷ National Environmental Policy Act; Act of January 1, 1970 (83 Stat. 852).

an "environmental impact statement." Preparation of the environmental impact statement requires consultation with affected federal, state and local government agencies, and interested members of the public. Failure to prepare an adequate environmental impact statement can result in the lawsuits whereby a federal judge can stop a propose agency action pending full compliance with the requirements of the law.

The National Forest Management Act of 1976 requires that the Forest Service prepare a land and resource management plan for every National Forest.²⁸ These plans prescribe management of the National Forest for a 10 to 15 year planning period. Forest plans require preparation of an environmental impact statement which must contain alternative schemes for forest management. The Act also imposes substantive and procedural requirements on the sale of timber to assure competitive bidding procedures, limits on the term of years for timber sale contracts, and limitations on clearcutting.

5. INTERPLAY BETWEEN LAWS AND PUBLIC POLICY

The management of the National Forests in the United States has been dramatically changed as a result of evolving federal laws. Whereas forest management was traditionally the domain of the professional forester in the first half of this century, it is now a multi-disciplinary process engaging the expertise from all the natural and social sciences. Additionally, the public and the courts have played an increasingly important role in influencing forest management policies.

The public influence on forest management has been profound. There is an enhanced public awareness of environmental issues which is manifested in substantial public support for laws to clean up polluted lands and waters, to preserve areas having significant scenic, recreation and wildlife values, and to gain a fairer return to the public treasury for the commercial utilization of forest resources.

Interest groups play increasingly active roles in public policy debates over natural resource management. Such groups are often organized with thousands of members supporting professional staffs of scientists and lawyers paid to advocate and promote their particular interests. Many environmental advocates generally seek to promote the designation of wilderness areas and other preserves, and to restrict timber harvesting and other resource utilizations. At the opposite extreme, commercial and developmental interests are similarly organized and seek to expand resource development on the public lands. The Forest Service frequently finds itself in the role of mediating between the conflicting pressures of the environmental and developmental advocates.

When members of the general public or organized interest groups are dissatisfied with forest management decisions, they often urge Congress to legislate a solution or they turn to the courts to challenge the legality of agency actions. Many of the laws discussed above give the

²⁸ National Forest Management Act of 1976; Act of October 22, 1976 (90 Stat. 2949).

public the right to sue in federal court to assure that public officials fully comply with the law, and it is for that reason that the courts have had a significant impact in shaping forest management policies over the last 30 years.

That disputes between various interest groups and the Forest Service frequently are decided in the courts is understandable in light of the ever increasing number of laws governing forest management. The laws which might be applicable to a given forest are sometimes vague and conflicting. Because of this, it may be difficult for the forest manager to reconcile the conflicting legal directions into a viable and useful land and resource management plan. Additional procedural requirements can also considerably slow the decision making process.

An example of an apparently irreconcilable conflict is the current debate over the harvesting of old growth forests in the Pacific northwest. Lawsuits filed by environmental organizations challenged timber harvesting in old growth forests in the Pacific northwest as a violation of various laws governing the management of the National Forests. At the center of the controversy has been the continued existence of the spotted owl, an endangered species. The Endangered Species Act makes it unlawful to destroy the habitat of animals and plants threatened with extinction.

As a result of various legal violations found by the courts, much of the timber harvesting on federally owned lands has been halted in the States of Washington and Oregon. The real issue in the dispute is not just the continued existence of the spotted owl, but the preservation of the entire old growth forest ecosystem. For the foreseeable future, timber harvesting will be severely limited in the Pacific northwest.

While there are many examples of ongoing controversies over National Forest management policies, the forest management system is generally working throughout the Nation. While some of the National Forest land and resource management plans are currently the subject of lawsuits, the majority appear to represent reasonable compromises between resource development and environmental protection. The general success of the Forest Service in meeting the myriad of legal requirements can be attributed to the agency's ability to apply a multi-disciplinary scientific approach to management. But, most significantly, the Forest Service has generally succeeded in garnering public support for the balancing of competing developmental and environmental interests through its complete involvement of the public in the forest planning processes.

6. LEGAL IMPACTS ON FOREST MANAGEMENT IN THE FUTURE

Forest management in the 21st Century will continue to be profoundly affected by legal requirements. Laws will evolve to meet the new political, social, scientific and technical challenges.

There has been a profound shift in public policy over the last century with respect to forest management on public lands. From the era of resource exploitation which characterized the

19th century, we have moved to an era of resource conservation in the 20th century. That trend will likely continue into the 21st century as a growing population and economy make greater demands on forest resources. The trend toward setting aside special areas for recreation, wilderness and wildlife will likely continue as these resources are perceived as dwindling and threatened by development.

As more special areas are set aside by law for wilderness, for preservation of species or for other special purposes, the concept of "multiple use" as the guiding precept of forest management will likely diminish. Instead of a mix of allowable uses on the public forests, we are likely to see more specialize zones for particular designated uses. As a result, those areas of productive commercial forests not set aside for some type of preservation purpose will likely be intensively managed for commodity production. These management decisions may likely be made by politicians through the legislative process rather than by professional forest managers. It will be the challenge for professional forest managers to assure that science and technology are available to influence public policy decisions in achieving sound forest management objectives.

CONCLUSION

Americans generally look to the law to reflect changing public attitudes about public policy and particularly to address public problems. There is no better illustration of this than the evolution of public land law. Many of the restraints imposed by law on forest management today are a direct result of past abuses, and the restraints also reflect a growing public understanding of the importance of forest ecology in the quality of our lives. The law causes understandable tensions between conflicting uses of our forest resources, but this tension is healthy in a democracy and should, in the long run, contribute to maintenance of sustainable forest resources for our children and grandchildren.

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THE EVOLUTION OF FOREST MANAGEMENT AND TIMBER POLICIES IN THE UNITED STATES

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This paper presents an overview of forest management and timber policies in the United States since colonial times, with particular emphasis on the National Forests. It shows how forest ownership, management philosophy, laws and policies have evolved over time, and how they are continuing to evolve even today. Forest management practices and timber productivity among forest owners are compared.

1. THE PUBLIC DOMAIN AND THE CREATION OF NATIONAL FORESTS

On July 4, 1776, 13 English colonies in North America declared their independence from England. The colonies became the 13 original states of the United States of America. The new states immediately claimed ownership of all land previously controlled by the English Crown, an area covering roughly the eastern one-third of today's United States. This was the original land base for the new country. Much of the best land in settled areas was already in private ownership under the English, and that ownership was respected by the new states and Federal government.

In one of the first acts of national unity, the 13 states agreed to cede 94 million hectares to the Federal government to provide tangible assets to help pay off the national debt accumulated during the Revolutionary War with England (Dana & Fairfax 1980: p. 6). The land controlled by the Federal government became known as "the public domain." During the 19th century, a series of purchases and treaties brought the public domain to about 743 million hectares, including 148 million hectares in Alaska that was purchased from Russia in 1867. Today, the total area of the United States is about 937 million hectares, about 55 percent of the area of Russia.

The U.S. Constitution places the public domain under the complete control of the Congress of the United States: "The Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States." (Art. IV, Sec. 3, • 2). Early leaders of the country agreed in principle that the public domain should eventually be disposed of to the states and private owners. However, there was much debate about how it could be done to avoid abuse and ensure equitable treatment of all citizens. New laws authorized the Federal government to grant and sell land to the states, railroad companies, miners, and settlers. One of the main reasons for disposing of the public domain was to provide revenue for the Federal government and to encourage settlement of the vast expanses of undeveloped land in the American West. There were continuing debates about which of these objectives was the most important, the issue being whether the land should be given away or sold.

As each new state joined the Union, it received a public domain land grant to help support the development of schools and community services. The state grants amounted to about 91 million hectares. Land grants ranging from 65 to 240 hectares were given to individuals provided they settled on the undeveloped land and improved it. The larger grants were on arid lands in the West where subsistence was more difficult because of the shortage of water.

Thirty-seven million hectares of public domain were granted to railroad companies during the 19th century to pay for the construction of transcontinental and regional railroads needed to open up undeveloped territory and provide transportation links to the frontier. Most of the Federal land grants occurred in the 19th century, but it wasn't until 1976 that a Federal law was passed to officially end the policy of public domain disposal. By then, 70 percent of the public domain had passed to state and private ownership.

Although the programs for disposing of the public domain were well-intended, some of them were poorly conceived and executed. Some were beset by fraud and abuse. The disposition era has been described as "a debacle, a period of waste and destruction, a source of national shame." (Dana & Fairfax 1980: p. 12). It did not raise much money for the Federal government, and it has been suggested that the settlement of the West occurred "in spite of rather than in accord with Congressional policies." (Dana & Fairfax 1980: p. 12). Others disagree, and some of the issues and laws related to western settlement are still debated today.

One of the most influential books during that period was *Man and Nature: Or, Physical Geography as Modified by Human Action* by George Perkins Marsh (Marsh 1864). Although the book was published 130 years ago, it is as appropriate today as it was then. It describes the intricacies of natural systems and warns of the perils of abusing land and natural resources and degrading the environment. Some consider the book to be the fountainhead of the American conservation movement. It inspired scientists, statesmen and other concerned citizens to speak out against the land abuses of the 19th century and seek more protection for the nation's natural resources, particularly forests and watersheds.

Responding to the pressure from conservationists, the U.S. Congress in 1891 passed a law that authorized the President to create Federal Forest Reserves on the public domain (Act of March 3, 1891; Ch. 561, 26 Stat. 1095). The first Forest Reserves were created almost immediately after the law was passed, and additions over the years have created a system of reserves (now known as the National Forests) that today covers over 77 million hectares in 42 states.

2. EVOLVING MANAGEMENT PHILOSOPHY FOR THE NATIONAL FORESTS

The 1891 law that created the Forest Reserves did not provide any guidance or authority for managing them. After much debate, the U.S. Congress in 1897 passed a law that authorized commercial timber sales on the forest reserves (Act of June 4, 1897; Ch. 2, 30 Stat. 11).

2.1 A Focus on Settlement and Economic Development

In 1905 the Forest Service was created in the U.S. Department of Agriculture. The Secretary of Agriculture outlined the following management philosophy for the National Forests in a letter to the first Chief of the Forest Service, Gifford Pinchot:

"... all land is to be devoted to its most productive use for the permanent good of the whole people and not for the temporary benefit of individuals or companies. All the resources of the Forest Reserves are for use, and this use must be brought about in a thoroughly prompt and business-like manner, under such restrictions as will insure the permanence of these resources ...

"The vital importance of Forest Reserves to the great industries of the Western States will be largely increased in the near future by the continued steady advance in settlement and development ...

"In the management of each reserve, local questions will be decided on local grounds; the dominant industry will be considered first, but with as little restriction to minor industries as may be possible; sudden changes in industrial conditions will be avoided by gradual adjustment after due notice; and where conflicting interests must be reconciled, the questions will always be decided from the standpoint of the greatest good for the greatest number in the long run." (Pinchot 1947: p. 261).

The Forest Reserves were created primarily to protect watersheds and ensure timber supplies for the future, but it is clear from the Secretary's letter that the management emphasis in the early days was to be on sustainable resource use to foster local industry and economic development.

There was not much pressure to harvest timber from the National Forests until the 1940s because there was plenty of timber available from private lands. Some federal timber sales were used to finance the construction of roads and trails needed to manage and protect the forests. A few large timber sales were made to finance highways and railroads, and in some cases to encourage the development of wood products industry as a means for community economic development in isolated remote areas. For example, in 1923 a large timber sale was made in a remote area of the state of Oregon that required the purchaser to build a sawmill and a railroad. In 1947, a large timber sale in Alaska required the purchaser to build a pulp mill that was to be supplied with National Forest timber for 50 years. In both cases the timber sale was intended primarily as a catalyst for regional economic development (Beuter 1984).

2.2 A Focus on Sustained Yield and Community Stability

A number of events during the 1930s brought greater attention to forestry in the United States. Most of the virgin timber on private lands had been harvested by then, and much of the land had not been properly regenerated. A number of large forest fires during the 1930s destroyed vast amounts of timber on both private and public lands. The Federal government was funding development projects on the National Forests to provide jobs for men who were out of work because of the Great Depression. All these things came together to make Americans more

aware of their forests and helped to encourage a greater commitment to sustained yield forest management. New laws authorized programs to improve forest access, provide better forest protection, and encourage the rehabilitation of cutover and burned forest land.

There was increasing concern about maintaining the social and economic stability of rural timber-dependent communities. A 1944 law authorized the creation of Federal Cooperative Sustained Yield Units (Act of March 29, 1944; Ch. 146, 58 Stat. 132). The units involved agreements between timber-dependent communities and National Forests that provided a steady flow of timber to the communities over time (see for example Beuter & Olson 1980 and Beuter 1990). As transportation and communication systems improved and regional economies became more diversified, this concept lost favor. Most of the units have been terminated.

Timber sales on the National Forests began to increase with the onset of World War II and on into the post-war years as returning soldiers created a high demand for new housing. The National Forests still contained mostly virgin timber and were largely unroaded. Harvest schedules (allowable annual harvest volumes) were determined by a planned, orderly conversion from wild, unmanaged forests to managed forests having a balance of timber age classes. In the long-run (perhaps 100 years) it was anticipated that the forests would be fully regulated such that growth and harvest would be in balance in perpetuity. In the meantime, it was anticipated that National Forest timber harvests would help to offset reductions in timber availability from private lands during the 50 years or so that it would take for the new plantations on private lands to grow to maturity. Although the theory of the regulated forest with harvest equal to growth is logical to foresters, it was soon to be seriously questioned from the broader perspectives of ecological science and changing national values.

2.3 A Focus on The Environment

During the 1960s and 1970s, the mood of America shifted dramatically from a focus on economic growth and development to a concern about the environment. Citizens reacted against air and water pollution, soil erosion, and the impacts of uncontrolled development on natural systems and scenic beauty. This inspired a number of new Federal laws that were to chart a new course for National Forest management.

The 1960 Multiple Use-Sustained Yield Act provided a bridge from the sustained yield era with its focus on timber production to a new era of concern about all forest resources (Act of June 12, 1960; P.L. 86-517, 74 Stat. 215). The 1964 Wilderness Act brought national recognition to the concept of permanently preserving unique scenic and wild areas for the benefit of future generations (Act of September 3, 1964; P.L. 88-577, 78 Stat. 890). The 1969 National Environmental Policy Act clearly stated the responsibility of the Federal government to monitor and protect the natural environment (Act of January 1, 1970; 83 Stat. 852). These laws have had a significant impact on National Forest management.

The Wilderness Act gave rise to long debates pitting timber, mining, grazing and other development interests against environmentalists who wanted to preserve large areas of the National

Forests as wilderness areas. All development and resource use activities except for hiking and camping are prohibited in most wilderness areas. As of 1992, 14 million hectares on the National Forests have been permanently preserved as wilderness areas by the U.S. Congress. Proposals for adding more than a million more hectares to the wilderness system are still pending in the U.S. Congress. The National Environmental Policy Act significantly changed the procedures for Federal forest management planning. Since 1970, Federal agencies have been required to conduct environmental analyses and reveal to the public significant potential environmental impacts that might occur from a project or activity being proposed on Federal land. Citizens are given opportunity to participate in the analysis and comment on the results. They may appeal land management decisions through administrative channels, and, if still not satisfied, may sue in Federal court to have their concerns considered.

Four laws passed in the 1970s significantly affected National Forest planning and management. The 1973 Endangered Species Act asserts Federal control over the protection plant and animal species, and provides authority for the Federal government to control activities that might adversely affect the long-term viability of species (Act of 1973, 16 USC 1531 et. seq.).

The 1974 Forest and Rangeland Renewable Resources Planning Act provides direction and guidelines for planning the use and development of the Nation's natural resources (Act of August 17, 1974; P.L. 93-878, 88 Stat. 476). It requires a periodic assessment of the status of the Nation's renewable natural resources and the anticipated national needs for these resources. The assessment is used to develop a program for meeting the needs. The program is used to justify funding requests to the Congress.

In 1976, the Federal Land Policy and Management Act (Act of October 21, 1976; P.L. 94-579, 90 Stat. 2743) and the National Forest Management Act (Act of October 22, 1976; P.L. 94-588, 90 Stat. 2949) updated and supplemented earlier laws pertaining to the management of Federal lands. The National Forest Management Act specifies procedures for forest management planning and achieving the policies of the 1960 Multiple Use-Sustained Yield Act. Most significantly, it requires the consideration of biological diversity and economic feasibility in planning timber sales and other resource use programs. It also reinforces the right of citizens to review and comment on plans and projects.

2.4 The Situation Today

After 20 years of trying to conform with all these laws, National Forest management is more controversial today than ever. Since 1992, the emphasis of planning and management has shifted from sustained-yield timber production to managing landscapes for sustainable ecosystems. Some Federal timber sale programs have been stopped completely while legal questions are reviewed in the Federal courts.

No matter what happens, it is certain that the volume of timber harvested from the National Forests in the future will be much lower than the sustained yield levels anticipated 20 years ago. The following are the main reasons for harvest reductions:

1. Reduction in the area of land managed for timber: Timberland is being allocated to non-timber uses or protection zones such as wilderness preservation areas, scenic corridors, wildlife habitat protection, and streamside protection buffers.
2. Landscape management restrictions: Harvest levels will be constrained by a new emphasis on maintaining biological diversity across a designated landscape or watershed. Areas available for harvesting will be limited by desired patterns for vegetation and ecosystems across landscapes.
3. Limitations on stand-level timber management activities: Some timber management practices such as the use of herbicides and fire to control unwanted vegetation are being restricted or eliminated; there are new restrictions on road construction and logging methods. Clearcutting will not be used unless absolutely necessary to achieve a desired management outcome, such as the regeneration of an intolerant tree species or the rehabilitation of an area that has been damaged by natural events or previous management practices.
4. Economic constraints: Timber sale programs will have to be economically feasible. That is, it must be documented that the benefits exceed the costs before timber sales will be allowed.
5. Legal uncertainty: The complexity of forest management and environmental laws slows down the timber sale process because of extra effort needed to avoid legal challenges, or extra time needed to defend against legal challenges that do occur.

During the past 100 years, the management focus for the National Forests has evolved from an emphasis on settling and developing the frontier, to sustained-yield timber management and community stability, to environmental protection and comprehensive planning for all resources, and finally to ecosystem sustainability and landscape management.

3. TIMBERLAND OWNERSHIP AND FOREST PRACTICES IN THE U.S.

It now remains for this paper to complete the story of the evolution of forest management in the United States by putting the National Forests into the context of other forest ownerships. About one-third of the U.S. (298 million hectares) is classified as forest land. About two-thirds of the forest land (198 million hectares) is classified as timberland that is biologically capable of growing commercial crops of timber.

3.1 Ownership Pattern

There are four major ownership classifications for timberland in the U.S.: National Forest, other public, forest industry, and farmers and other private. Only 27 percent of the timberland area in the U.S. is in public ownership (Table 1). The National Forests hold 17 percent of the timberland area, and other public owners, 10 percent. Most of the "other public" timberlands are

owned by the states, with the rest divided between Federal agencies other than the Forest Service, and local governments, such as counties and cities.

Table 1: Area of timberland by owner class (thousand hectares)

All ownerships	National forest	Other public	Forest industry	Farmers & other private
198,117	34,261	18,953	28,512	116,391
100%	17%	10%	14%	59%

Source: Powell et al 1993: Table 8.

The largest owner class, "farmers and other private," holds 59 percent of the timberland area. It includes about six million individual owners, with farmers being the largest single component (17%). The rest of the nonindustrial private owners are citizens in all walks of life who happen to own some timberland.

The "forest industry" owner class consists of private companies having large timberland holdings ranging from about 20,000 to several million hectares each. Although forest industry owners account for only 14 percent of the Nation's timberland area, they contribute about one-third of the Nation's timber harvest each year (Table 2). They practice intensive timber management for the purpose of supplying their own forest products mills or selling timber on the open market.

Table 2: Timber net growth and removals, 1991 (million m³)

Item (for 1991)	All owners	National forest	Other public	Forest industry	Farmers & other private
Net growth	612.4	93.2	55.6	121.5	342.1
% by owner	100%	15%	9%	20%	56%
Removals	461.8	56.7	27.9	150.8	226.4
% by owner	100%	12%	6%	33%	49%

Source: Powell et al 1993: Tables 33 & 34.

Overall, the U.S. is growing one-third more timber than it is cutting each year (Table 2). Removals exceed growth only for the forest industry owner class, which suggests that the forest industry harvest is likely to fluctuate somewhat in the future in an approach toward a long-term balance between harvest and growth. Current harvest levels in part reflect the anticipation of increasing future growth rates expected to result from the current intensive management practices that include planting genetically superior seedlings, stocking density control, and fertilization. The comparison of harvest and growth raises the question of how the various timberland owners decide to manage their lands.

3.2 Management Practices and Controls

There was a lengthy discussion earlier in this paper about how the management of the National Forests evolved from a focus on timber management to today's emphasis on ecosystem sustainability and landscape management. These changes over time resulted mostly from

special interest groups working through the democratic political system. By law, National Forest management must be responsive to the public interest. And, the public interest is distilled through the political system in the form of laws and regulations. That is true also for other public lands, which must be responsive to government constituencies at the state, county, or city level.

The management of private forest lands is driven by the objectives of many individual owners, which may vary from intensive timber production to no timber production at all. Private owners usually wish to maintain the market value of their forest land as high as possible. Timberland value is derived from market values for what the land can produce (productivity) in timber or other benefits. Assuming that timber production is the highest economic opportunity, timberland productivity in the long run is determined by the rate of timber production over time as measured in cubic meters per hectare.

Timber production efficiency can be estimated by comparing actual productivity against potential productivity. In the U.S., forest industry owners tend to be both more productive and efficient in timber production than other owners (Table 3; also see the Epilogue starting on page 22 for further discussion of this topic). Overall, current timber growth in the United States averages 59 percent of potential growth as defined by inherent biological site capability. With current timber growth at 73 percent of potential, forest industry owners have the highest apparent timber production efficiency. It should also be noted that, on the average, forest industry timberlands also have the highest growth potential at 5.88 cubic meters per hectare per year (Table 3). The combined ownership of productive timberland and intensive timber management reflects the clear objective and motivation of forest industry owners to practice sustained yield timber production.

Table 3: Potential and current annual growth, and efficiency of timber production, by owner class, 1991

Item	All owners	National forest	Other public	Forest industry	Farmers & other private
Average growth potential (m ³ /ha.)	5.18	4.83	4.62	5.88	5.18
Average current growth (m ³ /ha.)	3.08	2.73	2.94	4.27	2.94
Efficiency (%)	59	57	64	73	57

Source: Derived from Powell et al 1993: Tables 5, 6, 8 & 33.

NOTE to Table 3: *The average growth potential is the average annual volume growth at the age of maximum mean annual increment of a fully stocked natural stand consisting of species best suited to the specific site.*

The National Forests, farmers and other nonindustrial private owners share the lowest timber production efficiency at 57 percent, but for different reasons. The National Forests tend to carry high volumes per acre in mature and overmature timber having relatively low growth rates. On the average, National Forest timber is growing at only 1.8 percent of inventory (de-

rived from Powell et al 1993: Tables 13 & 33). In contrast, farmers and other private owners tend to carry relatively low timber stocking, mostly in younger age classes. Their timber is growing at an average of about eight percent of inventory, but because of the low stocking of desirable trees, the absolute volume growth is significantly below the potential productivity of the land. This comparison demonstrates two different ways to be inefficient in timber production - too much timber inventory and too little.

There are several reasons for the lower timber production efficiency of farmers and other non-industrial private owners. Many owners do not care about growing timber or have better uses for their scarce investment capital. Some owners simply cannot afford to make the investments needed to achieve a full stocking of desirable timber species. And still others lack economic or technical knowledge to take advantage of their opportunities. In contrast, the relatively high efficiency of timber production for forest industry lands indicates their clear timber growing objective and the availability of capital to make the necessary investments in growing stock and timber management.

Generally, the National Forests and other public owners do a good job of managing their lands, but their management emphasis is more on multiple use forestry and ecosystem protection than on timber production. Their higher timber inventories are justified to protect scenic values, streamsides, wildlife habitat, and other multiple use values. This raises the question about whether private timberland owners are required to protect environmental values in the U.S. The answer is yes, but the requirements vary from state to state. All forest owners must protect species that are listed as threatened or endangered under the Federal Endangered Species Act. In addition, the states have their own wildlife protection laws and forest practices rules that must be followed by private owners.

The regulation of private forest practices is accomplished in two basic ways: command and control or incentives. Under a command and control procedure, laws and regulations prescribe what landowners must do or must not do. The rules are enforced by state forest practices officers and landowners are subject to fines if they violate the rules. Under incentive programs, landowners may be paid (e.g., through tax incentives and other subsidies, or direct payments) to protect environmental values. Incentives or payments are most common when the public interest in environmental protection requires the taking of private property rights. Under the U.S. Constitution, a landowner is entitled to compensation by the government for the loss of private property rights, although there is latitude for the government to regulate private land use and management without compensation in matters involving public health, safety and welfare. In summary, most states have forest practices rules to protect environmental values on private lands, but the intensity and type of regulation varies from state to state. Typically, the intent is to promote logging safety, minimize soil compaction and erosion, and avoid air and water pollution. In some states, a landowner must have a logging and forest management plan before a logging permit will be issued. Many states require regeneration with desirable tree species promptly after the logging is completed.

4. CONSIDERATIONS ON MANAGEMENT EFFICIENCY

Table 3 provides a measure of the relative timber production efficiency among the forest owner classes in the U.S. Following the presentation of this paper in Moscow on June 21, 1994, it was apparent there is a need to clarify the meaning of the table and the discussion of timber production efficiency. The issues to be clarified are:

4.1 The Standard Used To Determine Relative Efficiency

Timber growth potential in Table 3 is based on the average annual volume growth at the age of maximum mean annual increment of a fully stocked natural stand consisting of species best suited to specific sites. This is derived from measurements in fully stocked natural stands of various ages and represents the theoretical inherent maximum sustainable growth capability of a site over time. It also represents the expected annual growth at any time of a perfectly regulated forest occupying any area being considered.

For a given site, it is likely that growth under intensive timber management could exceed the standard defined above. But over a large area having a high variability of site capabilities the inherent site capability is a reasonable standard of comparison. Much timber management activity is devoted to just achieving and maintaining the fully-stocked condition over time that is needed to realize the inherent site capability. Without measures to enhance inherent site capability such as irrigation and fertilization, the main accretion of volume under intensive management comes from harvesting mortality that would otherwise have been left to rot in the woods.

4.2 Differences in Site Capability

The inherent site capabilities in Table 3 show differences in timber production potential among owner classes. For example, forest industry timberlands have an average annual inherent capability of producing 5.88 m³ per hectare, while the average for the national forests is only 4.83 m³ per hectare. This means that, all other things being equal, the timber growing potential per hectare on forest industry timberlands is 22 percent higher than on national forest timberlands. This verifies the tendency for private owners in the U.S. to have ended up with the best timberland, that is the land having the highest economic potential for growing timber. The higher timber growing efficiency on forest industry lands reflects both the objective of owners to produce timber and the greater economic opportunity of high site land. The lower efficiency of timber production on farmer and other private lands is less attributable to a lack of economic opportunity than it is to a lack of knowledge and clear objectives to produce timber.

4.3 The Meaning of Current Growth

The use of current growth as a measure of timber production efficiency in Table 3 needs to be qualified. Average current growth reflects a wide variation of site capabilities, species and stand conditions across each owner class. Although most of the growth is attributable to commercial species, not all occurs on the most valuable species that could be grown on a given site. The clear timber growing-objective of forest industry owners makes it more likely that

their growth represents a more valuable mix of commercial species than the growth for the other owner classes.

It could be argued that a measure of efficiency should reflect relative value growth rather than physical growth. That would require accounting for species value differences relative to site capabilities among the owner classes. Beyond species there is also the issue of differing stand conditions between ownerships, such as age and stocking. Stand conditions vary greatly across a wide expanse such as the U.S. as a whole, but they are important considerations for determining the meaning of current growth. For example, the current growth rate of 4.27 m³ per hectare for forest industry lands could represent a balance of understocked age classes or a few age classes having varying stocking levels. Caution and sensitivity to the variation is needed in interpreting the meaning of current growth and the timber production efficiency implied by it.

4.4 Normative Implications Regarding Forest Ownership

The concept of relative timber production efficiency is not intended to infer that one type of forest ownership or tenure is superior to another. Nor is it meant to imply that timber production is necessarily the best use for timberland. It merely reflects the situation that exists in the U.S. after 100 years of development and management of forests under a variety of ownership situations. There are obvious implications regarding the role of owner objectives and market incentives in timber production, but these should be viewed as hypotheses that should be tested under the unique combination of forest, legal, economic, social and cultural conditions of the situation being analyzed.

From the U.S. experience, it is reasonable to hypothesize that forest industry ownership is likely to have the highest efficiency for timber production over time because of a clear objective to produce timber, and the knowledge and financial resources to do so. There are strong incentives for those in the business of growing and selling timber to acquire the best timber growing land and to manage it for the highest economic return, subject, of course, to environmental laws, regulations and policies that help to insure long-term forest sustainability. The lower timber production efficiency of other owners is not necessarily bad. It may be justifiable in terms of better economic alternatives or other reasons individual owners have to give higher priority to non-timber objectives. Or, it may reflect a lack of knowledge or interest in timber production, or structural inefficiencies in mustering the resources needed for efficient timber production.

CONCLUSION

The mix of public and private forest ownership in the United States assures a wide range of opportunity that encompasses the spectrum from free enterprise resource development to forest conservation. Federal and state environmental laws provide a degree of assurance that forest ecosystems will be protected and sustained in the long run. The processes for forest protection and management in the U.S. have been evolving for over 100 years, and they are

still evolving. To some, the process of change from a heavy timber production emphasis to ecosystem management is agonizing, but most Americans agree with the goals we are trying to achieve, if not always the paths we have chosen. The diverse mix of public and private forest ownership helps to insulate the aggregate system from changes that move any component significantly in one direction or another.

Overall, it has been documented that America's forests are in many ways in better shape today than they were 50 years ago (MacCleery 1992): Losses to wildfire have been greatly reduced; standing timber volume and growth have greatly increased; populations of many wildlife species have increased dramatically; and, recreational use of our forests sets new records every year.

While the accomplishments are impressive, there remain great challenges for the future. Our knowledge about forest ecosystems has increased dramatically in recent years. It is becoming clear that what is good for timber production may not always be good for other forest values. It is likely that some forest management methods and procedures that have contributed to the successes cited above may be changed in the future. For example, the control of wildfires was cited above as a success, but in some ways it is also being viewed as a failure. Many ecologists believe that periodic fires are needed to sustain healthy ecosystems in regions where there has been a history of natural fire occurrences. They recommend that wildfires be allowed to burn when feasible, and that there should be more use of controlled burning as a management tool. There is also an increasing environmental backlash against plantation forests managed for timber production. It is common to hear the slogan: "A tree farm is not a forest," a notion that has shifted the emphasis of Federal forest management away from timber production to ecosystem management. This is a concept that is likely to be seriously resisted on private lands. Is a tree farm any less legitimate than a corn field or a wheat field in meeting basic human needs?

There is much to observe across the broad range of American forests and forestry practices over time. There are good examples and bad examples, both on the ground and in policy. We welcome the opportunity to share our knowledge and experiences with our friends in Russia and elsewhere.

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THE EVOLUTION OF FOREST MANAGEMENT POLICIES ON CROWN LAND IN THE PROVINCE OF ONTARIO, CANADA

Trevor R. Isherwood and Riet Verheggen

INTRODUCTION

This paper describes the evolution of forest policy in Ontario. It also provides the reader with a general description of the province of Ontario with respect to geography, population, access and forest types.

The province is accountable for the management of all the land it owns, comprising approximately 90% of the province. The Ministry of Natural Resources is the organization within the Ontario government that is responsible for protecting and conserving public lands and waters. The Ministry's programs are concerned with the use of the physical resources of land, water, trees, fish, animals and certain minerals for resource utilization and recreation.

In Ontario, tenure (the condition or right by which a property is held), as an instrument of policy, has been used to allocate rights to timber and/or land, to regulate exploitation, to stimulate economic and social development, to influence the amount and form of revenue from the forest and to affect forest management. The disposal of Crown timber in Ontario is achieved through a system of licensing, where the province retains ownership of the land and sells the timber to private enterprises.

The evolution of forest policy in Ontario has its roots with the appointment of the first Crown Lands Commissioner, Peter Robinson in 1827. During the past 167 years, farmers, foresters, and politicians have played a role in the evolution of forest management policies and legislation.

1. THE FORESTS AND THE FOREST SECTOR IN ONTARIO

Ontario is one of the eastern provinces of Canada. In area, it is larger than France and Germany combined, approximately three times the size of Japan.

It is the most populous province in Canada, with a population of 9.7 million people, the majority residing in the southern portion of the province. The largest city in Ontario is Toronto with a population of 3.7 million people. Ontario borders the United States, sharing 20 border crossings by road, rail and water.

The province has a 25,000 kilometre network of highways connecting all parts of the province and accessing at least 10 major border crossings with the United States. Commercial trucking in Ontario employs over 50,000 people, operates 90,000 pieces of equipment, and generates over \$5 billion in gross revenues per year.

Ontario's Great Lakes ports and St. Lawrence Seaway waterways serve the waterborne cargo requirements of 17 American states and four Canadian provinces, and open the way to international markets.

Transcontinental railway lines provide freight service to eastern and western Canada, and through six ports of entry to United States rail networks.

The forests of Ontario can be divided into three regions based on marked differences in terrain, soil and climate. They are: the Deciduous Forest Region, the Great Lakes-St. Lawrence Forest Region, and the Boreal Forest Region.

1. The Deciduous Forest Region is mostly privately owned. Its major tree species are sugar maple (*Acer saccharum* Marsh.), basswood (*Tilia americana* L.), a variety of oaks (*Quercus* spp), beech (*Fagus grandifolia* Ehrh), and a few scattered conifers including hemlock (*Tsuga canadensis* (L.) Carr), eastern red cedar (*Juniperus virginiana* L), white pine (*Pinus strobus* L.) , and tamarack (*Larix laricina* (Du Roi) K. Koch).
2. The Great Lakes-St. Lawrence Forest Region, extending inland from the edges of the Great Lakes and the St. Lawrence River is a forest of a very mixed nature. It is characterized by white pine (*Pinus strobus* L.), red pine (*Pinus resinosa* Alt.), hemlock (*Tsuga canadensis* L.) and yellow birch (*Betula alleghaniensis* (Britton)) and sugar maple (*Acer saccharum* Marsh.).
3. The Boreal Forest Region is the largest and most northern forest region in Ontario. It is characterized mainly by conifers such as jack pine (*Pinus banksiana* Lamb.), black spruce (*Picea mariana* (Mill.) B.S.P.), white spruce (*Picea glauca* (Moench) Voss), eastern white cedar (*Thuja occidentalis* L.), balsam fir (*Abies balsamea* (L.) Mill), and broad-leaved trees including poplar (*Populus tremuloides* Michx.) and white birch (*Betula papyrifera* Marsh.). Incidentally, the Boreal Forest Region comprises the greater part of the forested area of Canada, stretching from Newfoundland to the Rocky Mountains and Alaska.

The population of Ontario is concentrated in generally the same general area as the Deciduous Forest Region, where the majority of land is privately owned. Therefore; the policies discussed in this paper are policies which affect the Boreal Forest and Great Lakes-St. Lawrence Forest Regions.

The growing stock by area for Ontario's Crown forest is approximately 50.4% spruce, 14.2% jack pine, 14.2% poplar, 8.3% white birch, the remaining stock consists of fir, maple, white pine, other conifer and other hardwoods.

Today, the forest sector is one of the key contributors to the provincial economy - and the main economic engine of Northern Ontario. When secondary manufacturing for operations such as millwork, tissues and corrugated container products are included, the industry directly employed 64,000 workers in 1991 and recorded sales of \$9.0 billion. The primary forest industry

which manufactures products directly from timber, generates direct employment of 28,000 jobs. This primary industry includes 26 pulp and paper mills, 50 large sawmills, 14 veneer mills and 8 panel (board) mills.

The key forest products of Ontario are hardwood and softwood kraft pulp, newsprint, softwood lumber, hardwood lumber, and structural wood panel (oriented strandboard, plywood, etc).

In 1992, 1.6 million tonnes of wood pulp were produced, 4.0 million tonnes of newsprint paper and boards, and 85 million square metres of panels.

Ontario's sawmills produce approximately 12.85 million cubic metres of lumber annually, which consists of 78% spruce, pine and fir, 11% white pine and red pine, and 11% hardwoods. The principal customer is the United States, which receives approximately 50% of the total lumber production and 67% of all pulp producers shipments.

The size of Ontario, its population distribution, its proximity to the United States, its forest types, its transportation network, and the state of its forest industry, all contribute to how forest management policy and legislation have evolved over time.

Until the early 1980's, the Ontario government managed the public forests primarily for timber production, on a sustained yield basis. This philosophy of timber production has changed and continues to change drastically, however, the current legislation and policies have had a hard time keeping pace with the changing environmental demands being placed on the policy makers. Environmental concerns have increased at a local and global scale resulting in a change of attitude in all Ontarians. Ontarians want forests managed in a balanced way, for a range of ecological, social and material values, and Ontario has taken great strides to meet those demands by embarking on a series of policy development initiatives to encompass sustainable development. We are very close to having a *Crown Land Forest Sustainability Act*.

2. LOOKING BACK...

During the 1600's, under the French Regime, the use of land was predominately for agriculture and the conditions relating to timber were almost negligible. In 1683, all oak suitable for the use by the Navy was reserved for that purpose, which caused some difficulty when the regulation prevented the clearing of land. This was the first sign of conflict between the colonist and the timber holder.

Under the British Regime in the 1700s, townships were surveyed to ensure their adequate reserves of timber, specifically, white pine for naval constructions, were set aside for army and navy fortifications and barracks.

Up to and including the first quarter of the 1800s, the forests of Ontario and Quebec (the province east of Ontario) were looked upon as a source of timber supply for the Royal Navy and a source of profit for the entrepreneurs involved in trade. The country did not receive any direct revenue in the way of stumpage or rentals.

The series of events leading to today's successful forest management partnerships between the Ontario government and the forest industry, which are based on formal Forest Management Agreements, actually began in 1826. In that year, the Executive Council of Ontario legalized the issuing of cutting licenses on Crown land, formalizing for the first time the relationship between the Crown as owner and the industry as user of the resource.

The first *Crown Timber Act* came into effect in Ontario in 1849, to regulate the cutting of the natural forest and provide revenues, which were paid to the Crown by those who cut the trees. The licences were for 12 months.

The concept of ground rent was introduced in 1851, with logs exported from the Province assessed at double the rate of Crown dues. By the late 1870's, lumber accounted for up to 35 percent of total provincial exports. Until the early 1900s, Crown dues were the largest single source of income for the province and to a large degree provided the funds for the building of schools, roads and other functions of the government of Ontario.

In 1878, following uncontrollable fires in the 1870s, an Act to Preserve the Forest from Destruction by Fire was passed. The portion of the province containing valuable stands of pine were designated as fire districts. During the period between April 1 and November 1 of each year, special precautions were to be taken and enforced with penalties against carelessness.

In 1888, the Crown Timber Act was amended to require pine timber cut on Crown lands to be sawn into lumber before exporting and in 1900 the Act was further amended to require spruce to be processed into pulp for export.

The beginnings of forest management, specifically silviculture, became evident between 1890 and 1920. A growing concern was being expressed in the settled areas of Southern Ontario, where agricultural lands on sandy soils were being eroded as a result of improper farming practices. In 1906, the Prime Minister of Canada, Sir Wilfrid Laurier said "It is not fair to us who are living and still less is it fair to the generation to come after us - that we should allow the destruction of the forest to go on year by year by the cutting down of the trees and make no effort to replace what is taken away. The trees are a crop like any other growth".

Public concern grew regarding the wasteful practices of the so-called timber barons in the pine forests of Ontario and the reforestation of marginal and abandoned farmlands was given impetus in southern Ontario; however, in the north the disposition of licenses, logging and forest protection from fire were the most important priorities.

The decline of the pine sawlog industry in southern Ontario in the early 1900s coincided with the development of the pulp and paper industry in the north. By 1938, Ontario accounted for 35.8% of Canadian newsprint production.

Between 1927 and 1929, three significant pieces of legislation were passed:

- The *Forest Act* (1927) which gave the Minister the power to expropriate land for forestry purposes, the intent being the segregation of forest land from farm land;
- The *Provincial Forests Act* (1929) which permitted the setting aside of public lands for future timber supplies; and
- The *Pulpwood Conservation Act* (1929), which required all pulp companies to supply the Government with complete information about their holdings and to plan future management on sustained yield basis.

All of these pieces of legislation were basically ineffective, largely due to the depression in the 1930s, and because little was done to ensure compliance. As well, there were now two sets of legislation, one based on a presumption of more or less infinite woods industry growth and inexhaustible wood supplies (the Crown Timber Act), and the other on the need to limit growth to a level that finite wood supplies could support (The Provincial Forests Act and the Pulpwood Conservation Act).

The period between 1930 and 1941 was one of forest exploitation. Following World War II vigorous industrial growth occurred, especially within the forest industry and including forest management. The need for an inventory of the forest resource was identified and the Ministry set in place a forest resource inventory which in 15 years virtually covered the province in 15 years.

The Report of the Ontario Royal Commission on Forestry in 1947 stated "Unless the public is willing to spend large sums of money on forestry in the next twenty-five years, efforts toward improvement or even maintenance of the present forest conditions will continue to be a little better than a gesture".

Following the Royal Commission on Forestry Report, a new Act was introduced in 1947, named the *Forest Management Act*, to ensure that all companies were equally responsible in their management obligations; management plans, operating plans and annual plans were a requirement and would be subject to review and approval, with or without alterations, by the Minister; all cutting had to be done in accordance with these plans; and the Minister could cancel an agreement or licence, or stop operations, if a company did not comply with the Act or regulations. Each company was responsible for both harvesting and forest management. The Ministry was responsible for carrying out forest management on Crown management units, which are areas licensed to smaller operators, and the Ministry was to be the regulatory agency and supervise activities on the larger areas under license. Crown management units provided the settlers, as small operators, an opportunity to harvest and saw wood.

The most noteworthy feature of this legislation was that each company was responsible for carrying out both harvesting and forest management as a condition of this statute, not as a condition of the tenure document.

The implementation of the Forest Management Act (1947) resulted in a significant increase in the number of foresters on staff over the next 15 years and the establishment of several tree nurseries. This was the beginning of a commitment to practice forest management in Ontario.

Several statutes governed the administration of crown timber, which presented the forest industry with problems in interpretation because of overlap among the statutes. The overlap also posed a problem to Government from a regulatory and compliance point of view. The overlap in the statutes made them difficult to enforce, therefore; eight statutes were consolidated in 1953, into the Crown Timber Act. The major feature was the revision to the tenure system. All old agreements with the forest industry were replaced by licences issued by Order-in-Council, valid for 21 years, with options for renewals. The licence document authorized the cutting of Crown timber.

It is important to note that the authority to harvest was vested in the tenure document (licence) while the requirement for planning and regeneration were requirements of the statute. This approach tended to separate the functions of harvesting and regeneration in the minds of both company and Government foresters, with the company foresters being cast in the role as harvesters and the Government foresters as regulators. Their goals should have been the same - to harvest and regenerate in perpetuity and provide wood at predictable cost over long periods of time to a stable industry.

By 1960 it became clear that the forest industry, which had the responsibility for forest management, including regeneration, was not doing an effective job of regeneration, for several reasons:

- the level of professional and technical expertise and forest management knowledge was still being developed,
- planting stock which had been developed to accommodate Southern Ontario was expected to succeed in the North, and
- the forest land in the north was in the initial stages of being inventoried and access in the north was limited.

The result, in terms of regeneration, was failure and it was some time before effective regeneration techniques were developed for cutover boreal forest lands in Northern Ontario. It is important to note here that, although Ontario had recognized the need for forest management for some time, formal forest management responsibilities were not clear until 1947, which was only 13 years prior. In terms of forest management and required practices, Ontario was very young.

In 1962, the Crown Timber Act was again amended, this time to transfer the full responsibility for regeneration to the Province, leaving harvesting with the companies. The logic for these two separate functions was to permit logging to develop along purely economic lines and silviculture along biological lines. There was a provision that the government could enter into

regeneration agreements with the licensee for the promotion and maintenance of the productivity of the licensed area.

Between 1962 and 1977, government's accomplishments in regenerating cutovers increased greatly in terms of area treated. There were increased expenditures in mechanical site preparation, planting, seeding and tending, as well as intensified effort in the area of tree improvement with the establishment of seed collection areas and clonal orchards.

Harvesting technology developed to produce wood at minimum cost with little or no reference to the needs of site protection and seed sources (consideration of trees to provide seed for artificial or natural regeneration); and the relationships between company and Government foresters tended more and more to be those of adversaries rather than of cooperators in achieving a common goal for the common good. The forest management staff of many companies disappeared and the development of silvicultural expertise grew only among foresters within the Government.

3. FOREST PRODUCTION POLICY (1972) AND FOREST MANAGEMENT AGREEMENTS

A number of concerns resurfaced again around 1966 regarding the future demand for timber, the level of forest renewal activities, the regulation of timber harvesting and the future of the forest products industry. Ontario began considering the development of a strategic planning approach to forest management which would influence the future of the forest resource. The result was the adoption of the Forest Production Policy in 1972, which spelled out a range of options for long term forest production, and gave quantification and direction which was missing before, and assigned an annual production target of 9.1 million cunits (25.5 million cubic metres) annually to the Crown land forest of Ontario by the year 2020.

The policy directed the Ministry to plan and implement a program for resource allocation, forest renewal, tending, protection, and other associated forest management activities to meet the Forest Production Policy goal. One result of the policy was a large infusion of public moneys into regeneration.

The Forest Production Policy was a major but preliminary step. It was in effect a provincial rationale which involved the aggregation and extension of projects and budgets to meet a specified objective. The full implementation of this policy was severely limited by the initiation of a Government-wide policy of restraints on expenditures and hiring, after 1975. The policy direction was valid; however, funding was limited.

In Ontario, select committees, Royal Commissions, and various studies have influenced policies and actions. The *Timber Revenue Task Force Report* (1975) identified the economic value of the forest industry and established the principle that the forest industry must pay its fair share of the cost of forest management consistent with the industry's ability to pay.

The *Special Program Review in 1975* recommended that forest management responsibilities revert to the private sector. It stated that, in the interests of greater economy and efficiency,

the licensee should assume full responsibility for maintaining the productivity of the forest lands under license. This study was another facet of the policy to reduce the number of civil servants and to vest as many services as possible in the private sector.

The Armson Report (1976) took a critical look at forest management in Ontario.

The report was widely reviewed by government and industry and its recommendations were instrumental in the development of Forest Management Agreements (FMAs). Most important is what it had to say about the relationship between government and industry in relation to forest management and tenure.

"The development of forest management and silviculture is dependent on three factors: a statement of policy together with a direction provided by leadership, adequate support (including funding), and a competent professional and technical staff to undertake the necessary program."

"More effective management is likely to happen when those concerned with the planning and implementation of harvesting operations also have the responsibility for full forest management". This proposition was based on the fact that decisions concerning location and extent of harvest area, nature and extent of access and the type of logging machinery, and the timing and sequence of operation all have direct and important implications on regeneration and subsequent tending treatments.

Tenure and incentives were discussed in the report with the following observations:

"The licensee must have tenure and incentives if he is to undertake any meaningful forest management responsibility (planning and renewal), and he must have a degree of confidence in his relationship with the Crown (long term tenure). The landowner (Crown) must have assurance that the licensee is maintaining the productive capacity of his land, along with any safeguards deemed necessary".

The report recommended that the licensee assume responsibility for forest management and that the accomplishments of the licensee in meeting his obligations be reviewed at each five year period and, if deemed satisfactory, the license be extended.

In 1977, the Ontario Forest Industries Association of Ontario, representing the pulp and paper industry, presented a brief to the Minister in response to the Armson Report and the Timber Revenue Task Force Report. This brief set the stage for industry negotiations with Government. The industry was receptive to the Armson recommendations to transfer responsibility to them for forest management on designated areas within their present licences subject to four conditions:

1. The transfer was to be at the option of the licensee;
2. There must be a defined basis of tenure;

3. There must be incentives to encourage licensees to assume these new responsibilities;
4. There must be an effective process to monitor and review achievements in management.

The result of many discussions and deliberation based on the Armson report, was an amendment to the Crown Timber Act in 1979 to include a section allowing the Minister to enter into Forest Management Agreements (FMAs) with the industry.

The objective of this amendment was to integrate silviculture and harvesting; to make the forest industry responsible for forest management activities (planning, road construction and maintenance, harvesting, regeneration and tending); and to supply the mills identified in the agreement. This was accomplished through contractual agreements between the Crown, as landlord, and certain forest companies, as tenants. The amendment made it mandatory for silvicultural specifications and regeneration standards to be set out in the agreement.

Negotiations with the forest industry has resulted in 28 signed FMAs with 15 forest industry companies in Ontario, eight with pulp and paper companies, six with sawmills, and one with a panelboard company, covering a total area of 181,000 square kilometres or 69 per cent of the licensed area.

Other, more implicit objectives of the program were to minimize the additional costs of wood harvested resulting from forest management activities, provide a better distribution of the harvest area, maintain employment levels in northern Ontario communities, and provide enhanced levels of regeneration and protection from fire, insects and disease as a direct result of an accelerated forest access program.

FMAs have been referred to as "evergreen agreements". They are drawn up for 20 year terms and are extended every five years if the company meets its obligations. If a company does not meet its obligations, the agreement may not be extended or could even be terminated at the end of a five-year review.

The costs of forest management activities are shared between the government and the forest companies. The government ensures regeneration by providing the seedlings for planting and pays the basic costs of forest renewal. The government also paid part of the construction and maintenance cost of certain all-weather forest access roads because they provide opportunities for public use and are an improvement to the land base. All other costs associated with forest management staff, equipment and planning are borne by the company.

Some of the company's responsibilities include:

1. The production of and adherence to long and short-term plans at specified times that outline the harvest, access, forest renewal and forest maintenance activities which are to take place;

2. Harvesting and regeneration of the forest to produce successive crops of timber on a sustained yield basis (This meant that the companies were responsible for managing the forest in perpetuity, as long as moneys were appropriated by the legislature to ensure the activities occurred). In other words, the government maintained the responsibility and accountability for ensuring the finances were in place to carry out the management plan;
3. Payment of Crown charges for the area under the Agreement and for all timber harvested;
4. Declaration timber surplus to it's requirements, as identified in the timber management plan (This is important to ensure the smaller operators have a continued wood supply.);
5. Reforestation at company expense if regeneration is unacceptable (based on agreed upon standards) after a prescribed period of time (usually five years);
6. Adherence to the standards set out in the "ground rules", a series of administrative procedures and technical prescriptions;

The ground rules are the most important section of the Agreement. They contain mutually agreeable silvicultural prescriptions which apply to the five year operating period. Although a certain amount of consistency across the province is maintained, the ground rules are specific to each Agreement and reflect the varied conditions of the forest being managed.

The incentives to the licensees referred to in the Armson report are four fold:

1. The Crown has the responsibility to make payments for basic silviculture and road construction and maintenance;
2. The Crown will provide a modern information system accessible to each company;
3. Where the company makes an investment, for example regeneration or thinning operations, at its own cost, to increase productivity, the increase will be available to the company at a nominal stumpage charge; and
4. Areas that were harvested prior to signing the FMA, and which were not regenerated satisfactorily, were eligible for government funding, in order to regenerate productive forest area. The company is responsible for successfully regenerating this area within the first 20 years of the agreement, at a rate of 5% each year. Renewing this area on accessible lands provides the industry with an economically advantageous supply of wood.

Ontario's commitment to the forest management program is evidenced by the fact that Government spending grew to \$250 million annually in 1991 from \$59 million in 1979. Additionally, \$243 million has been spent in Ontario for the construction and maintenance of forest access roads on FMAs. Due to budget constraints, funding for road construction and maintenance ceased in 1992; however, the 12 years of funding have ensured a well distributed network of roads throughout the productive forest land of Ontario.

Although funding for forest management has decreased to approximately \$216 million in 1993, 150,000 hectares of planned regeneration was accomplished compared to harvest levels of 180,000 hectares.

How does Ontario measure up to the Forest Production Policy of 1972, with an assigned annual production target of 25.5 million cubic metres annually on Crown land forest of Ontario by the year 2020?

Presently, approximately 20 million cubic metres of fibre are harvested annually on Crown lands in Ontario. This figure fluctuates between 18 million and 22 million primarily as a result of market conditions.

While harvest is measured by volume and area, regeneration has historically been measured by area. Therefore, it is difficult to relate harvest to growth in terms of volume. The province has implemented a growth and yield program, but it is in its initial stages.

The lack of growth and yield data has been a cause for concern and in April 1991 the Minister appointed an Independent Forest Audit Committee to report on the condition of cutover areas in the boreal forest of northern Ontario, and to determine the success or failure of artificial and natural regeneration on previously harvested areas of the boreal forest.

The Committee reported back to the legislature in October 1992. Its findings classified 96% of plots as adequately regenerated if the boreal tree species of spruce, jack pine, larch, cedar, balsam fir, poplar and birch were considered. However, when commercial conifers (i.e. spruce and pine), were considered, only 59% of the plots could be considered successfully stocked. The report also stated that the maintenance of black spruce as a major species in the boreal forest ecosystems should be a concern because its presence is decreasing significantly. So, while we are reassured that the forests of Ontario are being regenerated under present policies, we must recognize that the composition of the forest is changing.

4. WHERE ONTARIO IS HEADED....

In 1994, Ontario finds itself in a difficult position financially, with continued pressures for a wide range of services, including health, social services, education and support for the environment. In this economic climate, the province is being forced to re-evaluate its relationship with the forest industry once again.

Although the FMA program is seen as a major break through in the relationship between the forest industry and the Crown in terms conducting the full range of forest management practices in Ontario, the system is not without it's critics.

Concern for the management of Ontario's Crown forests has been a long standing public issue. Prior to the 1980s, most of society regarded forests as endless, and available primarily for industrial purposes. But environmental concerns, both local and global, produced new social

values that are still emerging, and which are placing new expectations on what forests could and should produce.

The role of the forest as centres of recreation and home for wildlife has become more important, and the cultural and spiritual importance of the forest to aboriginal communities is being recognized.

The public is also demanding greater direct influence on the development and application of forest policy, and a guarantee that today's use will sustain the integrity of forest ecosystems and keep the options open for future generations.

The Ontario government is committed to sustainable forestry. Sustainable forestry is forest management that ensures the long-term health of forest ecosystems, and which contributes to global environmental benefits, while providing an array of social, cultural and economic opportunities now and for future generations.

Once again, Ontario recognizes a need to update its Acts and policies in order to be in step with the changing attitudes. The province is making huge progress in developing policies and legislation which reflect the concerns for:

- inadequate levels of forest renewal;
- environmental damage from improper forest management practices;
- undue focus on timber management and inadequate recognition of the full range of forest values necessary to manage forest ecosystems;
- limited options for forest tenure and licensing arrangements;
- limited capacity to provide the public with consistent and reliable information about the state of Ontario's Crown forest resources;
- inadequate opportunities for the public to become involved in forest management activities;
- inadequate monitoring and enforcement of forest practices and limited ability to match penalties with severity of violations, or to require remedial action;
- the Province's fiscal capacity to fund forest management;
- the competitiveness of Ontario's forest industry;
- the potential reduction in export markets because of environmental concerns about Canadian forest management generally, and the resulting economic vulnerability of forest industry based communities.

In spite of a monumental workload that appears unmanageable at times positive steps are being taken. To address these concerns and to ensure that any new policy addresses the concerns in a well researched and integrated manner, the government has committed itself to several long term initiatives which are coordinated under the sustainable forestry umbrella.

Forest management in Ontario changed forever in 1987 when Ontario embarked on a Class Environmental Assessment for Timber Management on Crown Lands in Ontario. The Board

had to be persuaded that the planning process in Ontario would be able to manage the forest as a renewable resource, carefully balancing the need for timber with the protection of equally important assets such as old growth white and red pine, wildlife, water and recreation.

Between 1988 and 1992, the timber management practices on Crown land were scrutinized, and evidence was heard for 411 days. 500 people made submissions to the Board and the record grew to 70,000 pages of daily recorded transcripts.

The Board's decision, which was made public in April, 1994 and the Board generally approved the planning process in place in Ontario, with a comprehensive list of conditions. Now we have good solid direction on how to proceed with forest management activities in the province.

Even though the environmental assessment process was proceeding, Ontario recognized that the public concerns listed above were valid and had to be acted on before a decision by the Board was made. Several studies have been initiated to address them.

- Ontario is developing a new forest revenue system that reflects the financial value of Ontario's forest producers to all users, is responsive to the corporate objectives of the Ontario government, and will enhance the ministry's knowledge of resource values based on their full range of benefits in support of integrated forest management.
- Ontario is also revising the 1972 Forest Production Policy, now referred to as the Timber Production Policy. The mandate of this initiative is to develop timber production options and associated costs and benefits, in order to secure a sustainable supply of timber to meet Ontario's economic, social and environmental needs. A series of options are to be ready for review this fall.
- To address the public concern regarding meaningful participation in forest management, Ontario has initiated a community forestry project. The goal is to develop policy which provides for enhanced community involvement in forestry. The result will be policy which will facilitate the empowerment of a broad coalition of community interests with resource management, decision-making and program delivery responsibilities.

The province is also negotiating a new business relationship with the forest industry, which would see the industry assume both the cost and the functional responsibility for forest renewal on the majority of lands harvested in the future. The proposed new partnerships are driven by the fiscal realities of the 1990s, and build on the success of the FMAs. They would ensure that funding is available for silviculture by setting money aside for forest renewal before harvest occurs. The FMAs have given forest industries a level of management expertise and capital infrastructure which now makes it feasible for them to take on a greater share of forest management responsibility.

The new agreements will make it possible for the Ministry to create new forms of partnerships other than with the forest industry (for example with local communities and Aboriginals groups) to ensure the sustainability of our forests, forest industry jobs and communities, based on sound ecosystem management and a better valuing of the resource.

As the Armson report stated in 1976, "the development of forest management and silviculture is dependant on three factors: a statement of policy together with a direction provided by leadership, adequate support (including funding), and a competent professional and technical staff to undertake the necessary program."

While the task is enormous there is a commitment from Government, the forest industry, labour and the public which Ontarians believe will bring us into the 21st century with sound legislation and policies which embrace sustainable forestry.

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FOREST SERVICE RESPONSE TO CHANGING PUBLIC VALUES, POLICIES AND LEGISLATION DURING THE TWENTIETH CENTURY IN THE UNITED STATES

Dennis C. Le Master, Joseph T. O'Leary, and V. Alaric Sample

1. VALUES, POLICIES AND LAW

Two major shifts in values of the American people toward natural resources and the environment occurred during the past one hundred years. The first of these was the conservation movement of the late 19th and early 20th centuries. It grew out of concern about the condition and trend of natural resources and the disposition of public land, and in opposition to laissez faire capitalism which was held responsible for what was regarded as wasteful exploitation of American natural resources, including forests, and the ravaging of the public domain by special interests.

The conservation movement was part of the reforms of the Progressive Era which generally were in opposition to special interests, waste, and incompetence in government. Accordingly, these reforms were characterized by government intervention in markets, broad distribution of benefits to the public, use of efficiency criteria in evaluating programs, and a fundamental belief in the efficacy of rationality and science. The progressive conservation movement was no exception, for its essential features were public land retention, a wise-use philosophy regarding the use of natural resources, self-supporting resource development programs, and scientific management of natural resources.

The public policy framework that emerged emphasized protection of forests from wildfire and their management based on scientific principles. The policy framework assumed a strong public sector role in: 1) acquisition of scientific knowledge through research and its enlightened application by resource professionals; 2) protection of forests, regardless of ownership, from wildfire, insect infestations, and disease epidemics; 3) productive management of private forest lands through technical and financial assistance and tax incentives; 4) adoption and enforcement of strong state and federal wildlife conservation laws; and 5) acquisition of public lands for stream-flow protection and timber production. A key element of the public policy framework that emerged was a strong focus on cooperative efforts among federal, state, and private sector interests to achieve common goals. A stronger more coercive federal role in the direct regulations of private forests lands was considered and debated, but ultimately rejected. The values, policies, and major laws associated with this framework are summarized in *Table 1*.

Table 1: Values, Policies, and Major Laws of the Progressive Conservation Movement

Social Value	Policy	Law
To protect federal forest lands from destructive exploitation and to put certain cutover forest lands under federal ownership for watershed protection and prevention of flooding as well as to provide resources for future generations.	Management and acquisition of of public lands for timber production and to secure favorable conditions of water flows.	Creative Act of 1891; Organic Administration Act of 1897; Weeks Act of 1911
To protect forests from disastrous events, and in so doing, encourage forest land investment and management.	Technical and financial assistance to states for control of wildfire.	Clarke-McNary Act of 1924
To put forest land in productive condition, providing resources for future generations.	Technical and financial assistance to states for cooperative tree seed and seedling production.	Clarke-McNary Act of 1924
To preserve the natural heritage as it relates to wildlife.	Prohibition of interstate transportation wild animals or birds taken or possessed in violation of the laws of the state from which or to which they were shipped; migratory birds declared to be under the custody and protection of the U. S.	Lacey Act of 1900; Migratory Bird Treaty Act of 1918
To manage forest with predictable results.	Authorization of a comprehensive forestry research program for the Forest Service, including periodic timber surveys.	McSweeney-McNary Act of 1928

The second major shift in values began after World War II in the 1950s with growth in per capita real income, widespread use of automobiles, and a relative increase in leisure time. The result was, for that time, an unprecedented increase in demand for outdoor recreation activities. From 1950 to 1960, for example, recreational visits to the national forests increased more than 300 percent, from 26 million to 81.5 million visitor days. Noncommodity values of the national forests, specifically as sites for outdoor recreational opportunities, began to rise in their relative importance. About the same time, concern about the preservation of wilderness on public lands in the West became an important public policy issue, and the preservationist philosophy of Henry David Thoreau and John Muir again challenged the tenets of the progressive conservation movement as it did in the early 20th century. Wild places and things were valued in their own right, not as they might serve human consumption.

Rachel Carson published *Silent Spring* in 1962, condemning the wanton use of chemical pesticides and warning of their consequences upon the environment. "For the first time in history of the world," she wrote, "every human being is now subjected to dangerous chemicals, from the moment of conception until death" (Carson 1962:15). With *Silent Spring*, environmentalism - the belief that the living world is a continuous, self-renewing, and virtually closed

system that must be protected from the harmful effects of modern technology - began its way as a political movement. On April 22, 1970, the first Earth Day has held. Environmentalists, preservationists, conservationists, and outdoor recreation enthusiasts - indeed, an estimated 20 million Americans - participated (Scheffer 1991). The outpouring was unanticipated by Washington politicians. Since that time, they have viewed environmentalism as a matter of political consequence, and major environmental laws have been enacted into law.

As a result, the policy framework changed, becoming larger and more complex. In addition to the five areas listed earlier, another six were added: 1) management of the national forests for commodity and noncommodity resources, including outdoor recreation; 2) designation of portions of national forests, and other federal lands as well, as wilderness, which are to be protected from human development activities; 3) a statutory requirement for all federal agencies to use "all practicable means ... to create and maintain conditions under which man and nature can exist in productive harmony..." and to prepare environmental impact statements for "major federal actions significantly affecting the quality of the human environment;" 4) regulation of emissions of pollutants into the air, discharges of pollutants into water courses and bodies, disposal of hazardous wastes, and the use of pesticides; 5) protection of threatened and endangered species, including their critical habitat; and 6) comprehensive land management planning for the national forests. Values, policies, and selected major laws associated with the additions to the policy framework are contained in *Table 2*.

It is important to note that careful distinctions have been made by several analysts among the terms: utilitarianism, progressive conservation, environmentalism, and preservation. These distinctions turn on the relative acceptance of human consumptive use of natural resources and toleration of human disturbance of the biosphere. Culhane (1981) presents the terms with respect to a continuum of these two variables.

Utilitarianism-----Progressive Conservation-----Environmentalism-----Preservation
-----Use-oriented-----Biocentric-----
-

He explains:

A pure utilitarian ... is concerned solely with the human use of natural resources, irrespective of the wider consequences. The conservationist is committed to use, but attempts to reconcile it with biosphere-imposed constraints.... The environmentalist is committed to maintaining the integrity of the biosphere...; maintenance of mankind's existence is a secondary benefit,... The preservationist wishes to protect ... the biosphere from human use, irrespective of the possible benefits of that use for humans (1981:9-10).

While these distinctions are useful for systematic analysis, they tend to be blurred in everyday practice. For example, a conservation group may support wilderness designation of a particular site in a national forests, while a preservation group may be committed to wilder-

ness preservation, but support regulation of the use of chemical pesticides as opposed to a complete ban.

Table 2: Values, Policies, and Major Laws of the Environmental Movement

Social Value	Policy	Law
To recreate in an accessible, aesthetically pleasing natural environment	National forests are to be managed for both noncommodity and commodity resources, to be administered on a sustained-yield basis.	Multiple Use-Sustained Yield Act of 1960
To preserve our natural heritage	Portions of national forests may be designated as wilderness and as such shall be protected from human development activities.	Wilderness Act of 1964
To preserve our natural heritage	Portions of rivers in national forests may be designated as wild and scenic rivers and managed accordingly.	Wild and Scenic Rivers Act of 1968
To maintain a healthy, sustainable environment	Federal agencies shall use "all practical means to create and maintain conditions under which man and nature can exist in productive harmony...;" an environmental impact statement is required for all federal actions significantly affecting the environment.	National Environmental Policy Act of 1969
To maintain a healthy, sustainable environment	Emissions of pollutants into the air, discharges of pollutants into water courses and bodies, disposal of hazardous waste, and the use of pesticides shall be regulated to minimize their harmful effects.	Clean Air Act Amendments of 1970 and 1977; Federal Water Pollution Control Act Amendments of 1972; Federal Environmental Pesticide Control Act of 1972; Resource Conservation and Recovery Act of 1976; Toxic Substances Act of 1976
To preserve our natural heritage as it relates to wildlife	Federal agencies shall conserve threatened and endangered species; furthermore, no actions taken by them shall jeopardize the continued existence of a threatened or endangered species or result in the destruction or modification of its habitat.	Endangered Species Act of 1973
To reduce societal conflict over the protection, management, and use of natural resources	A periodic strategic plan and individual national forest land management plans shall be developed, reviewed, and revised according to specified guidelines, using an interdisciplinary approach and with public participation.	Forest and Rangeland Renewable Resources Planning Act of 1974; National Forest Management Act of 1976

2. VALUE DIFFERENCES RELATED TO NATURAL RESOURCES

2.1 Identifiable Current Values

Human values are beliefs inferred on the basis of observed human behavior. The values of society concerning the protection, management, and use of natural resources have changed over the last thirty years. The changes have become so large as to suggest a movement toward a new paradigm (Catton and Dunlap 1978; Dunlap and Van Liere 1978; Albrecht et al. 1982; Lyden 1988). Lyden (1988) describes this well:

In the natural resource field, some commentators feel that even those values which nearly everyone has agreed to in the past are changing. What might be termed as the Dominant Social Paradigm (DSP) applicable to this field consists of a belief in abundance and progress, devotion to growth and prosperity, faith in science and technology, commitment to a laissez-faire economy and limited government planning, and private property rights... This perspective is now being challenged by a New Environmental Paradigm (NEP) stressing limits to growth, the balance of nature, and the finite nature of natural resources... In some parts of the country the NEP may have replaced the DSP as the dominant frame of reference in natural resource policy decision making. Whether or not this has occurred, it is clear that society no longer brings a uniform set of values to the decision-making process. As a result we not only see disagreement and conflict occurring in the public decision making, but also confusion about the sources of the disagreement. (Lyden 1988:844)

Kluckhohn and Strodtbeck (1961) noted that values that influence people's behavior stem from different ways of thinking about life and the world around them. They can be influenced by both experience and information, but tend to exist as a relatively stable foundation upon which opinions are based and be resistant to change. Potter and Norville (1981) reviewed and synthesized eight studies of social values in the United States as part of describing how they were incorporated into an energy-technology assessment project. They wrote:

(T)he consensus appears to be that values are conceptions of the desirable that help to guide decision making, and they usually contain criteria for preferences by providing codes or standards for conduct. They are believed to be general and abstract concepts, and thus they, themselves, are not directly observable but must be inferred from the behavior they elicit. They are also thought to be enduring, stable, and learned (Potter and Norville 1981:179).

An important theme in trying to understand value differences in natural resources has been comparison of groups with urban and rural backgrounds. Fortmann and Kusel (1990) note that conflicts over natural resource issues and management are frequently argued to be associated with the "environmentalism of new residents of urban origin and (that of) long standing residents." Fortmann and Kusel summarize the evidence supporting this finding and subsequently take issue with several aspects of it. Their data indicate more agreement than differences exist in values toward forests and forest resources, with greater support for pro-environmentalist positions. Similarly, Dunlap (1987; 1991) has noted a growing concern in the United States about environmental issues that appears to transcend characteristics like urban and rural. The suggestion is that many rural residents had pro-environmentalist attitudes in the first place which were not well articulated, and that the arrival of people who had lived in

urban areas, who had participated in environmental controversies, and who were willing to speak out against pro-development interests, gave rural residents the words to express their views.

Potter and Norville's (1981) examination of social values indicate there could be a broad range of values that might be identified. However, in terms of natural resources, six appear to be of the greatest interest. These social values are classified (Stankey and Clark 1991) into six categories:

- Commodity values (timber, range forage, water, minerals)
- Amenity values (nature, scenery, life style)
- Environmental quality values (air, water)
- Ecological values (biological diversity, endangered species)
- Public use values (recreation, tourism)
- Spiritual values

The foregoing values stem from different ways people think about their relationship with the natural world around them. Several of them have taken on a more prominent role in the Environmental Movement. Each is important because they expand the range of choices people consider in making choices about the protection, use, and management of natural resources.

2.2 Commodity values

Commodity values are associated with conceptions about material comfort, economic benefits, and economic progress and growth. MacCleery (1991) indicates the development of the United States was highly dependent upon products that came from the forest: fuel, timber for construction materials, and even wildlife habitat. The emphasis on the commodities that can be taken from forests is underscored by recent higher education programs in forest management that emphasized business. Davis (1966:1) quoted the Society of American Foresters' 1958 definition of forest management in his text of the same name: "The application of business methods and technical forestry principles to the operation of a forest property." While he did suggest other opportunities that could be pursued on a forest property, these often were presented as being ancillary to timber production.

Emphasis on concepts like community stability grew in the early twentieth century. Sufficient timber could be made available for local industry on a sustainable basis to be sure that an area would be able to maintain its local economy. Hence, the emphasis of timber production was viewed as a means for economic development.

The literature on Americans' views toward commodity values would not suggest that material interest has declined. In fact, the United States has gone through a recent, well documented period of materialism. However, as Machlis (1991) points out, the public's view about forests and their historical uses appears to be affected by population growth in non-metropolitan areas and proximity to forest areas, lack of support for Forest Service management objectives, shifting values within the forestry profession, the extent of interest in the quality of life,

public involvement in national forest planning, and greater scientific intervention. Although the population changes that Machlis identified were in the western United States, the same patterns are also evident in the East and South and have been described in various studies of forest land change. Following Potter and Norville's (1981) description of values that include conceptions about what is desirable, the changes noted above broaden the audience and the variety of views about desirable outcomes, thus placing more value orientations on the table for consideration.

2.3 Environmental Quality

Awareness by the public about the environment grew during the 1960s and was in its ascendancy around the 1970 Earth Day celebration. Dunlap (1987) notes that while public support for environmentalism appeared to decline somewhat, it has remained strong through energy crises, economic downturns, and tax revolts. In fact, several authors have noted that the environment has emerged as one of the persisting concerns of the American public with even some signs of growth (Anthony 1982; Mitchell 1980; Ladd 1982; Dunlap 1991). Some concern was expressed about the impacts of the Reagan administration upon environmentalism, but research indicates that: (1) its support gained strength rather than diminished, (2) that polls documenting this support could be used to support environmental legislation (e. g., Clean Water Act and Clean Air Act), and (3) that failure to provide support for the environment could be politically dangerous (Dunlap 1987).

Dunlap (1991) followed up his observations about environmental concern polls noting that the trends were consistent with the finding he reported in 1987. Indeed, the support appeared to be getting stronger. He wrote:

Used intermittently in New York Times/CBS polls since 1981, the fourth item asks respondents to agree or disagree with a very strong worded statement: "Protecting the environment is so important that the requirements and standards cannot be too high, and continuing environmental improvements must be made regardless of costs." Agreement with this statement rose steadily over the past decade, with the result that in 1990, three-fourths of the public was expressing agreement and only one-fifth was expressing disagreement (Dunlap 1991:12).

2.4 Ecological Values

The growth in concern about ecological values, on the one hand, is related to issues about environmental quality, and on the other, the changing role of science. Concerns about biological diversity, old-growth forests, and endangered species and a host of other related issues are all interconnected into a web of both public and professional values. The National Research Council (1990) called for a greater role for scientists in communicating ecological knowledge to policy makers. Machlis (1991) describes an explicit attempt by the Forest Service in its New Perspectives (now Ecosystem Management) program to include scientists in management decisions. In a recent article in *Science*, Congressman George E. Brown, Jr. stated:

U. S. government support for basic research has reflected a widespread, but weakly held sentiment that the pursuit of knowledge is a cultural activity intrinsically worthy of public support... Politicians - always on the lookout for miracle cures to sell to the public - have enthusiastically embraced research as the key to a bright future... Today ... the uneasy alliance between scientists and politicians is beginning to come unglued.

An excessive cultural reverence for the objective lessons of science has the effect of stifling political discourse, which is necessarily subjective and value laden (Brown 1992:200-201).

Dealing with biological diversity issues, Raven and Wilson (1992), also reporting in *Science*, outlined a 50-year plan in 10-year increments to conduct biological diversity surveys that aim at the ultimate identification and biogeography of all species. Placed in the context of concern for economic well being and stagnation, it is challenging to think that ecological values and science would rank higher than economic values in the political arena. This is underscored by Brown's (1992) observation that despite 50 years of increasing government support for research, the standard of living in the United States is declining. The value of science and its contribution to ecological values will continue to be under pressure as skepticism about scientific programs continues to be an issue.

2.5 Recreation Values

Outdoor recreation participation grew exponentially after World War II, at rates that far exceeded those of the pre-war period. In part, this increase was due to a change in social preferences; the mobility of the automobile, greater real income, and more leisure time combined to accentuate the trend in a substantial way. National commissions were formed to address this profound change and make recommendations on, for example, how the public land agencies might respond to the change in demand for outdoor recreation. Resources were made available to improve access and enhance the use of recreational facilities on public lands. Projections of likely future recreation participation show expected increases across all recreational activities and in all three categories: land, water, and snow and ice.

Although one of the values associated with recreational use of public lands is associated with "re-creation" and refreshment of the spirit (often linked to preparation for work), the participation levels have also reflected significant economic value. In addition, while tourist activities have always had a close interdependency with resource areas, increased attention to economic impacts and revitalization of communities and regions appears to have refocused attention on the value of recreation and travel. In fact, agencies like the Forest Service, Bureau of Land Management, and National Park Service have explicitly begun to refine their roles, not only in terms of domestic participants, but also in terms of international travelers. In addition, there are some national studies (President's Commission on Americans Outdoors 1987) that suggest the emergence of citizens that value leisure as their highest pursuit, and work is pursued essentially in support of it. Although the literature suggested 30 years ago this would happen because of an increase in leisure time and a decrease in work, other factors appear to be influencing this phenomenon like changing attitudes toward work.

2.6 Amenity Values

Perhaps one of the main effects of forest uses like recreation and tourism has been a growing interest in the amenity values of forests. As more people have had the opportunity to visit forest recreation areas, interest has also grown in making these areas more attractive by improving the scenery. Indeed, "visual resource management" is now a matter of systematic study. The early work focused on streams and road corridors, but it was soon broadened to include timber harvest areas, downhill skiing areas, valued scenic attributes of different natural settings, and landscape views. Schoeder (1992) indicates amenity values include not only quantitative aspects, but also qualitative features that involve perception, judgment, thought, emotion, imagination, and intuition. These themes appear to also have growing legal standing as environmental and aesthetic quality are receiving greater protection in the courts (Smardon and Karp 1993).

Amenity values were identified with natural, historical, wildlife, and cultural resources during a recent meeting on amenity resources and rural economic opportunities held in State College, Pennsylvania. In the context of rural areas, amenity resources were identified as those features of the environment that provide beauty and pleasure (Shafer and Siehl 1991). The results of this meeting were successful enough to influence the final version of the 1990 Farm Bill in which amenity resources and rural development were linked and included as a new economic development focus.

2.7 Spiritual Values

An emerging, increasingly prominent demand for public wildlands is defined by the spiritual values associated with the on- and off-site use of forests and other natural areas. Driver et al. observed recently:

While the spirituality-related values of natural areas might not be any more important today than they always have been, interests in and concern about these values are now being articulated more clearly and stronger and by a broader array of interest groups than in the past. It is a type of resource "use" that proactive, creative, and responsible resource managers must attend... (Driver et al. 1992:5)

The connection of spiritual values with forests emerges from a variety of sources. Schroeder (1992) identifies spiritual values showing up as one of the uses of the forest in the *Journal of Forestry* (Salwasser 1990), the National Research Council (1990) report on forestry research, and in the technical dendrology text of Harlow and Harrar (1958) in which a sense of reverence was mentioned when entering a giant sequoia grove. Schroeder also describes the challenge for the natural resource professional in dealing with spiritual values:

(T)he arguments for a land ethic are mostly abstract and intellectual, and are often justified solely in terms of material human benefits... But the educational process for natural resource professionals ignores the intuitive/feeling aspects of human experience, and focuses almost exclusively on a rational/thinking approach (Schroeder 1992:5).

This issue was highlighted in the "Workshop on Spiritual Values of Forests and Other Natural Areas" held in Santa Fe, New Mexico in 1992, where concerns were expressed both about the emergence and growth of spiritual values associated with natural resources in certain settings and contexts and the challenge of their measurement and understanding. How can managers manage or policy makers make policy when so little is understood about the interface between spiritual values and natural resource management?

3. CHANGES IN PRACTICES RESULTING FROM THE PROGRESSIVE CONSERVATION MOVEMENT

Implementation of the policy framework of the progressive conservationist movement was led by the Forest Service. And it resulted in several changes in natural resource practices documented most recently by Fedkiw (1989), MacCleery (1992), and Sedjo (1991) and summarized below.

3.1 Use of Resource Professionals

Among the first of these changes was the use of resource professionals in the practice of forestry. Scientific management was a central theme of the progressive conservationist movement, and trained forestry professionals were required for it to be carried out effectively. The Forest Service encouraged and facilitated the growth of the forestry profession in the United States. Beginning with Gifford Pinchot, its policy was to employ technically trained professional foresters. Since only two universities, Cornell and Yale, offered forestry curricula at the time, their numbers were few. By providing employment opportunities for foresters, establishment of undergraduate forestry educational programs at other colleges and universities was encouraged. By 1915, 13 schools offered forestry programs, and by World War II, the number increased by 10, a total of 23. Today, there are over 50 forestry schools in the United States.

The founding of the Society of American Foresters, the national organization representing the forestry profession, is another example of Forest Service encouragement of the forestry profession. Indeed, the initial organizational meeting of the Society was held in Gifford Pinchot's office in the Division of Forestry on November 30, 1900. Throughout its subsequent history, the agency has been a strong supporter of Society activities. In a similar way, the Forest Service played a leadership role in establishment of the range management profession and the Society for Range Management, the national organization representing the range management profession.

3.2 Establishment of Forestry and Range Research

Scientific management requires development of new knowledge to address identified problems. Forestry research was an important activity of the Forest Service from the time of formation of the Division of Forestry in the Department of Agriculture in 1876. It was enhanced by establishment of regional experiment stations beginning in 1908 and the Forest Products Laboratory in Madison, Wisconsin in 1910. It has further enhanced by the organization of the Branch of Research in the agency in 1915. The biggest stimulus to Forest Service research was its congressional recognition through passage of the McSweeney-McNary Act in 1928 in

which a comprehensive program of research in all phases of forestry and range management, including a nation-wide timber survey, was authorized. The Forest Service became the pre-eminent forestry research institution in the nation, a position it has held to this day.

The agency has augmented its research efforts through cooperative efforts with forestry schools and state agricultural experimentation stations. The result is that the forestry research establishment in the United States is unsurpassed in the world and has been so for many years. And its discoveries have led to the development and application of science-based forestry practices, increased efficiency in wood utilization, and the development of new wood products which often tend to extend timber supplies.

Range research by the Forest Service in the 1930s, 1940s, and 1950s was very productive, nearly as dramatic as they were in forestry. The range research program later became comparatively stagnant, focusing on red meat production. Recently, the focus of the program has shifted and once again is yielding important findings on rangeland ecosystems and their protection, management, and sustainable use.

3.3 Wildlife Conservation

The overexploitation of wildlife in the United States during the 19th century exposed the inability of the states to control the taking of wildlife. The Lacey Act of 1900 prohibited the transport of wildlife that had been illegally taken across state lines. The Migratory Bird Treaty Act of 1918 placed migratory birds under the custody and protection of the federal government. National wildlife refuges began to be established around the turn of the century, and additions were made in each subsequent decade. The Federal Aid in Wildlife Restoration Act, better known as the Pittman-Robertson Act, was passed in 1937. It authorized the allocation of revenues from an excise tax on firearms and ammunition for approved wildlife research and habitat acquisition, development, and maintenance.

States began to strengthen their game laws during the same time period as a better understanding of wildlife management began to emerge. Deer, elk, pronghorns, mountain goats and sheep, moose, turkey, and beaver were restocked in areas where their populations were depleted, and their numbers began to grow, often dramatically. Most of these species are now in abundant numbers. MacCleery writes: "Wildlife has been a major conservation success story" (1990:35).

3.4 Protection of Forests from Wildfire

The most important need in forest management at the turn of the century was the control of wildfire. And it continued to run unchecked for the first two decades.

In 1924, the Clarke-McNary Act authorized the Forest Service to provide technical and financial assistance to states for the prevention and suppression of wildfire. The fire control systems that were devised, covered federal, state, and private forest land in a cooperative effort both in funding and in detection and suppression. By the end of the 1930s, these efforts began to

show substantial results. Over 40 million acres were being burned annually in the 1920s. By the end of the 1930s, the number of acres burned had been reduced to about 30 million acres. The trend continued to decline until the 1960s where it has stabilized at about three to five million acres burned annually. This remarkable success was a result of improved forestry practice in terms of the detection and suppression of wildfire, the development of fire control organizations and facilities, and cooperative federal, state, and private control programs.

3.5 Cooperative Federal and State Programs

Cooperative federal and state programs were not limited to wildfire control. Section 4 of the Clarke-McNary Act also authorized financial and technical assistance to states to establish and operate nurseries to produce growing stock for windbreaks, shelterbelts, and farm woodlots. Furthermore, it authorized technical assistance to states to provide educational programs and technical assistance to farmers in establishing and improving their woodlots, shelterbelts, and windbreaks. While the initial annual appropriation limit in each case was small, \$100,000, these provisions extended federal cooperation with states into new areas. They were successful both in establishing nurseries and producing growing stock. Greeley wrote:

(S)tate forest nurseries have increased to 74 in number and a yearly production of 307 million trees. In 1949, 32 forest nurseries were also maintained by federal agencies and 13 by private forest landowners. During the five years from 1945 to 1949, 1,144,000 acres were planted, for which at least two-thirds of the stock was supplied from state production. As a 'pump primer', section 4 of the Clarke-McNary Act has been strikingly successful. (Greeley 1953: 185)

The three-point federal-state cooperative program formed in the Clarke-McNary Act - control of wildfires, production of growing stock, and educational programs for woodland owners - tended to expand and strengthen the state forestry agencies. As a result, many state forestry programs for private landowners were initiated, promoting better forest practices on private lands. Tree planting increased dramatically in the late 1950s and 1960s as part of the Soil Bank program. Nevertheless, it began to rise again and continued to grow to the present day. In the 1980s, more than 26 million acres were planted, including a record 2.3 billion seedlings planted on 3.4 million acres in 1988. While some of these increases were in response to government programs, the fact is that the increase in real prices of softwood sawtimber and lumber have improved expected financial returns of tree planting and forest management for timber growing.

3.6 Rehabilitation of Cutover Forest Land and Marginal Farm Land as National Forest Land

Often forgotten in current controversies over the protection, management, and use of the national forests in the East is that they were acquired land that had been abused, depleted, and poorly protected. Shands and Healey write:

The national forests of the East, in the main, were assembled from land that nobody wanted. In the nineteenth and early twentieth centuries, millions of acres were shorn of their most valuable timber species, sometimes burned over or badly eroded, and then left behind by a timber industry that had exhausted the resource and moved

West. Other forests, especially in the South, were created from grown-over fields of a marginal agriculture that had depleted the soil and disappeared. Most of the land purchased for first eastern national forests in the early 1900s cost the government less than five dollars an acre...

Today, this same land has been healed and rejuvenated...

The rehabilitation of the eastern national forests ranks as one of the most remarkable conservation achievements of this century. These national forests are now a treasure store of scenic, timber, wildlife, mineral, wilderness, and recreational resources. (Shands and Healey 1977:3)

4. CHANGES IN PRACTICES RESULTING FROM THE ENVIRONMENTAL MOVEMENT

Several changes in Forest Service practices occurred as a result of statutory policies enacted with increasing frequency during the post-war period as the environmental movement grew in strength. Changes in Forest Service practices brought about by laws enacted during the environmental movement include:

- increased consideration of non-market values in carrying out the policies of the Multiple Use-Sustained Yield Act;
- increased management responsibilities, programs, and activities for national forest lands reserved by statute for specific noncommodity uses;
- environmental impact analyses for agency actions that might or would have a significant impact on the environment;
- compliance with all federal, state, and local laws regulating air and water pollution;
- protection of threatened and endangered species and their critical habitat when they are located on the national forests, which is to prevail over all other conflicting uses; and
- periodic strategic and long-term land management planning.

4.1 Multiple-Use Management

Demands for all uses of the national forests grew rapidly during the 1950s. So, too, did the conflicts among the user groups, especially between outdoor recreationists and the timber industry. The Forest Service requested legislation by Congress to clarify its mission and to strengthen its position with regard to the challenges and competing pressures from different interest groups. The result was the Multiple Use-Sustained Yield Act of 1960. The wording of the act was authored by the Forest Service, and it placed into law the management policies of multiple use and sustained yield as then practiced by the agency. As a guide for decision making, the Multiple Use-Sustained Yield Act lacks rigor. As a legal performance standard, it is altogether lacking. The act is significant, however, because of the direction it provides for management of the national forests. It effectively states that the national forests are for the public as opposed to a few interest groups, that all resources of the national forest are to be given equal consideration.

Forest Service implementation of the act has been uneven. The fact is timber harvesting and related activities were and continue to be prominent features in Forest Service programs and

budgeting, and nontimber resources were neglected. Furthermore, "the (organizational) structure of the Forest Service and its reward system" have been tied to timber because "timber meant money, growth, and power for the agency" (Cubbage et al. 1993:331). On the other hand, the statutory requirement for equal consideration of all resources obligated the Forest Service, and the steady growth of the environmental movement provided a corps of careful observers intending to insure compliance with the law. The net effect was that the agency became engaged in multiple-use management, much more so than if left to its own volition.

4.2 Reservations for Specific Uses

The Wilderness Act was passed four years later (1964). Fifty-four areas totaling 9.1 million acres - all on national forest land - were designated as wilderness. Equally important, the Forest Service was directed by Congress to review all primitive and roadless areas for their suitability as wilderness. The Whiskeytown-Shasta-Trinity and the Spruce Knob-Seneca Rocks National Recreation Areas were established in 1965, and in 1968, the Wild and Scenic Rivers Act was passed, establishing a policy that certain rivers of national significance should be preserved in their free-flowing condition because of their unique scenic, recreation, geologic, fish and wildlife, historic, cultural or other similar values. The National Trails System Act was passed the same year. It preserved scenic and otherwise interesting trail routes through the United States.

With these three acts, Congress began the policy, which continues today, of reserving federal land that is unique or has some special uses, in other words, of establishing dominant use reserves on federal land, including the national forests. The result has been to reduce the area of federal land under multiple-use management and to make federal land managers more conscious of non-commodity uses of federal land. If such uses are not taken into account, Congress may reserve land exclusively for such uses.

4.3 Management and Use in Productive Harmony with Nature

The National Environmental Policy Act (NEPA) was signed into law on January 1, 1970. It established a national policy that the federal government use "all practicable means and measures ... to create and maintain conditions under which man and nature can exist in productive harmony..." To implement this policy, the act requires all agencies of the government to "include in every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment,..." what has come to be known as an environmental impact statement.

No other environmental legislation has had greater impact on the behavior of federal land management agencies than NEPA. Agencies were compelled to take into account systematically the environmental consequences of their actions. Failure to complete an adequate environmental impact statement has resulted in delays in implementing projects and has been the basis for lawsuits, many of which were successful.

4.4 Regulation of Pollution

A number of major environmental laws were enacted subsequent to the passage of NEPA. None of them have had greater impact than the Federal Water Pollution Control Act Amendments (FWPCAA) of 1972 and its amendments of 1977 and 1987. The act authorizes a comprehensive program for regulation of water pollution administered by the Environmental Protection Agency (EPA). Among other things, EPA is directed to issue to federal and state agencies: (1) guidelines for identifying and evaluating the nature and extent of nonpoint sources of pollutants, and (2) processes, procedures and methods to control pollution resulting from non-point sources. Section 404 of the act also requires landowners to obtain permission from the Corps of Engineers for dredge and fill operations in the waters and wetlands of the nation. This review and permit process has evolved into an extensive wetlands protection program. The act also provides that federal agencies be subject to, and comply with, all federal, state, interstate, and local requirements for water pollution abatement and control.

The restrictions of non-point pollution from silvicultural activities has had important impacts on both public and private forest management. FWPCAA required states to prepare "208 plans" to prescribe methods for controlling non-point source pollution from agriculture, silviculture, mining, and construction. However, lack of adequate technical and financial resources at the state level led the Council on Environmental Quality to conclude in 1976 that "there has been little constructive progress in ... regulation of (non-point source pollution)" (Council on Environmental Quality 1976:23). The Water Quality Act of 1987 expanded federal assistance and direction regarding non-point source pollution, requiring each state to identify navigable waters impacted by non-point source pollution, indicate the sources of pollution, and to describe best management practices for dealing with each type of non-point source pollution.

State best management practices (BMPs) applied to runoff of pesticides as well as excessive sedimentation of watercourses, limiting the broadcast application of silvicultural herbicides. Much of the excessive sedimentation from forest management activities comes not from recently harvested forests, but from surface runoff from unpaved access roads and skid trails. Thus, FWPCAA through state BMPs has strongly influenced the extent and construction of forest road systems and their location relative to riparian areas. Where several forest landowners share a common watershed, FWPCAA has brought closer coordination and cooperation among adjacent owners in order to avoid unacceptable cumulative impacts on water quality. More importantly, it provided technical planning assistance through the Environmental Protection Agency, the Corps of Engineers, the U. S. Fish and Wildlife Service, and the Department of Agriculture, requiring these agencies to coordinate more closely with one another in assuring compliance on public lands and facilitating landowner compliance with voluntary BMPs.

Considerable controversy has developed regarding the definition and delineation of wetlands subject to Corps of Engineers permitting processes, especially in highly productive forest lands in low-lying areas such as the coastal plain of the southeastern United States. In order to reduce opposition from agricultural and forestry interests, the Clean Water Act of 1977

amended section 404 to exempt "normal farming, silvicultural, and ranching activities" from most of the dredge and fill restrictions. Nevertheless, forestry practices commonly used on private lands in the Southeast continue to be challenged as violating the purposes of the Clean Water Act, especially those involving the draining or degradation of wetlands, and regulation of water pollution may yet have a significant impact on public and private forest management.

The Clean Air Act of 1970 regulates ambient air quality, authorizing the federal government through EPA, to impose controls if states do not satisfy national standards. The 1977 amendments provide that federal agencies be subject to, and comply with, all federal, state, interstate, and local requirements for air pollution abatement and control. They also establish standards for Class I air quality areas which include many wilderness areas located in national forests. The major impact of the Clean Air Act on forest management has been through limitations on the amount of particulates and smoke generated from prescribed burning. At first, this was an issue concerning burning after timber harvesting for slash disposal and site preparation. Increasingly, however, regulation of burning under the Clean Air Act has become a serious limitation on the use of prescribed fire to maintain the health, productivity, and biological diversity of fire-dependent ecosystems such as ponderosa pine ecosystems in the Inland West or long-leaf/wiregrass ecosystems in the southeastern United States (Agee 1993; Sampson and Adams 1994).

4.5 Protection of Threatened and Endangered Species

The Endangered Species Act of 1973 established a national policy for the conservation of endangered species and the ecosystems upon which they depend. The act was passed without political debate and only a modest amount of publicity. Subsequently, it has proven to have far-reaching effects and been the cause of several major political controversies.

The Endangered Species Act has two major processes: (1) designation of species as threatened or endangered through listing, and (2) the protection of threatened and endangered species and their critical habitat. Two federal agencies and their cabinet officers have the authority to list species: the U. S. Fish and Wildlife Service under the secretary of the interior and, in the case of anadromous fish and most marine species, the National Marine Fisheries Service under the secretary of commerce. Once a species has been listed, federal agencies are required to ensure, in consultation with the Fish and Wildlife Service or the National Marine Fisheries Service, that their actions will not jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of the habitat of such species. The presence of a threatened or endangered species on federal lands drastically affects management. Indeed, their protection upon federal land that is the habitat of an endangered or threatened becomes the principal use of the land, superseding any conflicting use. The number of threatened and endangered species is significant. As of December 4, 1992, 246 species occurred on national forest system land or were likely impacted by Forest Service activities.

4.6 Comprehensive Land Management Planning with Public Participation

The Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 is an effort to resolve conflicts over the use of natural resources through comprehensive, long-term planning. It provides for a periodic ten-year Renewable Resource Assessment for the United States as a whole, regardless of land ownership, and for a periodic five-year Renewable Resource Program, based on the Assessment, for management of the National Forest System, Forest Service Cooperative Forestry Assistance programs to states and private landowners, and Forest Service research. Two years later, the National Forest Management Act (NFMA) was passed, providing standards and guidelines for planning and management of the national forests. NFMA was passed in response to the decision by the Fourth Circuit Court of Appeals, upholding a lower court decision, that timber sales in the Monongahela National Forest violated provisions of the Organic Administration Act of 1897. It was constructed as an amendment to RPA.

RPA and NFMA are the congressional response to widespread public protest during the 1960s and 1970s over national forest management, particularly over the widespread use of even-age management and clearcutting. They are process-oriented, rather than outcome-oriented, intending to establish a framework by which the Forest Service and various public interests can reach agreement on the management of the national forests. Public participation is part of the process: first, as a result of the procedural rules implementing NEPA, and second, as a result of the wording of section 6 of NFMA, that "the secretary (of agriculture) shall provide for public participation in the development, review, and revision of land management plans."

Another feature of NFMA whose implications were not well appreciated at the time of passage was the requirement for guidelines for land management plans 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,..."

5. CHANGES IN FOREST AND RANGE CONDITION AS A RESULT OF PRACTICES OF THE PROGRESSIVE CONSERVATION MOVEMENT

5.1 Forest Condition

As mentioned earlier, Fedkiw (1989), MacCleery (1992), and Sedjo (1991) published separate studies on the condition and trend of U. S. forests. They each reached the same conclusion that the forests of the nation, in most of their major dimensions, are in significantly better condition today than they were a century ago. Major reasons for the conclusion are:

- The area annually burned by wildfire has been reduced by more than 95 percent.
- The cutover land that existed in 1900 - some 80 million acres - has long since been reforested, including the watersheds in the East whose denuding resulted in the disastrous flooding that led to the passage of the Weeks Act of 1911.
- Forest growth rates have exceeded harvest rates throughout the post-war period. Indeed, the total volume of growing stock has risen steadily through the five timber inventories taken over the period 1952 through 1988.

- Tree planting on all forest ownerships has increased dramatically since World War II and was at record levels during the 1980s.
- Wood utilization has increased in efficiency since the early 1900s, driven by steady increases in the real prices of sawtimber, enabled by the development and application of new technology.
- Conversion of forest land to cropland has stabilized. Actually, there has been no net increase of cropland for the last 70 years. Conversions have been offset by cropland abandonment.
- Some species of wildlife have experienced remarkable increases in their populations, including "wild turkey; beaver; egrets, herons, and many other wading birds; wood ducks and several other species of ducks; whistling swans; Rocky Mountain elk, pronghorn antelope; bighorn sheep; even white-tailed deer throughout most of its range" MacCleery 1991:6).

It is estimated that in 1630, the beginning of the settlement of North America by Europeans, there were 1.0 billion acres of forest land, 46.1 percent of the total land area, in what is now the United States. By 1907, there were 759 million acres of forest land, comprising 33.5 percent of the total land area; by 1992, there were 737 million acres of forest land, 32.5 percent of the total land area. Fedkiw, MacCleery, and Sedjo present substantial evidence and vigorously argue that U. S. forest lands of 1992 are in better condition than U. S. forest lands of 1907.

Nevertheless, serious questions can be asked about the comparative health of forests today as opposed to those of a hundred years ago. How resilient are they to disturbance in a comparative sense? No apparent answer is likely. What is their relative genetic diversity? Probably less because of widespread use of nursery stock in tree planting. What is their relative species diversity? Probably less because of simplification of forest ecosystems throughout the country. It is very likely that more species of plants and animals are in danger of going extinct today than they were 100 years ago. Are forests today more or less prone to disease epidemics and insect infestations? Probably more prone due to elimination of wildfire from ecosystems in which fire is an integral part. How severe are the impacts of exotic diseases, such as Dutch elm disease and the chestnut blight, and insects, such as the gypsy moth? Probably severe, at least in some regions of the country.

Simply stated, however favorable the current condition and trend of the forests of the nation, there are still important reasons for concern and caution.

5.2 Range Condition

Data on range condition are lacking in many different ways. One of the reasons is the first national assessment of rangeland was made in 1936 (U. S. Congress 1936), and the second, some thirty years later. Furthermore, there is disagreement on the term "range condition," which refers to the relative health of the range. Originally, range condition referred to range productivity in terms of livestock grazing and was based on a comparison of actual forage production with desired or potential. The concept evolved to one of actual production of

vegetation of a site to an ecological norm, such as climax vegetation. It has continued to evolve to include to some ecological standard but also the desired use of the site.

The best information available is anecdotal evidence and the judgments of respected observers. Thadis W. Box is one such observer, and he recently wrote:

I believe that the American range is in the best condition that it has been in this century. This view is primarily based on my review of historical reports and our collective experience. This does not mean the job of restoring the range from the past abuses has been completed. There are still many areas in need of management. It does indicate that the range can be improved with good management and favorable climatic conditions (Box 1990:111).

Later, in the same paper he writes:

I believe that the trend, on the average, has been up for rangelands over a number of decades and that the range is in the best condition of this century. This is my professional opinion and cannot be well documented with specific surveys and reports (Box 1990:113).

It is clear that a combination of factors - overgrazing, proper management practices, and drought - caused a deterioration of range conditions in the West, particularly the Southwest. What is not clear is the extent to which conditions have improved, a matter characterized in the recent National Research Council report *Rangeland Health* (1994) as one of "sharp debate." The debate will not lessen in the foreseeable future for there is no systematic data set. The report states:

All national assessments (of rangeland condition) suffer from the lack of the lack of current, comprehensive, and statistically representative data obtained in the field. No data collected using the same methods over time or using a sampling design that enables aggregation of the data at the national level are available for assessing both federal and nonfederal rangelands (National Research Council 1994:26)

The National Research Council report makes recommendations for a national system of inventorying and monitoring rangeland health, but they are yet to be put in place. If they are, assessments can be made of the management and use of rangelands in the future. Assessments of the past, however, will continue to be made on the basis of fragmentary and anecdotal evidence.

6. CHANGES IN FOREST AND RANGE CONDITION AS A RESULT OF PRACTICES OF THE ENVIRONMENTAL MOVEMENT

Changes in forest and range condition as impacted by the values, policies, and practices of the environmental movement are more difficult to assess than those associated with the progressive conservation movement. The reason in some cases is the laws establishing the policies are simply laws of compliance, coupled with the fact that the Forest Service is not the implementing agency. In others, it is because of the extended linkage between practice and condition, like the linkage between a well conceived plan and its implementation. The reason in still other cases is uneven implementation of public policy by the Forest Service.

6.1 Multiple Use and Sustained Yield

Equal consideration of all renewable resources of the national forests "in the combination that will best meet the needs of the American people...", coupled with the relative increase in environmental values of the public, would suggest growth would occur in the relative emphasis of noncommodity resources in the management and use of the national forests vis-a-vis commodity resources.

No incontrovertible evidence exists that this is the case. Timber harvesting in the national forests increased rapidly after passage of the Multiple Use-Sustained Yield Act in 1960 (continuing a post-war trend), reaching what were considered sustainable harvest levels under then-current management plans in the late 1960s. The nondeclining even flow policy in 1973 and forest planning required by the National Forest Management Act of 1976 caused significant changes in the timber sale program resulting in a modest decline in harvest levels - with large year-to-year variations caused by economic conditions - until 1990. Subsequently, harvest levels have rapidly declined "to reflect," as the 1993 update of the RPA Assessment puts it, "changing societal values" (USDA Forest Service 1993:28). The extent of range grazing by domestic livestock on the national forests has remained fairly constant since 1953, about the same after passage of the Multiple Use-Sustained Yield Act as before (Joyce 1989:40). In contrast, recreational use of the national forests has burgeoned as have water and fish and wildlife uses.

Some of these characterizations are crass because of problems in aggregation, and the leading example is recreational use of the national forests which is much different today than it was in 1960. Not only are there many more people doing activities that were done in the 1960s, such as picnicking, backpacking, camping, boating, and downhill skiing, people are also doing things that were not done in the 1960s, such as off-road vehicle driving, mountain biking, wildlife observation, kayaking, and snowmobiling. Indeed, recreational use of the national forests is a general category under which over 30 activities can be listed (English et al. 1993:6-8).

While the relative balance may have changed in the management and use of the national forests in terms of noncommodity and commodity resources, the critical question is the timeliness and effectiveness of the Forest Service response to the corresponding social values and public policies. Did the agency respond as rapidly and as ably as it might have? The answer is an unqualified no. The last 34 years have been years of continuing conflict over the management and use of the national forests, and the sources of criticism have come from the entire range of users of the national forest. The fact that no successful lawsuit has been brought successfully against the Forest Service for violation of the multiple-use provision of the Multiple Use-Sustained Yield Act is not compelling. As one court put it, the wording of the act, including its multiple-use provision, "breathes discretion at every pore" (*Perkins v. Bergland*). The Forest Service has exercised its legal discretion in terms of the balance of commodity and noncommodity uses of the national forests, and the unfortunate result is a continuing erosion of public support. The Forest Service is where it is today by design not accident.

Furthermore, it is in its current position because its efforts and the forest conditions resulting from them, were rejected by public opinion and the courts.

A second question with regard to implementation of the Multiple Use-Sustained Yield Act is whether a "sustained yield of the several products and services" of the national forests has been ensured? As indicated above, the results are ambiguous. Substantial changes in sustainable harvest levels on national forest timber have occurred on at least three different occasions. The first was after the Douglas-fir Supply Study (1969) which concluded that if the Forest Service continued to use then current rotation management practices and utilization standards, existing harvest levels could not be sustained after the first rotation. The Forest Service issued Emergency Directive No. 16 in 1973 after public outcry and internal reaction to the study. The directive required timber planners to look beyond the first rotation and set the calculated allowable harvest at levels that would not decline, what came to be known as the nondeclining even flow policy.

Sustainable harvest levels were adjusted as a result of forest planning because: (1) substantial areas of land were removed from the allowable cut base as wilderness or as undeveloped reserves, and (2) harvest planning and practices on lands in the base were modified to minimize adverse impacts on the environment and harmful effects on noncommodity uses of the forests. Sustainable harvest levels were adjusted again in the early 1990s to meet habitat requirements of threatened and endangered species in the Pacific Northwest. These changes illustrate that sustainable levels of products and services of the national forests are not fixed. They have to be reassessed and adjusted from time-to-time as social values change. The challenge for the Forest Service is the timeliness and effectiveness of its response. To date, that response has been uneven and the subject of much public criticism.

6.2 Wilderness and Other Restricted-Use Designations

Changes in wilderness, wild and scenic river, and recreation designations during the past thirty years are shown in Table 3. They are substantial, the result of repeated affirmation by Congress of the policy of establishing restricted-use reserves to protect federal land considered unique or special in some way.

Table 3: National Wilderness, Wild and Scenic Rivers, and Recreation Areas in the National Forest System, 1965, 1970, 1980, 1992

	1965	1970	1980	1990	1992
National Wilderness Areas ^a	9.1	9.9	17.6	33.3	33.6
National Wild and Scenic Rivers ^b	n. a.	457.1	1417.2	3705.3	4604.4
National Recreation Areas ^a	0.2	1.4	6.1	7.5	8.3

^a Millions of acres

^b Miles

Forest Service support for legislation carrying out this policy was unenthusiastic for philosophical reasons. It limited agency discretion. Furthermore, it eroded the authority of (forestry) professionals in making site-specific management decisions and was contrary to the principle of decentralization which is central to the organizational structure of the agency. Hence, while

wilderness, wild and scenic river, and recreation designations have grown over the past thirty years, the Forest Service has been considered more of an obstacle than an agent of change. The impact on the condition of the national forests was to limit their development in designated areas. The Forest Service's philosophical objections to wilderness, wild and scenic river, and recreation area designations effectively sided the agency with developmental interests.

6.3 National Environmental Policy Act

Congress considered and passed the National Environmental Policy Act with little attending public controversy. That soon changed, however. For the willingness of the court's to refine and extend NEPA procedural requirements and criteria for the adequacy of impact statements was not anticipated. The Forest Service had to amend its planning and decision-making processes to comply with NEPA, particularly those dealing with public participation. Indeed, the agency was engaged at the time in a re-examination of many of its policies and programs as a result of the growing controversy over clearcutting in the national forests and the failure of the Timber Supply Act in the House of Representatives. In October 1970, Forest Service Chief Edward P. Cliff wrote an interoffice memorandum to all employees which said in part:

Our programs are out of balance to meet public needs for the environmental 1970s, and we are receiving mounting criticism from all sides. Our direction must be and is being changed... The Forest Service is seeking a balanced program with full concern for the quality of the environment. (Cliff 1970)

The agency's compliance with NEPA was a mixed success. The Forest Service was commended for its NEPA efforts in a report of the Council on Environmental Quality in 1974 (Council on Environmental Quality 1974:378-381). At the same time, it was often in court in NEPA lawsuits, the majority of which it was losing. Forest Service litigation successes in NEPA lawsuits are summarized in Table 4. It lost more than it won during the first nine years of implementation, and it won more than it lost in the next fourteen years.

Table 4: Forest Service NEPA Litigation Successes

	Wins	Losses
1970-1988 (published cases)	20	26
1989-1992 (published and unpublished cases)	39	10
T O T A L	59	36

Source: Memorandum to F. Dale Robertson, Chief, Forest Service, from James P. Perry, Assistant General Counsel, Office of General Counsel, U. S. Department of Agriculture, February 16, 1993.

The data in Table 4 suggest Forest Service compliance with NEPA has improved over time. NEPA is a law of compliance, a law in which an agency has little discretion. It simply must comply with the statutory requirements, including their implementing regulations. Complying with something required is not what sets apart a strong government agency intent on serving the people of the nation. It is doing only what is necessary. Accomplishments become substantial, recognized, when they go beyond the minimum.

The net effect of NEPA on the condition of the national forests is arguable. NEPA has caused the Forest Service to become more sensitive to the environmental consequences of proposed actions. It would be difficult to argue, however, that the environmental condition of the national forests has improved over the past 25 years because of passage and implementation of NEPA. The causality is not that direct. Perhaps it would be more pertinent to ask what would be the condition of the national forests if NEPA were not enacted in 1970.

6.4 Water and Air Pollution

Generally, the Forest Service has complied with federal, state, and local laws regulating air and water pollution, having a positive effect on the condition of the national forests. Nevertheless, there are significant problems. Smoke management from prescribed burning has been a continuing source of difficulty for the Forest Service, state forestry agencies, and private forest managers in complying with the Clean Air Act. Federal and state air quality regulations severely limit weather conditions under which prescribed burning is permitted, often making it impossible for forest managers to complete necessary slash disposal and site preparation. Alternative mechanical and chemical methods do not have the same positive effects as fire, such as favorably modifying soil chemistry, and often have negative side effects of their own.

Environmentalists are becoming as concerned as forest managers over the potential limitations of the Clean Air Act on the use of prescribed fire. Many fire-dependent ecosystems where fire has been controlled or excluded for several decades have undergone substantial change in the composition of both plant and animal species, with possible loss of some species. Largely due to the exclusion of fire for nearly a century, forest conditions in some regions of the country are at a near crisis (Sampson and Adams 1994). Resulting changes in tree species composition and density have left forests in large areas of the Inland West in a weakened condition, no longer able to withstand normal cycles of drought and endemic insect infestations and disease epidemics. Mortality rates due to insects and diseases have been extraordinarily high in these weakened forests, creating large accumulations of heavy fuels and setting the stage for catastrophic wildfires of unprecedented size and intensity.

Forest Service accomplishments in terms of air and water pollution are modest principally because the relevant laws are laws of compliance. Further, the agency is not the lead agency. Hence, air and water pollution in and on the national forests is an important, but still a secondary priority.

6.5 Protection of Threatened and Endangered Species

Two hundred and forty-six federal threatened and endangered species occurred on national forest lands as of December 1992, approximately one-third of the total number of such species listed at that time. While several other federal agencies had similar numbers and percentages, none of them were embroiled in controversy to the extent the Forest Service was. A leading reason was protection of northern spotted owl habitat, primarily late successional stage coniferous forests, in the Pacific Northwest. An increasing body of evidence indicated that logging of old growth forests were causing spotted owl populations to decline.

Criticism of the Forest Service timber sale program mounted, and the agency was slow to respond.

On March 23, 1991, Judge William L. Dwyer ruled that nearly all sales in the 17 national forests with spotted owls be stopped until the Forest Service prepared a management plan and an environmental impact statement for the species. The essence of the injunction was agency compliance environmental law, and Judge Dwyer commented:

The records of this case and of No. C88-573Z show a remarkable series of violations of the environmental laws (Dwyer 1991:18).

He expanded on the point later in the decision:

More is involved here than a simple failure by an agency to comply with its governing statute. The most recent violation of NFMA exemplifies a deliberate and systematic refusal by the Forest Service and the FWS to comply with the laws protecting wildlife. This is not the doing of the scientists, foresters, rangers, and others at the working levels of these agencies. It reflects decision made by higher authorities in the executive branch or government (Dwyer 1991:21)

Still later, Judge Dwyer said:

The problem here has not been any shortcoming in the law, but simply a refusal of administrative agencies to comply with them (Dwyer 1991:34)

Unfortunately, the old growth-spotted owl issue is not unique. Similar, though lesser, controversies have occurred over timber harvesting in the national forests and protection of threatened and endangered species as well as other wildlife species whose populations are declining, i. e., sensitive species. Examples are clearcutting near red-cockaded woodpecker nests in national forests in Texas, logging and roadbuilding in national forests in Montana and their impacts on grizzly bear and bull trout populations, and timber harvesting in southern Appalachian national forests and its impact on black bears. In each case, the Forest Service effectively placed itself in the position of being less than fully committed to protecting threatened, endangered, or sensitive species in carrying out its national forest management activities.

The prohibition in section 7 of the Endangered Species Act is very clear. Chief Justice Warren Burger wrote the Supreme Court decision in *TVA v. Hill*, and he said:

One would be hard pressed to find a statutory provision whose terms were any plainer than those in section 7... Its very words affirmatively command all federal agencies "to insure that action authorized, funded, or carried out by them do not jeopardize the continued existence" of an endangered species or "result in the destruction or modification of habitat of such species...". This language admits of no exception (Supreme Court of the United States 1978).

Forest Service compliance with the Endangered Species Act is probably the weakest with respect to all the other laws and policies of the Environmental Movement. It puts the agency directly at odds with most of the interest groups that occupy the continuum earlier described by Culhane from progressive conservation to environmentalism and all of them from environmentalism to preservation.

6.6 Renewable Resources Planning and National Forest Management

Implementation of the Forest and Rangeland Renewable Resources Planning Act (RPA) is the responsibility of the Forest Service, and if it were successful, the agency would have a framework for developing a strategic plan for its future direction that would have broad public support and that would be of assistance to Congress in establishing budgetary priorities in the annual appropriations process. The result in terms of forest and range condition would be broad agreement on the respective roles of private and public forests and rangelands, the general outlines of Forest Service programs, and the overall management and use of the national forests. Unfortunately, no such agreement exists, in large part, because the agency's success in implementing RPA has been incomplete.

RPA implementation has been the subject of many congressional hearings and studies by various groups and individuals both inside and outside of government, and the problems identified and corresponding recommendations are fairly well recognized and agreed upon. A recent study by the Office of Technology Assessment (1990) summarizes them under three categories of problems, namely data, analysis, and direction.

- Data:
 - Incomplete and weak data in the RPA documents;
 - Poor linkage of data among the RPA documents;
- Analysis:
 - Poor foresight of impending problems for resource management;
 - Lack of evaluation of opportunities for improving yields of renewable resources;
 - Poor display of benefits and costs of (RPA) Program activities;
- Direction:
 - Weak guidance for addressing renewable resources issues;
 - Poor support for budget decisions;
 - Poor commitment (to RPA) from (executive branch and congressional) decision makers;
 - Poor evaluation of (RPA) Program implementation. (Office of Technology Assessment 1990:11)

Implementation of RPA is not without some accomplishments, and they should be recognized. The data in the documents have substantially improved over time with each successive effort. Correspondence between the principal documents - the Assessment and the Program - has improved. Roles, issues, strategies, and initiatives were systematically treated in the 1990 RPA Program, and as a result, comparatively strong guidance to Forest Service personnel was given for addressing natural resource issues, a significant improvement over the past. Finally, the Annual Report has improved, meeting more of the requirements of RPA.

Failures in implementation of RPA cannot be placed solely with the Forest Service. Congress, the Office of Management and Budget, and the Office of the President must share the blame.

Management of the national forests is probably as controversial today as it was at time of passage of the National Forest Management Act (NFMA). As of September 30, 1992, 119 forest plans were completed and guiding management of those national forests. Only four plans remained uncompleted at that time, all of which were in California - the Klamath, Shasta-Trinity, Mendocino, and Six Rivers National Forests. These four forests were revising their previously

issued draft forest plans as a result of the listing of the spotted owl as a threatened species. Has national forest planning improved the condition of the national forests? Has it been effective in setting goals and conditions for the national forests, identifying standards and guidelines for activities, and describing actions and funding necessary to achieve the goals? Anecdotal responses must be given to each of these questions, for no systematic evidence is available which allows a conclusion that the condition of the national forests have improved as a result of forest planning.

Like RPA, many congressional hearings and studies by various groups and individuals both inside and outside of government have been conducted on Forest Service implementation of NFMA, and many of the findings are critical. Two of the leading studies are *Forest Service Planning: Accommodating Uses, Producing Outputs, and Sustaining Ecosystems* by the Office of Technology Assessment and *Critique of Land Management Planning* by the Forest Service with assistance by The Conservation Foundation and the Department of Forestry and Natural Resources, Purdue University. The summary recommendations that followed from the latter study are:

- Simplify, clarify, and shorten the planning process;
- Ensure high-quality planning;
- Improve the organizational and administrative infrastructure for planning;
- Strengthen and clarify the ties between forest plans and programming, budgeting, and appropriation activities;
- Define, clarify, and explain the RPA, NFMA, and NEPA processes and their integration into the agency's framework for multilevel planning decision making, and management;
- Develop a comprehensive strategy with clearly assigned responsibilities for implementation and maintenance of forest plans;
- Refurbish the mechanisms for quality control, management review, and monitoring forest plans. (Larsen et al. 1990:ix-x)

The OTA study concluded:

Despite these problems, NFMA planning can fulfill the strategic process envisioned by Congress. Clearer legislative direction, a broader information base, targets for ecosystem health as well as for annual outputs, more effective participation, and a variety of analytical technologies could lead to technically and politically feasible national forest plans and management. Distinguishing and organizing monitoring, linking activities to results, and involving the public in monitoring can assure that forest plans are implemented. Appropriations by management activity, realistic budget assumptions in forest plans, better accounting for special accounts and trust funds, and fair compensation to counties for the tax exempt status of federal lands could lead to federal financing consistent with the forest plans and overall federal budget constraints. Finally, a more interactive RPA-NFMA planning process, with forest plans as the baseline for the national forest system and with long- and short-term direction for all resource values and all branches of the agency, can result in a national direction that can be achieved through national forest planning and other

Forest Service activities. These changes can complete the strategic planning process for the national forests that was begun with NFMA and has been evolving under Forest Service leadership. (Office of Technology Assessment 1992: 29-30)

While criticism of national forest planning has been substantial, and a significant number of lawsuits have been filed against the Forest Service for its implementation of NFMA, the agency has been quite successful in court. Twenty-one NFMA cases (published and unpublished) were adjudicated during the period 1987 through February 2, 1993. The court ruled in favor of the Forest Service in 16 cases and against it in 5. (Perry 1993)

6.7 Public Involvement

Public participation in Forest Service planning is required by statute. The Multiple Use-Sustained Yield Act requires that management of the resources of the national forests be "in the combination that will best meet the needs of the American people;..." Of course, such needs can be determined most effectively by the Forest Service interacting with the public and determining its values and wants. The implementing regulations for the National Environmental Policy Act, specifically 40 CFR 1500, require agencies among other things: (1) to examine public concerns in advance of decision making, (2) to coordinate activities with other government agencies at all levels, and (3) to solicit comments from interested individuals and organizations. Public participation is not required in RPA directly. Instead the requirement flows from the provision that the RPA program "be developed in accordance with principles set forth in ... the National Environmental Policy Act of 1969." In contrast, Congress was direct in its requirement for public participation in NFMA. Section 6(d) reads: "The secretary (of agriculture) shall provide for public participation in the development, review, and revision of land management plans..."

There have been many studies of the Forest Service's public participation efforts, and virtually all of them are critical. The Forest Service may be complying with the "letter of the law", but not its "spirit." (Russell et al. 1990:1) Much of the problem has to do with the model the Forest Service uses, which is based on due process, on receiving full and equal representation of various views and values, which tends to compell the participants into adversarial positions. The process is inherently divisive and promotes conflict and distrust among the interests and with the agency. As one study concludes: "Hardly anyone is satisfied by the current model of public participation." (Shands et al. 1990:18)

If the Forest Service's public participation efforts were successful, its understanding of the values and desires of the public would be greater. It could make its programs and activities for management of the national forests more responsive, and they would receive more public support. Unfortunately, this is not the prevailing situation, to the detriment the condition of the national forests.

7. CHANGES IN CONDITION OF PRIVATE FOREST LAND AS A RESULT OF PRACTICES OF THE ENVIRONMENTAL MOVEMENT

Many environmental laws were passed at the state level in the early 1970s as a part of the environmental movement. Several states, particularly in the West, also passed laws regulating forest practices or revised old ones to increase environmental protection and to insure forest land productivity. Specific concerns at the time were protection of water quality and riparian zones; control of the use of herbicides; regulation of timber harvesting; maintenance of soil productivity, and forest regeneration. In addition, almost all forested states that did not pass new laws regulating forest practices, developed and promoted voluntary best management practices to comply with the area-wide planning requirements of FWPCA.

In the late 1980s-early 1990s, another wave of state regulation of forest practices occurred, driven primarily by public concern over continued degradation of water quality, wildlife habitat protection, and maintenance of biological diversity. The outstanding example is California where major revisions were made to what was already one of the most comprehensive, restrictive state forest practices laws in the country. Similar revisions were made in the state forest practices laws in Oregon and Washington. In all, seven states enacted laws regulating forest practices during the period 1986-1992 (Cubbage et al. 1993:422). Furthermore, the credible threat of state regulation of forest practices in the South compelled the forest industry to increase protection of environmental values on industrial lands.

As a result, one would expect that conditions on private forest lands in the United States have generally improved in terms of both environmental protection and timber growing. Nevertheless, public uneasiness continues over practices and the condition of private forest lands and for good reason. In the South, for example, where the extent of regulation of forest practices is comparatively small, less than expected rates of reforestation have raised both economic and environmental concern. The relative lack of reforestation and related investments following timber harvesting on many nonindustrial private forest lands results in increased pressure on industrial lands as a timber supply source at a time in which there is also mounting pressure on industrial lands to protect habitat for threatened or endangered species, such as the redcockaded woodpecker. The higher timber values that normally accompany decreased timber supply also increase the risk that landowners will liquidate their forest inventories prematurely and, with little state-level regulation, do so with little regard for environmental values.

Concern over implementation of the Endangered Species Act has resulted in some unintended and perverse consequences, specifically accelerated timber harvesting and a decline in wildlife habitat conditions on some private forest lands. In both the South and the Pacific Northwest, uncertainty over possible restrictions on timber harvesting on private forests found to host or potentially host populations of threatened and endangered species, have reportedly stimulated an increase in timber harvesting. In many cases, the harvesting is premature in terms of the age class of the timber, but owners are willing to accept lower timber values than risk, by waiting, the right to harvest at all. Furthermore, this concern works against the decision to reforest.

In areas affected by recent cutbacks in timber supply from federal forest lands, notably the Pacific Northwest, increased stumpage prices have contributed to accelerated rates of timber harvesting. This spate of harvesting on private lands may have set the stage for a sharper than anticipated reduction in future regional timber supplies with negative implications for rural, timber-dependent communities and political pressure for a return to unsustainable rates of timber harvesting on federal forest lands. Corporate takeovers and leveraged buy-outs of the 1980s are still causing negative repercussions on private forest lands. In some cases, the pressure to service high-interest bonds is resulting in the systematic liquidation of timber inventories with little regard for the subsequent condition of the forest or impacts on environmental values. In other cases, large tracts of contiguous forest land have been sold off for subdivisions or for development as vacation home sites (Harper et al. 1990). Efforts have been made by both federal and state governments to address these challenges through such mechanisms as conservation easements and outright acquisition, but insufficient funding has limited their success.

Silvicultural practices in forested wetlands, exempted under the 1978 amendments to the Clean Water Act, are under scrutiny. The continuing loss of forested wetlands throughout the United States has caused environmental challenges to practices such as "bedding" or periodic draining in areas of the southeastern coastal plain where high water tables result in temporary flooding following timber harvesting. Clearcutting, which is used extensively on private forest lands, is problematic. Increasingly, the mosaics of early-successional, even-age stands that are the rule on industry lands are regarded as incompatible with sustaining the natural diversity of plant and animal communities. In a few instances, however, private forest land owners are coordinating their efforts with management of adjacent federal lands so that, at the landscape level, early successional areas on private lands complement the management of public forest land that emphasizes the protection of ecological values, including biological diversity. Nevertheless, efforts currently exist in several states and at the federal level to outlaw clearcutting on both public and private lands.

Ironically, management of both industrial and nonindustrial private forest lands for the purpose of maximizing fiber production has resulted in some forests that are ecologically healthier than those on neighboring public lands. In both the Southeast and Inland Pacific Northwest, in areas characterized by fire-dependent forest types such as Ponderosa pine and shortleaf pine, selective harvesting has maintained a stocking density and species composition similar to what would occur under a natural regime of periodic, low-intensity ground fires. In contrast, on many public forest lands in these regions, the combination of a century of fire exclusion and a reliance on clearcutting, with few if any silvicultural treatments in between rotations, has resulted in overstocked forests with small diameter, low-vigor trees unable to withstand natural variations in climate and insect and disease pathogens. Many of these forests have experienced high levels of mortality and present a wildfire risk of a scale and intensity that is likely to result in plant and animal communities quite different from those that would naturally occur.

Changes in the condition of private forest lands as a result of the policies and practices of the environmental movement thus run in two opposing directions. The increased regulation of forest practices and protection of the forest environment through state forest practices acts and voluntary best management practices have generally served to raise the minimum standard of forestry practice on private lands in the United States. On the other hand, environmental protection tends to reduce timber inventories available for harvest on private lands which exerts upward pressure on stumpage prices. Further, reduction of the timber sale program on federal forest lands, in large part for the purpose of protecting the environment, has also tended to exert pressure on stumpage prices. The result has been accelerated harvesting on private lands, and in some cases, harvesting in trees and stands that are of young age.

Other things being equal, higher stumpage prices should encourage investment in tree planting and intensive management for timber production on private lands. Whether the recent and current level of investment in timber management is sufficient to stave off sharp increases in real stumpage prices in the future is arguable. Similarly, what is the net effect of these opposing forces in terms of the condition of private forest lands, is very difficult to assess, certainly with available data.

8. CONCLUSION: FOREST SERVICE ACCOMPLISHMENTS

The Forest Service has many significant accomplishments if measured in terms of the values and public policies of the progressive conservation movement. Such values would include belief in the efficacy of rationality and science, efficiency in government, conservation of natural resources, and public land retention. Indeed, as described earlier, the Forest Service was a leader in the use of natural resource professionals, forestry and range research, the protection of forests from wildfire, the development of cooperative programs to reforest cutover lands, the acquisition and rehabilitation of cutover forest and marginal farm land to become part of the National Forest System. Furthermore, at least until the late 1970s, the agency was often characterized as a model public agency in terms its effectiveness and the esprit de corps of its employees. All of these accomplishments are well documented by Fedkiw, Mac Cleery, and Sedjo as well as by earlier studies by Kaufman (1960), Robinson (1975), and Steen (1976).

Forest Service accomplishments if measured in terms of the values and public policies of the environmental movement are fewer. There are several reasons why. First, the Forest Service response to changing social values in implementing the Multiple Use-Sustained Yield Act was slow and often ineffectual. Second, the Forest Service is not the lead agency in the implementation of NEPA, the air and water pollution control laws, and the Endangered Species Act. Its role is to comply with these statutes, and it has had mixed success in doing so. Third, wilderness and other restricted-use federal land designations have had broad public support and have been repeatedly made by Congress over the past 30 years. Forest Service support for such designations has been unenthusiastic because they are viewed as eroding the discretion of the agency and the authority of professional forest land managers. As a result,

the growth in these designations on national forest land is not looked upon as an accomplishment of the agency, but something that was accomplished over agency opposition. Fourth, implementation of RPA and NFMA are a direct responsibility of the Forest Service, but their implementation has been attended by much public criticism of which at least some is warranted. In addition, few identifiable benchmarks exist by which progress can be measured in terms of the implementation of these laws.

Public attitudes about the environment and natural resources began to change in the 1960s and incorporate values of the environmental movement, such as preserving the natural heritage, maintaining a healthy environment, and encouraging the relative emphasis of noncommodity resources in the management and use of federal lands. The Forest Service was slow to respond to these changes. The failure to adapt agency culture and management practices to reflect changing public values and policies resulted in increasing confrontations with interest groups, administrative and legal challenges, and declining employee morale. By 1992, the agency stood alienated, with comparatively few accomplishments to its credit in terms of the policies and practices of the environmental movement.

That the Forest Service was unable to adapt to the values of the environmental movement in a timely way is curious. Their plain reading reveals them to be more extensions of the values of the progressive conservation era than their opposite. While conflicts between environmental and wise-use conservation values are very real at the individual site level, they tend to be less distinct, even blurred, at landscape and conceptual levels. Could not this have been better understood? Would not the progressive conservationists of the turn of the century, living at a latter stage of development of the United States, wanted a significant part of our natural heritage preserved; a clean, healthy, sustainable environment; and to have the opportunity to recreate in accessible, aesthetically pleasing natural environments? Surely they would!

The values, policies, and practices of the environmental movement are as important as those of the progressive conservation era, maybe even more so since they are more proximate in time. Success varies with the standards used in assessing it. If Forest Service performance is measured in terms of the standards of the progressive conservation era, the agency has many accomplishments to its credit. If Forest Service performance is measured in terms of the standards of the environmental movement, the agency's success is quite mixed, which is largely the basis for its current difficulties.

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PUBLIC INVOLVEMENT IN THE FOREST SERVICE

J. Lamar Beasley

1. GENERAL ASPECTS OF PUBLIC INVOLVEMENT

The Forest Service administers 191 million acres of public lands located in 43 states, Puerto Rico, and the Virgin Islands. The Agency is charged with the mission of sustainable yields in multiple-use conservation for recreation, wilderness, water, wildlife and fish, and minerals and timber. Located in the Department of Agriculture, it has 34,000 full-time employees and an additional 10,000 seasonal employees.

Much of this paper will borrow liberally from papers and research by other Forest Service employees and associates. It describes Forest Service experiences, but they are very similar to those of other public land management agencies in the United States, i.e., Bureau of Land Management, Park Service, and the Fish and Wildlife Service. Attributes may be found within this paper and in the appendix.

Public Involvement is communication between two or more people. At its most basic level, it consists of education, response forms, and letter writing. In its more advanced form, it consists of meetings, field trips, seminars, and interactive gatherings. Successful public involvement builds long-term relationships; promotes dialogue; emphasizes involving employees with the public; allows public access to decisionmaking; provides insights into public values and references; helps build better decisions; and makes the public feel ownership for their national forests.

Every citizen of the United States is the "public" of the Forest Service. When segmented, the formal categories include government agencies; tribal governments; elected officials at federal, state and local levels; non-government organizations; civic groups; universities and educational institutions; individuals; and corporations. Every Forest has a formal "Key Contact List" which receives notices, letters, newsletters, and news stories on an ongoing basis. Some forests maintain a list of over 5,000 interested persons and organizations. The record for public comment on a forest plan was over 50,000 letters. An informal list of key "Key Contacts" are identified and these are often opinion leaders; they might be found in the local hairdresser's shop, a university classroom, or the chain saw rental store.

The interests of the public include: environmental preservation or conservation, commercial production, history, sight-seeing, recreation, non-commodity uses, scientific research and economic development.

The purpose of public involvement may vary. At one end of the spectrum we might inform or educate so that the public will understand why forests are being managed in a certain way. Public involvement techniques involve questions and answers in a classroom-like setting. The Forest Service hopes the public will cooperate with the proposed activity because of increased understanding.

At the other end of the spectrum, the objective may involve more complicated interactive processes with the public on proposals and alternatives that influence final decisions. Once the Forest Service receives written comments, the Agency relies on scientific analysis techniques. Most public comments are coded and remain anonymous; analyzers are usually objective, trained public affairs specialists; and the emphasis in the analysis is placed not only on how people feel about an issue, but why they feel that way and what they would prefer as a solution. This information is synthesized and presented to the management team for deliberation. What the public says can greatly influence the final outcome. The myth still persists today in some quarters that public involvement is a vote counting process. Some companies or organizations will start letter writing campaigns, often cancelling each other out. Because of this, the sheer volume of numbers of people for or against an issue seldom influences decisions.

Individual letters with well thought out reasons for wanting different solutions, can outweigh thousands of signatures on a petition or form letter.

2. HISTORY OF PUBLIC INVOLVEMENT

Dr. Terry West explains much of the evolution of public involvement in early Forest Service history in Centennial Mini-Histories of the Forest Service. In 1876, Congress appointed Dr. Franklin B. Hough as the first Federal Government forestry agent. His charter was to determine if a timber famine, predicted after the Civil War in 1964, was indeed true. The alarming results of Hough's statistical study was that there could indeed be a famine for timber within the next several decades if the people of the United States didn't act soon. Hough recommended the creation of forest experimental stations, tree planting, set asides and scientific management of Federal timber lands, and the need for public education about forest conservation.

Thus were planted the first seeds of public involvement in forestry. The job of gaining the cooperation of forest users by earning their respect fell to the district rangers. Accustomed to taking timber and forage from adjacent public lands at will, local forest users did not easily accept regulation. The employment of local men as rangers helped, because these rangers could draw on their common background to explain the need for rules to their neighbors and friends. Knowledge of local customs sometimes extended to local language. The 1906 Use Book (a book of regulations and instructions for the use of national forests) states that those employed in Arizona and New Mexico should know enough Spanish to conduct business with Mexicans. The Ranger was in charge of the public resources and to succeed, he relied upon public involvement. As described by Robert T. Duhse, "The Ranger was often the only policeman, fish and game warden, coroner, disaster rescuer and doctor. He settled disputes be-

tween cattle and sheepmen, organized and led firefighting crews, built roads and trails, negotiated grazing and timber sales contracts, carried out reforestation and disease control projects and ran surveys." This decentralized approach to working with the public is still a strong component of management - and public involvement - today. The first debates in forestry were over watershed, fire control, and sheep grazing.

Public involvement began in earnest over gaining support for laws that would allow foresters to provide watershed and fire protection. It was probably the memory of the disastrous Johnstown Flood of 1889 that made the consequence of watershed deforestation obvious to people in the East. Devastating massive fires in 1910 in the West moved public opinion even closer to the forester's views for need for wildfire control of forested lands. Cattlemen did not want sheep on forest ranges and irrigation farmers and urban residents wanted watershed protection, including banning of both logging and grazing on national forests. The debate stopped the acquisition of any new forests. To end the stalemate, first Forest Service Chief Gifford Pinchot developed a grazing policy to allow users to have a stake in their national forests. The art of compromise in land management was born.

Much of public involvement today still revolves around these same issues, plus mining. The current issues in the news are old growth forests, threatened and endangered species, and fisheries.

Up to the 1950's, much of the Forest Service public involvement was self directed and Agency initiated. Common sense dictated that you couldn't manage the land properly if the community was against you. The first Chief of the Forest Service, Gifford Pinchot, guided the thinking of future foresters graduating from the forestry school of Yale with practical advice that holds true today:

"A public official is there to serve the public and not run them.

Public support of acts affecting public rights is absolutely required.

It is more trouble to consult the public than to ignore them, but that is what you are hired for.

Find out in advance what the public will stand for; if it is right and they won't stand for it, postpone action and educate them.

Use the press first, last, and all the time if you want to reach the public.

Don't be a knocker; use persuasion rather than force, when possible; plenty of knockers are to be had; your job is to promote unity."

In the 1940s and '50s, demands by large, mainly urban and environmental groups increased for non-amenity values. The Forest Service still emphasized its sustained yield timber program, at the bidding of Congress, but had less money and programs for wilderness, wildlife and recreation management. Out of this dissatisfaction arose a movement to require public involvement.

3. LEGAL MANDATE FOR PUBLIC PARTICIPATION

Val Chambers explained what happened next in her paper "Legal Mandate for Public Participation." Forest Service land and resource planning and management is now guided by four primary laws: the Multiple-Use Sustained-Yield Act of 1960 (MUSYA), the National Environmental Policy Act (NEPA) of 1969, the National Forest Management Act (NFMA) of 1976, and the Federal Land Policy and Management Act (FLPMA) of 1976. Together these statutes provide both a conceptual basis and a firm legal mandate for public involvement in forest planning and management. Common among these laws is the implicit recognition that planning and managing public resources is not solely the function of technical expertise and scientific decisionmaking. It is inherently a subjective process, dominated by social, political, and cultural questions. The laws require the Forest Service to involve all interested persons in a meaningful way and to respond to changing public values and needs.

3.1 The Multiple-Use Sustained-Yield Act of 1960

The passage of MUSYA in 1960 and several Federal statutes in the 1970s significantly opened up administrative agency procedures to closer public scrutiny and more active public involvement. Under MUSYA, the Forest Service retained primary authority and significant discretion over the management of forest resources. Nevertheless, by expanding the number of public resources over which the Agency had express management and regulatory authority, the act provided a stronger conceptual basis for Agency responsiveness to a wide variety of public values than had previously existed.

MUSYA directs that, in managing the national forests, the Forest Service shall give "due consideration... to the relative values of the various resources," and shall ensure that resources are "utilized in the combination that will best meet the needs of the American people." The act embraced the concept that the public's interest is best served by managing the national forests for many values, but provided to Agency managers only the most general guidance as to how to accomplish this. MUSYA began a trend toward external, as opposed to internal, public involvement standards of accountability. However, it did not provide the general public with any legal right to participate in forest planning.

3.2 The National Environmental Policy Act of 1969

Throughout its history, the Forest Service has solicited public input in its decisionmaking processes, but often informally and infrequently. With the enactment of NEPA in 1970, the Agency was expressly required to establish procedures for public involvement in planning and management. Congress enacted NEPA at a time when the public was demanding more access to administrative decisionmaking. NEPA requires Federal agencies to assess the environmental effects of any proposed major Federal action that would significantly affect the human environment. NEPA emphasizes "full disclosure" of Agency decisions and findings from environmental assessments and environmental impact statements. An examination of all management alternatives, and comments from reviewing state and Federal agencies, must also be made available to the public. NEPA does not provide standards and guidelines for public

involvement, nor does it specify that public meetings must be held. It treats the public principally as a recipient of information, rather than as a participant in decisionmaking. Under the law as written, Federal agencies have a duty to make environmental documents available for review, but are not required to solicit feedback from the public.

A much clearer guidance to agencies on the purpose of public involvement occurred under the administrations of Presidents Nixon and Carter. They directed the government to give the public a more participatory, consultative role rather than to rely solely on the vague "inform and educate" language of the law. Regulations to implement NEPA were issued under President Carter in 1978 directing agencies to:

- make diligent efforts to involve the public in preparing and implementing NEPA procedures.
- provide public notice of hearings, public meetings, and the availability of environmental documents.
- hold or sponsor public meetings/hearings whenever appropriate.
- solicit appropriate information from the public.
- make documents, comments received, and any underlying documents available to the public.

The regulations also require that environmental information be made available to public officials and citizens before decisions are made and actions are taken. Public input must be solicited early in the planning effort through scoping, and the NEPA process must be integrated with other planning at the earliest possible time to ensure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts. The National Environmental Policy Act regulations also require that the Forest Service issue quarterly schedules of proposed actions, so that the public is well informed and able to participate.

While the regulations set forth clearer guidance to the agencies, standards for public involvement in forest planning and management have evolved largely through case law. In *California v. Block*, the court noted that the Forest Service was required to present a broad range of alternatives to allow full public participation in decisionmaking, and information was not only to be collected, but was also to be considered in decisionmaking. The statutes and regulations on implementation, as well as case law, have provided important direction for the agencies on public participation.

3.3 The National Forest Management Act of 1976

With the passage of NFMA in 1976, Congress asserted the public's right to participate and play a key role in Forest Service planning and decisionmaking. Enactment of the law was largely triggered by the Monongahela decision and other court decisions (e.g., the Bitterroot) that threatened to halt certain timber harvesting practices on national forests.

The Monongahela and Bitterroot controversies involved not only the legitimacy of timber management practices under the 1897 Forest Service Organic Act, but also questioned the

Agency's interpretation of its multiple-use and sustained-yield mandates. The uproar over clearcutting was a focal point for many groups with an interest in reforming national forest management. These conflicts demonstrated public perceptions of the Agency as insensitive to non-timber values, and public demands for greater Agency accountability on upholding its multiple-use mandate.

NFMA embraces the notion set forth in NEPA regulations that many conflicts can be reconciled by involving the public both early on and continuously. In the words of Senator Humphrey, chief sponsor of the bill, it "creates the policy machinery for making certain that professional expertise and public desires are brought together in the public interest."

In addition, rather than just referring to NEPA for guidance on public participation, NFMA specifically requires public participation in the development, review and revision of forest plans, and encourages the use of citizen advisory boards. Since the enactment of NFMA, some regulations strengthening the requirements for public participation and Agency response to public desires have been added, while others have been deleted.

In response to the combined requirements of NFMA and NEPA, the Forest Service devised a 10-step process that is typical of comprehensive planning: 1) identification of public issues and management concerns, 2) development of decision criteria, 3) collection of inventory information, 4) analysis of the management situation, 5) formulation of alternatives, 6) estimation of the effects of alternatives, 7) evaluation of alternatives, 8) release of the draft plan and EIS to the public, 9) plan approval, and 10) plan implementation, monitoring, and evaluation. The Forest Service overall has done a good job of involving the public during the early and later stages of planning, and seeks to do a better job of involving the public during the middle stage (steps 2-7) (Blahna and Yonts-Shephard, 1989).

3.4 Federal Land Policy and Management Act (FLPMA) of 1976

With the enactment of the FLPMA in 1976, Congress further directed that in administering public land statutes and exercising discretionary authority granted by them, the Secretary be required to establish comprehensive rules and regulations after considering the views of the general public.

4. FOREST SERVICE EFFORTS IN PUBLIC PARTICIPATION

The Forest Service has long included the public in its planning and decisionmaking, at least informally, and has done much to meet and even exceed NEPA and NFMA requirements. A commitment to listen to people and respond to their needs, and to promote grass-roots participation in Forest Service activities and decisions is highlighted in the Agency's Mission, Vision and Guiding Principles. Yet the public is largely critical of Agency efforts. Recent studies have shown that the public doesn't understand why the Agency makes the decisions it does, and believes it has little influence on the Agency. In essence, the public perceives that the Forest Service has failed in its public participation responsibilities.

One explanation for the perceived failure is that the Forest Service model of participation is still based on due process, on receiving full and equal representation of various views and values. Thus, each interest is forced to argue the rightness of its position and the wrongness of other positions. This process is divisive and promotes conflict and distrust among the interests and with the Agency. Forest Service failures are also blamed on insufficient (or undetectable) incorporation of public comment into decisionmaking. Others suggest that the Agency in the upholding of professional and scientific standards resists the participation of non-experts. Finally, some observers have noted that public participation is limited by the focus on resource outputs and budgeting, and the lack of managerial incentives and support for effectively involving the public.

Yet, the Forest Service has had numerous successes in involving the public in national forest planning and management. Many agency managers have a clear idea of why the public is to be involved - to determine what is truly in the public's interest. Furthermore, they understand the goals of public participation - to gain insights into public values, to provide an early warning of potential problems, to build better decisions, and to be accountable to the public. They recognize the absolute importance of public involvement in making sound decisions that protect the land and meet human needs. As a result of such understanding, better public participation practices have been adopted in the Agency. Relationship building, in-person communication instead of form letters, and meetings where adversaries talk face-to-face characterize much public involvement in the Forest Service. Under these new approaches, including "open decisionmaking" (or decision building) and "shared leadership," the Agency and the public are both contributors to decisionmaking. The Forest Service acts to facilitate dialogue, and sustained interaction among all participants to find common ground and build acceptable decisions. This is a marked departure from the Agency's traditional role of balancing interests and adjudicating conflicts.

This new approach not only involves the public, but helps participants understand how certain decisions are reached, and builds mutual trust and understanding.

Even with the best public participation programs, it is not always possible to develop plans and make decisions that are acceptable to all parties, particularly with the mind-boggling complexity of nearly all issues and interests affecting national forest management today. Administrative appeals and litigation will continue to be used by some parties to "buy time" and effect certain outcomes. (Recent changes in appeals regulations uphold the right to appeal, but emphasize that potential appellants need to bring issues to the Agency during the planning process, not after the decision has been made.)

Sometimes disputes can be settled before groups resort to legislative remedies. Alternative dispute resolution methods, which include negotiation, mediation and arbitration, are being employed more frequently in the Agency to reach decisions, where relationships have broken down or where group processes have come to an impasse. The Forest Service will continue

to emphasize bringing in all interested parties at the very beginning of planning processes, working collaboratively with interest groups and other agencies, and building long-term relationships with the public.

5. PUBLIC INVOLVEMENT OF THE FUTURE

This new approach is being defined as "Communities of Interest and Open Decisionmaking" process proposed by Jeff Sirmon, William Shanks and Chris Liggett.

A paper by Jeff Sirmon, Williams Shanks and Chris Liggett in the Journal of Forestry better explains this new approach in practical terms: "Reflecting on the class conflict that has plagued his state since the early days of settlement, Montanan William Kittredge writes, "We need to see that adversarial, winner-take-all, showdown political decisionmaking is a way we defeat ourselves. Our future starts when we begin honoring the dreams of our enemies while staying true to our own"...His comments are just as applicable to the rancorous debate over resource management policy and practice that absorbs particular regions of the United States and resonates nationally. In the Pacific Northwest the debate is posited as owls versus jobs; in the southeast it is red-cockaded woodpeckers versus landowner rights; in other contexts it is urban residents against rural dwellers or established residents versus newcomers.

Controversy and conflict over resource decisions appear to be intensifying. As a result, issues critical to the nation's future are avoided, energy is dissipated, and everyone involved loses credibility. Problems seem unsolvable. Confidence is replaced by cynicism. Though there is a tendency to blame the management agencies, responsibility should be shared broadly. Parties involved in the conflict typically view opponents as the source of the problem and spurn responsibility for finding solutions. To counter this, we need to find new ways to get people to talk to one another about what they really want from the forests and find effective ways to engage them in civil dialogue and mutual education about their needs and values.

Ironically, management agencies have unwittingly promoted divisiveness and polarization as they deal with the publics they serve. In too many cases, they exert authority instead of sharing power. The traditional processes for public involvement create foes when they should build relationships.

One answer is to create and nurture communities of interests, combined with a flexible and comprehensive approach to public involvement called open decisionmaking. A community of interests offers a way to build relationships. Open decisionmaking is a complementary way of working with the community. Today decisionmakers must not only follow specific, legally mandated processes in planning long-term management directions and in developing specific projects; they must also share decisionmaking responsibility with the public. The social, ecological, and political complexities of the late 20th century have dramatically altered the working environment. The Forest Service - and other public agencies - need a new approach to

working with the public and a new model of leadership to guide society toward a more sustainable future.

This new partnership is exemplified in the theory of leadership in a community of interests, articulated by Ronald A. Heiferz of Harvard University's Kennedy School of Government. In a community of interests, says Heifetz, responsibility for problem solving falls not on a single leader but on a group. In confronting difficult policy issues, people must struggle with "their orientation, values, and potential tradeoffs... No leader can magically do this work... Only the group - the relevant community of interest - can do this work" (Heifetz and Sinder 1990, p. 187). In traditional practice, the leader is an authority figure who calms the winds of change and restores order. In a community of interests, by contrast, a leader causes work to be done by stimulating members of the community to engage each other and ultimately resolve the issues that concern them. Heifetz sees the leader not as a problem solver but as a catalyst, mobilizing others to solve problems. The challenge is to stimulate the group to do the work - to address problems and come up with solutions.

In this model, the role of the public lands manager changes radically. The key to success is to keep participants focused on resolving issues. Leaders from every interest must be given the opportunity to argue their points of view and be willing to respect those who disagree. Resolution takes time and requires patience. The Conservation Foundation/Purdue report (Shands et al. 1990) ...advocated open decisionmaking in which the contending interests and the Forest Service work together. The report provided four guidelines for joint problem solving:

- encourage a frank exchange of views among all interests, especially before views harden;
- encourage the sharing of information;
- help identify opportunities for joint problem solving; and
- make it clear how a decision was reached.

A community of interests establishes the working environment for open decisionmaking. Both feature leadership that is shared and distributed among participants, free and open communication and mutual education, and a transparent decisionmaking process. Effective resource managers become educators, data providers, developers of viable alternatives, interpreters of laws and regulations, representatives for those not able to participate in the dialogue, and protectors of nonhuman and future interests. The authors conclude, "Sharing power does not mean that professionalism of management skills must be compromised. Rather, it means that leadership skills must be more finely tuned to the requirements of today's social climate. Open decisionmaking in a community of interests may eventually result in decision processes in which "communality and mutual responsibility are fundamental."

No matter what form public involvement takes, the new approach is to return to implementing personal types of public participation rather than relying on nonpersonal communication such as written comments. The use of interactive methods providing two-way communication is the preferred direction. These methods include workshops, tours, meetings, conferences and

seminars. In 1993 a team of public affairs officers examined the Forest Service public involvement program. Their report, "Strengthening Public Involvement," provides recommendations for changes that were adopted by the Forest Service leadership team and includes a checklist for managers designing a public involvement program and an effectiveness matrix outlining all the various public involvement processes that exist to date.

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AN ANALYSIS OF THE EXPORT TRADING COMPANY ACT OF 1982 AND U.S. WOOD PRODUCT EXPORTS

James E. Granskog

The paper provides an overview of the Export Trading Company Act (ETCA), and the performance of the wood products industry under the Act. The background and general provisions of the act are discussed first, followed by an examination of wood products firms that are utilizing the Title III certification process authorized under the Act.

1. BACKGROUND

The American economy is based upon free market competition. Antitrust laws are those statutes that are designed to preserve or promote the free competition that the country depends upon for economic health. In the late 1800's, the first federal legislation which expressly addressed anticompetitive behavior was enacted out of concern over the enormous power that had been concentrated in the railroad and oil trusts. The Sherman Act of 1890 declared every restraint of trade to be illegal, and prescribed penalties for anyone who attempted to monopolize trade or commerce. The Sherman Act was given further elaboration in 1914 by the Clayton Act and the Federal Trade Commission Act. However, it soon became apparent that small businessmen were at a severe disadvantage against unrestrained competitors in foreign markets. As a result, the Webb-Pomerene Act of 1918 was enacted to provide an antitrust exemption for export trade associations.

The Webb-Pomerene Act, or Webb Act as it was commonly referred to, was the precursor to the ETCA. Companies that combined exporting efforts and registered under it were granted a measure of antitrust immunity in order to compete more effectively against foreign cartels. Although Webb associations enjoyed some success initially, vigorous antitrust prosecution created a general perception among businessmen that they were not adequately protected by the Webb Act, and some even feared that registration would trigger prosecution by calling attention to questionable conduct. For this and other reasons, exports by Webb associations declined from a peak of 17.5 percent of U.S. exports in 1930 to less than two percent by the late 1970's (Forbes 1978).

Despite a disappointing history of performance under the Webb Act, there were some specific instances of successful association. Wood and paper products were one of three product categories accounting for a majority of the active Webb associations (Bueter 1969).

2. THE EXPORT TRADING COMPANY ACT OF 1982

In the early 1980's, falling exports and widening trade deficits focused widespread attention on trade policy in the United States. In 1982, the Export Trading Company Act (ETCA) was enacted with hopes of boosting U.S. exports. Although the ETCA was not the only export en-

hancing action undertaken by the federal government during this period, it was perhaps the most publicized effort (Yoho 1983).

The ETCA was discussed and debated for about four years before its passage at the end of the 1982 Congressional session (Acheson 1984). Starting in 1978, bills were introduced in both the House and Senate as proposed replacements for the Webb Act. The House version sought to amend the Sherman Antitrust Act to clearly give export trading companies (ETCs) more protection than provided by the Webb Act. The Senate version, however, provided for review and certification of specific export activity in order to give exporters more security from antitrust prosecution. Eventually, both versions became part of the Act, but the Webb Act was not repealed. In addition, banking law was amended to allow banks to become equity participants in ETCs.

The intent of the ETCA of 1982 was to encourage small and medium-sized companies to jointly sell their products abroad. Supporters of the Act noted that Japanese trading companies were an important component in the export success of that nation, but the United States had never developed similar institutions (Bello et al 1985). By pooling their resources, it was hoped that American businesses would achieve significant economies of scale and provide a full range of low cost export services similar to the Japanese trading companies.

Prior to the passage of the ETCA of 1982, U.S. exporters had been authorized to collaborate by the Webb-Pomerene Act of 1918, but court decisions had limited its antitrust exemptions. However, the wood products industry was among the more active users of the Webb-Pomerene Act. Consequently, it was generally expected that forest industry exports would be significantly enhanced by passage of the ETCA.

The ECTA has four separate or independent titles combined into a single statute. Title I contains the Act's title, lists Congressional findings, declares the purpose of the Act, and directs the Department of Commerce to create an Office of Export Trading Company Affairs to promote and support ETCs. Title II, also known as the Bank Export Services Act, permits certain types of banks to invest in ETCs; the banking provisions are outside the scope of this paper, but Seberger (1984) provides an in-depth treatment. Titles III and IV, of most interest for this analysis, modify the application of antitrust statutes to export trade.

Title III authorizes export trade certificates of review and rules for their issuance. The certificate delineates the export trade, export trade activities, and methods of operation to which the certificate applies; the person to whom it is issued; and any terms or conditions deemed necessary by the Department of Commerce or Justice to assure compliance with conditions covering domestic activities specified in the Act. These certificates confer immunity to prosecution under U.S. antitrust laws. In order to preserve their certified status, grantees must file annual reports and include any relevant change that occurs in the interim.

Title IV amends the Sherman Antitrust Act to not apply to conduct involving trade with foreign nations, unless such conduct has a direct and substantial effect on domestic trade. Similarly, it also amends the Federal Trade Commission Act to not apply to unfair methods of competition involving commerce with foreign nations, unless such conduct has a direct and substantial effect on domestic commerce.

Titles III and IV overlap in their effect on antitrust immunity. The practical effect is to allow companies a choice between certification under title III or reliance on the protection of Title IV. Certification reassures the ETC that it will not be prosecuted for approved conduct, but some confidentiality is lost as a notice of every application is published in the Federal Register. On the other hand, Title IV provides a somewhat less protective shield but preserves business confidentiality.

3. CERTIFICATION OF WOOD PRODUCT EXPORTERS

3.1 Certification Criteria

As noted, Title III authorized certificates of review to give exporters greater protection from antitrust prosecution. Virtually any entity (not just an ETC) doing business in the United States can apply for a certificate. To qualify, the applicant's export-related conduct must show specified standards. It must (1) not substantially lessen competition or restrain trade in the United States or restrain the export trade of U.S. competitor; (2) not unreasonably enhance, stabilize, or depress prices in the United States; (3) not be an unfair method of competition; or (4) not reasonably be expected to result in the sale or resale in the United States of the exported goods or services (U.S. Department of Commerce 1982). The certificate is issued by the Department of Commerce with concurrence by the Department of Justice. Once issued, the certificate, with appropriate terms and conditions, provides an exemption for the certified conduct from criminal and civil suits under both federal and state antitrust laws.

3.2 Firms Certified

As a part of the certification process, the Department of Commerce must publish in the Federal Register a notice identifying the applicant and describing the export-related conduct to be certified. To assess wood industry participation under the ETCA, a list of all certificate applications was obtained from the Department of Commerce. Wood product entities were then identified from the summaries published in the Federal Register, and each company was then contacted by telephone to gather additional information necessary to assess performance.

Since 1983, 152 export trading entities have received certification under Title III of the ETCA. Of the certificates that have been issued, 13 were identified as wood product ETCs (certified only for wood products) and 3 other companies had wood products specified among the authorized products. These numbers do not include more than 20 companies certified to facilitate trade for "all products."

Of the 16 companies identified as wood products related, seven are currently active, seven are inactive but file annual reports, and certificates for two companies have been revoked (*table 1*). In addition, one application representing Oregon softwood lumber producers did not receive certification. Overall, the 14 certificates still in effect cover a total of 67 firms (applicants plus members).

Table 1: Firms issued export trade certificates of review for exporting wood products

Name and Location	Year Certified	Members (no.)	Primary Product
Active			
Carolina Western Greenville, SC	1984	1	Lumber, hardwood
Quality Exporters Grenada, MS	1984	3	Lumber, softwood
Sealaska Timber Ketchikan, AK	1984	1	Logs, softwood
Amer. Wood Chip Export Portland, OR	1987	5	Chips, softwood
FEXCORP Walterboro, SC	1989	4	Chips, hardwood
Georgia Wood Export Marketing Co-op Statesboro, GA	1990	13	Lumber, softwood
Allegheny Highland Hardwoods Portland, NY	1994	8	Lumber/dimension, hardwood
Inactive			
International Development Institute Alexandria, VA	1983	--	Forestry and lumber*
Savannah Sales Corp. Savannah, GA	1984	12	Chips, softwood
N.B. Carson & Co Cleveland, OH	1984	--	Lumber and wood products*
Wrangell Forest Products Ketchikan, AK	1985	--	Alaskan timber products
East West Trade Rockville, MD	1986	2	Timber and wood products*
Crann Corp. Beaverton, OR	1987	1	Lumber, softwood
Olde South Traders, Inc. Tallahassee, FL	1988	6	Lumber, chips
Revoked			
H.L. Porter Associates	1984	--	Timber and wood products*
International Lumber Co.	1989	--	Lumber and panel products, softwood

*Certified for other, non-forest products.

Sales data for each year were not available, but information for 1991 was provided by firms active during that year. Export sales by certificate holders were estimated at \$125 million, or 1.9 percent of the total value of U.S. wood product exports in 1991. This proportion of export sales by wood product ETCs is about the same as the exports by Webb associations prior to the passage of the ECTA.

3.3. Conduct certified

One type of conduct certified allows small mills to meet to allocate markets and fix prices. The members then make their export deals independently. This type of conduct is inexpensive and works well with the independent nature of small mill operators, and small businessmen in general.

More common are certified entities which have several members who either sell their products to an export intermediary, or who allow the export intermediary to act as their agent. Export intermediaries may act as commissioned agents or as merchant distributors, depending upon the marketing situation and the needs of the supplier. When acting as an agent, the trading firm does not take title and is compensated solely by generating foreign market sales. After obtaining an order the agent may not have any further involvement with the transaction. By retaining title, the domestic supplier bears the financial risk of collecting from foreign buyers and retains control over the physical fulfillment activities associated with exporting its brand. When acting as merchant, the trading firm purchases the product and resells it abroad on its own account.

Three entities which identified one other member (in addition to the applicant) were export subsidiaries controlled by parent companies. These firms are little different from an "in-house" division of a business selling products directly to a foreign buyer. However, the firms were authorized to purchase additional products for resale from other independent suppliers, but generally were not doing so.

Three inactive firms that also were certified for other, non-wood products appear to have been organized to provide export facilitation services rather than to act as export intermediaries. Services identified included consulting, market research, referrals to commercial banking and credit information, advertising, catalog production and distribution, and other information sharing.

At least one ETC was activated for a single enterprise, to fill a large order from a foreign government. The principal bought lumber from other mills to meet this order. The ETC was in operation for two years, but is currently inactive.

4. CONCLUSION

U.S. wood product exports have more than doubled since the ECTA was enacted, but very little of the increase is attributable to the formation of ETCs. Although about 10 percent of all firms certified under the ETCA have been wood products related, shipments by these organizations have been small. Nevertheless, entities that have been certified generally have favorable impressions about the ETCA. General responses from wood product ETCs were that it provides more protection from antitrust litigation than was available previously, it lends credibility to overseas marketing efforts, and it has allowed small and medium-sized forms to cooperate to fill orders too large for individual members. In some cases, however, it has been difficult to get sufficient cooperation among members to enable successful operation. Overall, the

ETCA has not boosted U.S. exports to the extent anticipated before enactment, but it does offer a viable marketing alternative for wood product exporters.

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THE IMPACT OF FEDERAL ENVIRONMENTAL LAW ON FOREST RESOURCE MANAGEMENT IN THE UNITED STATES

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1. INTRODUCTION

The United States has enacted a plethora of environmental protection laws during the past three decades that have affected forest resource management. This legislation has been prompted by public concerns that unfettered commerce and development have caused damage to the environment, and threatened public health and safety as well. The publication of Rachel CARSON's *Silent Spring* in 1962 exposed the dangers of pesticide accumulation in animal and human food chains, and triggered the modern environmental movement. Pervasive water and air quality problems subsequently led to calls for stricter pollution controls. At the same time, increasing amounts of leisure time and rising personal incomes prompted both individuals and organized groups to become more involved in natural resource issues. These and other factors combined in the late 1960s to build broad-based public support for a variety of environmental causes such as wildlife protection, wilderness preservation, clean air and water, and outdoor recreation.

Strong political support for environmental protection followed, resulting in the passage of many public land management and federal environmental enhancement laws in the 1960s and 1970s. A number of statutes enacted during this period addressed general environmental protection in some fashion. Others were directed to specific resources. These laws have individually and collectively had a substantial impact on forest management practices. The impact has dramatically increased in recent years as original legislation has been reauthorized and its scope expanded, and as the courts have become more involved in interpreting the meanings of the often broad statutory mandates. In this paper we provide an overview of the influence of modern U.S. environmental legislation on forest resource management practices. We discuss general environmental statutes that affect forest resources, specific forestry and wildlife laws, and the expanding role of the courts in determining legislative intent. The paper concludes by examining the future outlook and implications for forest management.

2. MAJOR FEDERAL ENVIRONMENTAL LAWS

The list of major federal environmental laws that affect U.S. forest resources is extensive. The more significant of these federal statutes are shown in *Table 1*.

Some of the laws listed in *Table 1* are original statutes that have remained largely unamended, such as the Wilderness Act and the National Environmental Policy Act. Others, such as the Clean Air and Water Pollution Control Act Amendments, were nominally amendments to existing legislation. But the amending laws in the 1970s were by no means minor enhancements;

they were substantial, strong new laws designed to protect the environment. In addition, many of the federal environmental statutes passed in the 1970s - such as the Endangered Species Act and the Federal Water Pollution Control Act Amendments - have been reauthorized and strengthened in the 1980s.

Table 1: Major U.S. Federal Environmental Laws Affecting Forest Resource Management

1964	Wilderness Act	78 stat. 890; 16 USC 1131, 1136
1965	Land and Water Conservation Fund Act	78 stat. 899; 16 USC 4601
1968	National Trails System Act	82 stat. 919; 16 USC 1241-1251
1968	Wild and Scenic Rivers Act	82 stat. 906; 16 USC 1271-1287
1969	National Environmental Policy Act	83 stat. 852; 42 USE 4321, 4331-4335, 4341-4347
1970	Clean Air Act Amendments	69 stat. 159; 42 USC 7401 et seq.
1972	Federal Water Pollution Control Act Amendments	86 stat. 816, 33 USC, various sections
1972	Federal Environmental Pesticide Control Act Amendments	61 stat. 163-172; 7 USC 135-136
1973	Endangered Species Act	87 stat. 184; 16 USC, various sections
1974	Forest and Rangeland Renewable Resources Act	88 stat. 476; 16 USC 1600-1614
1976	National Forest Management Act	90 stat. 2949; 16 USC, various sections
1976	Federal Land Policy and Management Act	90 stat. 2744; 43 USC, various sections
1980	Alaska National Interest Lands Conservation Act	94 stat. 2374; 16 USC, various sections

2.1 Wilderness, Trails, and Scenic Rivers

Regional and national movements to set aside some forests and river corridors as protected natural areas have been pursued in the United States since the beginning of the 20th century. These efforts culminated in passage of the Wilderness Act in 1964, the Wild and Scenic Rivers Act in 1968, and the National Trails System Act in 1968. All were enacted with preservation objectives. Each used a similar model of setting aside a modest number of areas initially, with provision for future expansion. This permitted proponents to avoid excessive opposition to the authorizing legislation, but at the same time provided the opportunity to muster support for future additions to each system.

Each of the three laws was designed to preserve qualifying areas in their natural state - protected from timber harvests, mining, or other development - although these restrictions were phased in gradually in some cases. The National Wilderness Preservation System began with nine million acres in 1964. The System was designed to set aside federal lands as wilderness areas "... where the earth and its community of life are untrammelled by man, where man himself is a visitor and does not remain." Amendments made to the Wilderness Act in 1974 include special provisions for the creation of wilderness areas in the eastern U.S. on lands not able to meet the strict requirements specified in the original legislation.

With few exceptions, motor vehicles, motorized equipment, motor-boats, aircraft, and other mechanical devices are banned from designated wilderness areas. Additionally, natural fires usually are allowed to burn unchecked unless they threaten adjacent lands. Similarly, insect outbreaks and disease are not suppressed in wilderness. These policies are designed to

keep the areas natural, but have been widely criticized when lack of protection has led to fire or insect damage on neighbouring private forest lands.

The National Trails System Act established a system of trails along historic travel routes and within scenic areas to promote public outdoor recreational opportunities. The Wild and Scenic Rivers Act codified the policy that certain rivers should be preserved in a free-flowing condition to protect outstanding scenic, recreational, geologic, fish, wildlife, historic, cultural, and similar values.

By 1988, the areas designated under all three laws had expanded greatly. The wilderness system, by far the largest, included over 90 million acres; 38.5 in national parks, 32.5 in national forests, and 19.3 in national wildlife refuges.

Nevertheless, preservation groups have sought to designate a substantial amount of additional acreage under the three laws in order to protect rivers from being dammed, forests from being cut, wildlife from being endangered, or natural areas from being developed. These efforts have spurred frequent disagreements among preservation and utilitarian interests, as has management of the reserved areas. Many of the disagreements led to court challenges during the late 1960's and early 1970's.

These early decisions have served to set the stage for the current wave of litigation. For example, the ruling in *Parker v. U.S.* [307 F. Supp. 685 (D. Colorado 1969), affirmed 40 U.S.L.W. 2202 (10th Circuit 1971)], which involved the Wilderness Act, had a major impact at the time on the authority of public forest administrators to make management decisions (SIEGEL 1972). In this case the plaintiffs asked that a proposed national forest timber sale be enjoined until studies were made concerning applicability of the Wilderness Act to the area. They contended that the timber sale acreage should be included in the adjacent primitive area which had been proposed as wilderness under the 1964 Act. The Court held for the plaintiffs and the decision was upheld on appeal. This case established the concept of "de facto" wilderness - that is, areas of national forest land that are outside of primitive area boundaries but are alleged to meet the definition of wilderness as set out in the Wilderness Act.

The cases of *Sierra Club v. Yeutter* (661 F. Supp. 1490, D. of Colorado [1987]) and *Wilderness Society v. Tyrrel* (701 F. Supp. 1473, E.D. of California [1988]) are typical of later litigation. In the former decision, the Court held that reserved water rights are created when national forest lands are designated as wilderness areas pursuant to the Wilderness Act and that the Forest Service must therefore prepare and submit a plan evaluating the alternatives for protecting wilderness water resources. In the second decision, the Court held that a Forest Service plan to harvest burned timber on a national forest, without completing a management plan for an adjacent wild and scenic river, violated the Wild and Scenic Rivers Act.

2.2 The National Environmental Policy Act

The environmental movement of the 1960s was marked by scepticism of the role of government in natural resources conservation. Large federal bureaucracies had developed; agencies had developed close ties to the interests that stood to benefit from their decisions; and many groups were left out of agency decision-making processes. As one response, Congress passed the National Environmental Policy Act (NEPA) of 1969, which went into effect in 1970 (Schoenbaum 1982).

The act mandates that the federal government use all possible means to:

- 1) fulfil the responsibilities of each generation as a trustee of the environment for succeeding generations;
- 2) assure for all Americans safe, healthful, productive and aesthetically and culturally pleasing surroundings;
- 3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable or unintended consequences;
- 4) preserve important historic, cultural, and natural aspects of the national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;
- 5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
- 6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

In order to accomplish these lofty objectives, Section 1 of NEPA sets forth detailed procedures that must be followed by all federal agencies. For every major federal action significantly affecting the quality of the human environment, agencies are required to prepare a detailed statement on the environmental impact of the action; on any adverse environmental impacts that should be avoided; on alternatives to the proposed action; on relationships between short-term use and long-term productivity; and on any irreversible or irretrievable commitments of resources that might occur. These statements must not only be reviewed internally by government agencies, but also by the public.

NEPA and its regulations subsequently issued have been used extensively to achieve the broad environmental goals stated in the act. Through its procedural rules, the law has served to insure that a variety of interest groups and affected parties are actively involved in the federal environmental decision-making process.

NEPA has also provided a substantial basis for federal court litigation. Most cases have been filed by citizen and environmental groups seeking to halt government agency action on the basis that the agency either violated NEPA by not preparing an environmental impact statement (EIS), or that the EIS prepared was inadequate. The court's disposition of these

cases has varied from complete dismissal, to requiring preparation or rewriting of an EIS, to temporary or permanent stop work orders being issued (Schoenbaum 1982). Although NEPA was not designed to be implemented by the courts per se, more than 2,000 court cases have been filed to try to stop a particular agency decision. Many of these have involved federal forest management activities.

NEPA immediately began to have far-reaching implications for U.S. forest resource management (Siegel 1973). The Forest Service prepared only five impact statements in 1970, but submitted 35 in 1971, 88 in 1972, and 125 during the first four months of 1973. Subsequently, EIS preparation by the agency has continued unabated over the ensuing years. A wide variety of actions have been addressed, ranging from stratification of national forest acreage into management units to expansion of a winter sports area to use of herbicides to control unwanted vegetation in crop tree release. The cost of preparing impact statements is often very great. Management actions must then be delayed, often for many months, while the federal Environmental Protection Agency (EPA) studies the statements and considers the potential environmental effects. To avoid the risk of lengthy and expensive litigation (which often still occurs) and the associated injunctive delays, the government is often forced to prepare statements in doubtful cases. As a result, the cost of implementing many administrative decisions is a severe financial burden.

2.3 Air Pollution Control

The Clean Air Act Amendments of 1970 required EPA to set national primary and secondary air quality standards to protect public health. The individual states were to develop plans to meet these standards, subject to EPA approval. The planning requirement was further strengthened by later amendments in 1977.

EPA initially focused on reduction of emissions from industrial and point sources, including manufacturing plants. These regulations have now led to a permit system to limit air pollution from manufacturing facilities such as pulp and paper plants and sawmills. For example, even new pulp mills must get specific permits to emit industrial fumes in a region.

Another important component of the 1970 legislation was a requirement for prevention of significant deterioration of air quality (Dana/Fairfax 1980). After a court challenge (*Sierra Club v. Ruckelhaus*, 344 F. Supp. 253, D.D.C. [1972]), EPA issued regulations establishing three categories of clean air regions. Class I areas had to be retained in a pristine, unchanged state, Class II areas could undergo moderate air quality deterioration, and Class III areas would be allowed to absorb new development to a point which equalled but did not exceed the secondary national standards. The 1977 amendments reaffirmed this concept, and specifically mandated that all international parks and wilderness areas, and national parks larger than 5000 acres, were to be Class I areas. Certain "scenic visibility" areas, including some on national forests, also fall into this category.

EPA also has focused on air quality degradation from nonpoint sources of pollution. As a result, most states have now adopted regulations for controlling open burning in wildland areas. These laws were prompted in part by the federal air quality law and partially by local issues. They are also utilized to implement ambient air quality standards.

Controls on prescribed silvicultural burning became a particular concern in 1987, when EPA proposed that smoke from such fires must meet a particulate matter size emission standard that could conceivably legally eliminate prescribed burning in some situations. Eventually, however, lobbying by the National Association of State Foresters and the American Forest Council led EPA to revise the standard to comply with conventional prescribed burning practices. This issue is interesting in that limits on emissions from prescribed burning do not permanently eliminate air pollution. To the extent that there are wildfires, the same type of emissions will still occur.

2.4 Federal Pesticide and Herbicide Control

Another major area of environmental protection has evolved under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1947 and the substantial amendments contained in the 1972 Federal Environmental Pesticide Control Act (FEPCA). The 1972 amendments instituted strong federal control over the application of pesticides and placed EPA in charge of pesticide regulation. The act was further amended in 1975 to: 1) require EPA to advise the Secretary of Agriculture before taking action with respect to a pesticide; 2) provide the Department of Agriculture with specific authority to comment on pesticide regulations; and 3) require EPA to assess the economic impact of any action proposed or taken against a pesticide. These amendments thus insured some coordination among EPA, the Department of Agriculture, and the relevant user groups (Dana/Fairfax 1980).

FIFRA/FEPCA authorized EPA to classify and register the uses of most herbicides, pesticides, fungicides, and rodenticides. EPA has thus had to rule on the safety of each existing chemical, based on the available scientific evidence, and list the specific allowable applications for which the chemical can be used. Registration for many chemicals commonly used for forestry purposes has been withdrawn by EPA, most notably 2,4,5-T.

2.5 Water Pollution Control

Based on wide-spread perceptions of severe water quality problems, Congress enacted the Federal Water Pollution Control Act (FWPCA) Amendments of 1972. The 1972 law clearly defines point source pollution as any discrete conveyance such as a pipe, ditch, or other identifiable source with a distinct origin. Nonpoint source pollution was not so clearly defined, however, leaving much to administrative interpretation. Over time, agreement has evolved that nonpoint pollution refers to that originating from a widespread land area, such as from silvicultural, agricultural, mining, or construction activities.

2.5.1 Section 402 - Industrial Point Sources

Section 402 of the 1972 FWPCA Amendments established the National Pollutant Discharge Elimination System (NPDES), which would be administered by the EPA, to control industrial point source discharges. Initially, EPA proposed to use Section 402 permits as a vehicle to control almost all sources of pollution, including those emanating from agricultural and forestry activities. The prospect of permits for all forestry and farming activities led to immediate, adverse reaction and caused EPA to withdraw the proposal. EPA subsequently published regulations excluding small animal feedlot, agricultural and silvicultural operations from the Section 402 discharge permit requirement. In a legal challenge to EPA's authority to exempt classes of activities the court ruled for the plaintiffs (*Natural Resource Defense Council v. Train*, No. 1629-73, D.D.C. 1975). It issued a final order requiring EPA to promulgate regulations extending the NPDES permit system to include all point sources in the concentrated animal feeding operation, separate storm sewer, agriculture, and silviculture categories. The court decision forced EPA to make a distinction between point and non-point sources that would be regulated under Section 402 (Rey 1980). The agency subsequently did this, categorizing virtually all forestry sources other than those originating at mills or woodyards as nonpoint pollution.

2.5.2 Sections 208 and 319 - Nonpoint Source Pollution

Section 208 of the 1972 amendments mandates state planning to control nonpoint source pollution from mining, agricultural, development, and silvicultural activities. EPA originally interpreted Section 208's state planning requirement as applying only to problem areas designated by the governor. However, litigation led to a court decision that Section 208 planning should apply to all areas of the state, including nondesignated forest and agricultural lands (*Natural Resources Defense Council v. Train*, 396 F. Supp. 1386 [1975]). Although this ruling was affirmed upon appeal, the Court held that the intensity of planning for nondesignated areas need not be as great as for designated areas (*Natural Resources Defense Council v. Costle*, 564 F.2d 753 [1977]).

EPA pursued Section 208 implementation aggressively in the early 1970s. It drafted a model state forest practice regulatory act that included severe controls on forestry practices. Most eastern and southern states have strongly opposed the use of such a water quality implementing mechanism, and have instead developed educational and voluntary best management practice (BMP) systems to control forestry non-point pollution. These state implementing mechanisms are extensively discussed by Haines et al. (1988) and Cubbage et al. (1989).

Despite the efforts that have stemmed from Section 208, many interest groups and members of Congress continued to believe that nonpoint source pollution was still an impediment in achieving the nation's water quality goals. As a result, Congress passed the 1987 Amendment.

A principal component of the 1987 law - Section 319 - contains specific language intended to improve control of nonpoint source pollution. Section 319 requires each state to have prepared by August, 1988, detailed water quality management plans that identify bodies of water not in compliance with water quality standards because of nonpoint source pollution. The plans also are required to identify categories and individual nonpoint sources that violate water quality, and to describe control mechanisms. States were to then devise either regulatory or voluntary programs to control nonpoint source pollution - including that emanating from forestry activities (Hohenstein 1987).

In implementing their nonpoint source control mechanisms - whether voluntary or regulatory - states may base compliance on use of BMPs or on state water quality standards. BMPs are the optimal methods, measures, or practices for preventing or reducing water pollution, including, but not limited to, structural controls, operation and maintenance procedures, and scheduling and distribution of activities. Water quality standards (WQS) are specific water quality criteria, both narrative and numeric, for the water bodies of a state. There has been considerable debate regarding which of these approaches should be used in the case of forestry operations, and indeed some question whether WQS can be used without completely halting some forestry activities (Hohenstein 1987). In 1987, EPA released a memorandum stating that BMPs generally should serve as adequate implementing mechanisms to meet water quality goals, which somewhat ameliorated forestry fears of excessive regulation.

As of 1989, most states had submitted their Section 319 plans. In the South, all states except Florida elected to use nonregulatory mechanisms. Florida uses a mix of regulatory and educational programs. All the western states with state forest practice regulatory acts had already incorporated water quality protection measures into the acts. Northeastern and midwestern states rely mostly on BMPs and educational programs, but some utilize formal regulation as well.

Several recent court decisions have also now made it clear that the states have authority to supplement BMPs with their own water quality standards, and that public agencies must comply with state rules concerning nonpoint pollution (Siegel 1987). Most notably, the 9th Circuit Court of Appeals has held the U.S. Forest Service responsible for ensuring that runoff from road building and timber harvesting in the national forests complies with California's state water quality standards (*Northwest Indian Cemetery Protection Association v. Peterson*, 764 F.2d 581, 795 P.2d 688 [9th Cir.1985], cert. granted, 107 S. Ct. 1971 [1987]). The Forest Service had argued that the use of state approved BMPs alone fulfilled all obligations under the FWPCA. The Court rejected this argument, finding no indication "that the BMPs were to be considered standards in and of themselves", and further ruling that the BMPs were merely a means to achieve water quality standards.

2.5.3 Section 404 - Wetland Point Sources

Under Section 404 of the FWPCA, forest management activities involving dredge and fill operations in navigable waters and adjacent wetlands may require a permit from the Army

Corps of Engineers before commencement. Dredge and fill operations are basically defined as any activity which converts waters or wetlands into dry land, even by the slightest distribution of surface soils (51 Federal Register 41210). The Corps' implementation of Section 404 has been desultory. It initially tried to administratively limit its jurisdiction under the FWPCA to only major rivers and harbors that were capable of carrying commercial traffic (STINE 1983).

As a result, environmentalists brought suit (*Natural Resources Defense, Council v. Callaway*, 392 F. Supp. 685 [1975]) - alleging that the Corps minimal Section 404 regulations violated the FWPCA mandate. The plaintiffs contended that Congress had intended for the law to control all water pollution in the United States, not just that in traditional navigable waters. The Court ruled for the plaintiffs, and instructed the Corps to revise and expand its regulations to protect wetlands and even small streams. The Corps promptly complied, but was initially somewhat unenthusiastic regarding implementation of the broadened requirements (Stine 1983).

The broad judicial interpretation in the Callaway decision of navigable waters and wetlands would have led to permits being required for forestry activities such as logging and road building, even near intermittent streams. The 1977 Amendments to the FWPCA, however, exempted normal silvicultural activities - as well as the construction and maintenance of forest roads when accomplished in accordance with approved BMPs - from the permitting requirement. Nevertheless, Section 404 is still quite relevant to forestry operations because there is some disagreement as to what constitutes "normal" silvicultural practices (Cabbage/Harris 1988, Cabbage et al. 1987).

For example, in litigation in Louisiana, several local hunting clubs brought suit against a farmer who was clearcutting his hardwood bottomland so he could plant soybeans. The plaintiffs argued that the property was wetland and charged that the timber cutting should be subject to Section 404 permit requirements since it was not a normal silvicultural activity. The federal trial court ruled for the plaintiffs and was upheld on appeal (*Avoyelles Sportmens' League v. Alexander*, 473 F. Supp. 525 [1979]), 511 F. Supp. 278 [1981]. The importance of this decision lies in the court's concurrence in the very liberal definition of wetlands, which could subject forestry practices to more procedural and technical regulation than in the past to protect water quality. The courts held that discing the site resulted in the displacement and redeposition of soil and that these activities were intended to convert the wetland to dry land, therefore, the operation was subject to the Corps' regulations.

The same panel of judges reached the opposite conclusion in *Save Our Wetlands v. Sand* (711 F.2d 634 [1983]). In this case, clearing activities to construct an electric transmission corridor involved cutting and windrowing trees and allowing them to rot. The court held that this did not constitute a dredge and fill operation. The disparate decisions in these two cases were based primarily on whether clearing activities resulted in wetlands conversion.

The scope of the Corps Section 404 jurisdiction has been further clarified by several more recent court decisions. In *U.S. v. Riverside Bayview Homes* (106 S. Ct. 455 [1985]) the U.S. Supreme Court ruled that an area adjacent to a body of water need not be frequently flooded to be subject to regulation by the Corps. In *Bailey v. U.S.* (647 F. Supp. 44 [1986]) and in *Swanson v. U.S.* (789 F. 2d 1368 [1986]) the courts held that artificially created wetlands were subject to Section 404 jurisdiction.

In November 1986 the Corps of Engineers issued its final rules on Section 404 dredge and fill permits and other regulatory programs that it administers (Federal Register 51:219, November 13, 1986, pp. 41206-260). These regulations continue to exempt normal silvicultural activities from permit requirements. But they also state that "activities which bring an area into farming, silviculture, or ranching use are not part of an established operation". Such activities, therefore, are not exempt from permit requirements. The regulations additionally state that, while normal harvesting is exempt, "this does not include the construction of farm, forest or ranch roads". In this respect, Section 404 Corps authority may overlap with the provisions of Section 208 as administered by EPA. For example, logging roads and skid trails which meet BMP guide-lines established under state Section 208 planning may be exempt if they meet several additional Section 404 criteria.

The final regulations reiterate that Section 404(h) of the 1977 Amendments allows the Administrator of the EPA to transfer administration of the Section 404 permit program for discharges into certain waters of the United States to qualified states. Once a state's 404 program is approved and in effect, the Corps will suspend its application processing and turn it over to the responsible state agency.

In 1986, EPA created a new Office of Wetlands Protection. The office has an official policy goal of no net loss in U.S. wetlands area. The agency is currently working with the Corps on a mitigation policy and a procedure for easily delineating wetland on the ground, as well as on other research projects. Office of Wetlands officials state they are not seeking to expand EPA regulatory jurisdiction, but rather to delegate more responsibility to the states through assistance in assumption of the 404 program (Berg 1987).

In 1987 and 1988, EPA began to revise its interpretation of which silvicultural activities were exempt from permits. In fact, the agency has not only advocated that hardwood to pine conversions not be exempt, but also that natural pine to pine plantation conversions require a permit. Its position on this matter is crucial, because it helps set the rules for administration of Section 404, and must ultimately approve any actions first processed by the Corps of Engineers. Additionally, some groups are lobbying to have the 404 permit jurisdiction taken completely away from the Corps, stating that the Corps has failed dismally in protecting woodlands (National Wildlife Federation 1988).

2.6 Endangered Species Protection

To respond to the problems of accelerated habitat destruction and species extinction, Congress enacted the Endangered Species Act in 1973. The objectives of the Act are to:

"provide a means whereby the ecosystems upon which endangered species and threatened species depend on may be conserved; [and] to provide a program for the conservation of such endangered species and threatened species."

To achieve these goals, the Secretary of Interior is required to maintain a list of endangered and threatened species and to insure that those species are protected. In carrying out the purposes of the act, all other federal departments and agencies are to make certain that all actions authorized, funded or carried out by them do not jeopardize the continued existence of endangered or threatened species or their critical habitat.

A key provision of the Act is found in Section 9. This section prohibits the harming, harassing, removal or destroying of a listed species on either private or public land. These actions are collectively termed "takings".

Congress reauthorized and strengthened the Endangered Species Act in 1988. The reauthorization raised fines for violations of the law, and requires the federal government to monitor more closely about 1,000 potentially endangered plants and animals. New protection was added for endangered plants as well.

The Endangered Species Act has generated continual controversy relating to forestry and wildlife management on federal lands. It has been applied and used with vigor by wildlife interest groups trying to preserve critical habitat for many endangered species. Two of the more intense controversies have involved preservation of habitat for the spotted owl in the Pacific Northwest and for the red-cockaded woodpecker in the South (Fosburgh 1986). In both cases, national forests have been compelled to substantially revise their forest management plans and reduce timber harvesting in order to provide adequate preservation of old-growth stands to protect the birds' habitat.

2.6.1 Spotted Owl

In the Pacific Northwest, the Forest Service had designated many old-growth timber areas that were protected from timber harvesting for spotted owl habitat. Environmental groups appealed these plans as providing inadequate protection. In December 1988, therefore, the Forest Service announced that it would establish a network of habitat areas - ranging from 1,000 to 3,000 acres - in 13 Oregon and Washington national forests, effectively linking old growth areas throughout the two states (Williamson 1988). This 1.6 million acres of connectors was intended to strike a reasonable balance between sustaining spotted owl populations and providing timber supplies vital to the local and state economies. The Forest Service estimated that the annual timber harvest on the 13 forests would be reduced by 180 million board feet per year. However, environmental groups claimed that these set asides, too, were

inadequate and filed suit after the Department of Agriculture refused to consider eight appeals against the Forest Service policy.

The basis of the suit (*Seattle Audubon Society v. Robertson*, #C89-160 [W.D. Washington]) was that the Forest Service plan was faulty because it did not consider contrary scientific opinion, thereby rendering the supporting environmental impact statement inadequate. After the case was filed, the Court imposed an injunction against 165 timber sales totalling 1.2 billion board feet - nearly half of the annual volume that would ordinarily have been cut in the Pacific Northwest by the Forest Service. The log shortage became particularly acute in the summer of 1989, exacerbated by exports of logs from privately-owned lands to Japan and restrictions on cutting because of fire danger. As a result, mills were forced to curtail operations and dismiss workers. Complaints to Congress mounted.

In October 1989, therefore, Congress passed legislation (P.L. 101-121) as a compromise to the spotted owl controversy. The new legislation places strict limits on injunctions against Forest Service timber sales. It requires the Forest Service to submit to environmental groups a list of planned sales in old growth areas that have more than 40 acres of timber suitable for spotted owls to use. The environmental interests must then identify half of the timber volume on these areas and it will be allowed to be sold. Once this is done, no other federal challenges of the action can be brought.

In the meantime, however, a lawsuit was filed against the legislation on constitutional grounds. The plaintiffs asserted that the restrictions imposed on new lawsuits against timber sales are unconstitutional in that they violate the separation of powers doctrine which limits the right of Congress to prohibit court review. On November 6, 1989, however, the federal district court for the Western District of Washington upheld the constitutionality of the legislation and lifted the injunction against the timber sales.

The spotted owl controversy has not been confined to the Forest Service. The Bureau of Land Management was also under a court injunction for many months prohibiting cutting on much of that agency's land in Oregon. The injunction (*Portland Audubon Society v. Lujan*, # 87-1160 [District of Oregon]) was finally lifted by the 9th Circuit Court of Appeals. The Bureau also obtained relief for many of its sales in P.L. 101-121 - similar to that granted to the Forest Service. In December 1989, the constitutionality of P.L. 101-121 was also upheld by the Oregon Federal District Court.

2.6.2 Red-Cockaded Woodpecker

Like spotted owls, the red-cockaded woodpecker in the South also depends on old-growth pine forests for its habitat, and has been listed as an endangered species. Most private forest landowners in the South have cut their old-growth pine stands; only the Forest Service manages extensive pine acreage on long rotations. Thus the primary responsibility of providing adequate woodpecker habitat has fallen on the Forest Service. The issue of timber harvests versus woodpecker habitat preservation is a difficult one.

The southern national forest plans developed in the 1980s did provide some habitat protection, but many wildlife interest groups did not consider it adequate. The Sierra Club thus brought suit against the Texas National Forest plans in 1988. The federal court (*Sierra Club v. Lyng*, 694 F. Supp. 1260 [E.D. Texas 1988]) ruled that no clearcutting could occur within 1,200 meters of any red-cockaded woodpecker colony. This represents an area of about 480 hectares (1200 acres) for each known active bird colony. The decision was upheld by the Appeals Court.

Overall, the Endangered Species Act provides a powerful tool for protecting endangered species, but it can also severely disrupt commercial timber as well as other forest resource activities. For example, the U.S. Supreme Court ruled that the Forest Service must assess endangered species impacts before issuing oil and gas leases (U.S.S.C. No. 88-865, February 21, 1989). In recent years there has been considerable litigation involving disruption of endangered species habitat and whether such disruption involves a "taking". In the beginning, habitat destruction was prohibited only on public lands. In 1995, however, in the case of *Babbitt v. Sweethome*, 115 S. Ct. 2407, the U.S. Supreme Court upheld the regulatory interpretation of the prohibition on taking listed species to apply also to significant habitat modification on private lands.

2.7 Forest Resource Planning

As the preceding review indicates, broad federal environmental protection laws have had a substantial impact on forest resource management practices on public and private lands in the United States. In addition, many specific federal forest resource laws have addressed both public and private forestry. The two most significant of these specific statutes are the Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 and The National Forest Management Act (NFMA) of 1976. Each addresses the management of the 190 million acre National Forest System, and each is integrally linked to environmental protection and planning on national forest lands.

The Forest and Rangeland Renewable Resources Planning Act authorizes the Secretary of Agriculture to prepare a decennial Assessment document to facilitate long-term planning for the national forests and for private forest lands as well. In addition, a five-year Program document must be prepared and submitted to the President which includes alternatives for the protection, management, and development of the National Forest System. The Assessment and Program documents, together with a detailed Statement of Policy, are intended to be used in framing presidential budget requests for Forest Service activities.

The National Forest Management Act amends the Forest and Rangeland Renewable Resource Planning Act and the Organic Administration Act of 1987 by requiring land and resource management planning for units within the National Forest System, and additional regulation of timber harvesting on national forests. The major provisions of the Act require (a) public participation in the planning process, (b) promulgation of regulations to govern the preparation and revisions of the management plans, (c) resource management guide-lines

for controversial management activities such as clearcutting, and (d) economic analysis of management alternatives.

The public participates in the formulation of forest plans, and individuals or groups may file administrative appeals to plans they deem unsatisfactory. Prior to enactment of the planning legislation, public participation consisted primarily of comments on draft environmental impact statements or procedural challenges to management decisions under NEPA. Today, the provisions for participation under NEPA are supplemented by the provisions for administrative appeals of forest plans (36 C.F.R. 211, 219 [1987]) and for appeals of specific management decisions.

Dissatisfied citizens may also seek judicial review of plans, thus removing them from the administrative appeals process. This litigation may be based on violation of RPA/NFMA, failure to prepare an adequate EIS under NEPA, inadequate protection of species listed under the Endangered Species Act, or for a variety of other reasons. The environmental laws have combined with the national forest planning process to provide fertile grounds for litigation.

3. CONCLUSIONS

As this review clearly indicates, national environmental laws and forestry laws with environmental provisions have had a substantial impact on forest resource management in the United States. These statutes have been designed to protect a broad range of environmental benefits - including water and air quality, common and endangered species, timber production, and recreational opportunities. At the same time the number of court cases initiated to require stricter implementation of environmental legislation is increasing rapidly.

On federal lands, in particular, the vigorous implementation of environmental protection laws - coupled with extensive public input and frequent litigation by environmental groups - is causing substantial changes in resource management. Timber harvesting and commercial development are rapidly losing their dominance. National Forest and Department of Interior land managers must now carefully balance resource use and resource protection. Although local interests may often favor commercial use of public lands, they now must contend with strong general public support of the environment and with national laws designed to protect nonmarket values. Indeed, the legislative balance may well have shifted from unbridled development with little thought for the environment to a focus on environmental protection and natural area preservation, with little concern for economic returns or commercial interests. Even where commercial uses remain important, however, they are becoming increasingly regulated.

Federal land management laws do not directly regulate private lands. Nevertheless, their impacts are still important. The federal water pollution control laws have prompted states to use voluntary BMPs or forest practice regulatory acts to protect forest water quality from nonpoint source pollution. These BMPs/forest practice acts may address timber harvesting

practices, logging road construction, chemical applications, or streamside timber harvesting and residual stand conditions. Federal and state air quality laws also have led to regulation of prescribed burning in many states. Herbicide and pesticide regulation also indirectly affects private land management practices, by governing which chemicals may be used for silvicultural practices.

The scope of current federal law is likely to be expanded by legislative amendment, judicial review, and administrative discretion. How can U. S. forest resource managers respond to this trend? Their actions now will determine the latitude available in the future to manage public and private forests for both market and nonmarket goods. Forest users and managers who favor preservation or nonmarket goods and services are likely to support stronger environmental protection statutes. On the other hand, forest managers who favor commercial uses such as timber growing, developed recreation, mineral extraction, and hunting may oppose further legal controls.

To date, forest resource management groups have relied primarily on providing information to policy makers and the lobbying of key decision makers. Environmental groups have pursued these strategies as well. But they have also built effective grass roots lobbying organizations and capitalized on media coverage of well-planned demonstrations. Forest industry groups have lost much of the grass-roots support they once had, and have only recently begun to employ demonstrations and the media to publicize their positions.

Environmental groups have vastly outspent and have outmaneuvered forest industry groups. Many such organizations actively pursue administrative rulings and judicial interpretations of existing legislation that will favor their positions. The forest industry, on the other hand, has just begun to develop a cohesive legislative strategy and has seldom initiated litigation. But as this review suggests, the courts will be crucial in determining the allowable degree of freedom for practicing forest management and harvesting timber in the years ahead. Preservationists will prefer to restrict autonomy; utilitarians to maximize professional discretion.

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THE RELATIONSHIP OF FEDERAL SOIL EROSION CONTROL LAWS FOR CROPLANDS IN THE UNITED STATES TO SUSTAINED FOREST PRODUCTION

William C. Siegel

1. THE EFFECTS OF SOIL LOSS

Although soil erosion to some extent is a natural process, the general consensus of opinion in the United States is that it currently comprises a more serious problem than at any time in the last 60 years. Based on the 1977 National Resources Inventory, a computerized national resource data base covering all nonfederal land, the annual average loss of soil on croplands from sheet and rill erosion was at that time in excess of four billion tons (National Research Council 1986). More recent estimates indicate that some progress has been made. A 1982 appraisal reported that total soil loss from U.S. croplands had declined to two billion tons per year - still a serious problem (Batie 1983).

Soil erosion has both on-site and off-site detrimental impacts. On-site damage reduces productivity, diminishing the efficiency of labor and capital. Off-site damage - caused by the runoff of fertilizers, nutrients, pesticides and sediment to water bodies and other sensitive areas - degrades the environment. Soil erosion is the most significant form of agricultural water pollution. Approximately 100 million of the 400 million acres of cropland in the United States is classified as highly erodible (Harl 1989).

Declining productivity has traditionally been the central concern of soil conservationists in the United States, stemming from the devastating soil losses of the 1930's. Beginning in the 1970's, however, public concern has shifted to off-site impacts - primarily the water pollution associated with soil erosion and water runoff (American Farmland Trust 1984, Clark 1985).

The off-site impacts of soil erosion include damage to air and water quality, as well as toxic contamination from nutrients and pesticides. Estimates of the contribution to air particulates in the United States by wind erosion range from 33 to 239 million tons annually (Malone 1989). Sediment from soil erosion and the resultant water runoff carry many types of pollutants such as fertilizer residues, insecticides, herbicides, fungicides, dissolved minerals, and animal waste-associated bacteria. It is estimated that 360 tons of pesticides alone are moved from agricultural land by wind and water each year (Clark 1985). Additionally, sediment flows provide high levels of turbidity infiltration of many streams, lakes and reservoirs.

On-site impacts primarily concern productivity. Erosion directly affects the inherent productive capacity of land by degrading the physical, biological, and chemical characteristics of the uppermost layer of soil, and by reducing the depth of the plant-rooting zone. The resulting loss of productive capacity leads to more fertilizer and pesticide use in order to expand per acre yields. The end result is increased runoff and water contamination.

2. EARLY FEDERAL PROGRAMS

Federal legislation to curtail soil erosion in the United States began as a response to the great economic depression and the extensive droughts of the early 1930's. More than 27 federal programs, under eight different administrative agencies, were passed into law in the next 50 years. Three of these - the Agricultural Conservation Program, the Forestry Incentives Program and the Soil Bank Program - have involved extensive tree planting and other forestry practices.

Agricultural Conservation Program: The Agricultural Conservation Program is administered by the Farm Services Agency. Both long-term and short-term contracts are provided for financing soil conservation practices. The cost-sharing ranges from 50 to 75 percent of the cost of approved practices. There is a maximum payment of \$ 3,500 per recipient per year under agreements that range from three to ten years. A local committee, elected by local farmers, recommends how the cost-sharing should be distributed. The Natural Resources Conservation Service provides technical advice for the conservation measures. For many years eligible practices included tree planting, various timber stand improvement practices, and fencing of forest land. For the last several years, however, forestry practices have been excluded.

Forestry Incentives Program: The Forestry Incentives Program, also administered by the Farm Services Agency, provides cost-sharing for approved forestry planting and also for timber stand improvement practices. Approximately two million acres have been planted under this program since its inception.

Soil Bank Program: The soil bank legislation was passed in 1956. Under this program, farmers received federal payments for placing previously harvested croplands in soil conservation uses - including tree planting. The program was designed to control agricultural surpluses and soil erosion. It ended from lack of funding in 1960 and the last contract expired in 1970. Nearly 30 million acres were placed under the Soil Bank, including about two million acres planted in trees - mostly southern pine (Batie 1983).

Limited Success: All federal soil erosion control programs implemented prior to 1985 were voluntary. None can impose meaningful sanctions of any sort on a landowner guilty of contributing to, or failing to control, excessive erosion. As a result, there has been only limited direction of federal funding (targeting) toward the properties that need it the most - the highly erodible cropland that is responsible for a disproportionate amount of the total erosion. Nevertheless, those of the programs still in existence continue to be of some importance in providing technical assistance and cost-sharing for conservation measures.

3. NEW FEDERAL PROGRAMS

The focus of reform began with passage of the 1985 Farm Bill. For the first time the law directed that federal funding for soil erosion control be concentrated in problem areas. The 1990 Farm Bill built on and expanded the base of the 1985 legislation. The 1990 statute authorizes six conservation programs of importance to forestry. Four were continued with

modifications from the 1985 law. The other two are part of the new Agricultural Resources Conservation Program authorized by the 1990 statute.

3.1 Sodbuster Program

The sodbusting provision ensures that no highly erodible land will be placed into agricultural production for the first time without active application of a conversion plan that entails conservation measures for keeping soil erosion within acceptable limits. It thus discourages the conversion of fragile, native range and forest acreage to cropland. It does this by providing that a producer is ineligible for government program payments for agricultural commodities produced on highly erodible land unless an active conservation plan is in place and being followed.

The sodbuster regulations define highly erodible land as that which has an erodibility index of 8 or more. The index is a numerical value that expresses the potential erodibility of the soil in relation to its soil loss tolerance value without consideration of applied conservation practices or management. This means that land which may be actually eroding at an acceptable rate but has an inherent potential of eroding eight times faster than it is rebuilding will be considered highly erodible acreage.

The restrictions apply to areas on which highly erodible soil is predominant. Predominance will occur in a field if either one-third of the field, or 50 or more of its acres, are highly erodible. Farmers who do convert forest to cropland will have no problems if they apply conservation measures that keep soil erosion within acceptable limits. Those who elect not to, or cannot do so because of the difficulty and high cost, risk the loss of government farm program benefits.

3.2 Swampbusting Program

The swampbuster provisions of the 1985 Act provide that federal farm programs may not subsidize the destruction of existing wetlands. This legislation is intended to reduce the acreage of wetlands - including forested wetlands - being converted to cropland. Highly erodible wetlands with medium to high potential for conversion to agricultural use comprise five million acres in the United States. Most is forested. About half is in the states of Alabama, Florida, Mississippi, North Carolina, South Carolina, Michigan, Minnesota and North Dakota. More than half of the country's remaining wetlands are forested (MOULTON 1991).

The original swampbuster statute provides that any person who produced an agricultural commodity on converted wetland after December 23, 1985 become ineligible for government price and income support and all other U.S. Department of Agriculture payments. Unlike the sodbuster program, it did not matter whether a conservation plan was in place or not. However, there was no violation until an agricultural commodity was actually planted on the site. The 1990 Farm Bill made the swampbuster restrictions more stringent. Now any action whatsoever that makes a wetland more suitable for crop production constitutes a violation. Wetlands have also been more narrowly defined beginning in 1991, creating considerable controversy among various interest groups.

3.3 Conservation Compliance

The conservation compliance provision is the most controversial section of the 1985 Farm Bill. This legislation requires that all farmers who crop highly erodible land (as defined under the sodbuster statute) apply approved conservation measures for controlling soil erosion if they wish to participate in government farm programs. The statute applies to acreage that was in agricultural production between 1981 and 1985 or set aside under a U.S. Department of Agriculture program.

The approved conservation plans were to have been developed by January 1990 and fully implemented by January 1995. No penalty is being applied, however, in those cases where plans have been delayed by a backlog of work within the Natural Resources Conservation Service - the agency which assists with development and approval of the plans (Malone 1989). A conservation plan is defined as a document containing the decisions of a person with respect to the location, land use, tillage systems, and conservation treatment measures as scheduled which, if approved, must be or have been established on highly erodible cropland in order to control erosion.

3.4 The Conservation Reserve Program

This provision of the 1985 Farm Bill was enacted with the primary purpose of creating a program for the long-term retirement of marginally productive and highly erodible cropland. Nearly 34 million acres had been enrolled in the Conservation Reserve Program (CRP) at the end of 1990. Nearly two million acres had been planted in trees. Of all the Farm Bill provisions, this is by far the most important for forestry. Eligible acreage is defined as highly erodible land that has been planted to produce any agricultural commodity other than orchards, vineyards or ornamental plantings in two of the CRP years from 1981-1985 - and which is still available for crop production. A particular field can be considered highly erodible only if two-thirds or more of the land in the field meets the requirement for erodibility. If the two-thirds requirement is met, the entire field is eligible if the noneligible acreage cannot be separated into a manageable unit. Ten acres is the smallest area that can be enrolled under CRP unless a particular state has established a higher number. Any person owning eligible cropland may enter into a CRP contract if that person has used the property for at least three years before signing up. This restriction does not apply in the case of inherited property. To enroll in the program, applicants must submit a bid to their local Agricultural Stabilization and Conservation Service office during the sign-up period for the year in question. The bid may be accepted or rejected. If accepted, a contract is signed.

Annual Payments: CRP participants receive annual cash payments from the government for a period of ten years to compensate for retiring their cropland and abiding by the CRP contract terms. The total payments to any one owner may not exceed \$50,000 per year. CRP annual payments have no effect on the total amount of payments that an individual is otherwise eligible to receive under other U.S. Department of Agriculture programs. An enrollee must agree not to use the enrolled land for any commercial purpose, and to plant and maintain a suitable vegetative ground cover - which includes trees - to control soil erosion.

Cost-share Payments: All CRP participants must implement a conservation plan for the enrolled acres. This plan must be approved by the local conservation district, and must describe and schedule the conservation practices that will convert the CRP land to a less intensive use. In return, the government shares the cost of carrying out the conservation practices as specified in the contract. The cost-share payments may be made only for the establishment or installation of an eligible practice, and may not exceed 50 percent of the cost.

Changes Made by the 1990 Farm Bill: A total of 34 million acres was enrolled in the CRP under the 1985 Farm Bill. An additional 11 million acres may be enrolled under the 1990 Bill. The 1990 statute mandates that two million CRP acres (one million in 1994 and another one million in 1995) be reserved for the most severely erodible acres as a safety net for farmers who find it necessary to retire land in order to satisfy erosion control limitations under the conservation compliance program.

The CRP has been effective in attracting the most erodible land; farmers have generally enrolled their most severely eroded acres first (McEowen and Harl 1990). For the initial sign-up in 1986, the average reduction in soil erosion for the acres accepted was 26 tons per acre per year. This figure had declined to 14 tons by the August 1989 sign-up. As a result, the 1990 Bill contained changes in the bid procedures. Applicants now submit bids on a national rather than on a state basis. Additionally, bids will be accepted based on the highest environmental benefits per federal dollar with emphasis on water quality, trees and wildlife. One of the more significant 1990 provisions, enacted to encourage the planting of hardwood trees, permits 15 year contracts for hardwood tree planting as compared to only 10 year contracts for conifers. Farmers may also now elect and receive cost-share assistance to convert fields currently planted in CRP grass to CRP hardwoods, and may extend 10 year contracts on such acreage to a maximum of 15 years.

Tree Planting Under CRP: The 2.2 million acres planted to date (1992) in trees under CRP is distributed across 41 of the 50 states. Planting, however, is highly concentrated in the 13 southern states - only 8.5 percent has occurred outside the south (Moulton, Baldwin and Snellgrove 1991). More than 60 percent of the trees planted are in Georgia, Alabama and Mississippi. More than 97 percent are conifers, primarily loblolly pine. Black walnut is the most commonly planted hardwood species. CRP trees represent the equivalent of 1.1 percent of all southern timberland and 3.2 percent of the south's pine resource.

3.5 Wetlands Reserve Program

The goal of this program - established under the 1990 Farm Bill - is to place one million acres of farmed wetlands, and former restorable wetlands now being farmed, under long-term or permanent easements by 1995. Cost-share payments are provided for restoration practices, including tree planting. For this reason, the planting of wetland tree species has been terminated as a CRP cover practice. Non-forested acres under easement can over time also be expected to naturally convert to trees unless maintained in an open condition to meet wildlife habitat needs.

3.6 Environmental Easement Program

This legislation, also established under the 1990 Act, provides for perpetual easements for certain lands now in the CRP and other programs. Property owners are paid for the value of the easements and receive up to 100 percent federal cost-sharing for approved practices. Farmers are required to permanently give up their farm base acres within the easement area and cannot use the land for any purposes inconsistent with the easement plan. Normal and customary forestry practices, however, are permitted.

4. CONCLUSIONS

The most impressive aspect of the 1985 Farm Bill, as enhanced by the 1990 statute, has been the coordinated approach it presents. The CRP program will take 45 million acres of the most erodible and fragile cropland - about 10 percent of the total - out of production. The sodbuster and swampbuster programs will continue to preclude many new acres of the same kind of land from going into crop production. Then, too, CRP and the conservation compliance program are interactive. To meet soil erosion standards under the latter, certain areas cannot be cropped, so CRP is an attractive alternative. Additionally, CRP acreage will be subject to conservation compliance when the contracts expire.

The future impact of CRP on forestry will depend largely on the fate of the enrolled lands after initial contract expiration in 1996. Several factors currently built into the program will discourage reversion to annual crops and limit the negation of the conservation and forestry benefits achieved. First, when the contracts expire, the enrolled lands will automatically become subject to conservation controls under the conservation cross-compliance provision of the 1985 legislation. Producers will lose eligibility for U.S. Department of Agriculture subsidies if they revert to commodity production without first developing and implementing soil conservation plans. Secondly, because CRP contracts are concentrated on marginal lands, the financial incentive to resume crop production will be less than for highly productive acreage. In addition to these factors, land planted to trees is likely to remain in that use for another reason. Most of the owners of CRP forestry acreage have other timber interests and many have long-term exposure to forest management.

The current federal income tax law also favors enrollment in the various Farm Bill programs - including those involving the planting of trees - and continuation in tree cover upon program expiration. Prior to 1987 national tax policy was inconsistent with regard to soil conservation. The investment tax credit and accelerated depreciation made conversion of fragile lands to agriculture economically feasible (Meyer, Pederson, Thorson and Davidson 1985). The credit and the rapid depreciation were available for purchases of most farm equipment. Income from the sale of farm assets was also subject to only a relatively modest capital gains tax.

The 1986 Tax Reform Act, which became effective in 1987, made sweeping changes. The investment tax credit was abolished except for reforestation costs and accelerated depre-

ciation is now only available for personal property, not real estate. Even though still accelerated, the depreciation period for personal property has been extended.

The preferential treatment of capital gains was also eliminated. Additionally, the Tax Reform Act limits soil and water conservation deductions to those practices implemented under a conservation plan approved by the Soil Conservation Service or a comparable agency. Tax deductions may no longer be taken, as before, for expenses incurred in converting wetland. The 1986 Tax Act also repealed the deduction for the costs of clearing land for farming. And finally, many conservation cost-share payments are excludable from income.

In summary, tree planting under the 1985 and 1990 Farm Bills has made a substantial contribution to the nation's timber growing stock - particularly in the southern United States. Because of these plantings, the total number of trees planted in the United States as a whole in each of the years from 1986 through 1990 was more than had ever been planted in any prior year. Pine forests in the southern states are generally a declining resource. Prior to passage of the 1985 Farm Bill, the area in pine had decreased by 10 million acres over the previous 40 years. Since most of the trees planted under the Farm Bill's provisions have been southern pine, these plantings have assisted markedly in reversing the pine decline. In addition, they have increased the diversity of cover types in landscapes otherwise dominated by acreage in intensive agricultural use.

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FEDERAL PROTECTION OF THREATENED AND ENDANGERED SPECIES: IMPLICATIONS FOR FOREST RESOURCE MANAGEMENT IN THE UNITED STATES

Clifford A. Hickman

1. INTRODUCTION

The objectives of this paper are essentially the following:

- to review the policy response of the federal government set-forth in the Endangered Species Act (ESA) to increasing concerns on species extinctions;
- to examine those provisions of the ESA that are of key importance in terms of providing protection for domestic species, and to illustrate how the scope of these provisions has been defined and clarified through both administrative regulations and court decisions; and
- to identify and briefly describe the major policy options that are being debated within the United States in connection with current Congressional efforts to amend the ESA.

2. SPECIES EXTINCTIONS AND POLICY RESPONSE

2.1 The Problem of Species Extinctions

For some time now, ecologists have been telling us that the rate at which the plants and animals of the world are being lost to extinction is higher than at any time in recent geologic history, and that this rate of loss is accelerating. One estimate suggests that species are currently being lost at a rate of approximately one per day as compared to a background rate of about one per year (17).¹ Highly specialized species with low reproduction rates -e.g., giant pandas, rhinoceroses, and whooping cranes - face the greatest threat of extinctions. In contrast, opportunistic species with high reproduction rates - e.g., rats, racoons, rabbits, houseflies, weed plants, starlings, and sparrows - tend to predominate among the survivors. One authority has described the future implied by these trends as the "pest and weed ecology" (17).

The causes of species extinctions are many and varied, and they include natural phenomenon associated with normal evolutionary processes. However, there can be no question but that the difference between current and historical extinction rates is largely due to the activities of people. In the past, the direct killing of species for personal consumption, or because of their commercial value, was an important cause of losses - but the situation is dramatically different

¹ It must be recognized that great uncertainty surrounds these estimates. At present, about 1.6 million species are known to exist (9). Estimates of the total number of species that may exist vary from 3.0 to 10.0 million (13). In recent years, scientific specialists have been identifying new species at the rate of about 10,000 per year (9). At this rate of progress, even if the number of people engaged in such work were to increase tenfold, it would likely be many years before we could estimate, with some exactness, just how extensive species extinctions have been.

now. Today it is the impact of people's activities on natural habitats that is the primary cause of species extinctions. The activities of people can adversely affect the natural habitats of other species in essentially three ways. First, habitat can be destroyed by conversion to another use - e.g., the clearing of forests or prairies, or the draining of inland or coastal wetlands for agricultural, urban, or industrial development. Secondly, habitat can be fragmented into parcels of insufficient size to support certain types of species.² Lastly, the quality of remaining habitats can be deteriorated because of such things as poisoning from chemical pesticides or air pollutants, or by the introduction of exotics that overwhelm domestic species.

In the United States, and indeed throughout much of the international community, the accelerating rate of species extinctions has become a matter of widespread public concern. These concerns appear to fall into three categories as follows:

Economic Concerns: These concerns arise because people realize that certain species of plants and animals may prove to be of tremendous commercial or utilitarian value in the future. This value might be as a source of genetic material for breeding more disease or drought resistant strains of agricultural planting stocks; it might be as a source of some new miracle drug; or it might be as a source of useful chemicals or fuel.

Ecological Concerns: These concerns arise because at least some people realize that biological systems perform an array of services that are of benefit to humans - e.g., cleansing of air and water, cycling of nutrients, stabilizing and generating of soils, and the fixing of minerals to plant roots - and that the perpetuation of these ecosystems and the services that they provide can be jeopardized by continued species extinctions. The danger is that one or more "keystone species" may be lost. These are species whose role in the biological community is vital to long-term ecosystem maintenance and stability (5,27).

Ethical or Moral Concerns: These concerns arise because some people, and their numbers seem to be growing, have come to question the appropriateness of the long held view that human-beings were created to rule over the earth and all the other species that live thereon. These people argue that the species "homo sapiens" has no right to exterminate another species. Quite the contrary, they contend that humans have an obligation to preserve the integrity, stability, and beauty of the larger biotic community of which they are a part (17,20). In essence,

² The ways in which habitat fragmentation can detrimentally affect species viability have become better understood as a consequence of new research findings in the field of "island biogeography" - which is the study of the geographic distributions of species on islands. This research suggests that habitat fragmentation can lead to species extinctions in several ways. These include: (1) the possibility that the fragmented habitat will not meet the spatial or heterogeneity requirements of certain species; (2) the possibility that the fragmented habitat may only support small populations which will be more susceptible to random events and genetic instabilities; and (3) the possibility that the fragmented habitat may trigger critical imbalances in plant - pollinator, predator - prey, and/or parasite - host interactions (27).

proponents of this emerging viewpoint on species inter-relationships feel that all species are to be valued - and, indeed, may be of equal worth.³

2.2 The Policy Response of the Federal Government

In response to the preceding concerns, the federal government of the United States, since 1966, has attempted to provide comprehensive legislative protection for species facing extinction.⁴ The country's current policy is set-forth in the Endangered Species Act (ESA) of 1973, as amended [16 U.S.C. Sect. 1531-1543].⁵ At the time that it was enacted, this law was not very controversial - as is evidenced by the fact that it passed the U.S. Congress with only four dissenting votes (21). This lack of controversy appears to have been due to the fact that most Congressional policy-makers were convinced of three things. These were: (1) that conflicts between species protection and development would not arise that often; (2) that when conflicts did arise, they would be relatively easy to resolve; and (3) that only federal agencies, for the most part, would be impacted. In retrospect, and based on 24 years of experience with the law, one would have to conclude that all three of these suppositions were in error.

Premise (1): Regarding the premise that conflicts between protection and development would occur infrequently, as the number of species receiving protection has increased, so has the number of conflicts; and every indication is that this will get worse, not better. As of May of 1992, 717 domestic species were receiving protection under the ESA; this total included 341 plants and 376 animals, both vertebrate and invertebrate (18). An additional 3,500 species awaited decisions as to whether or not they too should receive protection (15). Forestry has not been spared from this general trend towards increased conflicts. There are now pro-

³ If plants and animals can be beneficial to people in terms of the economic values that they represent and/or the ecological services that they provide - why, one might ask, do human-beings continue to behave in a manner that perpetuates additional widespread species extinctions? Economists have shown that such behavior is attributable to essentially two things. The first reason is that the vast majority of species will never be of any utilitarian value; and, regrettably, there is no foolproof way to distinguish between those species that will and those that will not. The second reason is that there are costs - in the form of opportunities foregone - that are associated with taking positive actions to prevent species losses, and these costs can be quite substantial (13,24).

⁴ The first federal statute intended to provide protection for species that were in danger of extinction was the Endangered Species Preservation Act of 1966 [P.L. No. 89-669, 80 Stat. 926 (1966)]. After some years this law was deemed to be deficient because: (1) it did not prohibit the sale or transportation of endangered species in interstate commerce; (2) it did not apply to plants and non-vertebrate animals; (3) it did not apply to foreign species in danger of extinction; and (4) it directed the Secretaries of Interior, Agriculture, and Defense to protect endangered species - but only insofar as was practicable and consistent with their primary missions. These perceived shortcomings eventually led to the passage of a new law - the Endangered Species Conservation Act of 1969 [P.L. No. 91-135, 83 Stat. 275 (1969)]. While this statute corrected many of the problems that were associated with the earlier law, it too was ultimately deemed to have certain shortcomings. The most significant of these shortcomings was that it failed to prohibit the taking of endangered species on private lands. Because of this weakness and others of lesser importance, this legislation was replaced - in 1973 - by the law that is now in effect (3,5).

⁵ Significant amendments to the Endangered Species Act have been made on three occasions - in 1978, 1979, and 1982.

tected species, or species that have been proposed for protection, that are significantly impacting upon forestry activities in virtually every region of the country. Examples include - the caribou in the extreme northeast; the grey wolf in the northern lake states; the red cockaded woodpecker in the southeast and midsouth; the mexican spotted owl and the northern goshawk in the southwest; the grizzly bear in the northern Rocky Mountains; and the northern spotted owl, marbeled murrelet, and sockeye salmon in the Pacific northwest.

Premise (2): Regarding the premise that those conflicts that did arise would be relatively easy to resolve, one need only point to the controversy surrounding the northern spotted owl and its impacts on forestry-related activities in the old-growth forests of the Washington, Oregon, and northern California to verify that this is not always the case. During the period from 1985 to 1989, the annual harvest from federally owned forests in this region was on the order of 5.0 billion board feet (BBF) - 4.0 BBF from lands administered by the Forest Service, and 1.0 BBF from lands administered by the Bureau of Land Management (25). Plans drafted by the two agencies called for gradually reducing this annual harvest rate by about 40 percent during the 1990's to better protect streams, recreation, wildlife, and other non-timber assets. The owl protection plans subsequently implemented dropped the annual harvest rate by yet another 40 percent (25). Various analyses, after making allowances for their procedural differences, indicate that the harvest reduction that is attributable to the owl, depending on the specific conservation strategy that is finally adopted, could cause 20,000 to 34,000 jobs to be lost in the region by the year 2000 (22). While this may be an extreme example, other conflicts involving forest as well as other types of land are also percipitating serious impacts.⁶ There can be little doubt but that Congress failed, when it passed the ESA, to recognize what would be required to protect, in a biologically meaningful way, the habitat of various species faced with extinction.

Premise (3): Finally, regarding the premise that, for the most part, only federal agencies would be impacted - while this may, quite literally, be true; as a practical matter the private sector has also been significantly affected. This has occurred for a variety of reasons, but three stand-out as being of particular importance.⁷ First, the language of the ESA is such that its provisions apply not only to activities conducted directly by a federal agency - but also to activities that require a federal permit or license, or that are funded, in whole or in part, with federal monies. Secondly, many of the activities that are conducted on federal lands provide goods and services that are utilized within the private sector - e.g., timber, forage for grazing, minerals, and oil and gas. When the federal management activities that provide these goods

⁶ For a thorough review of the northern spotted owl controversy, the reader is referred to the following article: Bonnett, M. and Zimmerman, K. (1991): Politics and preservation: the Endangered Species Act and the Northern Spotted Owl. *Ecology Law Quarterly* 18(1): 105-171.

⁷ For a discussion of some of the diverse ways in which private forest owners can be impacted by efforts to protect species that are in danger of extinction, the reader is referred to the following article: Irvin, L.T. and Wigley, T.B. (1992): Conservation of endangered species: the impact on private forestry. *Journal of Forestry* 90(8): 27-30, 42.

and services are disrupted by measures intended to protect species in danger of extinction, dependent elements of the private sector are impacted. Lastly, those provisions of the law that prohibit the "taking" of a protected species are directly applicable to private individuals and organizations. This fact is important because, as we will see, administrative regulations and judicial decisions pertaining to these provisions have rendered their scope much broader than originally envisioned.

3. KEY PROTECTIONS FOR DOMESTIC SPECIES

3.1 General Aspects

The ESA has been termed the "crown jewel" of American environmental protection legislation.⁸ Its stated goal is to conserve species that are faced with extinction by: (1) providing direct protection for such species, (2) providing indirect protection for such species through perpetuation of the habitats upon which they depend for their survival, and (3) providing a mechanism for the implementation of international treaties to which the United States is a signatory and that relate to the preservation of such species (16).

The ESA is administered by two departments of the federal government. The Department of Commerce, acting through the National Marine Fisheries Service (NMFS), exercises control over marine species. The Department of Interior, acting through the Fish and Wildlife Service (F&WS), has jurisdiction over terrestrial and freshwater species (3).

To attain its objective of conserving species faced with extinction, the ESA does essentially three things. First, it provides for the "listing" of rare plants and animals. Secondly, it provides for the designation of "critical habitats" and the formulation of "recovery plans" for listed species. Lastly, it establishes certain protections for species to be preserved. The provisions for listing, designation of critical habitats, and formulation of recovery plans are found in Section (4) and its associated administrative regulations. The principal protections for domestic species are found in Sections (7) and (9) and their associated administrative regulations. Accordingly, this paper will focus on these three sections and the regulations that have been promulgated pursuant to their implementation; however, where it is appropriate and helpful to do so, relevant court cases will also be considered.

3.2 Listing Process

Under the ESA, species may be listed as either "endangered" or "threatened." An "endangered" species is defined as a species which is in danger of extinction throughout all or a significant portion of its range. A "threatened" species is defined as a species which is likely to become

⁸ It is appropriate to note that there are a number of other federal laws that indirectly benefit the goal of species protection. These include: (1) laws aimed at protecting selected groups of wildlife species - e.g., the Migratory Bird Treaty Act, the Marine Mammal Protection Act, the Bald Eagle Protection Act, and the Wild and Free Roaming Horses and Burros Act; (2) laws aimed at controlling human use of public lands - e.g., the Wilderness Act, the National Forest Management Act, and the laws establishing the national parks and wildlife refuges; (3) laws aimed at controlling environmental contaminants - e.g., the Clean Air Act, the Clean Water Act, and the Toxic Substances Control Act; and (4) the National Environmental Policy Act.

endangered within the foreseeable future throughout all or a significant portion of its range (16). The ESA defines "species" to include subspecies as well as any distinct population segment of vertebrate fish or wildlife that interbreeds when mature (18). Thus, although 20 million sockeye salmon spawned in Alaska last year, the sockeye that swim up the Columbia, Snake, and Salmon rivers each year to their spawning grounds in central Idaho are now being protected as endangered (18).

The decision to list a species is to be made on the basis of the best "scientific and commercial" data available. Within this context, the term "commercial" refers to the use of trade data, it does not authorize the use of economic information. Indeed, economics is not to be considered in the decision to list a species. The factors that are to be considered include the following: (1) the present or threatened destruction, modification, or curtailment of a species' habitat or range; (2) the overutilization of a species for commercial, recreational, scientific, or educational purposes; (3) disease or predation that is affecting a species; (4) the adequacy of existing regulatory mechanisms for protecting a species; and (5) other natural or manmade forces that are affecting a species continued existence (4).

The actual listing of a species may occur in either of essentially two ways. One method is for the species to be listed at the initiative of the responsible administering agency. This process normally takes about 18 months to complete (18). However, if the agency determines that an emergency exists that poses a significant risk to the well-being of a species, listing can take place immediately upon publication of an appropriate notice in the Federal Register. This emergency listing will expire within 240 days unless normal listing procedures are commenced during that period (18).

The second - and more common method by which listing may occur - is in response to a petition submitted by some interested third party. When this occurs, the responsible administering agency has 90 days to decide if the petition presents enough data to support a more in-depth investigation. If the agency concludes that the petition is warranted, it initiates the in-depth investigation with the goal of compiling the best scientific and commercial data available. The agency may take up to 1-year to complete this status review, and after it has done so it may take one of three actions: (1) it may propose a rule to list the species, (2) it may extend consideration of the petition for an additional year, or (3) it may reject the petition and take no action. If the decision is to propose a rule to list the species, the proposed rule must be published in the Federal Register and distributed to appropriate experts. Usually a 60-day comment period is allowed, but this may be extended. After the close of the comment period the agency may issue a final rule, extent the proposal if there is a substantial question as to the sufficiency and accuracy of the data, or withdraw the rule. Any of these decisions can be challenged in federal court (3,4).

3.3 Critical Habitat

Regarding critical habitat, the ESA defines this as the areas within a species' geographical range that have those physical and biological features that: (1) are essential to the conser-

vation of the species, and (2) may require special management considerations or protection (27). This definition has been interpreted to mean that critical habitat need not include all geographical areas that a species could conceivably occupy; but that, conversely, it may include areas not occupied by a species if these areas are deemed essential to the species' survival and require special protection (3). In contrast to listing decisions, decisions regarding the appropriate extent of critical habitat are to be based on more than the best scientific and commercial data - economic and other relevant impacts are also to be recognized. Specifically, areas are to be excluded from critical habitat if the benefits of exclusion outweigh the benefits of inclusion - and if exclusion will not result in extinction of a species (3).

Section (4) of the ESA stipulates that critical habitat should normally be designated at the same time that the decision is made to list a species. However, the law does allow that the responsible administering agency can: (1) delay designating critical habitat if such habitat cannot be determined at the time of listing; or (2) forego designating critical habitat if the identification of such habitat would pose a threat to the species that is supposed to be protected (3). While it may seem unlikely that the designation of critical habitat could represent a threat, experience has shown that this is a distinct possibility. The danger, which is especially great in the case of plants, is that the identification of critical habitat will pinpoint the location of the threatened or endangered species for both collectors and vandals (21).⁹

3.4 Recovery Plans

Regarding recovery plans, Section (4) of the ESA provides that - unless a determination is made that they would not promote the conservation of a listed species - the responsible administering agency is to formulate such a plan for each species being protected under the law (16). The objective of recovery plans is to establish time schedules and set-forth the site-specific actions that will be needed to restore threatened or endangered species to their former status as viable, self-sustaining members of the ecosystems they have traditionally inhabited (8). Typically included in a recovery plan are such things as the following: (1) the measures that will be taken to identify and describe all existing populations; (2) the measures that will be taken to protect essential habitat by acquisition, manipulation, and/or clean-up; (3) the measures, if any, that will be taken to transplant populations to more protected sites; and (4) the measures that will be taken to ensure proper enforcement of the law (8).

4. RESPONSIBILITIES OF FEDERAL AGENCIES, SECTION (7)

Section (7) of the ESA seeks to protect listed species by imposing two types of responsibilities on all agencies of the federal government. These responsibilities are embodied in what have come to be known as the "jeopardy" and "conservation" clauses. Each of these clauses merits individual examination.

⁹ In reality, critical habitats have been designated for only about 20 percent of listed species. In most cases, the "official" reason for not designating critical habitat is the belief that such action would pose a threat to the listed species. Most authorities believe, however, that other considerations - e.g., fear of galvanizing local opposition, and the heavy time and cost burdens that the administering agency must bear - often enter into the decision (21).

4.1 Jeopardy Clause

The "jeopardy clause" of Section (7) prohibits all federal agencies from initiating, approving, or funding any action that will either: (1) jeopardize the continued existence of a listed species, or (2) result in the destruction or adverse modification of designated critical habitat (4). Administrative regulations issued pursuant to Section (7) have defined these two standards as follows (21):

"Jeopardize the continued existence of" ... means any action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

"Destruction or adverse modification" ... means alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species.

Of the two standards, the first, since it does not require an explicit link to critical habitat, is clearly the broadest in scope. This fact is of considerable importance because it implies that the two standards can in effect be treated as one standard which mandates that federal agencies not initiate, approve, or fund any action - not just within designated critical habitat but anywhere - that can reasonably be expected to appreciably reduce the likelihood that a listed species will survive and recover in the wild (21,27).¹⁰

All federal agencies contemplating actions that could conceivably impact upon a listed species are required, by way of compliance with Section (7), to adhere to a prescribed consultation process. The major steps in this process are as follows (3,16):

Step (1): The agency that is proposing to initiate some action contacts the appropriate administering agency and informs them of what they are planning to do and where. During this contact, the action agency asks the administering agency if a listed or candidate species is likely to be affected. If the answer is no, consultation terminates. If the answer is yes, the process moves on to step (2).

Step (2): The action agency requests formal consultation with the administering agency. Additionally, the action agency prepares a "biological assessment" that describes how, in its judgment, the planned action is likely to impact any listed or proposed species, or designated critical habitats. This biological assessment is forwarded to the administering agency.¹¹

¹⁰ The U.S. Supreme Court has agreed to decide if the ESA applies to overseas projects that are carried-out or funded by a U.S. agency. The original administrative regulations for Section (7) applied to foreign activities; however, starting in the early 1980's the Interior Department began to ignore these provisions. In 1986, the Department issued new regulations that dropped the international requirement altogether. In August of 1990, a federal appeals court struck-down the new regulations exempting international projects thereby opening the door for court challenges when such projects involve U.S. agencies or funding (2).

¹¹ Once formal Section (7) consultation has begun, the action agency is not to make any irreversible or irretrievable commitments of resources. Such resource commitments are precluded to ensure that opportunities for formulating and implementing reasonable and prudent alternatives are not foreclosed (16).

Step (3): The administering agency, within 90-days of receiving the biological assessment, issues a "biological opinion" concerning what, in its judgement, will be the direct effects of the planned action as well as the potential effects of other actions that in all likelihood will follow from the planned action. If a "no jeopardy" opinion is returned, consultation terminates. If a "jeopardy" opinion is returned, the process moves on to step (4).

Step (4): The administering agency works with the action agency to identify "reasonable and prudent" alternatives that will allow the planned action to go forward and yet be in compliance with Section (7).

If no reasonable and prudent alternatives can be identified, the action agency may proceed in any of three ways. First, it can abandon the project. Secondly, it can go forward with the project - but it will be subject to being sued for being in violation of Section (7). Lastly, it can request that the "Endangered Species Committee" be convened to evaluate the merits of exempting the project from the provisions of the ESA (3,16).

4.2 Conservation Clause

The "conservation clause" of Section (7) provides that, in addition to refraining from actions that could jeopardize listed species or the critical habitats upon which they depend, all federal agencies are to affirmatively use their existing authorities to promote the conservation of threatened and endangered species. "Conservation" is defined to mean ... the use of all methods and procedures which are necessary to bring any endangered or threatened species to the point at which the measures provided for in the Act are no longer needed (12). In other words, the "conservation clause" mandates that all federal agencies - in association with discharging their normal duties and responsibilities - are also to continuously look for opportunities to develop and implement programs that will positively affect rare plants and animals.

The language of the "conservation clause" and the related administrative regulations does not clearly delineate the exact scope of a federal agency's legally mandated conservation duties. However, there have been a number of court cases in this area which suggest that these duties are to be afforded the highest of priorities. Illustrative cases include the following:

TVA v. Hill [437 U.S. 153 (1978)] - In this landmark case, the U.S. Supreme Court clearly established that the responsibility of federal agencies to protect and conserve threatened and endangered species was to take precedence over their primary missions. In this instance, the Tennessee Valley Authority (TVA), a federally owned corporation, had begun construction, in 1967, of a dam and reservoir on the Little Tennessee River. This project was intended to provide benefits in terms of hydroelectric energy, flood control, and recreational development. In 1973, a scientist discovered that a rare species of perch, known as the snail darter, inhabited the stretch of the river that was to be inundated by the proposed reservoir. In 1975, the Secretary of Interior listed the snail darter as endangered under the ESA; and in 1976, when the project was 70 to 80 percent complete, the area that was to be impacted was designated as criti-

cal habitat. Despite this designation, Congress continued to appropriate money for the project and TVA continued with construction of the dam until, in 1977, the Sixth Circuit Court of Appeals enjoined further work on the project. The Supreme Court agreed to hear the case and, in 1978, it affirmed the decision of the Appeals Court. In its decision the Supreme Court stated that it was its finding that "without exception" and at "whatever the cost" -Congress intended that federal agencies give the conservation of listed species the "highest of priorities," even over their primary missions (10).

Carson-Truckee Water Conservancy District v. Clark [549 F.Supp. 704 (D. Nev. 1982) aff'd in part, vacated in part, 741 F.2d 257 (9th Cir. 1984)] - In this case a federal district court in Nevada upheld the authority of the Secretary of Interior to regulate the use of the reclamation project's waters so as to benefit two species of endangered fish -i.e., the Cui-ui and the Lahontan cutthroat trout. Members of the conservancy district had sued the Secretary to secure the release of the water for irrigation needs. The plaintiffs argued that the Department was only obligated to avoid jeopardizing the bare survival of the species. The court, however, rejected this argument - finding that, until the fish were no longer classified as endangered, the Secretary was required to give the fishery priority over all other uses of the reclamation project's waters. This decision was affirmed by the Ninth Circuit Court of Appeals (12).

National Wildlife Federation v. Hodel [Slip Op. No. S-85-0837 EJC (E.D. Cal. Aug. 26, 1985)] - In this case a federal district court in California agreed with the plaintiffs that the Secretary of Interior needed to be more proactive in terms of the measures that the Department was employing to protect the endangered bald eagle. The Wildlife Federation introduced evidence compiled by the F&WS which showed that, during the hunting season, some eagles were eating ducks and geese that had been crippled by lead gunshot - and that, because of secondary lead poisoning, this was leading to an increase in eagle mortality. The plaintiffs argued that the Secretary had the option, under the ESA, of either: (1) closing the hunting season in areas heavily used by eagles, or (2) requiring the use of nontoxic steel shot. The Department countered that it had complete discretion to pick-and-choose which conservation measures to utilize. The court rejected this contention stating that, under the ESA, federal agencies must: (1) consider a reasonable range of programs or actions that will lead to the recovery of a listed species, and (2) specify the basis for rejecting any particular measure (12).

4.3 Prohibition of Taking a Listed Species, Section (9)

Section (9) of the ESA seeks to protect rare plants and animals by prohibiting the "taking" of a listed species by "any person" subject to the jurisdiction of the United States (16).^{12/13} In

¹² The prohibition against "takings" actually encompasses only species that are listed as endangered. However, both agency practice and judicial interpretation have extended the prohibition to threatened species as well (12).

¹³ Section (9) does recognize certain limited exceptions to the general prohibition against takings. These exceptions are: (1) takings for scientific purposes, or to enhance the propagation or survival of a listed species; and (2) takings by certain native Alaskans when these are for subsistence purposes (16).

order to understand the scope of this prohibition, it is necessary to define the terms "taking" and "any person."

The term "taking" is defined very broadly in the Act to include harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in such conduct. It is appropriate to note that the administrative regulations promulgated pursuant to the law have, in turn, defined some aspects of "taking" very broadly. In this regard, the definition of "harm" has proven to be particularly important. In 1975 the term was defined very loosely so that it encompassed any habitat modification actions that significantly disrupted essential behavior patterns (26). In the early 1980's the term was defined more narrowly so that it now encompasses only those habitat modification actions that result in the actual killing or injuring of a listed species (26). In reality, however, as we will see, this narrower administrative interpretation of what constitutes "harm" has not been adopted in the courts.

The term "any person" has been defined to include individuals, corporations, partnerships, trusts, associations and other private organizations; or any officer, employee, agent, department, or instrumentality of the federal government, of any state, municipality, or political subdivision of a state; or any other entity subject to the jurisdiction of the United States (3). In other words, the term "any person" includes essentially all individuals and organizations that reside and/or conduct some type of operations within the United States.

The significance of Section (9) is that its reach extends directly into the private sector.¹⁴ At present, the two court cases that best define the potential extent of that reach are known as *Palila I* and *Palila II* - after the name of the endangered bird that was the focal-point of the litigation in both cases.

In *Palila I* [*Palila v. Hawaii Department of Land and Natural Resources*; 471 F.Supp. 985 (D. Haw. 1979), *aff'd* 639 F.2d. 495 (9th Cir. 1981)], the State of Hawaii was ordered to remove feral goats and sheep from a state owned game management area. The animals were maintained for sport hunting, but their grazing consumed the shoots and seedlings of mammane trees - thereby preventing the regeneration of the forest and impairing the habitat of the Palila. Although the game management area in question had been designated as critical habitat for the Palila, this point was legally irrelevant because of the absence of federal lands, funds, or participation. However, even though Section (7) could not be implicated, the federal district court for Hawaii found a violation of the ESA through the "taking" restrictions in Section (9). This decision was affirmed by the Ninth Circuit Court of Appeals (21).

In its ruling in *Palila I*, the federal district court cited the F&WS regulations that defined "harm" as significant environmental modification or degradation. In response to this judicial introduc-

¹⁴ Another significant feature of Section (9) is that, in contrast to Section (7), it does not require that there be harm to a species as a whole -the taking of a single member of a listed species is a violation (9).

tion of critical habitat modification into "takings" analysis, the F&WS, as noted earlier, promulgated new regulations which defined "harm" more narrowly - i.e., as habitat modification which actually kills or injures listed species by significantly impairing their essential behavior patterns. This change, however - as became apparent in *Palila II* - failed to have the desired affect (26).

In *Palila II* [648 F.Supp. 1070 (D. Haw. 1986), aff'd 852 F.2d 1106 (9th Cir. 1988)], the federal district court for Hawaii found that the State's game management program for another species of sheep still constituted a "taking" of the Palila within the meaning of Section (9). The court recognized the use of the word "actually" in the new regulatory definition of "harm," but held that habitat destruction that prevents the recovery of a species by disrupting essential behavior patterns causes actual injury to the species. Once again, on appeal, the Ninth Circuit upheld the lower court's ruling (21).

The decision in *Palila II* has potentially broad-ranging implications. By absorbing the Section (7) prohibition against adverse modification of critical habitat into the Section (9) prohibition on takings, the case effectively extends Section (7) to non-federal actions in designated critical habitats. Additional cases litigated since *Palila II* have indeed adopted this convention and, in some instances, have even extended it.^{15 /16 /17}

5. POLICY OPTIONS NOW BEING DEBATED

Having reviewed the United State's current policy for protecting species faced with extinction, it is now time to turn to the last objective of this paper. This objective is to briefly review the

¹⁵ One case that has extended the principles established in *Palila I and II* is *Mountain States Legal Foundation v. Hodel* [799 F.2d. 1423, 1427-28 (10th Cir. 1986)]. In this case the Tenth Circuit Court of Appeals held that if someone is maintaining grazing animals on their own land - and if these animals are so modifying the natural habitat as to cause indirect injury to a threatened or endangered species - the owner can be required to remove the animals from their land, even if the land has not been designated as critical habitat. This decision effectively combines the adverse modification prohibition of Section (7) with the takings prohibition of Section (9), and extends their joint influence to all privately owned lands - including those that have not been designated as critical habitat (3).

¹⁶ In 1982, Congress responded to the *Palila I and II* decisions by enacting an amendment, now included in Section (10) of the ESA, which provides for the "incidental taking" of a listed species. To obtain an "incidental take permit," an applicant must prepare a "habitat conservation plan" and submit this plan to the appropriate administering agency for approval (26)

¹⁷ Primary responsibility for enforcing the ESA rests with the federal government acting through the appropriate administering agency. However, to help ensure compliance, the law also authorizes two types of citizen suits. First, Section (11) provides that any person may sue in federal district court to enjoin any other person, or any governmental agency, from violating any provision of the ESA or its implementing regulations. Secondly, Section (11) further provides that any person may sue to force the responsible administering agency to perform any nondiscretionary duty under Section (4) - e.g., to make a listing determination. With one exception, 60-days advance notice must be given before either type of citizen suit can be initiated. The one exception is that, in the case of the second type of suit, legal action can be initiated immediately after giving notice if the species of concern is believed to be in imminent danger. When a violation of the ESA is judged to have occurred, both civil and criminal penalties may be imposed. Civil penalties include fines of up to \$25,000 per violation. Criminal penalties may include fines of up to \$50,000 and jail sentences of up to 1-year per violation. Additionally, in criminal cases, all means of taking (guns, traps), transporting (cars, trucks, planes, boats), storing (house, garage, greenhouse), and/or selling (computers, cash registers) protected species may be impounded by the government (16).

policy options that have been debated in conjunction with Congressional efforts to renew the ESA since its expiration at the end of 1992.¹⁸

As was true of the past debates that took place when the ESA was up for reauthorization, the current debate has highlighted the seemingly inescapable conflict between the public goals of species preservation and economic development. This time, however, the debate promises to be more intense than at any point in the past. In large part the heightened debate can be explained by the fact that the listing of more species has created greater pressures for preservation at the same time that an expanding population has created greater pressures for resource use and development. But to a significant degree, the strength of the current debate is also being fueled by a small number of high-profile and very controversial species preservation/resource use conflicts - e.g., the northern spotted owl issue.

In the United States today there can be little doubt but that there continues to be broad public concern over the matter of species extinctions, and thus broad public support for governmental action to control such extinctions. At the same time, however, it seems equally clear that a growing segment of the public has become increasingly concerned with: (1) the rising costs of preventing species extinctions, and (2) the questionable effectiveness and efficiency of the species-by-species approach to protection that is embodied in the ESA.

In 1990, approximately \$102.3 million was spent on the conservation of 477 listed species (18). While this represents but a small fraction of the estimated total funding that would be required to recover just currently listed species, it seems unlikely, given the many pressing needs that are constantly vying for the available federal tax dollars, that funding for species preservation will increase substantially in the years ahead.¹⁹ If this indeed proves to be the case, it will perpetuate an undesirable situation that has existed in the past. Specifically, we will be forced to choose which species to save and which to neglect when we presently have no sound biological, legal, or ethical criteria for making such decisions. In the past, contrary to what one might expect, the tendency has been to favor: (1) subspecies over full species, (2) species with low recovery potentials over those with high recovery potentials, and (3) so-called "glamour species" -e.g., the grizzly bear, bald eagle, and Florida panther - over less appealing species such as the Nashville crayfish and the Texas blind salamander (5,17).²⁰ These decisions

¹⁸ At the end of 1997 the ESA had not been permanently reauthorized, although numerous bills from 1991 through 1997 to do so have been introduced in both the House of Representatives and the Senate. The ESA has been temporarily extended by Congress on a year-to-year basis since 1992 pending reauthorization.

¹⁹ The Inspector General of the Department of Interior has estimated that the total cost that would be required over the next decade to recover just currently listed species is about \$4.6 billion (18).

²⁰ Of the \$102.3 million that was spent on threatened and endangered species in 1990, over half was spent on just eleven of the 591 plants and animals that were listed. At the top of the list was the northern spotted owl, which benefited from \$9.7 million in expenditures. Other top species were: least Bell's vireo - \$9.2 million; grizzly bear - \$5.9 million; red-cockaded woodpecker - \$5.2 million; Florida panther - \$4.1 million; desert tortoise - \$4.1 million; bald eagle (in the lower 48 states) - \$3.5 million; ocelot - \$3.0 million; jaguarundi - \$2.9 million; peregrine falcon - \$2.9 million; and the California least tern - \$2.7 million (2).

have been made even though, in terms of their ultimate importance to humankind, it might make more sense to save some species of mold, sponge, or insect.

The growing recognition that the ESA's "species-by-species" approach to protecting rare plants and animals may be both ineffective and inefficient - i.e., needlessly costly for the benefits that are produced - has prompted an intense search for alternatives.^{21 /22} In this regard, considerable interest is now being shown in what is called the "ecosystems" approach to species protection. Under this approach, instead of focusing on the use of heroic measures to save particular species, emphasis is placed on identifying and setting-aside biologically meaningful reserves that can be maintained as self-sustaining ecological units.²³ The perceived benefits of the ecosystems approach include the following (6,27):

- it preserves biological diversity as well as specific targeted species;²⁴
- it protects the entire support system (i.e., habitat) that all species residing within a particular area require for their survival;
- it forces managers to adopt an ecological and long-term view in planning for the survival of species;
- it allows for more orderly development since industry and others know in advance which areas to avoid; and
- it is more efficient in accomplishing the goal of preventing species extinctions. Recovery efforts are not constantly being diluted as new species meriting protection are identified.

²¹ As evidence of the ESA's ineffectiveness, opponents of the legislation point-out that only 15 species have been delisted since the law's enactment - and that of these, only 4 species were delisted because they were recovered. The remaining species were delisted either because they had become extinct, or additional populations were discovered (15).

²² Recognizing that Congress may well elect to retain the current species-by-species approach, both proponents and opponents of the ESA have recommended that certain changes be made. Proponents of the law urge that: (1) the listing process be streamlined, (2) the procedures for designating critical habitats be improved, (3) the mechanisms for formulating recovery plans be expedited, (4) funding be improved, (5) enforcement be strengthened, and (6) the principles of "triage" be applied in deciding which species to protect (5,15,17). Opponents of the law urge that: (1) protection be limited to species whose rarity is human-caused; (2) "species" be redefined to exclude subspecies and separate geographic populations; (3) economic and social factors be given more weight in listing decisions; and (4) flexibility be incorporated into the language of the law by including phrases such as "insofar as practicable," "best available technology," "to the extent feasible," and "in the public interest" (14,19).

²³ The species-by-species and ecosystems approaches are both examples of what scientists call the "in situ" approach to protecting genetic resources. The "in situ" approach involves protecting species in their natural habitats. This is in contrast to the "ex situ" approach which entails protecting plants and animals in permanent collections such as zoos and botanical gardens, or protecting seeds and other genetic materials in controlled environments such as germplasm banks. Although the "ex situ" approach has the advantage of lower cost, it is feasible for only a small fraction of species; additionally, it obviously cannot be used to protect species that have not yet been discovered (24).

²⁴ The U.S. Council on Environmental Quality has stated that "biological diversity" is a broad catch-all term that ... "includes the interconnected and related concepts of genetic diversity, including the genetic variability within individuals, races and populations of species; species or ecological diversity, including the number or richness of species within a community or habitat; and habitat or natural diversity, including the variety and number of natural habitats and ecosystems" (7).

The primary disadvantage of the ecosystems approach is that, to protect some types of species - i.e., those that range quite widely - it may be necessary to set-aside fairly large areas and to impose very stringent restrictions on the use of these areas (6).²⁵ Of course, even under the current species-by-species approach extremely large areas are now being impacted by measures designed to prevent extinctions.

At present the ecosystems approach is being tested in Idaho through a cooperative effort involving the F&WS, the Nature Conservancy, and the Idaho Departments of Fish and Game and Water Resources. The study is using a procedure called "gap analysis" to assess whether or not Idaho's existing preserves are adequate to protect the State's biological diversity. Gap analysis employs state-of-the-art geographic information system (GIS) and computer mapping techniques to identify and delineate areas of "species richness." By comparing the locations of species-rich areas with the locations of existing preserves, gap analysis can show where biological diversity is already well protected and where additional preserves would do the most good (23).²⁶

In recent years, a number of bills have been introduced into the U.S. Congress with the purpose of putting-in-place mechanisms which would ensure that federal agencies give more attention to the protection of biological diversity.²⁷ Representative is HR (585) which was introduced into the House of Representatives in April of 1991. This bill would (1):

- establish an interagency committee to draft a national strategy for enhancing biodiversity;
- set-up a new research center at the Smithsonian Institution and charge it with the task of filling-in the gaps in biodiversity research;

²⁵ In the United States, a number of federal agencies - e.g., the Forest Service, the Bureau of Land Management, the Fish and Wildlife Service, and the National Park Service - already control relatively large amounts of relatively undeveloped land. These lands could be used as a starting-point for establishing a network of ecosystem reserves. Such a strategy would help to: (1) minimize costs by limiting the need for additional land acquisitions, and (2) minimize impacts on the private sector.

²⁶ A similar test was initiated in California on September 19, 1991. On that date the State signed a Memorandum of Agreement on Biological Diversity. Under this agreement, four federal and six state agencies will collaborate on their resource management activities with the goal being to protect both biological diversity and economic viability across mixed ownerships.

²⁷ In April of 1991, a 96-page report known as the "Keystone Report" was released. The report provides direction to federal agencies for biodiversity management on public lands; and it is significant because it was put together by representatives from Congress, the federal land management agencies, commodity groups, and conservation organizations. The report concludes: (1) that biodiversity is necessary for the continued health of humans, and is a major factor in the resiliency of ecosystems; (2) that federal lands can play a significant role in biodiversity conservation; (3) that biodiversity goals can be achieved while allowing significant human uses of the natural resources on federal lands; and (4) that current efforts to conserve biological diversity are inadequate. To correct the latter problem, the report recommends that several actions be undertaken. One recommendation calls for establishing a cabinet-level panel to annually review the status of biodiversity on public lands, and to explore ways of encouraging the private sector to assist in enhancing biodiversity. Another recommendation is that agency scientists cooperate towards compiling a detailed inventory of the biological resources on public lands, and that this inventory be used to formulate strategies for enhancing biodiversity (1).

- direct the Interior Department to complete a "gap analysis" inventory of the entire United States;
- authorize a matching grants program to encourage the states and private organizations to assist in conducting biological resource inventories; and
- direct the Council on Environmental Quality to come up with guidelines for evaluating how federal agency actions impact biodiversity. These guidelines would be incorporated into the environmental impact statement (EIS) process that was set-up by the National Environmental Policy Act (NEPA) of 1969 [P.L. 91-190, 83 Stat. 852; 42 U.S.C. 4321, 4331-4335, 4341-4347].

Only time will tell if the "ecosystems approach" will supplant the "species-by-species approach" as the primary policy mechanism by which the United States seeks to strike a biologically sufficient and publically acceptable balance between the goals of species preservation and economic development. The issue is incredibly complex. The ESA and the emerging biodiversity initiatives express the noblest intentions of humankind - a concern for the well-being of our fellow species. However, America's use of its abundant natural resources has been the bedrock of its economic and political strength for over two centuries - and this situation remains unchanged even today.

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THE INTERACTION OF STATE AND FEDERAL WATER QUALITY LEGISLATION IN THE UNITED STATES - IMPLICATIONS FOR FORESTRY PRACTICES

William C. Siegel

1. INTRODUCTION

During the last several decades the United States Congress has directed the nation's Environmental Protection Agency (EPA) to take the lead in controlling water pollution in each of the individual states. This dictate began with the 1972 Amendments to the Federal Water Pollution Control Act (FWPCA). That law required the states to develop and implement water quality management plans, subject to EPA approval, for alleviating nonpoint pollution. It also required the promulgation of a permit system for point source discharges into navigable water and wetlands. The 1972 legislation was subsequently strengthened by the 1977 Clean Water Act. In response to these two statutes, the states have addressed implementation of water pollution control measures with varying degrees of success. In many parts of the country today, nonpoint sources - in particular remain a substantial contributor to water pollution.

Congress thus enacted the Water Quality Act of 1987, a law that sets new directions for protection of the nation's water. It places abatement of nonpoint sources on an equal footing with point sources in the EPA's continuing water pollution control effort. It does this by setting forth specific procedures and requirements that each state must follow.

This paper begins by briefly reviewing the impacts of silvicultural practices on water quality, and the history of federal water quality legislation affecting forestry operations in the United States. It then summarizes current state laws and other institutional mechanisms that are designed to protect water quality from the adverse effects of certain forestry practices. The present status of the various approaches, as well as recent legislative initiatives, are discussed and the future outlook assessed. Situations in several states that are of particular interest are examined in more detail.

2. FORESTRY IMPACTS ON WATER QUALITY

Many types of forestry activities can affect water quality. These include tree harvesting, construction of logging roads, site preparation for tree planting, and various types of timber stand improvement practices. Such operations can all disturb the forest floor, which may result in nutrients from organic matter being released into lakes, streams and rivers. Logging operations can also cause erosion, permitting sediment to enter adjacent waters. Erosion can additionally occur during periods when soils are left bare, such as after site preparation but before planting. Logging debris placed in streams may contribute to water pollution.

Water quality is sometimes impaired by the removal of standing vegetation near stream banks because the buffer protecting the water is gone. Loss of shade may additionally cause water

temperature increases which can be harmful to aquatic life. Forestry activities may also pollute water with chemicals that leak from equipment or which otherwise enter streams as runoff. Accidental fuel and lubrication spills, herbicides, pesticides, and even fertilizers can all reach adjacent waters. Once a pollutant reaches water, the characteristics of the water itself - such as volume, flow rate, and chemical properties - will influence the impacts of the pollutant.

Numerous studies have examined the effects of forestry practices on water quality. An examination of harvested sites in the New England states indicated that 50 to 70 percent had some erosion problems (Patric 1976). Over 50 percent of the problems were caused by logging roads.

Nutrient loading in streams after clearcutting has also been identified as a problem (Sopper 1975). However, many other studies have concluded that forest nutrient losses on clearcut sites that were allowed to reforest naturally were not large nor long-lived. Partial or strip cutting has been found to moderate nutrient losses substantially - to levels only two to three times those found in undisturbed forests (Hornbeck et al. 1974).

Several studies in the Southeast have examined the pollution effects of logging and site preparation. One in North Carolina found substantial soil losses from logging roads. Those with no or light gravel cover lost up to 270 tons per acre of road per year, whereas those with six inches or more of gravel cover lost only 25 tons (Douglass 1977). A study of site preparation in North Carolina found that sites harvested, KG-bladed, windrowed, burned, and planted lost 580 pounds of soil per inch of runoff. Discing did not change soil loss rates, but - because runoff doubled - soil loss also doubled. Sites with similar harvest and site preparation treatments plus fertilizing, liming, and planting of grass and trees lost only 180 pounds of soil per inch of runoff (Douglass 1977)

3. FEDERAL LEGISLATIVE AND JUDICIAL HISTORY

Most modern efforts to maintain or improve water quality in the United States began with passage of the 1972 Amendments to the Federal Water Pollution Control Act (FWPCA) and continued after passage of the 1977 Clean Water Act. The 1972 Amendments marked the first time that pollution from forestry activities had been addressed in federal water legislation. Some of the states had previously enacted comprehensive water quality laws, but most had not and coordinated national action was lacking. Only a few of these state laws were directed to silvicultural water pollution - and then primarily to stream blockage from logging debris.

The 1972 amendments contain two sections that have direct implications for forestry operations. Section 208 is directed to nonpoint sources and Section 404 to point sources. Nonpoint source pollution is that which does not have a discrete origin, but rather comes from a widespread land area - such as that used for crops, mining or timber growing. Point source pollution, on the other hand, is that which is attributable to a discrete emission, such as in-

dustrial effluent, or runoff from agricultural feedlots or road ditches. Section 319 of the 1987 Water Quality Act also addresses forestry nonpoint source pollution in a significant way.

3.1 Section 208

Section 208 of the 1972 FWPCA Amendments mandated that the individual states develop and implement water quality management plans, subject to EPA approval. Silvicultural activities are designated as one source of nonpoint pollution that must be addressed in the plans.

EPA originally interpreted Section 208's state planning requirement as applying only to problem areas designated by each state's governor. However, litigation initiated by two environmental organizations led to a court decision that Section 208 planning should apply to all areas of the state, including nondesignated forest lands.¹ The ruling was affirmed upon appeal, but the Appeals Court held that intensity of planning for nondesignated areas need not be as great as for designated areas.²

EPA aggressively pursued implementation of Section 208 planning. The agency's efforts included strong recommendations for formal regulation of private forest practices by the passage of state forest practice legislation (Agee 1975). A model state law drafted by EPA contained overly strict reforestation standards, water quality and soil protection measures, and aesthetic protection guidelines. Critical response from the nation's forestry sector caused the agency to discard its model act in favor of less overt implementing mechanisms, including voluntary guidelines - particularly for the eastern United States where forestry-related water quality problems were perceived as being less severe than in the west. Most states in the eastern half of the country, therefore, have directly addressed forestry non-point pollution by means of voluntary programs that utilize suggested "best management practices" (BMPs) for forestry operations. BMPs are administratively defined by the EPA as "methods, measures or practices selected by an agency to meet its nonpoint source control needs. They include but are not limited to structural and nonstructural controls, and operation and maintenance procedures" (Wilkinson 1987). However, some states in the east and many in the western United States have also enacted regulatory legislation for controlling silvicultural nonpoint source pollution.

3.2 Section 319

Most state Section 208 management strategies were designed around the development of BMPs, whether voluntary or mandatory. The BMP approach, however, has generally been perceived as proving unsatisfactory (Haines, Cabbage and Siegel 1988; Wilkinson 1987). There is little evidence that it has been the dynamic control strategy originally envisioned. Nonpoint pollution affects more stream miles in the United States today than point source pollution and is a significant reason why the nation's rivers have failed to meet the water

¹ Natural Resources Defense Council v. Train, 396 F. Supp. 1386 (1975).

² Natural Resources Defense Council v. Costle, 564 F. 2d 753 (1977).

quality goals of the 1972 and 1977 FWPCA Amendments (U.S. General Accounting Office 1986).

Because of the persistent nonpoint situation, and other unresolved water quality problems, Congressional deliberations eventually led to a major revision of the 1972 and 1977 Amendments. The new statute was passed unanimously by both houses of Congress in 1986. President Reagan, however, pocket-vetoed the legislation after Congress adjourned. As an indication of their resolve to revise and strengthen federal water quality protection law, many members of Congress reintroduced the bill as the first of 1987. It was swiftly enacted in February of the year by overriding the President's veto. It thus became "the national policy" to control non-point sources "in an expeditious manner".

In order to do this, Congress included Section 319 which contains two key provisions with significance for forestry operations. The first is that the individual states were required to submit state assessment reports to EPA within 18 months. The reports were to identify waters that "cannot reasonably be expected to attain or maintain applicable water quality standards, or the goals and requirements of the new law, without additional action to control nonpoint sources of pollution".

They were to additionally identify "those categories and subcategories of nonpoint sources, or where appropriate, particular nonpoint sources which add significant pollution and contribute to the failures to meet the standards, goals, or requirements of the act".

The second requirement is that the states were required, also within 18 months, to prepare and submit to EPA detailed state water quality management plans "for controlling pollution added from nonpoint sources ... and improving the quality" of the state's waters. The plans were to identify and describe control mechanisms - either voluntary or regulatory - for alleviating nonpoint source pollution. The law authorized \$400 million in federal funds to be spent over the next four years for program implementation. Those states that elect the use of regulatory mechanisms were to be given priority in receiving these funds (Hohenstein 1987).

In implementing the control mechanism, whether voluntary or regulatory, the states may base compliance on either the use of BMPs or on general state water quality standards - or on both. There has been considerable debate over which of these approaches should be used for forestry operations. Some observers question whether water quality standards can be used at all without completely halting some forestry activities (Hohenstein 1987). This is because numeric water quality criteria which were originally intended to measure point-source pollution are not well suited for application to nonpoint sources. It is quite difficult to use such standards to determine the impact of silvicultural activities on pollutant concentrations (Haines, Cabbage and Siegel 1988).

Several court decisions have also now made it clear that the states have authority to supplement BMPs with their own water quality standards, and that public agencies must comply

with state rules concerning nonpoint pollution. The 9th Circuit Court of Appeals has held the U.S. Forest Service responsible for ensuring that run-off from road building and timber harvesting in the national forests complies with California's state water quality standards.³ The Forest Service had argued that the use of state approved BMPs alone fulfilled all obligations under the FWPCA. The Court rejected this argument, finding no indication "that the BMPs were to be considered standards in and of themselves", and further ruling that the MBPs were merely a means to achieve water quality standards.

In March 1987 the U.S. Supreme Court upheld the right of the California Coastal Commission to require that company mining on federal lands under the hardrock mining laws must meet state mining permit requirements for controlling nonpoint water pollution.⁴ The Court wrote that the mere requirement of a state permit did not evidence a duplication of federal permit requirements: "If reasonable state environmental regulation is not preempted, then the use of a permit requirement to impose the state regulations does not create a conflict with federal law where none previously existed. The permit requirement itself is not talismanic".

3.3 Section 404

Under Section 404 of the FWPCA, forest management activities involving dredge and fill operations in navigable waters and adjacent wetlands may require a permit from the Army Corps of Engineers before commencement. Dredge and fill operations are basically defined as any activity which converts waters or wetlands into dry land, even by the slightest distribution of surface soils.⁵ The Corps' implementation of Section 404 has not been overly aggressive. It initially tried to administratively limit its jurisdiction under the FWPCA to only major rivers and harbors that were capable of carrying commercial traffic (Stine 1983).

As a result, environmentalists brought suit⁶ - alleging that the Corps minimal Section 404 regulations violated the FWPCA mandate. The plaintiffs contended that Congress had intended for the law to control all water pollution in the United States, not just that in traditional navigable waters. The Court ruled for the plaintiffs, and instructed the Corps to revise and expand its regulations to protect wetlands and even small streams. The Corps promptly complied, but was initially somewhat unenthusiastic regarding implementation of the broadened requirements (Stine 1983).

The scope of the Corps Section 404 jurisdiction has been further clarified by several more recent court decisions. In 1985 the U.S. Supreme Court ruled that an area adjacent to a body of water need not be frequently flooded to be subject to regulation by the Corps.⁷ In two 1986

³ Northwest Indian Cemetery Protection Association v. Peterson, 764 F.2d 581, 795 P. 2d 688 (9th Cir. 1985) cert. granted, 107 S. Ct. 1971 (1987).

⁴ California Coastal Commission v. Granite Rock Co., 107 S. Ct. 1419 (1987).

⁵ Federal Register 41210.

⁶ Natural Resources Defense Council v. Callaway, 392 F. Supp. 685 (1975)

⁷ U.S. v. Riverside Bayview Homes, 106 S. Ct. 455 (1985).

cases, the courts held that artificially created wetlands were subject to Section 404 jurisdiction.⁸

The broad judicial interpretation in the Callaway decision of navigable waters and wetlands would have led to permits being required for forestry activities such as logging and road building, even near intermittent streams. The 1977 Amendments to the FWPCA, however, exempted normal silvicultural activities - as well as the construction and maintenance of forest roads when accomplished in accordance with approved BMPs - from the permitting requirement. Nevertheless, Section 404 is still quite relevant to forestry operations because there continues to be some disagreement as to what constitutes "normal" silvicultural practices (Cubbage, Siegel and Haines 1987).

In November 1986 the Corps of Engineers issued its final rules on Section 404 dredge and fill permits and other regulatory programs that it administers.⁹ These regulations continue to exempt normal silvicultural activities from permit requirements. But they also state "activities which bring an area into farming, silviculture, or ranching use are not part of an established operation". Such activities, therefore, are not exempt from permit requirements. The regulations additionally state that, while normal harvesting is exempt, "this does not include the construction of farm, forest or ranch roads". In this respect, Section 404 Corps authority may overlap with the provisions of Section 208 as administered by EPA. For example, logging roads and skid trails which meet BMP guidelines established under state Section 208 planning may be exempt if they meet several additional Section 404 criteria.

4. STATE LAWS AND OTHER IMPLEMENTING MECHANISMS

How do the state approaches to water quality protection interact with federal law? In response to the 1972 FWPCA Amendments, the states have adopted various mechanisms to achieve national water goals. Those that already had existing voluntary programs or regulatory legislation merely implemented those approaches in terms of the FWPCA requirements. The others had to develop new methods. Financial assistance for the promulgation of Section 208 plans was awarded by the EPA to each state in 1976 in the form of a planning grant. These grants were designed to assist in preparing the plans by 1979 for EPA approval. Most states came close to meeting the deadline.

In most eastern states, the state forestry agencies were assigned the task of developing the silvicultural portion of the 208 plan. In all of the southern states, Section 208 forestry plans dealing with nonpoint source pollution took the form of voluntary forest practice guidelines - or BMPs to be implemented through training and educational programs (Goetzl and Siegel 1980). Some states in the northeast have also adopted voluntary BMPs, but others have implemented regulatory approaches to ensure that forestry water quality goals are met. Most

⁸ Bailey v. U.S., 647 F.2d 44 (1986); S anson v. U.S., 789 F.2d 1368 (1986).

⁹ Federal Register 51:219, November 13 1986, pp. 41206-260.

western states have also adopted a regulatory approach - primarily as a part of the existing state forest practice regulatory law.

Virtually every state also has some type of general water quality protection law, many of which were enacted long before the FWPCA 1972 Amendments. Most of these broad statutes can be interpreted to apply to forest management practices if the state so desires (Cubbage, Siegel and Haines 1987). Depending on the particular state, general water quality laws may be administered by the water quality agency, environmental protection agency or other state resource agency. Legislative provisions range from general enabling statutes, giving the administrative agency broad regulatory powers, to very specific responsibilities that describe allowable actions in detail. Violators are subject to both civil and criminal penalties, and fines may be substantial. A number of states in recent years have also adopted wetlands protection laws that affect silvicultural practices.

State water resource protection measures, whether voluntary or mandatory, usually address logging road construction, maintenance, and revegetation; skidding near and across stream channels; application and disposal of herbicides and pesticides; and prevention of runoff during logging, site preparation, and planting. They may also be directed to streamside management zones, stream obstruction, and even dredging and clearcutting in some states.

5. A LOOK AT SPECIFIC STATES

The approach taken by certain states to water quality protection as related to silviculture is of particular interest. Several programs will be examined in more detail.

5.1 The South

In the South, Florida's comprehensive approach contrasts sharply with that of most other southern states, including Mississippi and Louisiana.

Voluntary BMPs are utilized in *Florida* to control silvicultural nonpoint source pollution. In addition, Florida potentially has the most stringent southern legislation affecting forest harvesting and silviculture. The state has enacted a number of rules under these laws that are designed to protect water quality and quantity. State regulations governing dredge and fill operations were first enacted in 1975. Under the law, any new dredging operation resulting in a ditch exceeding 35 square feet of cross-sectional area in a wetland required a permit from the Florida Department of Environmental Regulation (DER). For a number of years, the rule was only enforced for forestry operations if specific complaints were received. In 1983, however, state demands for additional wetlands legislation prompted calls for stricter enforcement of permit requirements for forestry operations. The Florida Forestry Association requested the DER to grant a general permit for all forestry activities. The Department agreed, but required that landowners notify the Florida Division of Forestry's prescribed burning telephone operators before beginning dredge or fill operations and that they follow the appropriate BMPs. Each month these recorded calls were to be sent to the DER (Drew 1984).

This procedure was superseded on October 1, 1984, when the Warren Henderson Wetlands Act became effective. This law has delegated silvicultural dredge and fill responsibility to Florida's five regional Water Management Districts (WMDs). Nominally, the law governing Florida's WMDs exempts most agricultural and silvicultural activities from regulation. This has been interpreted to mean that harvesting, site preparation, and planting are exempt, but that construction of roads, ditches, and culverts does require permits.

Each of the Water Management Districts approaches forestry activities differently. The Suwannee River District has adopted a notification process in which both private landowners and forest industry simply forward a postcard to the District office. The Northwest WMD adheres to a policy very similar to that followed during the DER's rule. The South Florida District has taken a more comprehensive view and, under certain conditions, currently includes the harvesting of timber in wetlands as being under its jurisdiction. This approach considers the impact of cypress removal on the watershed and the presence of exotic plant species, which in some instances readily invade a harvested site. Statewide voluntary guidelines specifically addressing silvicultural practices in wetlands have been developed.

In addition to wetlands regulation, Florida has also enacted a land use planning law that has been implemented by the counties. Forestry activities may be subject to regulation under this county zoning authority.

Louisiana has taken the nonregulatory approach to control of silvicultural nonpoint pollution, and has developed a comprehensive set of forestry BMPs. The primary authority for issuance of BMPs rests with the state's Office of Forestry.

The Louisiana Water Control Law is the state's formal authority for addressing water protection and pollution. Although this statute does not specifically address silviculture, it is broad enough to govern forestry operations if the Office of Water Resources and the Department of Environmental Quality should choose to do so. The Office of Water Resources is empowered to "regulate and restrain the discharge of pollution into water" and the Department "may promulgate rules and regulations, and issue permits for the control of water pollution". Administrative regulations, however, specifically exempt silvicultural operations from the non-point permit process - but forestry point sources do require discharge permits.

Louisiana also has a Natural and Scenic River System Law that restricts the removal of trees near designated stream. A stream obstruction statute forbids the felling, disposal or transport of timber in navigable waterbodies.

Mississippi also relies on the voluntary use of forestry BMPs which have been developed by the state. The Mississippi Air and Water Pollution Control Act gives implied authority over nonpoint pollution, including that related to forestry activities, to the state's water quality agency. Under this law, that body has the authority to develop "... comprehensive programs for the prevention, control and abatement of new or existing pollution of the air and water of the state ..." To date this legislation has not been directed to silvicultural operations.

5.2 The West

Many western states have linked Section 208 compliance with their formal forest practice regulatory statutes. *California*, in particular, has experienced an interesting relationship between the two.

California uses the administrative regulations promulgated under its forest practices act as BMPs for protecting water quality from forestry operations. This program relies on more than just rules. It is an integrated process that includes legislation, administrative regulations, licensing of professional foresters and timber operators, and an active enforcement program (Johnson 1987).

California's process is designed to be site specific because of the wide variety of forested conditions found in the state. The state Board of Forestry has adopted a comprehensive set of rules under its forest practice act, which is the strictest in the nation, to assure the continuous growing and harvesting of commercial tree species, and to protect soil, fish and wildlife resources. The rules deal with soil erosion, watercourse and lake protection, hazard reduction, silvicultural and regeneration methods, logging roads and landings, and fire protection.

California has two agencies that were both historically involved in regulating silviculturally related nonpoint water pollution: the Water Resources Control Board (WRCB) and the Board of Forestry (BOF). Federal-state coordination for Section 208 purposes was assigned to the WRCB which subcontracted with BOF for development of BMPs related to water quality.

In early 1979 the BOF set up a committee to study forest practices as related to water quality. The committee's report was submitted in 1984 and the WRCB granted certification to the BOF for a limited term of four years. Because the BOF study presented new rules and procedures, the WRCB made permanent certification contingent on the completion of a four year monitoring and assessment program to evaluate the BOF program. The four year program was never begun, however, due to cost. Instead a one-year pilot assessment was initiated and completed, a report filed, and hearings held. The report noted a number of deficiencies which precluded, in the authors' opinion, providing the best protection of the state's waters. The BOF proceeded to implement procedures designed to correct the deficiencies outlined in the report. These procedures involve both legislative changes and rule changes - changes which have made the nation's strictest forest practice regulatory statute even more stringent.

6. CONCLUSION

Control of water pollution from forest lands was first identified as a significant national problem in the United States by the 1972 FWPCA Amendments. Since that time, the individual states have used various mechanisms to implement the Section 208 nonpoint source pollution control component of the law which addresses - among other activities - those related to silviculture. Most southern and eastern states have relied on voluntary BMPs to achieve their forestry-related water quality goals. Most western states have utilized a formal regulatory approach. Problems of nonpoint water pollution from rural lands have persisted, however, and are still considered to be a serious problem. As a result, renewed efforts are now being made to reduce pollution from agricultural and forest lands under Section 319 of the 1987 Water Quality Law.

A review of the state water quality legislation that affects forestry practices indicates that many of the laws have not been very restrictive to date. In some cases the statutes do have the potential for strict control, but have not been aggressively invoked with respect to silvicultural operations. However, the passage of the 1987 amendments to the FWPCA, the issuance of final Section 404 regulations by the Corps of Engineers, and the increasing emphasis being placed on water resource protection all indicate that nonpoint and point source water pollution prevention will continue to be both a national and a state priority. As such, there will certainly be continuing efforts to control nonpoint source pollution from silvicultural activities and point source pollution from dredge and fill operations associated with logging roads, log decks, gravel pits and similar activities. The forestry community should be prepared for increasing implementation, either through administrative regulation or by relatively minor amendment, of many of the state water quality laws currently in force.

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A CENTURY OF WETLAND PROTECTION AND LEGISLATION IN THE UNITED STATES: DREDGING NAVIGATIONAL RIVERS TO PRESERVING WETLANDS FUNCTIONS AND VALUES

Deborah A. Gaddis and Frederick W. Cabbage

Based on the constitutional provision of controlling interstate commerce, in 1890 the United States Congress passed the first of many laws authorizing federal jurisdiction over the nation's waters. The Rivers and Harbors Act of 1890 assigned the Secretary of the Army regulatory responsibility for construction of dams and bridges on the nation's waterways, for dredging of waterways to improve navigation, and for deposition of refuse into the navigable waters of the United States. From these modest beginnings, the regulatory jurisdiction of the U.S. Army Corps of Engineers and other government agencies has expanded to include most land management activities that occur in the nation's waters. In addition the jurisdictional waters have been expanded to encompass all rivers, streams, and minor tributaries, as well as 40 million hectares of wetlands, which include 18 million hectares of forested wetlands. The purposes of legal regulation of waterways also has expanded greatly, from mere navigation to protection of the functions and values of wetland ecosystems.

The legislative, judicial, and administrative history of this expansion of wetlands regulation in the United States is reviewed based on a study of the federal laws and congressional records; court decisions; formal and less formal literature; and agency implementation policies and interpretations. The status of the rules and regulations governing forest management activities in wetlands is summarized and the prospects for further regulation of silvicultural and forest engineering activities discussed.

1. INTRODUCTION

The protection and management of forested wetlands in the United States has been a U.S. federal legislative issue for more than a century. Section 404 of the 1972 Amendments to the Federal Water Pollution Control Act (FWPCA) was the first explicit statutory base for a federal role in wetlands protection. Debates, regulations and courts cases about federal protection of wetlands have recurred ever since passage of the 1972 law. This paper briefly outlines the long history of federal wetlands regulation and discusses the matters of substance, procedure, and law that are subject to debate.

Most of the direct federal law governing forestry operations in wetlands is contained in Section 404 of the 1972 Amendments to the Federal Water Pollution Control Act as amended, and its subsequent administrative regulations. Some federal wetlands regulation also occurs indirectly under Sections 208 and 319 of the FWPCA, which mandate control of nonpoint source pollution. Wetland areas also are indirectly regulated under the federal Coastal Zone Management Act, and the 1985 and 1990 Farm Bills.

2. EARLY FEDERAL CONTROL OF WATERS OF THE UNITED STATES

The Original Role of the Corps of Engineers: Congress designated responsibility for maintaining navigability in U.S. waters to the U.S. Department of Army, Corps of Engineers. Under the direction of Congress in 1800s, the Corps began building harbors and maintaining and improving the navigability of waters used for commerce. However, the Corps was lacking in sufficient regulatory authority to protect navigability.

In 1890 the Supreme Court heard *Willamette Iron Bridge Co. v. Hatch*,¹ which gave Oregon the authority to control construction of dams, bridges and other navigational obstruction in the absence of federal regulation of the area. As a result of this decision, Congress promptly passed the Rivers and Harbors Act (RHA) of 1890, assigning the Secretary of the Army regulatory responsibility for all construction activities, including the deposition of refuse into the navigable waters of the United States (Blumm and Zaleha 1989).

In 1899 Congress amended the 1890 legislation.² Originally, Congress intended the amendments to provide funds for improving navigation. On request from the Corps of Engineers, Congress added ten sections to the bill to revise and clarify existing law concerning regulatory provisions (Adams 1992). For what was to become wetlands regulation, the relevant parts of the law were Sections 10 and 13. Section 10 gave the Secretary of Army authority to regulate all dredging, filling, and construction in navigable waters. Section 13, informally known as the Refuse Act, prohibited the discharge or deposition of any refuse matter in navigable waters or their tributaries except street and sewer runoff (Stine 1983).

Under the authority of Section 10, the Corps developed a permit program to regulate construction activities within the waterways. In the Corps permit process, decisions were based solely on the proposed project's effect on navigation and anchorage, just as the law directed (Stine 1983). These strictures provided the basis for federal control of interstate *navigable* waters for decades.

Congress Addresses Water Pollution: In 1948 the Federal Water Pollution Control Act (FWPCA) was enacted. This very weak law declared Congressional policy to be the prevention of pollution but assigned control over water pollution as a responsibility of the states. The federal government had the responsibility of reinforcing state efforts by providing technical assistance through research or demonstration projects for new technology and funding for pollution abatement efforts.

In 1956 Congress passed new legislation, Public Law 84-660, which created the first permanent national water pollution control program. The legislation was comprehensive in scope, covering program development, grants for state plans for pollution control, technical assis-

¹ 125 U.S. 1 (1888)

² 33 U.S.C. §§ 401, 403 (1991)

tance, research, and simplified enforcement measures for pollution control in interstate waters (Congressional Research Service 1973).

3. ENVIRONMENTAL FACTORS EMERGE

In the era between the 1899 RHA and the late 1950s, the Corps used Sections 10 and 13 of the RHA to protect the navigability of streams and other waters in order to protect commerce as required under the U. S. Constitution.³ Because of the focus on navigability, permit reviews did not consider environmental effects. Adverse effects on fish and wildlife from some of these operations influenced Congress to propose legislation to correct this problem (Stine 1983).

The Fish and Wildlife Coordination Act (FWCA) of 1934, as amended in 1958, added a new component to the Corps' duties as conservators of U.S. waters. The Coordination Act required the Corps to consider how proposed water projects would affect wildlife and fish habitat and conservation. Under the law, any government or private agency proposing improvements to streams or other waters under federal authorization was required to consult with the U.S. Fish and Wildlife Service (FWS) and the relevant state wildlife agency in order to conserve wildlife resources and to develop and improve habitat in concert with such projects.

Even with the legal requirement of consultation, the Corps continued to issue permits based primarily on navigational concerns until July 1967. Then the Secretaries of the Army and Interior signed a Memorandum of Understanding (MOU) whereby wildlife and fisheries' concerns would become a consideration for permitting activities. As a result of the MOU, and the increasing public concern about environmental issues, the Corps revised the permit program in 1968 (Stine 1983). The revised program expanded the evaluation criteria to include effects on "fish and wildlife, conservation, pollution, aesthetics, ecology, and the general public interest."⁴

Meanwhile, the constantly increasing population, changing living standards, and creation and use of new chemicals increased the pollution of the nation's waters. Congress reacted by passing further legislation: the Water Quality Act of 1965. The linchpin of the legislation was the requirement for the states to develop water quality standards for in-state waters by July 1, 1967. A new federal agency called the Federal Water Pollution Control Administration within the Department of Health, Education, and Welfare (HEW) would approve the proposed standards.⁵ The Federal Water Pollution Control Administration did not remain long with HEW and in 1966 the Department of the Interior took control of the agency.⁶

³ art. I., § 8

⁴ "Permits for Work in Navigable Waters," Federal Register 33 (Dec. 18, 1968): 18671

⁵ 79 Stat. 903

⁶ Reorganization Plan No. 2

In 1968 the Corps began public interest review as the chief criterion for permit issuance.⁷ The criterion mandated that the Corps consider the interests of the public during the permitting process, balancing resource utilization with resource protection. A total of 17 factors such as economics, aesthetics, land use patterns, navigation, recreation, energy concerns, historic preservation, fish and wildlife habitat, and others must be weighted for each project. The stated presumption of the regulation was that the permit would be granted unless contrary to public interest (Steinberg and Dowd 1988).

In 1969 the National Environmental Policy Act (NEPA) became law after several years of congressional interest in establishing a national policy on the environment.⁸ As part of NEPA congressional policy was explicit, requiring government "to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans."⁹ Also included in NEPA were specifics on federal agencies' implementation of the policy including the preparation of environmental impact analysis, requirements for an annual presidential report on the environment, and creation of the Council on Environmental Quality (CEQ) (Adams 1993).

In 1970 President Richard M. Nixon sent Reorganization Plan No. 3 to the House of Representatives for consideration. In this plan, Nixon proposed the creation of a new separate agency, the Environmental Protection Agency, to include all the government's environmental programs and activities under central organization.

Transferred to the EPA was the Federal Water Quality Administration from the Interior Department, the National Air Pollution Control Administration from Health, Education and Welfare and other scattered programs from such diverse sources as the Food and Drug Administration, Council on Environmental Quality, the Atomic Energy Commission and the Agricultural Research Service. William E. Ruckelshaus, formerly of Weyerhaeuser Co., was appointed as the first Administrator of the agency.

*The Corps Denies a Permit: Zabel v. Tabb.*¹⁰: Since the Corps had implemented new regulations to comply with the Fish and Wildlife Coordination Act in 1968, there had been some internal resistance to using the non-navigational criteria for permit approval. Corps personnel decided to deny a Section 10 permit on the non-navigational criteria within the new regulations in order to force a test on the legality of the regulations. The permit denial developed into the precedent-setting case of *Zabel v. Tabb.*¹¹ Colonel Robert Tabb, Jacksonville Florida District Engineer, received a permit application from developers Zabel and Russell. The

⁷ 33 Fed Reg. 18,672-7

⁸ See Adams, chapter xv for legislative history of NEPA and subsequent judicial and executive actions.

⁹ 83 Stat. 852, Sec. 101(a)

¹⁰ For a complete and excellent discussion of *Zabel v. Tabb* see Adams, pp. 379-383.

¹¹ 430 F. 2nd 199; 401 U.S. 910.

development firm wanted to dredge and fill eleven acres of tidelands under and next to Boca Ciega Bay in Jacksonville, Florida, in order to create a trailer park. The resulting park would not affect navigation in any way, but would demonstrably harm the aquatic ecosystem. Public involvement in the case was high, with hundreds of citizens, the U.S. Fish and Wildlife Service, and several state agencies writing comments to oppose the project. Colonel Tabb, under the constraints of the Fish and Wildlife Coordination Act, denied the permit because the proposed dredge and fill needed to build the park would damage the fish and wildlife resources of Boca Ciega Bay (Stine 1983).

The developers brought suit against the Corps, basing their case on the right of the Corps to reject a permit on grounds other than navigational constraint. The Court found for Zabel and Tabb, ordering the Corps to grant the permit in their 1969 decision. The Corps appealed, and in 1970 the Fifth Circuit Court of Appeals reversed the decision. The Court found that Congress had the power to forbid such development because "the destruction of fish and wildlife in our estuarine waters does have a substantial, and in some cases a devastating, effect on interstate commerce" (1 Environmental Reporter 1451, 1452, as cited in Adams 1993).

The Court also cited the National Environmental Policy Act in its support of the Corps action. Although NEPA had not been extant at the time of the permit denial, the Court stated that the decisions made must reflect the standards of the time of appeal. NEPA gave clear direction to federal agencies to consider ecological factors when an action was proposed under federal regulatory authority. Thus the findings obligated the Corps to consider environmental effects and respond accordingly. The clear findings of the court indicated to the Corps and to private interests that the consideration of environmental factors in issuing Section 10 permits was legal, and in fact, required (Adams 1993).

The Refuse Act Permit Program: During the sixties, interest groups prompted politicians to focus on Section 13 of the RHA of 1899, also known as the Refuse Act, because of its potential for preventing pollution of U.S. waters. Until this time, the Corps had used the Refuse Act permitting program solely to protect navigation. Wisconsin Representative Henry S. Ruess was chairman of the Conservation and Natural Resources Subcommittee of the House Committee on Government Operations. Through his leadership, this committee issued recommendations in February of 1970 that encouraged the expansion of Section 13's permit program to cover pollution discharges. Partially as a result of Congressional and Justice Department interest in expanding the use of the Refuse Act, President Nixon issued Executive Order 11574¹² to require the Secretary of the Army to implement a Refuse Act permit program in order to control pollutant discharge into U.S. waters. The program required the Secretary of the Army to consult with the Administrator of the EPA on water quality standards, and the Secretaries of Interior and Commerce, along with state agency heads, on wildlife and fisheries resources affected by such discharges. Compliance with NEPA, FWPCA, and FWCA was required to reinforce the expansion of Corps' reviews past mere navigational concerns.

¹² Executive Order No. 11574

The Corps took quick action, issuing a notice of proposed rule-making the next week. In April 1971 the final regulations outlined a permit program to regulate all discharges or deposits in navigable waters, tributaries, or wastewater treatment plants. Among the considerations required for permit issuance were impacts on water quality and fish and wildlife habitats. The EPA Administrator had final authority over water quality standards (Kalen 1993). Thus the Corps assumed a major role in the national efforts to stem pollution. After final regulations were established, permit applications flowed into Corps offices. Stine (1983) explained, "Nearly twenty thousand permit applications were submitted to the Corps by December. Of the eleven thousand processed and referred to EPA, only twenty-one were granted."

Judicial action soon interrupted the program with a decision on *Kalur v. Resor*¹³ concerning the Grand River in Ohio. Entities wanting to use the river for disposal of material sued, alleging the Corps was not authorized under law to regulate disposal into non-navigable tributaries of navigable streams. The Court determined Section 13 specifically authorized permits for discharges only into navigable waters and held the regulations moot (Kalen 1993). NEPA was also an issue, with the court's finding that the Corps would have to comply with NEPA procedures to issue permits. Since the court decision left thousands of dischargers without any way to avoid violating the Refuse Act, Congress was pressured to devise a solution.

4. FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972

Public concern over the quality of U.S. waters led the House Committee on Public Works to hold hearings on water pollution control early in 1971. The shortcomings of previous legislative initiatives were clear. At that time, only half of all the states had water quality standards approved by the federal government. Intrastate standards had been adopted voluntarily by 44 of the states, but enforcement of the interstate standards was limited. The pollution abatement procedure, as outlined in the 1948 FWCPA, was not working, the courts having addressed only one action in the period between 1948 and 1971. In addition, President Nixon's efforts to use the Refuse Act to control discharges of pollutants into waters were stymied by Court action on the *Kalur* case. Another problem was the limited power of the EPA Administrator to gather information on pollutants due to the exclusion of information about trade secrets and/or secret processes. EPA had no legal right of entry onto the premises of potential polluters to check for discharge of pollutants. There was a desperate need to have some sort of judicially accepted remedy to control pollution (Congressional Research Service 1973). Eventually, these concerns led to extensive Congressional debates and passage of the Federal Water Pollution Control Act Amendments of 1972.

As enacted, the portion of FWPCA relevant to wetlands are summarized as follows:

1. A distinction was made between point source and non-point source pollution. Point source was defined in Section 502(14) as relating to pollution from a discrete source.

¹³ 335 F. Supp. 1 (D.D.C. 1971)

2. Section 208 addressed area wide waste treatment management. State or local governments were to set up the programs which included " a process to (i) identify if appropriate, agriculturally and silviculturally related nonpoint sources of pollution, including runoff from manure disposal areas, and from land used for livestock and crop production, and (ii) set forth procedures and methods (including land use requirements) to control to the extent feasible such sources."
3. In Section 402, the National Pollution Discharge Elimination System replaced Section 13 of the Rivers and Harbors Act. This program was under the purview of the EPA Administrator.
4. Section 404 granted authority for dredge and fill permits to the Secretary of the Army. The EPA Administrator was given oversight authority over the permit granting process.
5. Section 404(b)(1) stated that spoil disposal sites for 404 permits must meet guidelines developed by the Administrator and the Secretary of the Army.
6. Section 404(c) gave EPA the power to prohibit discharges that could adversely affect municipal water supplies, marine or freshwater breeding areas, or wildlife habitat. Public notice and hearings were required along with consultation with the Corps.

The Corps Begins Section 404 Implementation: The Corps proposed its initial 404 regulations in May 1973. The broad-reaching regulations were hailed by many environmental organizations such as the Audubon Society. However, when the final regulations were issued in 1974, environmental groups were dismayed. The Corps had returned to its traditional definition of "navigable waters" limiting protection of wetlands in both coastal and freshwater sites. This decision was in spite of court cases such as *United States v. Holland*,¹⁴ which had extended federal jurisdiction to all waters that might affect commerce - not just those streams meeting traditional navigability tests (Stine 1983). It was clear that the Corps regarded Section 404 as exempt from the NPDES program for activities covered under Section 10 of the RHA. Environmental groups were outraged and began action to force the Corps to implement the law as written (Blumm and Zaleha 1989).

The Environmental Defense Fund (EDF) began a program of challenging selected permit decisions through the court system hoping that a series of court decisions extending the range of permitting beyond traditionally navigable waters would influence the courts to order the Corps to revise the 404 permitting program. The Natural Resources Defense Council took a different tack, filing suit directly against the Corps and Army officials in U.S. District Court, District of Columbia as *NRDC, Inc. v. Callaway*.¹⁵ The National Wildlife Federation was joint plaintiff in the suit, which argued that regulations promulgated by the Corps did not meet the goals of the FWPCA. The case was decided in favor of the NRDC. Judge Aubrey E. Robinson, Jr. ordered the Corps to revise its regulations in order to expand the definition of

¹⁴ 373 F. Supp. 665 (M.D. Fla. 1974)

¹⁵ 392 F. Supp. 685 (D.D.C. 1975); Civil Action No. 74-1242; Complaint filed by plaintiffs, August 16, 1974

navigable waters past mere water trafficking concerns in accordance with the intent of Congress as spelled out in the FWPCA. The Corps responded promptly, putting forward four alternative regulations for public comment and review on May 6, 1975.¹⁶ Disappointed by the decision, the Corps Office of Chief Counsel prepared to appeal. However, the Justice Department declined to make the appeal, infuriating the Corps personnel involved with 404 revisions (Stine 1983).

The disparity of executive branch views on 404 regulation was not just between the Corps and EPA. Various federal agencies met at the Office of Management and Budget during April 1975 to discuss the 404 program. Representatives from the Department of Agriculture and Department of Commerce favored the restrictive interpretation of the program as desired by the Corps. On the EPA's side stood the Department of the Interior and the Department of Justice. The Ford administration did not take a leadership position on the issue and the Corps realized that they would have to take their case to the public for their last chance to avoid becoming regulators of development rather than promoters of development (Stine 1983).

The Corps Goes on the Warpath: Within the Office of Civil Engineers of the Corps, the 404 program was the responsibility of General Kenneth E. McIntyre, deputy director of civil works. McIntyre, along with Colonel Robert Hughes of Public Affairs Office and Jack Lankhorst of the Office of Chief Counsel, plotted to bring the Section 404 issue to the forefront of public interest. Without formal approval of those higher in command, McIntyre and Hughes requested assistance from Locke Mouton, deputy chief of Public Affairs, preparing an inflammatory press release to arouse public concern and action to restrict 404 jurisdiction. Mouton agreed to write the material but warned his peers of the consequences. He suggested that the release be cleared first with the Assistant Secretary of the Army for Civil Works. McIntyre refused to consult with the Assistant Secretary and Mouton drafted a press release. After reading the draft, McIntyre and his staff decided it was not sufficiently inflammatory. Mouton revised his release by exaggerating the purview of the 404 program to incite maximum public outrage. One widely quoted section stated, "[F]ederal permits may be required by the rancher who wants to enlarge his stock pond, or the farmer who wants to deepen an irrigation ditch or plow a field, or the mountaineer who wants to protect his land against stream erosion" (Corps of Engineers News Release 1975 as cited in Stine 1983).

McIntyre was successful and public opposition to the proposed expansion of 404 exploded. Secretary of Agriculture Earl Butz added to the tumult with his own crusade against the program. Within the Army, the reaction was swift. Victor V. Veysey, Assistant Secretary of the Army for Civil Works demanded the firing of Mouton. Mouton was not fired, but Veysey made a public apology for the press release during the Congressional hearings resulting from the excitement (Stine 1983).

¹⁶ Navigable waters: procedures and guidelines for disposal of dredged or fill material. Federal Register 40 (May 6, 1975): 19766-98.

The response from environmental groups was similarly condemnatory. The NRDC, the NWF, the Wilderness Society, the Audubon Society and other groups publicly and privately protested the actions of the Corps. Mobilizing rapidly, environmental groups launched a counter-attack with educational programs and outreach efforts to influence their group members as well as the general public to protest the emasculation of the 404 program (Stine 1983).

The public expressed intense feelings about the proposed new regulations. More than 4,500 written comments from politicians, federal and state agencies, agricultural and forestry groups, environmentalists, and other interested citizens were received and reviewed by the Washington Corps office. Together with the EPA, the Corps issued proposed revisions to the regulation on July 25, 1975.¹⁷ The revisions were to be implemented over a two year period, in three phases (Blumm and Zaleha 1989). In order to regain the trust of the public, the Corps' Public Affairs Office launched a public relations program for the 404 program to mend relations with the EPA and improve the public conception of the Corps and its handling of the 404 program. Directives from top Corps officials made it clear that the Corps was to cooperate fully with the EPA and to comply without hesitation to the revised 404 regulations. As a result of the leadership from the top levels of the Corps, the regulations were implemented as written and relationships between the Corps and environmental groups improved significantly (Stine 1983).

EPA Issues Guidelines: Under Section 404(b), the EPA was to promulgate guidelines for permit issuance for the use of the Corps in making permit decisions. The guidelines were issued on September 5, 1975. Final action on these guidelines was prompted in part by the *Callaway* decision and the public brouhaha over the regulations. The EPA guidelines detailed concerns and goals for permit processing and criteria for evaluating proposed discharges. The guidelines also established a presumption against wetland filling unless the activity depended on proximity to water or was impractical to use other sites or methods of construction (Blumm and Zaleha 1989).

The Corps Makes the Environment First Priority: A pivotal court case involving Florida developers made it clear that the Corps took its new duties seriously. Deltona Corporation purchased 8,000 acre Marco Island in the 1960s, planning to convert its mangrove swamps and saltwater marshes into home sites. Deltona planned to create "finger fill" canals so most homes would have water access for boat docking. The property was divided into five parcels and the Corps granted Deltona a section 10 permit for dredging and filling operations in 1964 for the Marco River parcel. In 1969 the Corps granted a second permit for Roberts Bay over the objections of the FWS. The Corps warned Deltona that further permits were not guaranteed, but Deltona continued to sell lots in the remaining areas and began dredging and filling in an unpermitted area known as Collier Bay. Discovering the illegal activity in 1971, the Corps put out a stop order that required Deltona to cease work until permits were granted.

¹⁷ 40 Federal Register at 31,335 (1975) (previously codified at 33 C.F.R. § 209.120(i)(2)(ix) (1976)).

Deltona applied for and received state development permits and applied for the new section 404 permits required by the FWPCA. The District Engineer, Colonel Donald A. Wisdom, recommended Deltona be granted a permit to continue work on Collier Bay but recommended denial of permits for further development. Wisdom's superior, Major General Carroll N. Le Tellier, South Atlantic Division engineer recommended granting all permits under the assumption that denial would be a taking of property since the state of Florida had approved all permits. These conflicting recommendations were sent to the Washington office of the Corps for consideration by the Chief of Engineer, General William Gribble. After careful consideration, Gribble granted the permit for Collier Bay and denied the other permits. His decision was based on EPA guidelines, Corps wetlands policy, and the national public interest as outlined in FWPCA of 1972 (Stine 1983).

The Marco Island case was a catalyst in the evolution of the Corps from development promoter to environmental protector. In this case, the developers had been reputable, established individuals with a reasonable, practical plan for development. The denial of the permits would cause large financial losses, possibly even bankruptcy, for Deltona and yet the Corps decided to kill the development in order to protect the environment. For the Corps personnel, the personal involvement of the Chief of Engineers indicated a complete shift in priorities and a realization that the Corps internal war against the 404 program was lost (Stine 1983).

The Corps Modifies Section 404 Regulations: The Corps continued to refine the 404 program, issuing new regulations in 1977. Within these regulations, the Corps delineated four categories of jurisdictional waters (Kalen 1993):

- Category 1: Coastal and inland waters, lakes, rivers, and navigable streams as well as adjacent wetlands.
- Category 2: Tributaries of navigable waters, including adjacent wetlands. Nontidal drainage and irrigation ditches feeding into navigable waters were excluded.
- Category 3: Interstate waters and their tributaries, along with adjacent wetlands.
- Category 4: Other United States waters where the destruction or degradation could affect interstate commerce. Examples included isolated lakes and wetlands, intermittent streams, and prairie potholes.

The Corps also stated that their jurisdiction over wetlands must not depend on traditional delineations such as high water marks or mean tide line, reasoning the hydrologic connection between wetlands and their waters included areas proximate to the waters of the United States and even isolated wetlands. The requirement for periodic inundation was dropped in favor of a definition that included areas saturated often enough to support vegetation typical of saturated soil conditions. The regulations also created a general permitting program that allowed permits to be issued nationwide for discharges into certain area. General exemptions were also listed for activities such as farming practices. These regulations soon became obsolete, however, because Congress took action to amend the FWPCA (Kalen 1993).

Congress amended the FWPCA as the Clean Water Act of 1977.¹⁸ With this legislation, Congress continued the practice of issuing general permits covering states, regions, or the entire nation. Nationwide general permits could be issued by the Corps headquarters. Local general permits could be issued by district or division engineers. These permits were valid for a period of five years. The nationwide permit was a "permit by rule" as Section 404 would be satisfied by the landowner following the rules of the nationwide permit system. In the 1982 Corps regulations, 26 nationwide permits were listed. Most of these permits were for isolated structures such as mooring buoys or navigational aids. Probably the most widely recognized was Nationwide 26 permit, which authorized headwaters and isolated waters discharges (Strand 1993).

Congress also exempted certain activities from regulation in the 1977 Amendments. These included normal farming, silviculture, and ranching activities that were part of a continuing operation. The law also allowed the maintenance of drainage and irrigation ditches, maintenance of farm ponds, and construction or maintenance of farm or forest roads. If a state had an approved program under section 208, activities regulated thereby were exempted. A new section 404(g) allowed states to begin their own permit program for the management of dredge and fill material. A state's program, however, was limited in its oversight to waters actually used for navigation and the adjoining wetlands (Kalen 1993).

Proposals to amend section 404 in order to restrict program jurisdiction to traditionally navigable waters and adjacent wetlands were defeated. Congress had made it clear that their intent was to regulate activities over broad areas. The EPA was given final responsibility to approve state permit programs that met explicit congressional guidelines. The FWS was authorized to review state programs and any permits issued by the states (Blumm and Zaleha 1989).

5. THE 1980S: NEW DIRECTIONS

Despite the efforts of Congress, the CWA still left some unanswered questions with the 404 program. It was unclear whether the Corps or EPA had final jurisdictional authority to determine just what was the extent of "navigable waters." The Secretary of the Army sought an opinion from the Attorney General Benjamin Civiletti to clarify the matter. The Attorney General found that Congress had given EPA authority to make determinations of jurisdiction under the CWA including section 404. The EPA also was deemed the ultimate authority for scope of Section 404(f) exemptions (Strand 1993).

In July 1982 the Corps published an expanded nationwide permit program that immediately drew fire from environmental groups.¹⁹ The proposed regulations allowed general permits to be issued for isolated waters and waters above "headwaters." Previously, individual permits had been required in isolated waters greater than ten acres in surface area.

¹⁸ P.L. No. 95-217, 91 Stat 1566(codified as amended at 33 U.S.C. §§ 1251-1376 (1982)

¹⁹ 47 Fed. Reg. 31,794 (1982) (interim final regulations, including 27 nationwide permits)

The Corps began suffering tactical losses on all fronts. *Avoyelles Sportsmen's League v. Marsh*²⁰ was decided by the U.S. Court of Appeals for the Fifth Circuit in favor of the plaintiff. In the *Avoyelles* case, several large landowners cleared their bottomland hardwood swamps of timber and prepared the ground for soybean production by shearing, piling, and burning. The Sportsmen's League filed suit as interested citizens against the Corps, EPA, and the landowners, claiming that the clearing constituted a violation of the Clean Water Act because the landowners did not have a 404 permit. The Court found that the clearing machinery caused point sources of pollution because fill material was being deposited via the leveling process. The clearing qualified for regulation under Corps permit requirements because it was intended to change the usage of the land from forestry to agriculture (Adams 1993).

Adjacent Wetlands are Subject to Regulation: In 1985 the Supreme Court heard arguments on *United States v. Riverside Bayview Homes, Inc.*,²¹ where a developer was filling land for home-building. The Corps, who had lost in the Court of Appeals, sought to clarify the interpretation of "waters of the United States" and the proper jurisdiction of the Corps (Adams 1993).

The Court determined that the Riverside property was indeed wetland subject to regulation. Their reasoning was based on the vegetation present on the tract - vegetation that required saturated soil in order to flourish. The water that caused saturation of the soil was found to be ground water. In addition, the site was declared adjacent to navigable water. These three findings made it clear the site was a wetland. In their decision, the Court firmly stated that a "frequent flooding" of the area was not a prerequisite for wetlands delineation (Adams 1993).

Final Section 404 Regulations in 1986: New Section 404 regulations were promulgated by the Corps in November 1986.²² Discharge and fill permits could be issued after the public was notified and had the opportunity to comment. Some of the criteria for permit consideration were conservation, aesthetics, economics, fish and wildlife, water quality, energy, property rights, and public welfare. Normal silvicultural, farming, and ranching activities are exempt from the permitting process, but the regulations stated that "Activities which bring an area into farming, silviculture, or ranching use are not part of an established operation." thus these activities are not exempt from permit requirements. Additionally, while normal harvesting is exempt, this " ... does not include the construction of farm, forest, or ranch roads."

Wetlands that are managed for timber production must follow state approved Best Management Practices (BMPs) in order to be exempt from federal and/or state permit requirements. Thus these BMP requirements essentially mean that forestry operations in wetlands are regulated, but do not require permits. Roads and skid trails which meet the state BMP guidelines

²⁰ 715 F.2nd 897, 903 n.12 (5th Cir. 1983)

²¹ 474 U.S. 121(1985)

²² 51 Fed. Reg. 219[13 November 1986] 41,206-260

established under Section 208 of the FWPCA and also meet 15 additional Section 404 criteria are exempt from permits. To qualify for an exemption, they must be: (1) minimized in number, width, and length; (2) located sufficiently far from streams or other water bodies; (3) bridged or culverted so as to not impede expected flood flows; and (4) properly maintained and stabilized to prevent erosion. In addition (5) use of equipment in U.S. waters must be minimized; (6) vegetation disturbance in waters should be minimized during road construction; (7) road construction and maintenance shall not disrupt movement of aquatic life; (8) borrow material should be taken from upland sources; (9) fill discharges cannot jeopardize endangered species; (10) discharges should avoid wildlife nesting, breeding, and spawning areas; and (11) they should not be located near a public water supply intake. Furthermore, discharges should not: (12) occur in areas of concentrated shellfish production; (13) occur in scenic or wild rivers; and (14) contain toxic pollutants in toxic amounts. Lastly, (15) all temporary fills shall be removed in their entirety, and the area restored to its original elevation (Cubbage and Harris 1988).

The 1989 Wetland Delineation Manual: Recognizing the need for a consistent method of delineating wetlands, the Corps, EPA, FWS, and the Soil Conservation Service jointly produced the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands (Federal Manual)* in 1989. A tripartite criterion using hydrology, vegetation, and soils was used to determine if a site was a wetland under federal jurisdiction (Ogle 1993). This criteria has evolved to determine what is commonly called "jurisdictional" wetlands - those under federal control according to Section 404 of FWPCA.

The Federal Manual determined that an area had a wetland hydrology when the soil was saturated to the surface or was inundated by water during a year with average rainfall. The saturation to the surface was dependent on the type of soil and the water table. If the water table reached a certain level and remained for a week or more in the growing season (depending on soil type) then the soil was determined to be saturated (Ogle 1993, Adams 1993).

Soil requirements were presumed satisfied if the soil met the criteria from the National Technical Committee for Hydric Soils (NTCHS). The criterion for hydric soil types was the same as wetland hydrology criteria for those types, which improved the coherence between the criteria (Ogle 1993).

Vegetative criteria had two tests: "(1) more than 50 percent of the composition of the dominant [plants] from all strata are obligate wetland (OBL), facultative wetland (FACW), and/or facultative (FAC) species, or (2) a frequency analysis of all species within the community yields a prevalence index value of less than 3.0 (where OBL = 1.0, FACW = 2.0, FAC = 3.0, Facultative Upland FACU = 4.0, and Upland UPL = 5.0). The first test would allow a site to meet the hydrophytic requirement when more than half the dominant species were just as likely to occur on non-wetland sites as on wetland sites. In addition, where the site could meet the soil and hydrology requirements but could not meet the first vegetative test, the Federal Manual stated that the area could still be classified as a wetland. Hence, the requirement for all three criteria to be met was not actually a true requirement (Ogle 1993).

The agencies were pleased with the new manual. Delineation processes were simplified and the use of one manual across agencies increased the probability of coherence. However, the Federal Manual generated enormous public disapproval. Landowners felt that the criteria vastly increased the amount of land subject to regulation under the CWA and began efforts to restrict its use (Ogle 1993).

A New Manual is Proposed: As a result of the public opposition to the Federal Manual, President George Bush proposed a new wetlands policy on August 9, 1991. A revised delineation manual was published on August 14, 1991. The new manual (Proposed Revisions) differed from the Federal Manual for all three factors required for a wetlands determination: hydrology, vegetation, and soils. For soil, the proposed regulations were somewhat broader than the Federal Manual, using the National Technical Committee for Hydric Soils criteria plus three other categories for hydric soils. For vegetation, the second test of the Federal Manual was retained for the Proposed Revisions using the frequency analysis of plant species. In addition, where vegetation had been removed, the criterion was presumed to have been met if the area was deemed capable of supporting wetland vegetation (Ogle 1993).

The main change was to the hydrology requirements. To meet these requirements, an area had to be inundated for at least 15 consecutive days or saturated to the surface for 21 or more consecutive days during the growing season either from surface water or from ground water rather than the previous standard of a week or more depending on soil type. The measurement of soil saturation was possible from a variety of methods: presence of sulfidic material (smell of rotten eggs) within one foot of the surface, oxidization stains along living root channels, or plant adaptations to saturated conditions along with information on the frequency and duration of precipitation or other conditions resulting from hydrology (Ogle 1993).

During the comment period on the Proposed Revisions, public interest was intense. Over 50,000 written comments were sent to EPA and the EPA Wetlands Hotline had 80,000 calls concerning the manual. No action was taken by EPA on the manual and Congress effectively nullified any attempt to implement a new manual. The Energy and Water Development Appropriations Act of 1992 specifically barred the Corps from using the 1989 manual or any other manual that did not follow the requirements of the Administrative Procedure Act. Since then, the Corps has used the 1987 manual (Adams 1993).

The Recapture Provision as Applied to Pine Plantations. In 1991 the Environmental Defense Fund (EDF) along with other environmental organizations, sued Weyerhaeuser Company alleging violations of the Clean Water Act in their management of wetlands drained prior to the passage of the 1972 FWPCA.²³ Weyerhaeuser Company had purchased the Parker Tract in 1967 and 1969. At the time of purchase, the land was drained by major canals on three sides

²³ *Environmental Defense Fund v. Tidwell*

of the tract. Parallel drainage canals bisected the tract alongside the 24 miles of forest roads. Weyerhaeuser performed some ditching - at that time such activities were unregulated for the particular circumstances and conditions of the tract. After purchase, Weyerhaeuser implemented written forest plans to convert the existing pine-mixed hardwood stands to managed pine plantations (Weyerhaeuser Company 1993).

EDF claimed in its suit that converting a natural stand to a plantation was not part of a normal silvicultural operation and thus violated Section 404 of the CWA. EPA asked the court to remand the case so EPA could make a formal determination of whether Section 404(f) would be applicable to this situation. After several years of debate, motions, and maneuvers, EPA determined that Weyerhaeuser had not acted improperly in clearing the land and converting it to a pine plantation at the time, but went on to state under the current regulations, such conversions would probably not be considered a "de minimus discharge" and would be subject to regulation (Southeast Environmental Law 1994).

The Clinton Administration: President Bill Clinton decided to address the controversy over wetlands regulation by forming the Interagency Working Group on Federal Wetlands Policy in June of 1993. The group established five principles for the Clinton Administration's policy on wetlands:

1. No overall net loss of wetlands and long term improvement of quantity and quality of wetlands.
2. Efficient, fair, flexible, predictable regulatory programs without duplication among agencies.
3. Non-regulatory programs such as advance planning, inventory, research, and wetlands restoration are recommended to reduce reliance on regulation in order to protect wetlands.
4. The Federal government should enter into partnerships with state, tribal, and local governments, the private sector and citizens to protect wetlands via an ecosystem/watershed context.
5. Federal policy should be scientifically based (Protecting America's Wetlands 1993).

The working group developed a list of reforms and non-regulatory policy changes to recommend to the administration for implementation. Some of the specific initiatives are listed below:

1. Establishment of an administrative appeals process for wetlands permitting to avoid court cases.
2. Establishment of wetlands permitting deadlines.
3. Corps and EPA to issue a final regulation that prior converted farmlands are not subject to wetlands regulations.
4. The SCS to become the lead Federal agency to identify agricultural wetlands for both CWA and FSA.

5. The EPA, Corps, SCS, USFWS to use the same procedures to delineate wetlands.
6. Support for incentives for States to use watershed planning.
7. Support for increased funding for the Wetland Reserve Program.

The 1987 Manual will continue to be used until the National Academy of Science study of wetlands delineation is completed. If the Federal agencies jointly determine after consideration of the study that revision is needed, changes to the 1987 Manual will be proposed subject to public comment. The NAS study is expected to be released at the end of December 1994.

6. OTHER FEDERAL REGULATION

Section 208 of the 1972 FWPCA and 319 of the 1987 Amendments mandate control of nonpoint source pollution (NPSP) of the nation's waters. These requirements have led the states to pass laws and implement measures to control forestry-related nonpoint pollution, including that in wetlands. Best Management Practices have generally been developed as mechanisms for controlling NPSP.

An enforcement action in Florida illustrates the application of the nonpoint source pollution provisions of the FWPCA to forestry operations. A major forest products firm was harvesting a large bottomland hardwood stand during the wet winter months in 1990. The loggers were using the state BMPs as prescribed in Section 404, but the water quality and flow were nevertheless considerably impaired. The state water quality agency initiated a nonpoint source pollution enforcement action against the firm, stating it had violated the FWPCA Section 208/319 nonpoint pollution requirements. The firm initially fought this interpretation, but eventually conceded that the water quality protection measures did apply, and agreed to cease harvesting operations during excessively wet weather and to protect water quality.

A related issue that could affect even more area than wetlands alone is the promulgation of new forestry rules and regulations under the 1990 federal amendments to the Coastal Zone Management Act. The 1990 amendments require enhanced measures to control nonpoint source pollution from forest operations in coastal counties - defined as areas where 15 percent or more of the precipitation in an area would reach the ocean. This definition of a coastal county implies that the regulations could apply two to four counties deep in many of the approximately 38 states affected by the act.

The states were to develop regulations to implement the Coastal Zone Act pollution prevention measures by 1992. EPA was required to identify forest practices likely to contribute to pollution, identify BMPs that could be used to control it, and evaluate the costs of their implementation. The results of this study are then to be used by the states in considering mandatory BMP regulations to control forestry NPSP in coastal counties. If fully implemented, this proposal could greatly affect the regulatory scope of forestry operations, and have implications for wetlands (and dry lands) management regardless of forest type.

The 1985 and 1990 Amendments to the federal Farm Bill also can affect forestry operations in wetland areas. The Farm Bill contains provisions that prohibit landowners from converting wetlands to non-wetland uses, without losing cost-share or crop subsidy payments from other federal farm programs (termed cross-compliance). The Farm Bill also requires that by 1995 all farmers must have farm management plans in place in order to continue to receive federal subsidies and cost-share payments authorized by the Farm Bill. These sets of requirements can be used to prevent wetland losses (swampbuster) or loss of untilled dry prairie lands as well (sodbuster).

The swampbuster provisions have been applied by the Soil Conservation Service on wetland timber harvests in some Southern cases. The agency has developed specific wetland timber harvest notification forms that are required in certain areas of the south in order to maintain farm payments. Furthermore, farmers must have an approved SCS farm plan before harvests can occur in the wetlands, or else he will face loss of his other farm bill-related government payments on his other farm lands.

7. CONCLUSION

In the last two centuries, the public's opinion of wetlands has evolved considerably. Draining swamps and conversion to productive crop lands was a government objective for more than a century after the U.S. achieved independence. Federal law began to regulate the nation's navigational waters via the Rivers and Harbors Acts of 1890 and 1899. Controls on dredging and filling of rivers and disposal of refuse were the precursors of modern wetland law.

By the 1940s and 1950s federal administrative and legal authorities began to extend to fish and wildlife protection and water quality. These modest initial efforts and increased public demands eventually led to passage of the Federal Water Pollution Control Act (FWPCA) of 1972. As part of this comprehensive law, wetland protection was mandated under Section 404. This section requires that individuals who perform dredge or fill activities in the nation's waters must have a permit from the U.S. Department of the Army, Corps of Engineers.

Section 404 has evolved over the last 22 years through a series of Congressional Amendments, court decisions, administrative regulations, agency memorandums of understandings, and individual implementation actions. Wetland protection under Section 404 jurisdiction has expanded to cover all the nation's waters and wetlands, as defined by a complex federal wetlands delineation manual. "Normal" silvicultural activities remain exempt from permit requirements, but landowners must comply with the relevant Best Management Practices (BMPs) in their states and specific requirements enumerated in federal code. Forest practices that involve extensive drainage or make a "de minimus" discharge into the nation's waters, however, still require permits, which may indeed be denied for a host of environmental protection reasons.

In the future, we can expect wetlands regulation to become more complex as the scientific knowledge base expands and development pressures increase. Regulations will restrict op-

tions for forest management and increase agency oversight of silvicultural practices. Courts and legislative bodies will be forced to address the takings issue to determine if landowners' economic losses resulting from changing regulation should be compensated and, if so, where funds for compensation should be obtained. Landowners and land management professionals must be aware of current laws and regulations and be prepared to adapt forest management practices in order to comply with the law and to protect wetlands.

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A REVIEW OF FEDERAL AND STATE LAW AFFECTING THE USE OF PRESCRIBED FIRE FOR SILVICULTURAL OPERATIONS IN THE SOUTHERN UNITED STATES

Donald G. Hodges

1. INTRODUCTION

Forest managers in the southern United States have relied heavily on fire as an important management tool since the 1930's. Burning has been employed to accomplish a number of management objectives including wildfire hazard reduction, site preparation, competition control, wildlife habitat improvement, and disease control. In the past 20 years, however, environmental laws and regulations have increased the attention paid to fire emissions and their impact on air quality. In addition, decreased visibility resulting from prescribed fire smoke has caused numerous vehicular accidents. Between 1979 and 1988, 26 accidents in the South have been attributed to smoke from prescribed agricultural or forestry fires. The accidents have involved 24 fatalities, more than 50 serious injuries, and numerous minor injuries (Mobley 1989). Approximately 75 percent of the accidents and one-half of the fatalities resulted from forestry related fires. As a consequence, interest in increasing the restrictions on prescribed silvicultural burning is growing for human safety, as well as for environmental reasons.

This paper provides an overview of federal air quality legislation and state restrictions on prescribed fire in the southern United States.¹ The federal government's involvement is described as it evolved from a passive role in the 1950's to the current active level of regulation. Hauenstein and Siegel (1980) provide an excellent review of state-level restrictions on prescribed fire in the South. Their findings are reviewed and updated, based on changes in state laws and regulations during the last decade. The changes were determined by contacting state forestry and environmental quality agencies. Finally trends will be discussed in terms of the factors causing changes at the state level and possible future trends in prescribed fire regulation.

2. FEDERAL GOVERNMENT RESPONSIBILITIES

The federal government's air pollution control responsibilities in the United States have changed from a passive role of providing research and technical support to one of assuming the lead in setting air quality standards, and ensuring that state agencies enforce the requirements. The initial federal air pollution legislation was enacted in 1955. This legislation,

¹ The research was conducted while the author was a research forester with the Forest Resource Law and Economics Research Unit, Southern Forest Experiment Station, U.S.D.A. Forest Service, New Orleans, Louisiana. The author would like to thank Macky McClung for her assistance in compiling much of the information concerning changes in the state regulations. This paper was originally published in 1990. For a discussion of developments since then, readers are referred to The Legal Environment for Prescribed Burning in the South: Regulatory Programs and Voluntary Guidelines by Terry K. Haines and David A. Cleaves, which is pending publication in the Southern Journal of Applied Forestry.

the Air Pollution Control Act (P.L. 84-145), directed that all control responsibilities were to remain with the individual states and limited the federal role to one of providing research, technical, and financial assistance. By 1961, only 17 states were operating air pollution control programs with annual budgets of more than \$5000 (Regens/Rycroft 1988).

The Clean Air Act (CAA) of 1963 (P.L. 88-206) expanded the federal support for state efforts and provided for mediation among instances of transboundary pollution. Minor amendments to the 1963 legislation were passed in 1965 (P.L. 89-272) and 1966 (P.L. 89-675). These provided no substantial changes in the federal and state roles, and did little to address the control of stationary sources of pollution (Hauenstein/Siegel 1980). The Air Quality Act of 1967 (P.L. 90-148) was a precursor of current federal air pollution control policy. It created the initial federal standards for air quality and authorized the federal government to recommend specific control techniques. The states retained responsibility for most standard setting and enforcement, though the standards were subject to federal review and policies (Regens/Rycroft 1988).

The 1970's were marked by a significant change in the federal government's role in controlling several forms of pollution. The Clean Air Act amendments of 1970 (P.L. 91-604) and 1977 (P.L. 95-95) signaled this change for federal air pollution control by placing the responsibility for setting air quality standards with the federal government. Three provisions of this legislation are of particular interest to those concerned with prescribed burning: establishing national ambient air quality standards, developing state implementation plans, and preventing significant deterioration in areas where air quality already exceeds national standards.

2.1 National Air Quality Standards

The 1970 and 1977 legislation requires that the U.S. Environmental Protection Agency (EPA) Administrator identify and publish a list of air pollutants, and develop national primary and secondary ambient air quality standards (NAAQS) for each. Primary standards are to be established at levels necessary to protect public health; secondary standards at levels to protect public welfare, including protecting property and limiting impacts on aesthetic values. Currently, air quality standards are in effect for six pollutants, commonly referred to criteria pollutants (Regens/Rycroft 1988). These six are carbon monoxide (CO), lead (Pb), nitrogen oxides (NO_x), ozone (O₃), particulate matter (PM), and sulfur oxides (SO₂) - with particulate matter being the primary pollutant of prescribed fire. The current PM standard applies to particulates less than 10 microns in diameter, though EPA soon may develop a new standard for particulates less than 2.5 microns in diameter (Regens/Rycroft 1988).

The state implementation plans (SIPs) must contain provisions for implementing, maintaining, and enforcing the primary and secondary air quality standards. This is to be accomplished by the SIPs setting forth emission limits for stationary sources, schedules, and timetables for compliance. The states were allowed to set their standards at a more stringent

level than the federal standards, but not less. This legislation also required states to monitor air quality data and conduct preconstruction reviews of proposed new pollution sources.

2.2 Prevention of Significant Deterioration

The 1970 Clean Air Act amendments established the foundation for EPA's prevention of significant deterioration (PSD) program to protect the air quality in those areas which already exceed federal air quality standards. Three classes for these areas were established. As of January 6, 1975, all qualifying areas were categorized as Class II areas in which air quality deterioration is restricted to levels associated with normal, controlled growth. States then were to determine if these areas should be reclassified as Class I which severely restricts deterioration to maintain the pristine air quality, or Class III which allows deterioration to national ambient air quality standards.

Congress included provisions in the 1977 amendments directly aimed at protecting the visibility of the Class I areas. These primarily consist of national parks, designated wilderness areas, and wildlife refuges. EPA published an Advance Notice of Proposed Rulemaking on November 30, 1979 concerning the eventual regulations that were to be promulgated on visibility. Specific reference was made to prescribed burning as a source of pollution contributing to visibility impairment, noting that in some areas restrictions on burning may be necessary. EPA acknowledged that prescribed fire is a necessary management tool and the agency did not intend that it be eliminated. Rather EPA wanted to ensure that "its impacts on visibility be reduced where feasible and appropriate," (45 Federal Register, N^o101: 34777).

A major point of contention with respect to this rulemaking was the impact of integral vistas on adjacent lands. EPA defines an integral vista as a view from within a Class I area of a landmark or panorama located outside the Class I area. The proposed regulations extended Class I protection to the management of these vistas, in effect extending the boundaries of the protected areas considerably (Hauenstein/Siegel 1980). The proposed regulations gave federal land managers (principally those with the National Park Service, U.S. Fish and Wildlife Service, and U.S. Forest Service) the major responsibility for identifying the integral vistas with the states having little influence, regardless of the potentially serious economic impacts.

EPA published the final regulations on December 2, 1979 which revealed that the agency had chosen to adopt a slower, less aggressive approach to visibility protection. States were given a role in identifying and, more importantly, considerable latitude in determining the amount of protection afforded the vistas (Hauenstein/Siegel 1980). Prescribed burning still was noted as a potential problem, though no specific controls were placed on its use. Instead the states are required to consider smoke management techniques while developing their long-term strategy for meeting national air quality standards (45 CFR 51.306 (e)(5)).

3. STATE RESPONSIBILITIES

Many of the states' responsibilities have been addressed in the previous discussion of the federal government's role in air pollution control. Summarizing then, the federal air quality legislation requires individual states to develop implementation plans that outline emission limits and a strategy for achieving national ambient air quality standards, including enforcement measures. The states are directed by EPA regulations, as an inclusion in their long-term strategy, to consider smoke management as an alternative to enhancing air quality.

3.1 Pre-1980 Restrictions

Hauenstein and Siegel (1980) outlined how each of the 12 southern states approach air quality control with respect to prescribed silvicultural fire. All 12 state enabling statutes were found to contain, at a minimum, authorization to:

- "1. develop a comprehensive state implementation plan for air pollution prevention and control;
2. advise, consult, contact, and cooperate with other state and federal agencies;
3. encourage and conduct research and education programs;
4. adopt air quality standards for all areas of the state; and
5. hold public hearings as necessary."

Other provisions which were found in the majority of southern state air quality statutes include the granting of variances from regulations on an individual basis and establishing open burning permit requirements. Commonly found provisions in prescribed burning statutes developed by state forestry agencies include restrictions on fire starting agents, burning prohibitions during periods of poor air quality, requirements for prior notification of intent to burn, and restrictions on the timing of burning. Hauenstein/Siegel (1980) concluded that while the basic statutes were written to allow for strict regulation, the southern states at that time generally opted for voluntary compliance - enforcing the existing laws and regulations upon complaint.

3.2 Post-1980 Restrictions

Since 1980, several states have revised their air quality and forestry regulations in response to appeals from forestry, environmental, or public safety interests. Some states have eased the requirements to permit less restricted burning, while others have increased the restrictions on prescribed fire. The more pertinent components or revisions since 1980 are discussed below for each state. Readers desiring a more complete description of the pre-1980 rules are encouraged to refer to Hauenstein and Siegel (1980).

Alabama: A permit from the Alabama Forestry Commission is required for all prescribed fires. Those burning must have adequate equipment and personnel to conduct and control the fire. The Division of Air Pollution Control now requires permits for fires in only one county. This is due to a local air pollution program aimed at maintaining ozone levels below the maximum allowable level. The state government can suspend all open burning during periods of air pollution and drought emergencies.

Arkansas: Few restrictions are placed on prescribed fires by the Arkansas state government, although local regulations exist in some areas. Prior notification to the Forestry Commission is required for all forestry related fires, although the Commission serves only as an advisory agency. The Commission has developed voluntary smoke management guide-lines, and encourages compliance. Enforcement of air quality regulations remains with the Department of Pollution Control and Ecology. The Department also is authorized to cancel all prescribed burning on days of high levels of air pollution.

Florida: Oral permits from the Florida Division of Forestry are required for all prescribed fires. Burners are also asked to notify the local fire department. The Pollution Control Board can intervene if the Division of Forestry is not sufficiently enforcing the requirements. To date, no intervention has been deemed necessary by the Board. The Division of Forestry has established a "certified burner program" as an incentive for better fire planning. Individuals completing the program are allowed to burn under a wider range of conditions than non-certified burners, as they must agree to adhere to the smoke management guide-lines. More than 1000 individuals have completed the program to date. Recently, the Division developed a training program for interested parties who have little or no prior burning experience. All burning can be suspended during emergency drought conditions.

Georgia: Oral permits from the Georgia Forestry Commission became a requirement for all prescribed fires as of July 1988 (Forest Fire Protection Act GA. Code Ann. Sec. 43-229 to 243, amended 1988). Prescribed burning can be suspended during emergency air pollution or drought conditions. The Division of Environmental Protection is authorized to develop a permitting system, but to date has opted only for prescribed fire supervision by the Forestry Commission. The Commission has entered into cooperative agreements with the state Department of Public Safety and Department of Transportation for smoke management along highways and public roads. The Commission notifies the Department of Public Safety of any fires that could potentially reduce visibility along public roads or highways. The Department of Public Safety then is responsible for monitoring road conditions. If conditions warrant corrective action, the Department of Transportation is contacted to provide traffic control to minimize the danger of accidents due to reduced visibility.

Louisiana: No changes have been made in state laws or regulations pertaining to prescribed fire since 1980. The Environmental Control Commission is authorized to develop a permitting system, but has not felt that such action is needed. Fires are restricted during periods of drought or air pollution emergencies. Voluntary smoke management guide-lines were released in 1985. These encourage individuals to notify the State Office of Forestry of prescribed burning plans.

Mississippi: The Commission on Natural Resources is authorized to establish a strict permitting system for all open burning. As a practical matter, the Forestry Commission has been given the responsibility for developing prescribed burning regulations. The Commission on Natural Resources maintains enforcement authority. Oral permits from the Forestry Commis-

sion have been required for all prescribed fires since 1975, primarily as a means of tracking burning activity. All burning can be suspended during air pollution emergencies.

North Carolina: The North Carolina Forest Service is responsible for developing forestry related burning regulations. Written permits are required for all prescribed fires occurring between 12:00 midnight and 4:00 PM. Legislation was passed in early 1982 in response to smoke problems in the eastern part of the state. This legislation requires that written permits be obtained for fires, regardless of the time, in 19 eastern counties where the soils have a high peat content. The Forest Service also encourages compliance with its voluntary smoke management guide-lines. All burning can be suspended during air pollution and drought emergencies.

Oklahoma: The Oklahoma Forestry Division has been given responsibility for developing prescribed fire regulations, although the Division has no authority to enforce the guide-lines or levy fines. Individuals must notify the Forestry Division of their intent to burn. No other restrictions are placed on forestry related burning in Oklahoma, except for suspension of all burning during declared emergency drought conditions. Burners are encouraged to follow the voluntary smoke management guide-lines. Currently, the Forestry Division is using those developed in Arkansas and Louisiana, while it is drafting its own set of guide-lines.

South Carolina: Authority for an open burning permit system has been granted to the South Carolina Department of Health and Environmental Control. The Commission of Forestry, however, now handles the responsibility of supervising prescribed fire in the state. Prior to 1980, individuals were required to notify both the Department of Health and Environmental Control and Commission of Forestry before burning. The notification requirement has now been simplified to include only the Commission. In addition to notification, however, the state's smoke management guide-lines became mandatory in 1985. The guide-lines require that a prescribed fire management plan be written for each area to be burned. The plan must include information on the location and purpose of the burn; a description of the stands, fuels, and topography; weather conditions and preparation required; and smoke management information. Five categories of burning days are identified based on weather conditions. Burning limitations then are determined by the category of day involved, distance to the nearest downwind smoke sensitive area, and available fuel. Burning can be suspended during air pollution or emergency drought conditions.

Tennessee: The air quality regulations of the Tennessee Department of Health and Environment were revised in 1988 (Chapter 1200-3-4 - Open Burning), but requirements pertaining to prescribed fires remain unchanged. Both the Department of Health and Environment and the Division of Forestry are authorized to issue permits for prescribed fires. Currently, however, those who wish to burn must only give prior notice to the Division of Forestry for forestry related fires conducted during fire season (October 15 - May 15). County fire prevention officials must be notified if the burning will take place near large towns or cities. No other notification or permit is required under the current regulations. All open burning is prohibited

during drought periods declared by the governor. The Department of Health and Environment maintains the enforcement authority for air quality compliance.

Texas: The regulations of the Texas Air Control Board were revised June 16, 1989 (31 TAC Chapter 111). Prescribed burning for forest management is allowable under the revised regulations without a permit from the Air Control Board. The Texas Forest Service must be notified, however, prior to any burning for forest management purposes. Open burning must be conducted between 9:00 AM and 5:00 PM, when wind speed is between 6 and 23 miles per hour, and when the wind will carry smoke away from sensitive areas. The Air Control Board maintains authority for enforcing the regulations. Fines for violation of the air quality regulations now range from \$50 to \$10,000 per day. The maximum fine in 1980 was \$1,000. The Texas Forest Service assesses fines for property damages due to escaped fires. The Forest Service currently is considering smoke management guide-lines based on South Carolina's.

Virginia: The Virginia Air Pollution Control Board revised its regulations in 1988. Open burning for forest management is permitted if the fire is at least 1000 feet away from an occupied building, unless the owner grants permission, and the fire is attended at all times. Allowable uses of fire for forest management include fire hazard reduction, competition and disease control, site preparation, wildlife habitat improvement, and right-of-way maintenance. The state Forest Fire Protection Law was revised in 1988 also. The statute pertaining to windrow burning was revised to allow such fires. Prior to 1988, burning windrows was precluded by a stipulation prohibiting the piling or bunching of slash. The Division of Forestry still must be notified prior to burning.

4. DISCUSSION

The state regulations discussed above centre on a number of changes in prescribed fire restrictions during the past 10 years. Hauenstein and Siegel (1980) identified three states requiring written permission for burning in 1980 - Alabama, Florida, and North Carolina. Mississippi has relied on oral permits since 1975. As of 1989, Georgia was employing an oral permit system, while South Carolina's smoke management guide-lines have become mandatory.

Conversely, many states in the western Gulf region reported few changes in prescribed fire regulations. Louisiana is the only state in the southern U.S. that has not instituted a formal permit or notification program. Arkansas, Oklahoma, and Texas continue to rely only on prior notification to regulate prescribed fire. Moreover, Tennessee has actually reduced its restrictions, in terms of the notification requirement.

Why is there a notable difference in regulation trends among the southern states? Most state officials attribute the increased regulatory activities in the eastern half of the region to smoke problems in urban areas and concerns about public safety. Georgia and South Carolina have experienced a large number of vehicular accidents due to reduced visibility from fires. Such

accidents may be the greatest cause of legislative activity at the present time, rather than environmental concerns. Several state officials commented that their state legislature had considered additional regulations on prescribed fire due to one or more accidents caused by poor visibility. The Georgia Forestry Commission's cooperative agreements with the Departments of Public Safety and Transportation are further evidence of the attention that smoke from prescribed fire is now receiving.

Smoke management guide-lines have been developed by almost all the southern states. At the time of the study, however, South Carolina was the only state where such guide-lines were mandatory. Florida's certified burner program increases the likelihood of its guide-lines being followed because they are emphasized in the training program. Restrictions on burning are eased for those who complete the program and agree to follow the smoke management rules. Most of the other states have expended a great deal of effort publicizing their voluntary guide-lines during the 1980's. As many of the states cooperate in developing the guide-lines, the content of the rules is relatively uniform across the region. Generally, the guide-lines involve determining whether the weather and wind speed and direction are suitable for burning; notifying concerned public officials; determining the fuel loadings, smoke plume trajectory, and screening distance for smoke sensitive areas; and evaluating the results for future burning operations. Officials from those states that rely on voluntary smoke management guide-lines contend that adherence to the guide-lines by the majority of burners could avoid any further regulation.

What does the future hold for prescribed burning regulation in the southern United States? In examining the trends of the past decade, a definitive answer is difficult to formulate. As populations in the southern states continue to grow and more urban dwellers move into traditionally rural areas, conflicts between the general public and forest managers will increase. Most of the current laws demonstrate, however, that forestry interests have been successful to date in convincing policy makers of the importance of fire as a forest management tool. The forestry community has generally been proactive rather than reactive in addressing potential regulatory problems. Florida's certified burner program and Georgia's cooperative agreements with other state agencies are examples of this type of behavior. Consequently, prescribed fire has been exempted from most state permit systems. If prescribed fire is to remain a viable land management tool, all interested parties must continue to address regulatory issues in a constructive manner.

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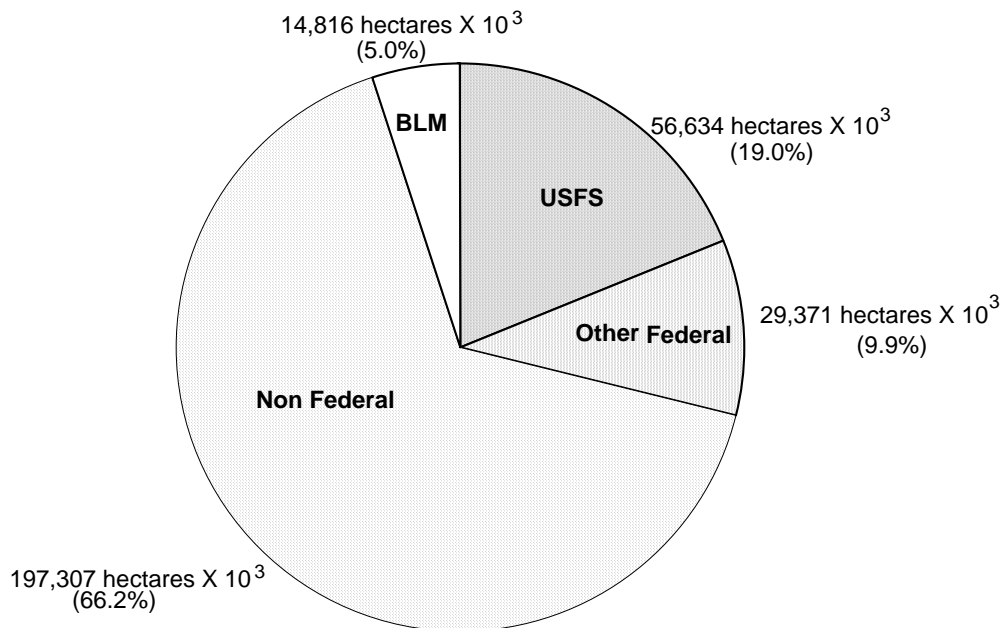
DETERMINING TIMBER HARVEST LEVELS AND SELLING PUBLIC TIMBER IN THE UNITED STATES¹

David N. Wear and Fred J. Stewart

1. MANAGEMENT OF PUBLIC TIMBER ASSETS

The forested landscape of the United States is characterized by a wide variety of landowners and management approaches. Lands are held by commercial, individual, state, and various federal owners, and all of these groups pursue different goals in the management of their lands. While there are obvious differences between private and public lands, there is even diversity within the public sector. Federal lands in the United States are managed by a number of agencies including the National Park Service, the Bureau of Land Management, the U.S. Forest Service, and the Department of Defense (see *Figure 1*). All of these agencies are chartered and regulated by different acts of congress and have different histories. Accordingly, they pursue different sets of public goals.

Figure 1: Forest Land Area in the United States by Broad Ownership Group, 1992



Source Powell et al., 1993

This paper focuses on forest management undertaken by the U.S. Forest Service, the largest public land agency in the United States, and especially on its management of the public timber assets contained in the national forests. While the U.S. Forest Service manages some

¹ The views expressed in this paper are those of the authors and do not necessarily represent the official views of the U.S. Department of Agriculture.

forests for wilderness and other special uses, the largest share of the national forests is dedicated to multiple use management which includes timber harvesting. Multiple use defines a middle ground between purely commercial private management and the strict protection of forests in parks and Wilderness Areas, thereby allowing a broad spectrum of public goals to be pursued. It also defines an unusual situation in the United States, where the federal government actively participates as a major producer of a commodity in a private market.

Managing public assets for private consumption raises difficult and important challenges for natural resource managers. Public institutions are not regulated by competition and are therefore not driven to efficient production in the way that private firms are. The challenge for the government is, accordingly, to structure regulation and incentives to induce efficient production from its agencies. This problem is especially difficult for public forestry where efficiency cannot be measured in market terms alone. In addition to timber outputs, which generate revenue, public lands produce many things, including aesthetics, wildlife habitat, and ecosystem health, that are not traded in markets.

Another set of issues arises where the scale of public timber ownership is especially large. This is the case in certain areas of the western United States where public lands may provide a large share or all of the timber products for local wood products industries. In these cases, the U.S. Forest Service not only participates in the local market, it defines the market's scale. This raises two issues. Problems similar to those associated with monopoly control could arise (Wear 1989). That is, because prices and production are not regulated by market forces, public production may distort the distribution of capital between sectors in the effected region and, indirectly, even effect management on private lands.

The other problem associated with large scale public participation in timber markets is the direct role that public forest management may have in the welfare of local communities (Schallou and Alston 1987). While there is a general reluctance to debate the equity or distributional outcomes of market-driven behavior, public management is often guided by distributional or stability goals (Wear and Hyde 1992). Stability rationales have often been used to increase timber harvests and to modify pricing policies. In this way, public timber management often tempers production efficiency with concerns for stabilizing employment in local areas (Daniels, Hyde, and Wear 1991).

Taken together, these issues set the complex stage upon which public timber is managed by the U.S. Forest Service. Economic information provides feedback for evaluating plans and for monitoring the outcomes of forest management. These are essential for national forest managers, who are responsible for managing large public assets for their highest social return and balancing timber production with other social goals.

The paper examines three aspects of public timber management in the United States. First, we examine multiple-use planning as a means of balancing the market and nonmarket as well as the efficiency and equity goals of national forest management. In effect, multiple use plans are aimed at setting sustainable levels of timber production by defining where and how

timber management is permissible and by defining a set of environmental standards for management. Second, we examine the actual implementation of timber sales, including timber sale design, appraisals, and auctions. The third focus of the paper is on accounting and monitoring of forest activities and conditions. Monitoring is essential for gauging the overall returns to public assets and it provides a mechanism for updating multiple-use plans.

The focus is framed by the general context of this workshop, the management of public timber in economies undergoing transitions to market allocation. The national forests in the United States provide one example of state management of resources in a market economy. However, while the U.S. experience is relevant, it is important to recognize that national forest management is undertaken in conjunction with well-established private markets for timber. These markets provide essential information for judging the performance of public timber management. This type of information is scarce in areas undergoing transition to market allocation and these approaches would need to be modified to address initial deficits of market information.

2. TIMBER HARVEST SCHEDULING AND MULTIPLE USE PLANNING

Timber harvest schedules are determined for national forests in the U.S. as a part of multiple use strategic planning. Each national forest produces a strategic plan guided by the philosophies of multiple use and long term sustainability. Accordingly planners must confront tradeoffs both between different types of forest uses and across time. These tradeoffs are evaluated for the specific resource and cultural conditions of each national forest in the context of long term demands for its goods and services.

Multiple use forest planning in the United States has been an ambitious undertaking. It has intended to (1) define the preferences and values of citizens regarding forest uses, (2) account for several interacting (and generally competing) resource goods - e.g. wildlife, water quality, and timber products, and (3) prescribe resource management schedules that meet the goals of a diverse citizenry while protecting the underlying productivity of resource systems. Strategic plans are generally constructed for very long time periods (usually about 100 years) but with the expectation that they will be modified or completely reconstructed every ten to fifteen years. Forest Planning in the U.S. is guided by a set of federal laws. In particular, the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act of 1976, requires strategic planning of National Forests.

From a technical perspective, planning the national forests is very complex and difficult because: (1) society demands many competing goods and services from public forests, (2) many of these goods and services do not trade in markets, so resource tradeoffs must be evaluated with imperfect price information, (3) the fundamental production responses of forests to management are not known with certainty, and (4) long-run planning requires forecasts of both market and nonmarket values. Taken together, these factors define the environment of uncertainty in which forest planning is conducted. In addition, because national

forests are large (on average, 360,000 hectares) and the planning horizon is long, a practically infinite number of production alternatives could be generated for each National Forest.

Forest Service planning represents an attempt to organize this complex set of problems in a way that leads to well-informed resource management decisions. The USFS has a thirty year history of structuring forest management problems with computer models, and the principle computer model used in multiple use planning over the last fifteen years has been a linear programming model that allocates forest land to different types of uses and simultaneously schedules timber management activities.² Linear programming has particular strength for forest planning because: (1) as an optimization model, it focuses only on relevant production alternatives (i.e. technically and economically inefficient alternatives are eliminated), (2) linear programming directly confronts resource tradeoffs with a multiple-use objective function, and (3) derived shadow prices provide insights into the costs of various constraints placed on the planning model.

Shadow prices are especially important in multiple-use planning where many resources cannot be priced and therefore may not enter into a value-based objective function. Instead, these resources are evaluated by constraining planning models to produce prespecified quantities. In addition, various administrative rules may also constrain forest planning models. The shadow prices of these constraints define their impacts in terms of foregone revenue and therefore provide insights into the values planners implicitly place on nonmarket goods, and the opportunity costs of administrative constraints.

While it is central to the efforts of planners, computer modeling is only part of strategic forest planning. Models are the central constructs for organizing massive amounts of data and evaluating approaches to resource management and various multiple-use goals. The processes behind defining these goals and which alternative courses of action to consider are critical elements of the planning process. This involves structured interactions between Forest Service officials and citizens who have interests in how the national forest is managed (this process, called "public involvement" is discussed by Beasley elsewhere in these proceedings). Finally, the selection of a strategic plan is not determined by the optimization algorithm. Rather, this choice falls to a decision officer who must balance various goals, measured effects, and political considerations in choosing a plan.

3. PLANNING INFORMATION

A strategic planning analysis requires three major types of information. Planning requires a definition of the public demands for goods and services derived from forests. These demands

² An early application of linear programming to timber management on the national forests is the TIMBER RAM model developed by Navon (1971). The model that has been the centerpiece of forest planning efforts since about 1980 is the FORPLAN model developed by Johnson. Johnson and Schuerman (1977) describe the theoretical structure of this type of planning approach while a series of handbooks provide technical details for using FORPLAN (Johnson et al. 1980).

are critical for determining management objectives. In addition, information on the resource conditions and resource production relationships for the specific national forest are required. The third type of information is defined by the plausible management choices available for forest lands. Management choices are defined as specific activities with their associated costs, revenues, and implications for environmental quality. Taken together, these components can be used to generate a set of alternatives for managing the national forest.

Management Objectives: At root, defining objectives for strategic planning must address why we have public forests in a market economy in the first place. While this alone could be the topic of a paper (e.g. Krutilla and Haigh 1978), we can easily assert that the role of public lands is simply to provide those benefits of forests that, for one reason or another, are not supplied from private lands. These benefits would include nonmarket services such as access to recreational opportunities, high quality wildlife habitat, ecological health, and visual quality in concert with marketable commodities such as timber and forage.³

In a perfect world, all of these goods and services would have a definitive value. Then planning objectives could easily be formulated using a straightforward objective function applied in a linear programming model. However, only a few of these have observable prices (in the preceding list, only timber and forage), while only a few others may have values that can be imputed from observed decisions (e.g. recreation values).⁴ The majority cannot be readily priced. Accordingly, planners must address objectives with both quantitative and qualitative methods.

The objective function for the linear programming model, albeit incomplete, is formulated in terms of those resources that can be priced (timber, forage, and recreation in the above example). The objective function is defined as "maximize the net present value of forest management for timber, forage, and recreation outputs," and is subject to a set of constraints. These constraints are generally used either to force the production of resources and services which do not have prices or to apply various administrative rules for management (for example timber may not be harvested from national forests before it reaches the culmination of its mean annual increment). The objectives of the overall planning alternative, therefore, are reflected in both the objective function and the set of values implied by the constraints on the model.

Net present value is defined as the sum of all discounted revenues minus the sum of all discounted costs associated with forest management. Computations therefore require a dis-

³ The mission of the USFS has evolved considerably since national forests were first established near the turn of the century. Reserves of public forests were originally seen as insurance against timber shortages. In this light, national forests were managed for sustainable and predictable timber supply. Concerns for the protection of water quality were part of the initial impetus for the national forests as well, and the complement of nontimber resources emphasized by the USFS has grown steadily throughout the century (see Wilkenson and Anderson 1987).

⁴ A considerable body of research on valuing nonmarket resources has developed over the last twenty years. However, only nonmarket values for recreation and, in some cases water, have been directly applied to national forest planning.

count rate which accounts for the opportunity cost of capital in a market economy and the choice of a discount rate can have significant influence over intertemporal resource allocation.⁵ Unlike private enterprises that must account for risks in their strategic planning, the U.S. Forest Service applies a risk-free discount rate of four percent to its analyses.

The relative importance of priced and non-priced resources is evaluated through a series of "public involvement" sessions, that inform interested citizens of planning efforts and elicit their concerns regarding forest uses. These sessions serve essentially as surveys of resource values and are applied to the planning process in two ways. First, different resource value "profiles" are used to define distinct resource management alternatives that emphasize certain resource products over others (for example one alternative might emphasize wildlife habitat and water quality, while another would give heavy weight to timber and forage production). The collection of alternatives defines a range of possible management plans that planners consider in detail.

In addition to, or in concert with the definition of alternatives, nonpriced resource objectives can be directly applied to the planning problem using physical constraints. For example, concerns regarding stable timber production, especially as it relates to stable employment in local areas has been implemented in forest planning by constraining timber harvests so that they cannot decline over time (the so-called nondeclining even-flow rule). Another example would be requiring an alternative to generate a specified quantity of winter range for a big game species.

Defining Resource Conditions: The quality of a strategic plan depends on many factors, but none are more important than an accurate description of the forest and its resources. This requires two types of information. One is an inventory of the forested area that defines existing resource conditions. For computer-based planning analysis this involves transcribing many types of resource inventories from maps to computer data bases. The entire forest is divided into small areas based on both the existing stand condition and growth potential and for each of these small areas, information such as the following would be recorded:⁶

- | | | |
|---------------------|-------------------------------|----------------------------|
| - Site productivity | - potential for water runoff | - visual protection class |
| - soil type | - soil sensitivity to erosion | - winter range suitability |
| - mineral inventory | - aspect | - summer range suitability |
| - timber inventory | - slope | - etc... |

⁵ For a general discussion of the discount rate and its implications for natural resource allocation, see Howe (1979, p 149-168) and Krutilla and Fisher (1975, p 60-75).

⁶ These tasks are readily accomplished using Geographic Information Systems (GIS). A GIS is a computerized mapping system for the entry, storage, and display of spatial data for a geographic area. Their development over the past ten years has greatly enhanced the ability to manage and use large spatially-referenced data sets.

The other basic type of resource information that is required for forest planning is resource production relationships. These are the basic production functions that describe, for example the growth and yield of tree species and forage-producing grasses, the release and transport of sediment, and the response of various animal species to different complements of habitat conditions. These are the central tools for defining how management activities influence the several goods and services that people demand from forests. While forestry in general has dedicated considerable energy to estimating timber growth and yield functions, many production relationships for other resources are not as well understood.

Defining Management Choices: The final area of information required for forest planning analysis is the set of feasible choices that can be applied to forested lands. There are two types of information that need to be defined. One is a set of multiple-use goals or management emphases. For each alternative, every area of forest is assigned a management emphasis. For example, one could emphasize visual protection, watershed enhancement, old-growth retention, or timber production. Each "management emphasis" has a set of standards and guidelines that define acceptable resource management for the specified management goals. The second layer of information used to define management choices is a set of explicit activities to be applied to an area. These include the types and timing of timber harvests, stand improvement activities (e.g. thinning), or other types of vegetative manipulation, for example, prescribed burning to enhance forage production.

Taken together, management emphases and activity schedules define the range of options that can be applied to each area of the forest. Accordingly, a critical component of effective planning is defining a range of choices consistent with the range of goals for the national forest. Strategic planning options may be unnecessarily narrow if the range of management choices is limited.

4. STRATEGIC PLANNING ANALYSIS⁷

Information on public goals, resource conditions, and management choices are organized within the planning model called FORPLAN⁸. It is used to bring together data to define the resource condition of a National Forest, the production relationships which describe how the forest will develop and respond to different management activities, the values of different resource outputs, and the costs of management. The model is solved using an optimization approach which defines an economically efficient management plan for each alternative considered for the forest.⁹ This reduces the decision space by eliminating from consideration the many suboptimal management plans which could achieve the same level of outputs. Of

⁷ Much of the material in this section is taken from Wear (1989).

⁸ FORPLAN is an acronym for Forest Planning Model. The design and use of this model has been the topic of much of the literature regarding forest planning over the last ten years.

⁹ Most FORPLAN models are designed to solve for the maximum discounted value of forest management. It is possible to solve for the maximum of any output. For example, it is possible to solve for maximum timber or recreation output.

course, the degree to which a solution actually reflects an optimal plan depends on the information used to construct the model.

While the modeling exercise is well-structured and extensive, the extent to which the planning analysis can inform professional judgement depends critically on how well decision-makers understand the limits and implications of their planning models. The solution to a FORPLAN model is mechanical but its construction and the interpretation of its results are largely subjective exercises, and they clearly depend on the judgment of planning teams and decision-makers. Much of this interpretation depends upon testing the sensitivity of the model to ranges of assumptions regarding uncertain values. The analysis of the several benchmarks and production alternatives undertaken in the environmental analysis of Forest Plans help define this sensitivity.¹⁰ In addition, judgement is required to balance the efficient provision of market goods against those nonmarket values that are not part of the objective function.

Cost/benefit analysis undertaken with a FORPLAN model addresses the relative efficiency of forest management alternatives and attempts to define that management plan which gives rise to the highest net discounted benefits. In addition, forest planning clearly addresses distributive or equity questions as well.¹¹ These distributive issues, often encapsulated as a "community stability" policy, are largely concerned with a redistribution of resource wealth from the public at large to the rural areas which are dependent on public forests for input to their wood products industries. These concerns for local production levels and their derivative employment and income are often used to justify departures from the efficient solutions defined by cost/benefit analysis. The tool for examining these employment and income effects is IMPLAN, an input-output model which describes the historical impacts of forest outputs on local economies, and projects the economic impacts of various production alternatives (USDA 1985).

Strategic planning decisions are ultimately the product of synthesizing the results of cost/benefit analysis, impact analysis, and professional judgement. The resulting plans have essentially four components. One is the land allocation, or quite simply, the map of prescribed land uses. The second is a set of management standards which guide the design and execution of management activities on the forest. The third is an overall output schedule which is

¹⁰ Benchmarks are analyses which estimate the production potential for various resource outputs under a minimum level of management required for the forest. In effect, these are used to define the potential range of production alternatives for managing the National Forest. Production alternatives are developed in accord with requirements of the National Environmental Policy Act of 1969. A good general discussion of benchmarks and alternatives is presented in Morrison (1987).

¹¹ The classic justifications for public intervention in a free market economy are: efficiency, stability, and equity. The efficiency justification for public forest management - arising, for example, from timber production externalities - is well established (see Krutilla and Haigh 1978). The use of equity criteria to direct public forest management is not nearly as clear (see, Alston and Schallau (1987). The importance of equity considerations in the outcome of Forest Plans is, however, clear in planning documents.

consistent with the land allocation, management standards, price and cost inputs to the analysis, and the objectives of the alternative. Fourth, because of uncertainty in resource data, production relationships, and prices and costs, a monitoring plan is also required. It is used to a) test whether the "output schedule-land allocation-management standards" triad is internally consistent, b) examine the plausibility of key assumptions used in the resource modeling, and c) compare the projected future with actual outcomes. In sum, monitoring should define when planning results are no longer germane, triggering amendments to Forest Plans or new planning analysis.

A final strategic plan for the forest is defined by selecting a preferred alternative. Often the final plan is not selected from the original complement of studied alternatives. Rather it may be constructed by combining desired elements of the original alternatives.

5. SELLING TIMBER ON THE NATIONAL FORESTS

Strategic plans provide overall guidance regarding the total quantity and the conditions under which timber can be harvested from a national forest but they do not define specific management projects. These plans are actually implemented through the design and sale of specific projects, including harvesting projects called timber sales. Planning for timber sales, while generally guided by strategic planning, is also a complex undertaking that must account for the special attributes of the areas that will be harvested. This would include the effects of the proposed project on, for example, water quality, forest regeneration, ecological conditions, and game habitats. In addition, very specific cost elements, for example road building, skidding and loading, and transportation must be weighed in defining the timber sale. In effect then, constructing timber sales defines a distinct level of planning in the U.S. Forest Service.

Timber sales are conducted in the national forests through a sale planning or sale design process followed by an auction. Sale planning aims to design timber sales consistent with multiple use objectives and plans. Once an acceptable sale has been designed, it is sold by auction to a private firm or individual who purchases the rights to the standing timber. The purchase is consummated through a contract between the purchaser and the U.S. Government that defines how the timber will be harvested. In the sections that follow, we describe in detail first how timber sales are designed and then how timber sales are sold by the U.S. Forest Service.

Strategic planning defines, in general terms, where and how timber may be managed. The allocation of lands to different management emphases defines where timber harvesting is and where it is not compatible with overall multiple use objectives. Each of these management emphases in turn, defines a set of environmental standards and operational guidelines for conducting timber management activities. For example, if the management emphasis of an area was timber production with the protection of visual quality, then activities that leave visible scars on the landscape would be prohibited. This might limit timber harvesting to

selection methods (i.e. partial cutting) and timber might be removed using helicopters rather than trucks to avoid constructing roads. Other management emphases might, alternatively, emphasize the protection of wildlife habitat or provide exclusive emphasis on cost-effective timber management.

A key linkage between the strategic plan and timber sale planning is in the selection of the group of specialists who will design the timber sale. The composition of this group, called an interdisciplinary team, is determined by the environmental standards and operational guidelines assigned to the specific area by the strategic plan. Clearly all interdisciplinary teams for timber sales will include silviculturists and logging engineers to focus on regeneration and harvesting techniques. In addition, standards and guidelines may call for expertise in the areas of watershed hydrology, fisheries, endangered species, or specific big-game species of wildlife. Specialists in these areas, who are employed by the national forest, are enlisted for the interdisciplinary team. A timber sale interdisciplinary could include specialists from several areas, including:

Silviculturist	Transportation Engineer
Soil Scientist	Hydrologist
Fishery Biologist	Big Game Biologist
Ecologist	Economist
Anthropologist	Landscape Architect

Each specialist is charged with representing their respective resource in designing the timber sale. This requires conducting a credible analysis that predicts the likely impacts of the sale on their resource and proposing cost effective ways to mitigate the negative impacts or improve resource productivity. For example, if the management emphasis calls for restricting increases in water flow in streams to ten percent or less, then a watershed hydrologist would be enlisted to estimate the effects of the timber sale on water flows. To comply with the guidelines, the watershed hydrologist might propose that cutting units be placed at different locations or be prohibited on especially critical areas within the watershed.

The interdisciplinary team works to propose a number of alternatives that demonstrate different approaches to meeting the strategic planning objectives and other specific objectives within the studied area. These alternatives offer up different approaches to accessing the site, logging the timber, and spreading harvest activities out over the landscape and through time. While all are, at a minimum, within the standards and guidelines specified by the strategic plan, the alternatives demonstrate a range of environmental, resource production, and financial outcomes. The ultimate analysis of tradeoffs falls to the decision officer, who must choose from among these alternatives or call for additional choices.

6. A CASE STUDY: THE NORTHSIDE ANALYSIS AREA

To illustrate the timber sale design process, we examine a timber sale planning analysis undertaken by the Lolo National Forest in Western Montana. This particular sale area illus-

trates many of the issues now confronted by the USFS on a regular basis. In this area, the national forest land is located in the upper part of a mountainous watershed. Private lands in the lower reaches of the drainage have, over the past twenty years been steadily converted from farms to residential uses. Accordingly, the national forest has high value for its visual backdrop. Recreation values are also high because the area is easily accessed by a relatively large population and because of a major ski area located on national forest land and operated, through a long-term contract, by a private concessionaire.

These values would typically weigh against active forest management in areas such as this. However, an overriding concern for this sale area is the prevention of catastrophic fires. Fire suppression and historic logging practices have greatly changed the vegetative condition of the area from old-growth ponderosa pine to a second-growth of very dense multi-species stands. This second growth has very high woody debris loads, posing high and increasing fire risks to national forest land and neighboring private residential areas. A primary objective of the timber sale, then, is to restore ponderosa pine vegetation, thereby reducing risks of fires and insect infestations.

The overall strategic guidance for the area is defined by management emphases (ME's) prescribed for this area by the Lolo National Forest Plan (see *Figure 2*). The following six ME's are shown:

Management Emphasis	Description
16	Focuses on timber management and providing healthy stands of timber.
25	Timber management subject to protection of visual quality of the area.
18	Focuses on providing forage as winter range for big-game species. Timber production is allowed.
23	This is a combination of ME's 25 and 18. That is, the area provides winter range for big game but it is also visually sensitive.
8	This is a special use area focusing on the down-hill skiing area.
11	This area is and will remain a roadless area. Timber management is not allowed, though prescribed burning may be used for other management objectives.

Only a small portion of the area is in ME-16 with a majority of the land in ME's 23, 25, and 18 which emphasize winter range for wildlife, visual quality, or a combination of the two. The collection of ME's clearly demonstrate the diverse set of demands placed upon this particular forest area. Accordingly, the design of the timber sale must address the costs and benefits of timber harvesting as well as the returns to these other objectives in qualitative terms. The sale's objectives are expressed in terms of both the overall strategic plan (ME's) and in terms of site specific goals (i.e. reduce fire hazard to surrounding private lands and recreational developments).

Figure 2: "Management Emphases" assigned to the Northside Analysis Area by the strategic plan for the Lolo National Forest

To address this range of issues, the interdisciplinary team constructed and examined ten different alternatives. The effects of these alternatives are displayed in *Table 1* and a map of one alternative's cutting units is shown in *Figure 3*. Not surprisingly, the alternatives emphasize partial cutting generally as a part of a shelterwood regeneration system as well as several prescribed burnings to reduce insect and fire risks. A very small portion of the area would be clearcut. Shelterwood systems allow the area to be harvested in stages so that vegetative cover is always maintained and visual qualities are protected.

Figure 3: Stand Prescriptions for the Northside Analysis Area, Lolo National Forest

Table 1 highlights important tradeoffs, including tradeoffs between combinations of logging systems, silvicultural methods, slash treatments, and transportation designs. An important and common tradeoff occurs between the amount of road construction and the amount of helicopter and skyline yarding systems. For example, alternative 3b has the highest quantity of helicopter yarding and a very small mileage of road construction. Conversely, alternative 4 shifts away from helicopter logging and has substantially more road construction.

Table 1: Summary of the effects of alternatives for the Northside Area

Descriptors	ALTERNATIVES									
	1	2b	3a	3b	3c	4	5	6	7	8
Number of Timber Harvest Units	0	23	9	19	23	17	15	0	23	23
Total Acres Harvested	0	1900	671	1374	1900	1352	1471	0	1900	1900
Tractor Harvest Acres	0	842	90	320	842	804	726	0	842	842
Skyline Harvest Acres	0	449	112	189	449	372	276	0	449	449
Helicopter Harvest Acres	0	609	469	865	609	176	469	0	609	609
Volume (MBF)	0	4238	1678	3304	4238	2507	3100	0	4238	4238
Seed Tree-ST (acres)	0	13	0	13	13	13	13	0	13	13
Disease Control-DC (acres)	0	123	123	123	123	123	90	0	123	123
Partial Cuts-IMP/EMB, SWP (acres)	0	1348	310	868	1348	1050	1057	0	1348	1348
Shelterwood Cuts-SW, GSW (acres)	0	416	238	370	416	166	311	0	416	416
Post Harvest Burning Only (area)	0	0	410	1064	1536	1126	1189	0	1536	1536
Post Harvest Slashing Only (acres)	0	1536	0	0	0	0	0	0	0	0
Ecosystem Burning Only (acres)	0	0	650	650	650	524	609	1851	650	650
Ecosystem Slashing Only (acres)	0	650	0	0	0	0	0	0	0	0
Total Burning/Slashing Acres	0	2186	1060	1714	2186	1650	1798	1851	2186	2186
Whitebark Pine Study (acres)	0	154	154	154	154	154	154	154	154	154
Total Treatment Acres ¹	0	2704	1475	2178	2704	2030	2234	2005	2704	2704
Long Term Road Construction (miles) ²	0	8.7	0	0.6	0	7.3	6.1	0	8.7	4.1
Short Term Road Construction (miles) ³	0	0	0	1.6	8.7	0	0	0	0	4.6
Total Road Construction (miles)	0	8.7	0	2.2	8.7	7.3	6.1	0	8.7	8.7
Road Reconstruction (miles)	0	3.5	0.8	3.3	3.5	3.5	1.3	0	3.5	3.5

All of these decisions have significant implications for the costs and benefits of the timber sale. The economic implications of road construction are especially complex because roads have a productive life of up to 40 to 50 years. While expensive to construct, once built they provide potential access for many future management activities and a long stream of associated revenues. Therefore, a cost/benefit analysis for the sale requires considering the full stream of costs and benefits of future timber sales associated with this initial investment. Accordingly, a present net value analysis is required to evaluate the long-run economic consequences of the timber sale.

The results of present net value analysis are shown in *Table 2*. Consistent with the strategic planning analysis, values are discounted using a four percent real discount rate. The present net value of the timber sale alone, shown in the first rows of *Table 2*, indicates that the short-run returns to the project range for strongly positive to strongly negative. However, when the

total schedule of treatments for the sale are taken into consideration (including ecosystem management burning), all alternatives have discounted costs in excess of discounted benefits, defining negative net present values.

However, it is important to remember that the PNV calculations account for the costs of all management activities but only the revenues associated with timber production. This particular sale was designed to produce several other benefits that cannot be directly priced and therefore they are excluded from the PNV analysis. Accordingly, it is the job of the Ranger to weigh the costs highlighted in the present net value analysis against the full range of benefits, including reducing fuel loads (see the row labeled "Total burning / slashing area" in *Table 1* and improving big game habitats in *Table 3*.

Table 2: Summary of present net values and acres treated for alternatives for the Northside Area

TIMBER SALE HARVEST	ALTERNATIVES								
Descriptors	2b	3a	3b	3c	4	5	6	7	8
PNV-M\$	82.6	24.8	-44.8	51.0	-101.4	-58.1	0	-31.1	-23.4
Harvested Acres	1900	671	1374	1900	1352	1471	0	1900	1900
\$/Acre Harvested	43	37	-33	27	-75	-40	0	-16	-12
ECOSYSTEM MANAGEMENT BURNING	ALTERNATIVES								
Descriptors	2b	3a	3b	3c	4	5	6	7	8
PNV-M\$	-246.3	-246.3	-246.3	-246.3	-232.5	-222.4	-427.7	-246.3	-246.3
Treated Acres	650	650	650	650	524	609	1851	650	650
\$/Acre Treated	-379	-379	-379	-379	-444	-365	-231	-379	-379
WHITEBARK PINE STUDY AREA	ALTERNATIVES								
Descriptors	2b	3a	3b	3c	4	5	6	7	8
PNV-M\$	-12.8	-12.8	-12.8	-12.8	-12.8	-12.8	-12.8	-12.8	-12.8
Treated Acres	154	154	154	154	154	154	154	154	154
\$/Acre Treated	-83	-83	-83	-83	-83	-83	-83	-83	-83
NORTHSIDE PROJECT TOTAL	ALTERNATIVES								
Descriptors	2b	3a	3b	3c	4	5	6	7	8
PNV-M\$	-176.5	-234.3	-303.9	-208.1	-346.7	-293.3	-440.5	-290.2	-282.5
Total Acres Treated	2704	1475	2178	2704	2030	2234	2005	2704	2704
\$/Acre Treated	-65	-159	-140	-77	-171	-131	-220	-107	-104
RANKING	ALTERNATIVES								
Descriptor	2b	3a	3b	3c	4	5	6	7	8
Based on Least Cost/Acre Treated	1	7	6	2	8	5	9	4	3

Table 3: Summary of forage produced for wildlife under different alternatives for the Northside Area

Descriptor	1	2B	3A	3B	3C	4	5	6	7	8
Winter Range Acres Treated	0	1876	767	1298	1876	1856	1556	1646	1876	1876
Forage Production (lbs/acre/year)	114,00 0	245,32 0	244,39 0	334,66 0	432,92 0	429,52 0	378,52 0	240,00 0	432,92 0	432,92 0

7. TIMBER SALE APPRAISALS AND AUCTIONS

After a timber sale has been designed, the rights to the standing timber are sold to a private firm or individual. The timber sale is advertised and then sold through an auction. Most revenue from the sale of federally owned stumpage goes initially to the US Treasury. However, a part of the sale is held to directly fund reforestation and brush disposal. In addition, current law stipulates that 25% of the revenue that goes to the Treasury is returned to the counties in the Forest where the timber was harvested. This portion of the revenues is intended to replace the tax revenue that would have accrued to the local county had the land been privately owned, and is used to fund local schools and roads.

However, before being sold, the value of the timber must be appraised to define its fair market value. All public agencies, and the public at large, want to receive as much revenue as possible from the sale of publicly owned stumpage. This leads to the need for a method to determine a "fair value" to be paid for federal stumpage. "Fair value" is defined to be a value that would be paid by the highest bidder in a competitive auction with two or more bidders.

There are several reasons to estimate this "fair value" prior to offering the stumpage for sale. An estimate of fair stumpage value is useful when sales are being designed to get an early indication if the sale is likely to be purchased. It may also be important for the government to know whether all the management costs incurred in designing and offering the sale, will be recovered by the expected stumpage revenue. If it appears that the sale will not recover all these costs, the government may choose to not offer the stumpage for sale unless other overriding goals and objectives would be met by the sale.

Harvests are often used to pursue goals other than the generation of revenue from timber production. An important and long-standing goal of the U.S. Forest Service has been to provide stability to local economies by supplying stumpage to provide jobs and income for local residents. In recent years, "ecosystem management" has become another objective that has been pursued through timber harvests. In some cases, it may be less expensive to "subsidize" ecosystem management with timber harvest than to accomplish the ecosystem task directly. For example, in the Northside Sale example, alternative 6 was designed to accomplish the ecosystem management goals without a timber sale (see Tables 1 and 2). However, in this case, the total cost of the non-timber alternative is more expensive than some of the timber harvest alternatives (comparing the economic effects of sale design alternatives is another important reason for conducting appraisals).

Perhaps most importantly, an estimate of timber's fair market value allows the government to set a minimum price that will be accepted for a timber sale. This is especially critical in areas where the number of bidders is small, limiting competition for the timber sale. In some cases, only one bid will be received for a timber sale. Here the minimum bid ensures that the federal government receives reasonable compensation for the resource.

8. APPRAISAL METHODS

Two different methods have been used by the U.S. Forest Service to determine a starting price for public timber stumpage offered for sale. The older method is called residual value appraisal and the more recent method is called transaction evidence appraisal. These are described in turn below.

Residual Value Appraisal: With this method, standing timber is priced by determining its eventual value as a product and subtracting all relevant harvesting, transportation, and production costs. The remainder, or residual, is the value assigned to the standing timber or stumpage. As long as the markets for the final product are competitive and all costs are included in the calculation, then the residual value is the expected fair market price for the timber.

Residual values are typically calculated from two different types of final products. One is finished lumber (or other products) derived from the timber. The other is the value of the logs when they are delivered to the mill. Clearly, it is easier to calculate the stumpage value from a starting point of delivered logs because there are fewer production costs to consider. The only reason to use final products in lieu of delivered logs as a starting point for the residual value appraisal is if delivered log prices are unavailable or if markets for delivered logs are not competitive. Ultimately the choice between starting points depends on where the best information is available.

As an example, consider the following costs of harvesting, transporting, and processing timber from a timber sale:

Road Construction	\$ 50/mbf	
Felling & Bucking	\$ 10/mbf	
Skidding & Loading	\$ 70/mbf	
Slash Disposal	\$ 25/mbf	
Reforestation	\$ 15/mbf	
Haul to the Mill	\$ 25/mbf	
Logging Profit and Risk	\$ 5/mbf	==> Total costs to mill = \$200/mbf
Milling & Manufacturing	\$ 125/mbf	
Milling Profit & Risk	\$ 25/mbf	
Total Costs	\$ 350/mbf	

If the starting point is the finished product and the finished product price is equivalent to \$400/mbf of stumpage, then the Residual Stumpage Value would be $\$400 - \$350 = \$50/\text{mbf}$. If the starting point is delivered logs and the delivered log price is \$250/mbf of stumpage, then the Residual Stumpage Value would be $\$250 - \$200 = \$50$.

In order to use Residual Value to determine stumpage value it is necessary to have market information at some point in the production process as well as good cost estimates of all activities that take place from the tree to that point in the production process that has market value. The U.S. Forest Service collected data on all production activities in order to use residual value appraisal. Without good market information at some point in the production process and reliable cost estimates (which may be expensive to determine), residual value appraisal will not provide useful stumpage value estimates.

Transactions Evidence Appraisal: Over the last decade, the residual value approach to appraising timber has generally been replaced with an approach that focuses directly on the prices that have actually been paid for recent timber sales. This approach, called "transaction evidence appraisal," uses statistical methods to predict the price that would be offered for the timber sale (see, Jackson and McQuillan 1979). This requires a database of information on timber sales sold in the recent past.

To predict the price that would be offered for a timber sale, regression analysis is used to relate several specific features of a sale to the resulting price. These features include site characteristics, sale design characteristics, and the present market price for finished products. The regression analysis has the following general form:

Timber Value = f(finished product market information, sale characteristics, site characteristics)

The kind of finished product market information may include:

1. Species specific product prices

Sale characteristics may include:

1. Proportion of sale volume by logging method-
 - a. Tractor
 - b. Groundlead
 - c. Skyline
 - d. Helicopter
2. Skidding distance
3. Volume/acre removed and total sale volume
4. Acres harvested
5. Road costs

Site characteristics may include such information as:

1. Volume by species of timber harvested
2. Diameter at breast height (dbh) by species
3. percent defect by species

These data along with actual prices paid for several historic timber sales are used to estimate the timber value equation. Once this equation is estimated with historic data, then the features of a new sale can be entered as independent variables and the equation will predict the sale price. In contrast to the residual value approach to appraisals, transaction evidence appraisals do not require detailed predictions of the various costs of logging, hauling, and manufacturing. Instead it requires a data base of timber sale features and the resulting price. Accordingly it would be difficult to implement this method initially in a developing market where observations of competitive prices may be scarce.

In cases where competitive markets are established, transactions evidence appraisals are strongly preferred for estimating values. This is because they are based theoretically and empirically on competitive pricing. They also avoid the problems and expense of correctly predicting technologies and costs. However, in cases where there are very few bidders, then it is difficult to assume competitive pricing. Here, in fact, the history of prices may reflect market imperfections and therefore not reflect fair market values. In cases such as this, residual value appraisals may be preferred, as long as the planner can define a competitive starting point price. With limited competition in a local market for timber this may be the regional finished product price.

Comparing Sale Values and Total Benefits: This approach gives the stumpage owner an idea of the reasonable value of stumpage from the perspective of the purchaser. However, the seller (in this case the government) may incur additional costs in preparing the sale. Examples would include costs of sale design, preparation of a timber sale document that meets legal requirements, sale administration, and pre-construction and construction engineering related to road construction. These management costs are not included in the determination of stumpage value using the residual value approach.

The stumpage value paid to the government in fact, may not be large enough to offset the total management costs of the timber sale. The result is what has been called a "below-cost" timber sale. The appraised value can provide an estimate of where below-costs are likely to occur. In addition, they can be used to judge whether the nonmarket benefits derived from the sale are warranted by the level of costs.

9. TIMBER AUCTIONS

Appraisals define the anticipated price for a timber sale and serve as planning tools and to define a minimum fair market price for timber. The actual sale of the timber takes place through an auction. The structure of the auction may have an influence on the price that is

actually paid for a timber sale (see Johnson 1979 and Rucker and Leffler 1988). the US Forest Service uses two types of auctions to sell timber sales.

The two types of timber auctions are oral and sealed bid. In both cases there is a minimum acceptable bid that is determined from the appraisal. In an oral auction a purchaser will start by offering at least the minimum bid price. Another purchaser can then offer to pay more. The original (or another) bidder can then increase the price that they will offer. This procedure will continue until one of the bidders offers more than anyone else is willing to pay. In a sealed bid auction, each purchaser will submit a bid to the government for the public timber. The bid is sealed and the purchaser cannot change the bid once the bid is submitted to the government. All bids are then opened at the same time and purchasers often are present when the bids are opened to see if they have won the right to harvest the timber. The highest sealed bid is awarded the timber. In some cases the highest bid is considerably above the next highest bid. In that case the sealed bid may result in a higher price for the government than would have been the case with an oral auction, because the high bidder would have stopped bidding the price up once other potential purchasers quit bidding.

Oral auctions have the benefit of directly engaging competitive behavior. That is, as long as there are two or more bidders (who are not colluding) then the price will rise through the auction until it reaches the point where it is priced equal to its marginal benefit to the buyer (i.e. the competitive price is obtained). However, in cases where there are few bidders and therefore there is a chance that only one bidder will participate, then the sealed bid auction would be preferred. With one bidder, an oral auction would result in selling the sale at the minimum price. With a sealed bid sale, the single bidder would have to make his bid with the anticipation of competition, likely increasing the resulting price.

10. MONITORING

The complex and interacting management plans used by the US Forest Service require constant monitoring and evaluation. This is because plans are based on forecasts of markets, uncertain information on production relationships, incomplete inventories, and the dynamic demands of the public. Accordingly, a monitoring program is necessary to ensure that the assumptions of plans are realistic and that the actions prescribed by the plans are being accomplished.

At the strategic planning level, several conditions must be monitored. These relate generally to the three primary products of planning: 1) the map of management emphases, 2) standards and guidelines, and 3) schedules of resource outputs and management activities. Resource inventories used in and management emphases prescribed by strategic plans (e.g. *Figure 2*), are scrutinized as projects such as timber sales are designed in specific areas of the forest. Where, after a site-specific analysis is conducted, the management emphasis appears incompatible, its boundaries may be adjusted accordingly. Various standards and guidelines are also monitored as these projects are completed. Water quality, soil

stability, and several other environmental/ecological conditions are monitored to ensure their compliance with the goals of the strategic plan.

Because there are basically two levels of analysis in the planning of timber production (overall harvest levels defined through strategic plans and specific projects defined through a timber sale design process) the actual implementation of timber sales could easily depart from long-term strategies. Accordingly, each national forest monitors its timber and other resource outputs for comparison with the output schedule prescribed by the strategic plan.

In addition, the Forest Service has established a timber sale accounting system called the "Timber Sale Information Reporting System (TSPIRS)." This system reports on the financial effects of each national forest's timber sale program including the costs of road building, timber sale preparation, etc... and timber revenues. Financial implications are reported in each year, but TSPIRS also includes a present net value analysis of the program's long-run effects (this reflects eventual returns to long-lived investments such as roads). In addition, TSPIRS provides estimates of the nontimber benefits that may also be derived from the timber sale program.

Another source of feedback comes directly from the public at large. Interested citizens are consulted throughout the planning process. If, after a plan (either a strategic plan or a timber sale plan) is completed, a citizen finds fault with it, then he may file an administrative appeal of the decision. The appeal requires that the decision be reviewed at the next level within the U.S. Forest Service. After appeal procedures have been exhausted, the citizen can then file suit against the decision in a court of law. While perhaps extreme, these avenues of redress provide a strong form of feedback on plans and provides strong incentive for the agency to work with the public on planning issues.

Information gathered through these various avenues of monitoring is used to revise strategic and operational plans. At some point, however, the changes accumulated through monitoring may become so substantial that they essentially invalidate the strategic plan. If this is the case, then plans are completely redrawn. Forest planning regulations require that plans be evaluated for revision every five years.

11. CONCLUDING REMARKS

This paper has provided an overview of how timber is managed in national forests by the U.S. Forest Service. General harvest schedules are determined through multiple use planning which engages public opinion and considers the impacts of forest management on several different resources. Planning analysis weighs economic as well as other quantitative and qualitative information in prescribing a strategic course of action for each national forest.

Timber harvesting projects also require an analysis of multiple-use goals, but in a very site-specific context. Timber sale design engages public opinion, weighs various alternatives and prescribes management based on the analysis of priced and nonpriced resources. Resulting

timber sales are appraised to determine the fair market value of the timber and sold at auction to private firms. These firms are bound by contract to follow the timber sale design and also post bonds to warrant their compliance with the contract.

In the U.S. then, the government maintains a large share of the control over the planning and management of national forests. The costs of this degree of control may be high and include the costs of maintaining large staffs of resource managers and specialists as well as the opportunity costs of public rather than private management. Benefits also accrue. By maintaining control over specific resource management plans, the government may respond to rapidly changing public concerns and resource demands without modifying large-scale contracts. Forest managers may also constantly monitor the economic and ecological consequences of management and readily fine-tune their plans. Being able to actively engage the public in discourse over resource use is especially important in areas where relatively large populations use or live near a national forest. This is increasingly the case in the United States.

Forest planning has been a contentious undertaking over the past twenty years, reflecting considerable conflict over what is and what is not appropriate management of the national forests. These conflicts have been highlighted by a series of actions prescribed by the Endangered Species Act of 1973 (ESA) which provides for the protection and recovery of individual endangered species. The listing of the Northern Spotted Owl (*Strix occidentalis caurina*) in the Pacific northwest region of the U.S. (a region that has historically produced about one-third of domestic softwood lumber) has led to prohibitions on timber harvests on many areas of the region's national forests. In effect the ESA supersedes the plans conducted by the US Forest Service.

The endangerment of the Northern Spotted Owl and other concerns regarding the ecological values of national forests fundamentally changing the management approach on national forests. Broadly called ecosystem management, this new approach calls for focusing primarily on the health of ecosystems in the management of national forests, thereby preventing species endangerment.¹² To the extent that ecosystem management could prevent the negative economic impacts of endangerment that are often incurred on both public and private lands, there may be financial as well as ecological arguments for such a policy.

As a result of these and other factors, timber harvests from national forests have fallen substantially over the past five years both in comparison with historic production levels and the output schedules of strategic plans. It is likely that many strategic plans will be revised within the next few years, defining a new epoch in the evolution of multiple use forestry in the United States.

¹² As seen in the Northside case study, ecosystem management already has a strong influence on timber sale design in the national forests.

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ECOSYSTEM MANAGEMENT AS AMERICAN LAW¹

Warren A. Flick and William E. King

1. INTRODUCTION

Ecosystem Management (EM) is apparently becoming law without legislative enactment. EM and sustainability of ecosystems, including ecosystem health, are key concepts that many resource managers have adopted as the best basis for public forest management. In 1992, the U.S. Forest Service adopted EM as its new guiding philosophy (Robertson 1992). In April of 1995, the Forest Service published proposed regulations which would implement EM (60 Fed. Reg. 18886 (1995) (to be codified at 36 C.F.R. §§ 215, 217, and 219) (proposed April 13, 1995) (hereafter cited as Proposed Regulations (PR) 36 C.F.R. §§ 215, 217, or 219)). If adopted, the proposed regulations will replace the existing regulations that govern National Forest planning, as authorized under The Forest and Rangeland Renewable Resources Planning Act of 1974 (88 Stat. 476) as amended by the National Forest Management Act of 1976 (90 Stat. 2949, codified at 16 U.S.C. §§ 1601-1614).²

As embodied in the proposed regulations, EM signals the passing of an era of production- or output-oriented forest management and the beginning of management for in-place recreational and aesthetic conditions. The existing regulations emphasize what the forests should produce, and the proposed regulations emphasize what the forest should be. It is a major shift in emphasis that corresponds to a major shift in social preferences.

The proposed regulations are perhaps best understood by viewing them through the lens of institutional economics, including property rights and transaction costs analysis, as advocated by North (1990), Barzel (1989), and others. It stands in sharp contrast to the production model of forestry as formulated by Bowes and Krutilla (1989) and Krutilla and Haigh (1978) and their predecessors. The institutional context for National Forest management is the American constitutional system.

2. AMERICAN CONSTITUTIONAL GOVERNMENT AS PROPERTY

The U.S. Constitution gives Congress the power to make all necessary rules respecting U.S. property (Article IV, Section 3, Clause 2). The laws Congress makes relate to the possession, use, and transferability of property, and therefore define public property rights. An important feature of public property rights is that they are part of a constitutional system that is distrustful of governmental power.

¹ The views expressed in this paper do not represent the views or policy of the Minerals Management Service or the U.S. Department of the Interior. This paper has been previously published in the Renewable Resources Journal, Autumn 1995.

² As of August 1997, the planning regulations discussed in this article are still under consideration by the U.S. Department of Agriculture.

The Constitution divides power among the states, the federal government, and the people. It grants enumerated powers to the federal government, within those powers it gives supremacy federal law, and it leaves all remaining power to the states or the people. The Constitution then divides federal authority among legislative, judicial, and executive branches.

Theoretically, the system keeps the federal government small and weak, but American experience has been to the contrary. The contradiction between the theory of limited government and the practice of expansive government is in part the outcome of constitutional interpretations by the Supreme Court. It has broadly construed the enumerated powers, giving the federal government immense scope.

Although vast in scope, federal power is limited by requirements for formal procedures and by the requirement that federal action must be authorized in law. To become effective, federal power must be within an enumerated power, then established in legislation. Federal agencies are also created by legislation. In doing its work, an agency must follow the Administrative Procedures Act (60 Stat. 237 (1946), *as amended*, (codified at 5 U.S.C. Chapter 5 and 7 (1995)), which lays out requirements for writing regulations (rules) and adjudicating administrative cases. Many substantive laws such as the Endangered Species Act and the National Forest Management Act specify additional procedures. Agencies further interpret legislation by writing policies and manuals. All of this amounts to an extraordinary amount of authority in support of agency action, all of which is necessary for its enforceability. These requirements tend to make federal power inflexible.

In both theory and practice, when a federal officer reports to work to manage a National Forest, the work must be rationally related to established policies, regulations, and legislation. Underpinning every federal officer's actions is an enormous investment in rules, policies, and procedures. Federal agents are not free to operate outside authorized limits. If a Forest Service officer wants to stop cutting timber and start restoring fish habitat, that officer must be able to find authority for restoration of fish habitat in agency policy, regulation, and legislation.

The best analogy to federal power in common experience may be a railroad. Before a railroad can carry passengers or freight, owners and investors must acquire rights of way; build terminals; design grades and turns; cut and fill the earth's surface; lay gravel, ties, and rails; and install switches and crossings. Once constructed, a railroad can carry huge amounts of freight and many passengers at low marginal costs, but only on existing tracks. A train cannot meander.

This contrasts to the freedom enjoyed by citizens and private organizations. Private persons do not need legislated permission to act. A sole proprietor can produce timber on Monday and fish habitat on Tuesday if he or she so chooses. This accounts for the flexibility of capitalist systems (Scitovsky 1980). Indeed, the law sanctions this freedom in, for example, the

common law of property which gives to a fee-simple owner the comprehensive rights to possess, use, and transfer his/her property.

Because the infrastructure of federal power is so costly, federal activity changes direction only after major social change or conflict.

3. SOCIAL CHANGE

Since World War II the United States, as well as the rest of the industrialized world, has enjoyed much economic growth. Americans moved to cities. High birth rates, along with improving medical care and nutrition, helped produce a population bulge known as the "War Baby Boom." By the 1960s many of these families and young people had turned to the National Forests for recreation. The universal presence of automobiles, new and improved highways, and shorter work weeks all contributed to the shift in demand.

It was and is an increase in the total demand for services from forests. During the week, Americans didn't lessen their commercial demand for paper, lumber, plywood, and other forest products. And they apparently were as price conscious as ever. But on Saturday they demanded uncut forests.

The Forest Service and other land management agencies like the Bureau of Land Management were caught in the middle of this great sea change. The Forest Service was trapped in volumes of policies, rules, contracts, laws, and traditions based in part on economic principles and favoring extractive uses. Its employees had an established culture surrounding those uses, which included relations with certain constituents, defined roles in communities, and relatively clear, standardized rules about the use of the forests (implied, if not explicit, property rights). And given the rigidity of the American version of limited government, it could not easily change, just as a railroad cannot move from existing tracks.

The great swell of new demand for aesthetic qualities produced great conflict. New laws were enacted emphasizing in-place values (Endangered Species Act, Clean Water Act, Wilderness Act). These laws were subsequently tested and interpreted in court. Slowly and painfully the Forest Service changed direction. Timbering declined, endangered species management grew, as did management for the preservation of antiquities, wildlife habitat, watershed quality, and other recreational and aesthetic values. Along with the change, the Forest Service began searching for a unifying concept that could resolve conflicts and focus the agency's forest management.

4. ECOSYSTEM MANAGEMENT - PROPOSED REGULATIONS

Ecosystem management is that focus. Until recently, EM was officially undefined. Now, however, in its proposed regulations, the Forest Service defines ecosystem management as: "A concept of natural resources management wherein National Forest activities are considered within the context of economic, ecological, and social interactions within a defined area or region over both short- and long-term." (PR 36 CFR § 219.2).

Proposed rule § 219.4 adds substance:

(a) *Goal.* The principal goal of managing the National Forest System is to maintain or restore the sustainability of ecosystems, thereby providing multiple benefits to present and future generations. The level and flow of benefits from National Forest System lands should be compatible with the restoration of deteriorated ecosystems and maintenance of ecosystem sustainability over the long-term." (PR 36 CFR § 219.4).

The Forest Plans will address this goal by, "[p]roviding for diversity of plant and animal communities and other conditions indicative of sustainable ecosystems," and by "[p]roviding for resource conditions which result in a flow of benefits to present and future generations." (PR 36 CFR § 219.4).

Sustainability of ecosystems is defined as:

"A concept which reflects the capacity of a dynamic ecosystem to maintain its composition, function, and structure over time, thus maintaining the productivity of the land and a diversity of plant and animal communities." (PR § 219.4).

Within that framework, the role of a forest plan is to identify the ecosystems and their desired "composition, function and structure," at "appropriate spatial scales." (PR § 219.4 (b)). Plans "must" provide for "restoration, protection, and conservation of soil and water resources." (PR § 219.4(b)(2)). Plans "should" provide for maintaining and restoring natural communities identified by the Network of Natural Heritage Programs and Conservation Data Centers as being "imperiled" or "vulnerable" globally, nationally, or state-wide. (PR § 219.4 (b)(3)). Finally, a plan "must" provide for the conservation of threatened or endangered species.

The proposed regulations also recognize that ecosystems "exist at multiple spatial scales," (PR § 219.4(d)), that they are "dynamic," which means that sustaining one does not necessarily imply "maintaining static conditions," (PR § 219.4 (c)), that management must proceed in the face of uncertainty or incomplete knowledge, and that it must adapt to new information (PR § 219.4(e)).

The proposed regulations provide for relationships with various publics "who have indicated a desire to be informed about forest planning or project activities on the Forest." (PR § 219.3(b)). Copies of planning documents must be conveniently available to the public (PR § 219.3(d)), and adoption of forest plans and projects must comply with the National Environmental Policy Act.

They also call for "staged" resource decision-making, the first stage of which is adoption of a forest plan, and the second of which is the adoption of particular projects consistent with the plan. (PR § 219.5). The plans do not compel particular projects; they limit "what actions may be authorized during project decisionmaking." (PR § 219.5(a)(1)).

Forest plans developed under the proposed regulations will allocate land and resources to various uses or conditions - they in effect zone the forest. The resources that may be allo-

cated include, "soil, water, fish and wildlife habitat, grazing, timber, oil, gas, mineral, recreation, wilderness, cultural, historic, geologic, vegetative, air, visual, and other relevant resources." (PR § 219.6(a)).

The plan must "identify where goals, objectives, standards, and guidelines are applicable" and that identification, on maps for example, constitutes "forest plan direction." (36 CFR § 219.6(b)).

Amid all of the procedures and definitions is a clear emphasis on "sensitive" species or natural communities, "imperiled" species or communities, "indicator species," endangered or threatened species, "candidate" species, "rare" species or communities, "vulnerable" species or communities, and "extirpated" species. (See generally PR §§ 219.2 - 219.4)

The rules governing timber management are almost at the end of the proposed regulation and are "generally the minimum needed to respond to the highly prescriptive requirements for timber management in NFMA [National Forest Management Act]". (Section by Section Description, 60 Fed. Reg.. 18912 (1995) concerning PR § 219.13). The Forest Service will identify lands not suited for timber management. These include lands where timber harvest would violate statute, executive order, or regulation (including presumably all of the preceding regulations establishing desired ecosystem conditions and habitats for sensitive or vulnerable species or communities.). (PR § 219.13 (b)) On the then remaining lands (suitable for timber production), the proposed regulations provide that standards (constraints) may be established that "prohibit or limit" timber harvesting. (PR § 219.13(c)).

On suitable lands, the Forest Service must calculate an "allowable sale quantity," which is a ceiling for timber sales from the plan area for a decade. (PR § 219.13(d)). It is not a "target" or "projection" because it does not reflect all of the factors that may influence future sale levels. (PR § 219.13(d)). The actual level of timber sales will be less than the ceiling. The proposed rule does specify a smaller land base than the existing rule. In the existing rule, the entire suitable land base is used to compute the allowable sale quantity. In the proposed rule, the land base for the calculation excludes suited lands on which standards have been imposed that are incompatible with timber harvesting (Section by Section Description, 60 Fed. Reg. 18914 (1995) concerning PR § 219.13).

The regulations then go on to adopt non-declining flow, and harvest age for even-aged stands at the culmination of mean annual increment. (PR § 219.13(1)(ii)(B) and § 219.13(e)). Finally the regulations severely limit clear cutting. (PR § 219.13(f) and (g)).

Generally the regulations make clear that National Forests will be subdivided and allocated to various conditions which will be defined, selected, restored, and maintained with local public participation. The emphasis on asset condition with further emphasis on preserving wildlife habitat and sensitive, vulnerable, imperiled, rare, candidate, threatened or endan-

gered species or communities, transform National Forest management into landscape gardening on a grand scale.

The regulations bring to mind a mosaic of special areas, places for sensitive or vulnerable species, major set-asides for endangered species, areas for special watershed protection, places where ecosystems are restored to a former and desired condition, special wildlife areas, and so on. The values provided will be mostly recreational and aesthetic values, for people who visit or view pictures of the forest or want the option to do so. Extractive uses, such as timber harvesting, will be residual, as a gardener may pick an occasional bloom for a friend.

5. A POLICY SHIFT - EXISTING VERSUS PROPOSED REGULATIONS

The proposed regulations change the character of rights and duties associated with National Forests, and the extent of change can be assessed by comparing the proposed and existing regulations. Major differences emerge in several key provisions.

Both existing and proposed regulations state planning principles. The first principle in existing regulations calls for, "multiple-use and sustained-yield management of renewable resources without impairment of" productivity of land (36 CFR § 219.1(b)(1)). The proposed regulations call for, "sustainable ecosystems which yield multiple benefits to present and future generations." (PR 36 CFR § 219(b)(1)). The shift from production of outputs to sustaining in-place conditions is clear.

Existing regulations go on to emphasize protection of all resources, including a recognition of ecosystem interdependence, but also "relative values," "management for goods and services," "economic efficiency," and "economic demands of the American people." (36 CFR § 219.1(b)). These latter terms are entirely missing from the principles underlying the proposed regulations. (PR 36 CFR § 219(b)).

Existing regulations call for coordinated planning levels, tying forest plans to the Renewable Resources (RPA) Assessment and Program (36 CFR § 219.4). The Forest Service must develop a regional planning guide, based in part on resource objectives (time specific and measurable) from the current RPA Program. (36 CFR § 219.9(a)(3)). Then individual forest plans must contain "identification of the quantities of goods and services that are expected to be produced or provided during the RPA planning periods."

These links to the RPA process are important because they ensure consistency with the National planning effort, much of which is based on economics. For example, the RPA Assessment must include an analysis of demand for and supply of renewable resources and price trends, evaluation of opportunities for improving yields of goods and services, and estimates of investment costs and returns. (16 U.S.C. § 1601(a)(1) and (2)). It must also include estimates of "additional fiber potential in the National Forest System" including the potential for "increased forest products sales, economic constraints, alternate markets, ...,

and other multiple use considerations.” It must also include estimates of the potential for increased utilization of forest and wood waste from National Forests, and it must report on wood manufacturing facilities and their supply relation with public lands. (16 U.S.C. § 1601 (b) (1), (2), and (3)).

The RPA Program must relate to the Assessment, and it must include an inventory of specific investment opportunities; specific identification of outputs, results, and benefits, in a way that allows comparisons of costs, benefits and returns to the Federal Government; and a discussion of priorities with “specified costs, outputs, results, and benefits.” (16 U.S.C. § 1602 (1), (2), and (3)).

In the proposed regulations, instead of specific links to the national planning process and the legislatively prescribed economic analyses, “the Chief determines those elements of the [RPA] Program that should be considered in forest plan implementation ...” (PR 36 CFR § 219.5(b)(3)) This detaches National Forest Planning from national economic planning, making economic considerations less relevant to National Forest managers, obliging them, by virtue of the other parts of the proposed regulations, to focus on forest conditions.

A third key comparison involves the contents of the forest plans and the planning process. In existing regulations, a forest plan must include a summary of the “demand and supply conditions for resource commodities and services, production potentials, and use development opportunities.” Also, it must describe “desired future condition of the forest” and identify “the quantities of goods and services that are expected to be produced ... during the RPA planning periods.”(36 CFR § 219.11(a), (b)).

The existing planning process requires the Forest Service to determine the ability of a Forest to supply outputs demanded by society. The Service must define “maximum ... production potentials of significant ... goods and services together with associated costs.” It must also estimate the “maximum present net value of those resources having an established market value ...”(36 CFR § 219.12(e)(1)(ii) and (iii)). The Service must formulate a broad range of alternatives for management, identifying the one coming nearest to maximum net public benefits. The existing planning process regulations abound with demands to calculate and consider present net value, benefits and costs, cost efficiency, resource outputs, financial effects, opportunity costs, resource tradeoffs, and so on. All of this is stripped out of the planning process in the proposed regulations.

The proposed regulations concentrate on the desired future conditions, and drop virtually all language requiring that the Forest Service specify economic conditions or planned outputs. They define forest plan “direction,” and they say it consists of “maps or similar information that delineate where goals, objectives, standards, and guidelines are applicable ...” (PR 36 CFR § 219.6(b)). Objectives describe “desired ... conditions, such as soils and vegetation; the desired state of resources resulting from human influences, such as infrastructure or historic sites; or how resources are to be perceived ...” (PR 36 CFR § 219.6(d)). Objectives

are measurable, but in the proposed regulations, the forest plan will not specify a time period for achievement.

Clearly the proposed regulations are guided by substantially different principles from those guiding the existing regulations. The existing regulations emphasize multiple-use and sustained-yield management for the production of goods and services. The proposed regulations emphasize the condition and sustainability of ecosystems. Existing regulations emphasize planning in the context of supply and demand relationships, including recognizing the equilibrating role of price. The proposed regulations emphasize preserving vulnerable, sensitive, or endangered species and communities. Existing regulations require Forest Plans to have specific links to the RPA process and time schedules of outputs. The proposed regulations expressly avoid such specificity.

The proposed regulations create a danger that the future planning process will be shrouded in murkiness, uncertainty, and ambiguity. The key components of a forest plan - desired ecosystem conditions that are sustainable - are less measurable or more ambiguous than the traditional outputs of timber, recreation, wildlife, and so on. It is not clear what ecosystems at which spatial scale will be desired. It is not clear what conditions of the ecosystems will be desired. And it is not clear how the Forest Service will aggregate the preferences of persons who choose to participate. These are the cornerstones of the proposed planning process, and they are all vague.

This lack of specificity is a dominant characteristic of the proposed regulations and it will make it more difficult for nearby citizens and businesses to form reasonable expectations about what commercial uses of the forests will be permitted. In contrast to in-place recreational and aesthetic uses, many commercial uses require substantial private investments in facilities and other business assets. These investments need the security of well-defined, enforceable property arrangements, exemplified in the current regulatory obligation to produce a schedule of planned outputs. Recreational outfitters, lumber manufacturing firms, and paper companies, for example, require location specific investments of substantial magnitude that can only be used for particular purposes. That isn't true of wilderness visitors, bird watchers, cross-country skiers, hunters, and so on. For the most part, the investments needed by such forest users are small, easily portable, and sometimes suited for use in activities away from the forest, as a hiker's boots or a bird watcher's binoculars.

Uncertainty prevents the kind of economic planning commonly found where property arrangements are clear and stable. The impact of added uncertainty will be to increase the transactions costs of private parties economically dependent on or connected to national forests. A logger, sawmiller, or local outfitter can read the regulations in vain for any indication of whether or to what extent a National Forest will continue to provide a base for his or her business. A devotee of endangered species or vulnerable plant communities, however, has much greater assurance for relying on the nearby national forests.

6. CONCLUSIONS

Perhaps the first conclusion should be a reminder that the proposed regulations are an important forest policy topic. The Forest Service is America's leading forestry organization, and its policies have effects far beyond the borders of its forests. It affects other federal agencies such as the Bureau of Land Management, and it influences states, counties, and other organizations involved in forest management. The proposed regulations are important because they indicate a major change in National Forest management. The Forest Service agrees. At a recent meeting, a high-level representative of the Forest Service said the agency is committed to ecosystem management in all of its activities. It will change management on the National Forests; it is not just a new label (Risbrudt 1995).

American law requires agencies to operate within the relatively inflexible framework described earlier. That legal environment makes federal jurisdiction especially appropriate to tasks that can be clearly described in a reasonable amount of writing, that call for repetition of clear procedures, and that are essentially similar in all parts of the country. Selling timber, delivering mail, inspecting meat, and dispensing Social Security benefits, among others, are arguably suited to federal jurisdiction.

Forest management, as envisioned by the proposed regulations, is essentially local, geographically specific, and ecosystem dependent. By proposing such locally dependent procedures, the results of which are open ended, the proposed regulations will greatly increase the cost of transacting national forest business. The property arrangements outlined above are high-cost methods of decision making.

The regulations call for an unprecedented amount shared governance through a protracted ("staged") decision process concerning all of the important attributes of National Forest management. Shared governance is expensive, especially when those involved do not share goals and values. The proposed regulations not only invite a continuation of the conflict between commercial and aesthetic uses, they also portend a winner.

Those favoring aesthetic use have an advantage because they are not burdened with expensive investments at fixed locations that create a dependence on nearby timber. They can and do pool their resources through environmental organizations, then carefully select which disputes to enter, concentrating their resources at selected locations over selected issues. If they lose a battle, they have spent only the specific resources associated with that battle.

Those favoring timber management can also pool resources, but if they lose a battle, one or more of their members loses raw material supply, which is their lifeblood. As firms die, the amount of resources in the pool will shrink, leaving them weaker for the next battle. Whatever the odds of winning the initial battles, so long as they are less than certain, those favoring timber will be expected to lose the war through attrition in the long term. This, of course, is in part the experience of the Pacific Northwest.

If commercial interests are defeated, the door will then be open for conflict among various in-place, aesthetic uses. Hikers, trail bikers, skiers, bird watchers, pure preservationist, ecologists, hunters, and so on, may oppose one another in conflicts over definitions of ecosystems, conditions, objectives, and standards. It will amount to a continuing if not unprecedented politicization of National Forest management.

To the extent these conflicts arise and continue, property arrangements will be even more insecure, and transactions costs will mount.

In addition to increasing transaction costs, the proposed regulation will increase the costs of forest activities. Ecosystem restoration and maintenance, like gardening, will involve public expenditures. Projects for soil stabilization, wildlife habitat, restoration of extirpated species, watershed enhancement, historic preservation and restoration, visual management of landscapes, and the restoration of ecosystems will cost, not return, money. These costs are distinct from transactions costs identified above. The costs identified here are the costs of performing the selected projects. The Forest Service apparently recognizes it is heading for high costs (Liggett et al. 1995), yet the proposed planning process eliminates requirements for economic planning.

The increasing transactions and activities costs will occur in the context of declining and modest levels of timber sales. It is not clear that Congress will support the new expenditures in the face of declining revenues from timber. In light of the current emphasis on deficit reduction and the continuing importance of defense, interest on the national debt, and social entitlements, the costs of ecosystem management in the Forest Service budget will be politically vulnerable. It will be vulnerable because there is little expressed national interest in the ecosystem conditions preferred by citizens interested in one locality. Even combined, it is doubtful that ecosystem conditions will generate the expressions of national interest that can compete with defense, interest on the debt, and entitlement programs. It is entirely possible that a major outcome of the policy of ecosystem management will be relative neglect of National Forest management.

A policy change of this magnitude deserves broad public debate. The Forest Service has chosen to abandon a planning process consistent with principles of economics and driven by national preferences and trends. It is proposing a system aimed toward a diversity of natural ecosystems at each local planning unit. By dropping economic planning, unhinging forest plans from a clear connection to the RPA process, and instead managing independently for resource conditions, the Forest Service is distancing itself from its authorizing legislation and important traditions in American law. Besides resting on a tenuous legal foundation, its new planning system will likely increase the net costs of National Forest management. It is tantamount to proposing a new railroad to tend a collection of local gardens, which is a bizarre and wasteful use of an expensive tool. Then, if the Forest Service adopts its proposed regulation, it will be laying track without buying the right-of-way and preparing the grade.

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FOREST TENURE WITH PUBLIC OWNERSHIP AND PRIVATE ENTERPRISE: A CANADIAN PERSPECTIVE¹

Peter H. Pearse

1. FOREST TENURE AND FOREST POLICY

In all the world's major timber-producing countries forest policy is beset with social and political change. In Russia and eastern Europe it is forced to adapt to new and quite different economic and political regimes. In Canada and the United States it is struggling to respond to a wide range of environmental concerns. And throughout developed and developing countries forests have become a central issue in the new search for sustainable development, calling for management policies that take account of broader social values and contribute more effectively to economic progress.

After centuries of gradual evolution, forest management systems and the forestry profession must respond rather abruptly to new circumstances. The new circumstances vary widely among countries, of course, as do their history and experience. As forest policy-makers everywhere consider ways of coping with new problems and opportunities they can benefit from each other's experiences and learn from their successes and failures.

This paper deals with the critical issue of forest tenure - that is, the arrangements through which users of forest resources obtain rights to resources. It is a Canadian perspective, drawing mainly on Canadian experience. But it focuses on a few fundamental problems which may be relevant in other countries with similar economic organization - most importantly, a general reliance on private forest enterprises within a mainly market system, but with extensive public ownership of forests - features common to both Canada and Russia.

The incentives of private forest enterprises to manage and conserve forest resources and to invest in silviculture depends heavily on their property rights. Thus, where forests are held in public ownership but utilized by private enterprises, tenure is a central instrument of forest policy. The Canadian experience suggests that licences and other contractual rights are inadequate where governments depend on licensees to manage public resources. Forms of rights that convey stronger proprietary interests provide economic incentives to manage and use resources more efficiently and with less need for regulatory control.

¹ This paper draws heavily on Peter H. Pearse, Forest Tenure, Management Incentives and the Search for Sustainable Development Policies, Chapter 5 in *Forestry and the Environment: Economic Perspectives* (W.L. Adamowicz, W. White and W.E. Phillips, eds.). C.A.B. International, Cambridge. 1993, pp. 77-96.

The paper begins by identifying forest tenure systems as instruments of forest policy in mixed market economies. The next section describes major types of forest tenure in Canada, followed by a discussion of some of their strengths and weaknesses. The remaining sections deal with the effects of certain characteristics of property rights and the scope for improving them in light of new conditions and policy objectives.

2. GOVERNMENT REGULATION, ECONOMIC INCENTIVES AND FOREST TENURE

In the market economies typical of western industrial countries, governments play a significant role in stabilizing economic activity, redistributing income and regulating economic activity where private market processes do not perform well. The last of these functions - regulation to correct market failures - is of particular interest here. Governments of western countries are deeply involved in regulating the way private forest enterprises develop and manage forests, how they harvest timber, and their utilization and marketing practices. The general rationale is that controls are needed to ensure that the behaviour of private enterprises conforms to the public interest.

In Canada, and to a lesser extent in other western countries, governments have an alternative means of controlling private forest enterprises, arising from public ownership of the forest itself. Where the government is responsible for public forests used by private enterprises, it can exercise its authority as landlord, as well as through its traditional powers to regulate. As agent of the forest owner, governments control the way public forests are managed and used mainly by issuing rights to private forest companies in the form of licences, leases, concessions and permits, and by attaching terms and conditions to them. These contracts provide governments with the means of controlling the rate and pattern of harvesting on public lands, the standards of forest management and development, and the distribution of financial gains from the resources used.

The various ways in which private users obtain rights to the forest - the tenure system - are part of the institutional framework within which the private sector must operate. The nature of these rights has a profound influence on the incentives of those who hold them, and operate under them, and so significantly affects the extent to which their behaviour conforms to the public interest. The tenure system thus affects the need for regulatory controls.

Governments can choose between two general strategies in attempting to influence private behaviour. One is the regulatory approach, or what American economist Charles Schultze has called the "command and control" system, which depends on legal proscriptions, regulations and bureaucratic controls to restrain unwanted tendencies of market processes (Schultze 1977). The other involves and cultivates market forces to harmonize economic incentives with the public interest, in this case the public interest in forest management and use. A fundamental issue of economic organization is the division between the two: what should be left to market forces and what should be managed by governmental regulation.

The major disadvantage of the regulatory approach is that it offers no economic incentives, other than penalties, for enterprises to behave differently, and no benefit for achieving standards beyond the regulated minimum. Market incentives, by definition, reward improved performance, and so constantly focus producers' attention on finding new processes and technologies to improve performance.

However, market incentives can promote efficient use of resources only if users hold suitable property rights over them. Where rights to resources are well-defined, long-term and exclusive, the market affords a feasible means of ensuring efficient use, as in the case of private farmland. But when the rights are ill-defined, temporary and insecure, market incentives become distorted, and recourse must be taken in regulation.

Thus the quality of forest management and utilization depends heavily on the framework of institutions within which users of the forest operate, and central among these institutions is the forest tenure system. But institutions are matters of policy choice, and can be changed to respond to new circumstances and objectives (Bromley 1989). Because the tenure system influences the incentives of forest users to manage and invest in the resources, the character of these property rights can be altered to align incentives more closely with the public interest. Institutional change is thus an alternative to regulatory control.

Tenure contracts are the link between public landowners and private users, setting out the rights and obligations of each party, the restrictions on operations, the standards to be achieved, the duties of each party, how resource rents will be shared, and so on. They restrict the holder in his effort to maximize his profit from forest operations, and they create and constrain the incentives that govern his operational decisions. What they permit him to do, and what they require him to do, determine how forests are used and managed. In Canada, most forest activities are governed by these contracts between governments and private forest enterprises.

Thus the tenure system is at the centre of forest policy where resources are in public ownership and utilized by the private sector. In our search for policies that are more in tune with new circumstances and public aspirations we should pay special attention to tenure arrangements and ways of redesigning them.

3. FOREST TENURE SYSTEMS IN CANADA

Canada and Russia find themselves with public ownership of most forest lands for quite different reasons. Canada was created in 1867 through a confederation of British colonies which (with the exception of Quebec, a former colony of France) had adopted forms of property in land from English common law. Typically, the Crown (i.e., the government) acquired the land from aboriginal people and then granted parcels to settlers, land development companies, railroads and other private interests. Crown grants in fee simple, which transferred ownership into private hands, were the simplest and least expensive way of providing rights to resources to those who needed them.

Around the turn of the century, federal and provincial governments in Canada turned their backs on the policy of relinquishing title to rural land and resources other than agricultural land. A similar change in policy took place in Australia and other former British colonies, and in the United States as well. Instead of granting ownership to the land, governments developed rights in the form of leases, licences and permits which could be issued to private parties to give them access to resources while retaining public ownership of the land.

The reasons for this shift in policy are complicated. They are related to the Conservation Movement which became a powerful political force in the United States. That movement reflected widespread anxiety about the depletion of timber and other resources of the American west by railroad and development companies, and distrust of speculators and other “robber barons” in providing for future resource requirements. There was also a widely-held belief in an imminent shortage of timber (a “timber famine”) and escalation of timber prices, which governments sought to realize for the public, and a growing interest on the part of governments in using public resources as means of influencing patterns of industrial development.

In any event, by that time extensive tracts of forest were already in private ownership in the eastern provinces of Canada that were settled earliest. In contrast, the new approach preceded industrial development in western and northern regions, with the result that most forest land is still Crown (or public) land.

Over the decades provincial governments have devised a wide variety of rights to timber, ranging from the traditional private freehold to the more prevalent licences and agreements that give their holders much more limited rights to use Crown forests (Haley and Luckert 1989). Canadian governments now have considerable experience to evaluate various forms.

For present purposes, it is instructive to consider two general types of forest tenure on public lands in Canada, which we can refer to as *management agreements* and *volume licences*. Together these two forms dominate the forest tenure system (Pearse 1990). They vary in detail among provinces, but here we can confine ourselves to their most common features.

Management agreements: Most notable, and particularly distinctive to Canada, are the sophisticated forest *management agreements* adopted by the major timber producing provinces to accommodate the long-term requirements of major forest products manufacturers, especially pulp and paper enterprises. Found in nine provinces, they are given various names such as forest management licences and tree farm licences. These management agreements typically cover large territories: one recently awarded in Alberta exceeded 73 thousand square kilometres - more than double the size of Belgium. Their terms are long, of 20 years or more, and in all cases they are either renewable when they expire or replaceable on an “evergreen” basis - that is, after only part of the term has expired, the licence may be replaced with a new licence, carrying the same term as the old one.

Some management agreements enable licensees to combine their private lands with contiguous Crown forest into a single management unit. In some provinces the terms and conditions of agreements are uniform; in others they are individually negotiated. Usually they require the holder to periodically prepare management and working plans which, when approved, become part of the agreement (Campbell and Pearse 1984). In almost all cases, the area covered by a management agreement is managed as a separate sustained yield unit with an approved allowable annual cut.

The conspicuous feature of these agreements is the balancing of the licensees' harvesting rights with management obligations. Usually, licence holders have exclusive rights to harvest timber within their licensed areas (though some licences allow for others to cut in special circumstances) and their rights are limited to the use of the forest for timber production.

In return for these rights to the timber, the agreements assign to their holders a wide range of responsibilities for managing the forest, including maintenance of forest inventories, forestry and development planning, road building and maintenance, forest protection, reforestation and other silvicultural activities. Virtually all the operational forest management in these licensed forests is done by licensees according to plans approved by the Crown forest agency.

Licensees are obliged to make certain payments to the Crown, including stumpage fees on the volume of timber harvested, payable as the timber is harvested, and in some cases an annual rental based on the area licensed. Often licensees are reimbursed for expenditures on improvements such as roads and silviculture. In most cases, the licensee is obliged to operate a manufacturing plant as a condition of the licence.

In the absence of opportunities to acquire freehold forest lands, these comprehensive forest management agreements have become the preferred form of tenure for much of Canada's forest industry. They are large, inexpensive to acquire, well suited to the needs and capabilities of large corporations and, on paper at least, secure. They are undoubtedly the most distinctive feature of the Canadian forest tenure system.

Volume licences: The other major form of forest licensing, referred to here as *volume licences*, are found in a variety of forms in seven provinces. They are primarily licences to cut a specified volume of timber per year within a broad administrative area, the specific location of operations to be designated from time to time (the exceptions are the Ontario and Newfoundland versions, which define the licensed areas as well). In most cases, licences are issued for 10 to 20 years, and are renewable or replaceable on an "evergreen" basis.

Because most of these volume licences do not define a geographical area, they do not involve individual forest yield regulation except as part of a larger forest unit. Their management obligations are generally less demanding than those of management agreements, but they usually involve some road building, protection, reforestation and, in most cases, the maintenance of a

manufacturing plant. The trend in recent years has been toward greater management responsibilities born by licensees.

4. STRENGTHS AND WEAKNESSES OF TENURE ARRANGEMENTS

General comments about the success of forest tenure system in Canada, administered separately and differently by ten provincial governments, are inevitably difficult. Judgements must be based on the policy objectives that the arrangements were designed to advance, which have varied over time and among provinces. Nevertheless, the most important public objectives can readily be identified.

Promotion of industrial development: A major objective of provincial governments has been to encourage industrial development, especially manufacturing industry. Historically, this has been the dominant concern of forest policy, and the primary means of influencing this development has been the allocation of rights to Crown timber. In this important respect the forest tenure system seems to have served well, as reflected in the impressive growth of the forest industry across Canada. Most new ventures involving substantial capital investments in recent years have been supported by management agreements or volume licences, indicating that their low cost of acquisition, their long terms, renewability and protection from competition, are sufficient to provide the security of raw material supply needed by investors.

Competition: While maintaining competition is a general policy objective in market economies, the forest tenure system has had the effect of weakening competition among forest products companies, especially competition for timber. In contrast to the United States and other western countries, the forest industry in Canada is largely, and in many regions entirely, dependent on Crown timber. In consequence, Canadian governments have had to design tenure arrangements that provide sufficient security of raw material supply to justify heavy private investments in manufacturing plants. In addition, governments have sought to muster the resources of the private sector to develop and manage, as well as harvest, the public forests in an effort to reconcile public ownership with modest management budgets. This has contributed to their willingness to grant secure, long-term rights, at the expense of competition.

As a result, most licences and agreements are initially allocated through negotiations with individual companies, carry long terms and provisions for continuing renewal, all of which narrow the scope for competition. This lack of competition for timber rights, combined with rules that allow them to be combined but not divided, and the tying of timber rights to manufacturing facilities, have the effect of promoting industrial concentration, regional monopolization of timber supplies and barriers to new entrants (Schwindt 1979).

One effect of the absence of competition for Crown timber is that it is difficult for the government to achieve another of its objectives - namely to collect the value of the public timber harvested. Without competitive sales that reveal the market value of timber, stumpage prices charged by the government must be determined administratively, and claims that Canadian governments

underprice timber is an endless source of friction among companies, governments and foreign competitors. Another, longer-term concern about the barriers to competition is about the industry's continuing competitiveness and vigour.

Inadequate investment in forestry: A rapidly growing concern in Canada is about the adequacy of silviculture and, more specifically, about the weak incentives to invest in forest enhancement where private enterprises manage but do not own the forests.

Licensees are reluctant to invest in silviculture beyond their contractual obligations, and so silvicultural effort on licensed Crown lands falls significantly short of the effort on similar private lands. One study found that voluntary silvicultural spending per hectare on Crown lands under management agreements averaged less than one-quarter the amount spent by the same companies on their private lands (Luckert and Haley 1989). This is convincing evidence of foregone opportunities on the suggesting waste of public resources and the prospect of declining timber supplies.

Provincial governments have devised a variety of techniques to promote silviculture on licensed lands. All licenses impose some *contractual obligations* on the licensee, which he must fulfill at his own expense or suffer penalties. This regulatory approach is often used to ensure basic silvicultural practices, such as reforestation after logging, but it is not sufficiently discriminating to provide for intensive silvicultural treatments appropriate to differing forest sites. Moreover, as long as licensees must absorb the cost, and the Crown claims any enhanced timber production, licence holders find their financial interest lies in restricting their efforts to the minimum required by their licence contracts.

Most provinces *reimburse costs* incurred by holders of forest management agreements for silvicultural work done on Crown land, or reduce the licensees' costs by providing seedlings and other requirements without charge. This reduces the disincentive to undertake such activities, but it provides no positive incentive for silvicultural effort.

Four provincial governments offer holders of management agreements silvicultural incentives in the form of *increases in approved harvest rates* in recognition of voluntary silviculture that increases timber yields. To sharpen the incentive, demonstrated increases in growth carry *reduced stumpage charges* in Ontario, and in Alberta they are free. However, even these harvest incentives have not stimulated much voluntary silvicultural spending. Moreover, the formulae used to fix regulated harvest rates produce the "allowable cut effect," which means that increases in the allowable harvest depends more on the inventory of the regulated forest than on the real impact of the silviculture itself, or its cost, thus distorting the distribution of silvicultural effort (Binkley 1980).

A considerable variety of other techniques for promoting silviculture on Crown lands have been proposed, ranging from conventional subsidies and tax incentives to elaborate schemes for re-

arding silviculture through share-cropping, warrants against timber in the future, and silvicultural or stewardship contracts as adjuncts to licensing arrangements (Boulter 1984; Luckert and Haley 1989; Pearse 1985). However, none of these appears likely to overcome the reluctance of licensees to invest in Crown forests, which stems from the perceived insecurity of long-term contractual arrangements with provincial governments.

Holders of forest agreements and licences on Crown lands decline silvicultural opportunities because their rights do not provide sufficient assurance that the benefits will accrue to them. In contrast to owners of private lands, who can expect to capture all the benefits of their efforts, licensees are restricted in terms of the kind of benefits they can enjoy, the time over which they can enjoy them, and the extent to which they must share economic gains with the Crown. Moreover, in spite of the apparent security afforded by the long terms and provisions for renewal and replacement in volume licences and management agreements, licensees perceive their rights as being insecure (Luckert and Haley 1989). Provincial governments have repeatedly resorted to legislation to abolish, curtail or alter private rights to Crown timber, so licence holders understandably perceive a risk of political intervention that might wipe out expected returns on silvicultural effort. In short, the tenure system fails to provide licensees with the essential security they need to exploit silvicultural opportunities.

The growing concern about meager investments in silviculture is associated with the transition, in many parts of Canada, from reliance on the original stock of natural timber to new crops of managed forests. It appears that temporary licences and leases are satisfactory means of allocating rights to exploit natural timber, but are not adequate to ensure appropriate husbanding of forest crops.

Imbalance in forest development: Another concern of growing importance is that the tenure system fails to recognize forest values other than timber, and therefore cannot ensure efficient land allocation among uses and combinations of uses. Because the needs of wildlife, recreation and other values often conflict with timber production, compromises must be made to achieve optimum patterns of resource use. But where the manager is a private enterprise whose rights extend only to industrial use of the timber, his incentive to manage for other values is absent. To aggravate this problem, timber is typically the only product of the forest that is commercially traded and valued in market prices, presenting a major analytical problem in determining the highest use or combination of land uses (Bowes and Krutilla 1989). All this puts a heavy burden on regulatory arrangements and the agencies responsible for supervising forest plans and operations. The results are often contentious.

5. CHARACTERISTICS OF PROPERTY RIGHTS

These deficiencies in the forest tenure system illustrate why economic theorists put such importance on property rights as determinants of how efficiently producers can use resources and how the benefits are distributed. Indeed, it has been theorized that, given the usual assumptions

about a pure market economy, complete private property in all inputs and outputs is a sufficient condition for maximization of human welfare.

Complete property refers to the various dimensions of property rights, and implies that none is restricted. Thus in order to channel incentives to use and develop resources most efficiently the rights of users must have certain essential characteristics. They must be *exclusive*, so that each holder can exercise his rights without interference from others. They must be *beneficial* entirely to the holder, so that his incentive to manage and use resources to maximum advantage is not blunted by charges or restrictions on the returns to his effort. They must be sufficient in *duration* to ensure that he can realize the future benefits and costs that flow from his actions. They must also be *divisible and transferable* so he can reallocate resources to higher uses and users as circumstances change. And they must be *secure*, so that his incentive to use resources efficiently is not undermined by uncertainty about any of these elements or their enforceability against third parties (Randall 1975). Lawyers conceive of property as a bundle of rights, the bundle being bigger or smaller depending upon how complete the holder's rights are in these various dimensions.

Rights to land are most complete under the traditional freehold; they are exclusive to the owner, include all the various attributes of the land, last forever, and can be divided and transferred without restriction. The rights available to users of Crown forests in Canada fall well short of this. They have limited terms. They normally restrict the holder to the use of timber, excluding other attributes of the land. They are usually not divisible or freely transferable. Economic benefits must be shared with the landowner. Typically, they are neither secure nor enforceable against third parties.

Even weaker are the rights of those who use attributes of the forest other than timber, such as wildlife, fish, water, recreation and aesthetic values. These are often not even exclusive; there may be many holders of rights to the same common property resources. And they are typically more limited in the other dimensions of property as well.

Significantly, the resources most often identified with environmental problems - wildlife, fish and water - are those whose users have the weakest property rights. These resources are usually common property; no user has exclusive rights, and hence none has an incentive to protect, conserve or manage the resources he uses. Accordingly, the task is left entirely to governments.

These deficiencies are aggravated by governmental decision-making that is not driven by the profit-maximizing motives of private enterprises, nor the incentive of private owners to generate the most value from their assets. As a result, governments often ignore opportunities to invest in enhancement of public resources. Consequently, resources are undermanaged and underdeveloped.

Moreover, wherever uses of different attributes of the environment conflict, such as when timber operations encroach on fish habitat, or farming conflicts with waterfowl, and when the competing users do not hold rights of equal quality, the one with the strongest rights tends to prevail at the expense of the other. Thus it is no coincidence that the resources under greatest stress, such as the fish, wildlife and water, are used under weak forms of rights, and suffer continuing encroachments from farmers and timber operators who are supported by stronger rights and are driven by more urgent economic incentives. We turn to governments to defend the weak from the strong. But again, public servants see their responsibility not so much in striking the value-maximizing trade-off as in reaching acceptable accommodations of opposing interests.

In this light, the tenure system can be seen as a obstacle to improved resource management. While it depends on private users to develop, utilize and manage the forests, it fails to give them strong incentives to invest in the resource, to conserve and protect its future productivity, and to get the most out of it. Because users of some attributes of the forest hold weaker forms of rights than others, patterns of use are biased against them. And while all users are private parties, this unbalanced system puts an increasingly heavy burden on public servants to allocate resources in the face of unfocused objectives, inconsistent budgets, conflicting values and interest groups with differing legal rights. The governmental regulator is forced into the centre of conflict, and his constant search for acceptable compromise cannot be expected to lead to efficient resource use.

These are not deficiencies that can be easily corrected with more of the traditional regulatory controls. Forests demand discriminating management, to take advantage of the variation among forest sites and the unique biological and economic character of each. Uniform rules and prescriptions are inappropriate and wasteful. Instead, efficient forest management calls for a system that will encourage those who use the forest to identify the capabilities of each site and adapt their management techniques accordingly. This suggests the need for realignment of the economic incentives that govern the behaviour of forest enterprises, which in turn suggests a need to re-examine the tenure system.

6. OPPORTUNITIES FOR IMPROVEMENT

The central point of the preceding discussion is that today's circumstances and needs call for stronger forms of rights to resources than were needed in the past. The Canadian experience suggests that licences and agreements that provide forest enterprises only vary truncated rights to public forests are inadequate to serve modern policy objectives. Although they were sufficient, in the past, to accommodate industrial development by allocating rights to natural timber, they fail to meet pressing new needs, especially the need to encourage long-term management and investment in silviculture.

Reform of this institutional framework can take either of two directions. At one extreme is the completely private model, based on private ownership of all resources. This implies that the rights held by users would be unrestricted in the dimensions of property noted earlier: they

would be exclusive, beneficial entirely to the holders, long-term, transferable and secure. Then theoretically at least, all costs and benefits would be internalized and normal market incentives would steer owners toward the most beneficial uses of their resources.

A rough example of this model can be found in Britain and some European countries, where ownership of the resources associated with a tract of land are typically stratified. Separate owners hold freehold or secure usufructuary rights to the subsurface minerals, the surface of the land, the water, the fisheries, the wildlife and the buildings and improvements. An extensive body of common law articulates the relationships among these rights. Disputes are settled privately, allowing for compensation to accommodate change, sometimes with the help of courts, but governmental agencies are rarely involved. Significantly, standards of resource management are generally high, producing some of the world's best managed forests not only for timber but also for wildlife, water and other forest resources.

At the other extreme is the completely governmental model, including governmental ownership, management and utilization of forest resources. This approach, more familiar to Russians than to Canadians, is unattractive not only for political reasons but also because it is regarded as inefficient, mainly because it does not provide incentives for efficiency. Preferences, in Canada and elsewhere, are clearly shifting in the opposite direction.

Our present systems, in Canada and Russia, lie between these two extremes, combining public resource ownership with private utilization. If we wish to rely increasingly on the private sector and market processes, the task is to strengthen the property rights of forest enterprises, thereby strengthening their economic incentives to manage and enhance the resources they use.

This might be done in several ways. The most obvious is to sell or transfer ownership of forest land to private enterprises or individuals. In Canada, at least, general privatization of public forest land would almost certainly be unacceptable, but there is probably scope for some expansion of private ownership, especially in developed areas.

Other possibilities include granting proprietary interests in the timber and forest growth, while retaining public ownership of the land itself, an approach recently adopted in New Zealand (New Zealand Forestry Corporation 1989). This provides forest enterprises the security of private property without raising the problem of relinquishing public title to the land.

In addition, usufructory rights could be strengthened. Licences and agreements of the kind now common in Canada could be replaced with long-term leases which, in contrast to the customary licences, run with the land and are enforceable against third parties (including governments), and so have much of the character of private property (Megarry and Wade 1966).

Finally, a word must be said about decentralization of decision-making. For reasons noted earlier, efficient forest management calls for attention to the varying needs and opportunities of individual forests and sites, so there is much to be said in favour of decentralized authority. Strengthening the property rights of private users is one way of decentralizing decisions. Gov-

ernmental administrative authority can also be decentralized, from central to regional or local bodies. The latter does not, in itself, alter the relationship between private resource users and public landlords: it only shifts the responsible public authority. But decentralization of public authority is likely to facilitate more discriminating resource management and greater sensitivity to the range of forest values.

7. CONCLUDING OBSERVATIONS

Economists of the property rights school have attempted to explain the evolution of property, from a primitive regime in which no property exists (Demsetz 1967). The basic idea is that, as demands on resources grow, users begin to interfere with each other's production unless they develop ways of allocating the scarce resources among themselves. Eventually, the potential gains from eliminating the interference and inefficiency make it worth the cost and trouble of organizing ways of allocating rights, which leads to private property. In short, when a resource is abundant relative to the demands on it, so that its value is low, the system of users' rights will remain crude, and appropriately so. But as resource values rise, raising as well the potential gain from improved allocation arrangements, more sophisticated systems of property rights can be expected to emerge.

The history of natural resource development in Canada fits this theory well. Since European settlement, one after another natural resource has become scarce and valuable, and means were developed to allocate it among competing uses. The process continues as demands on resources grow. This paper suggests a present need to develop and revise property rights to forest resources, to respond to changing needs.

Changes that strengthen the rights of resource users may prove more effective in present circumstances than increasing reliance on governmental regulation. This is not to suggest, however, that governmental intervention and regulation is unnecessary. Forestry gives rise to many market imperfections that cannot, as a practical matter, be corrected through improved property rights, and will continue to call for regulatory instruments. The point is that improvements in the forest tenure system can direct users' incentives more closely toward the kind of forest management that the public seeks, and this would undoubtedly reduce the burden on governmental regulation and improve the efficiency of forest management.

Moreover, we should not search for single solutions. The forests of both Canada and Russia are so vast and varied that there is scope for many approaches. A robust, competitive forest industry will be best served by a wide variety of forms of tenure, suitable for enterprises of varying scale, specialization and degrees of integration. Prudence suggests the need for careful and deliberate experimentation with the alternatives, taking advantage of experience in other countries, to find arrangements best suited to particular circumstances.

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PROBLEMS GOVERNMENTS FACE WHEN DESIGNING FOREST TENURE SYSTEMS: AN OVERVIEW OF CANADIAN TENURES¹

Martin K. Luckert and David Haley

Designing forest policies includes establishing conditions which specify the extent to which private individuals, or other groups within society, derive benefits from the use of forest resources. These conditions form property right structures, or forest tenure systems, which influence the behavior of their holders, and, consequently, the extent to which government policies further social objectives. Forest tenures may be disaggregated into several dimensions or characteristics. In designing a desirable forest tenure system, a government must specify, for each characteristic, an optimum balance between private and public interests. Measuring the economic tradeoffs necessary to reach such an acceptable balance presents many problems and makes the optimal specification of each variable a difficult task. Further complications are encountered when considering entire property rights packages made up of the individually specified characteristics. A general principle guiding the design of tenure policies may be to concentrate regulatory policies on correcting divergences between private and public interests, while paying specific attention to the effect that such policies may have on influencing the behavior of firms in areas where public and private interests coincide. An overview of Canadian tenures indicates that provinces have adopted a wide range of policies in responding to forest policy challenges.

1. INTRODUCTION

Countries worldwide are struggling with the problem of designing government policies for forest resources. Indeed, if there is a common thread across international forest policies, it may be argued that it is the quest for an appropriate set of government regulations which will create property rights to realize forest resource values for the public at large.

The quest for an appropriate set of regulations to govern the use of forest resources is premised on the assumption that private markets, and their accompanying private property rights, may fail to further public objectives. Several sources of market failure have been identified in the case of forest resources.² Perhaps the most common source is that many values associated with forests may not be internalized into market systems and, therefore, are not likely to be considered in the decisions of private firms. Accordingly, non-priced resources, such as clean air and water, may be supplied at a lower level than is socially optimal. Likewise, where costs are present which are not internalized, for example pulp mill pollution or negative impacts of logging, products may be over produced from a social perspective.

¹ This paper draws heavily from D. Haley and M.K. Luckert, 1990, "Forest Tenures in Canada: A Framework for Policy Analysis", Forestry Canada Information Report E-X-43. 104p.

² Boyd and Hyde (1989) and the Economic Council of Canada (1984) have provide summaries of market failures in forestry.

A second potential source of market failure arises because forest products and services frequently make up large portions of local and regional economies. Decisions made by private firms seeking to maximize profits may fail to consider the importance of community survival and the stability of regional economies. Finally, given the long time horizons associated with many types of forestry investments, there is a concern that the decisions of private firms may fail to give adequate weight to the welfare of future generations.³

In reacting to these market failures, governments may choose amongst a broad array of policy tools which may be used to regulate the activities of private firms. The purpose of this paper is to provide a framework for assessing the many concerns, or problems which governments face in choosing between numerous policy alternatives, and to describe the policy solutions which are being used in Canada.⁴ In the next section, the concept of property rights will be discussed and a conceptual framework will be developed within which alternative policy options can be assessed. Subsequently, this framework will be used to address some general problems which governments face in designing forest tenure systems. Finally, a description of current tenure arrangements in Canada will be presented.

2. A CONCEPTUAL FRAMEWORK

2.1 Property Rights as Forest Policy Tools

In general terms, forest policies are designed in order to further public welfare from the use and/or preservation of forest resources. The values which may be derived from forest resources are largely influenced by the property rights which institutions establish and enforce to facilitate the generation of resource values. Accordingly, property rights provide a crucial link between forest resources and the welfare which society derives from these resources, and may be looked upon as an important element in the design of forest policy.

Property rights have been defined in many ways.⁵ However, common to most definitions is the assertion that property derives its value from two primary components: 1) some actual good or service, and 2) the social conditions which restrict or promote the use of a good or the provision of a service. For example, a private firm may be granted rights to harvest trees. However, exercising such rights may be constrained by measures designed to preserve public interests such as: leaving buffer strips beside waterways; harvesting in such a way as to prevent soil erosion; and spreading out harvests over time in order to sustain yields.

³ Such concerns are frequently centered around the potential divergence between private and social rates of time preference. Luckert and Adamowicz (1993) provide a review of issues surrounding this problem.

⁴ It is *not* our intention to suggest an appropriate policy structure. As implied above, forest policies must reflect social values, frequently articulated in the form of government objectives. Without specific knowledge of government objectives it is impossible to pronounce on the suitability of a particular tenure system. Indeed, even with this knowledge, the frequently conflicting nature of government objectives renders the creation of an "optimum tenure system" difficult, if not impossible.

⁵ For an example of some of these definitions, see Haley and Luckert (1990).

It follows from the above definition of property rights, that there are as many kinds of property right structures as there are different combinations of social conditions which may be placed on the use of a good, or the provision of a service. One means of depicting the broad range of property rights is along a spectrum, where the endpoints are, respectively, defined as private and public property. At the private end of the spectrum there are no social constraints and, accordingly, firms may do as they wish with their property. As one proceeds towards the public end of the spectrum, social constraints increase as property rights are increasingly transferred to public control.

Viewing property in such a way highlights several important points. First, it follows that virtually any policy tool may be portrayed as a variation in property rights. For example, taxes and standards, which influence the behavior of private firms, can be viewed, merely as social constraints placed on using an asset. Second, the above characterization of property rights blurs the distinction between public and private property. Indeed, Alchian and Demsetz (1973) point out that whether enough rights have been transferred from private to public control to constitute public or private property is a moot point. Accordingly, if the problem in choosing among forest policies is characterized as a choice between public and private property,⁶ the premise for the issue is unclear, and the full range of possible considerations is severely truncated. Finally, it is also limiting to characterize property rights issues in terms of common vs. private property.⁷ As will become evident in the next section, the degree to which property is held communally, or the exclusiveness of property, is only one of many property right characteristics which may be regulated by government agencies.

Following the above definition of property rights, the issue at hand may be characterized as choosing the level of government control to exercise over the actions of private firms. These various mixes of government/private control may be referred to as alternative forest property right, or tenure, arrangements. To better assess the optimal level of government control, or the optimal forest tenure, it is useful to break down property rights into several dimensions or characteristics.

2.2 Characteristics of Property Rights to Forest Resources

Property rights have been characterized in many different ways depending on the objectives of authors.⁸ The following characteristics, taken from Haley and Luckert (1990), were chosen as key variables in differentiating among government policy options for property rights to forest resources.

Comprehensiveness refers to the number of assets to which a property right holder has control. For example, tenure holders may have rights to grow and/or harvest trees. Moreover, harvesting rights may be granted to specific species of wood, or all wood within a designated area. Furthermore, holders of forest tenures may be granted rights to non-timber resources such

⁶ Such characterizations are common in the literature. See for example Gameche (1984).

⁷ Such characterizations are also common in the literature. See for example Taylor (1992).

⁸ See for example Scott and Johnson (1983) and Schlager and Ostrom (1992).

as recreation, water, grazing, or minerals. *Duration* refers to the period over which rights may be exercised. Rights may be granted in perpetuity, or for lesser periods. When granted for less than perpetual periods, property rights may contain provisions for periodical renewal or replacement. *Transferability* refers to the extent to which holders of property rights are allowed to freely sell their rights or the products or services derived from their rights. For example, governments may only allow tenure holders to sell their rights under certain conditions (e.g. to a domestically owned company), and may prevent the export of logs.

The right of tenure holder to economic benefits refers to the extent to which the benefits derived from an asset or service can be retained by the holder of the property rights. As such, this characteristic is crucial in determining the incentives which tenure holders face. Rights to economic benefits are directly affected by the taxes and fees which must be paid to governments, and as will be discussed later, are affected indirectly by any property right characteristic which is a binding constraint on the actions of the firm. *Exclusiveness* refers to the degree to which a property holder may prevent others from enjoying the benefits derived from an asset or service. When an individual is allowed to exclude all other individuals from the benefits of property, then completely exclusive rights have been granted. At the other extreme, when nobody can be excluded from using a resource, the property rights are referred to as "open access". In between these two extremes, groups of individuals may exclude others under various forms of "common property".

Use restrictions limit the ways in which an asset may be managed or used. For example, forest tenures may prevent forest lands from being converted to agricultural uses. *Allotment Type* refers to whether rights are granted in the form of a specific volume or area. Holders of forest tenures may be granted rights to harvest a volume of timber wherever the government designates, or alternatively, holders may be allowed to extract volumes from anywhere within an assigned area. *Size specification* refers to restrictions placed on the size of a resource which may be granted, or the size of a firm which may hold property. For example, forest tenures may have maximum areas or volumes which may be granted to firms of a specified maximum or minimum size.

Operational stipulations refers to specific operations which tenure holders must carry out as a condition of holding tenure. For example, forest tenures may require their holders to harvest according to sustained yield principles, undertake various management responsibilities, and/or operate a forest products processing plant. *Operational controls* are measures put in place by governments in order to ensure that the conditions of tenures are met. Such controls may include monitoring and enforcement standards, or requiring that operational and management plans be submitted to the government for approval.

Security refers to the confidence which tenure holders have in their property rights. Insecure rights may exist if the tenure holder perceives that changes will occur which will adversely affect the benefits which may be enjoyed from exercising rights, while tenure holders with secure rights anticipate no changes to their rights, or changes which may enhance the value of their rights.

2.3 Choosing Among Alternatives Forest Policies

The above characteristics serve to define, more precisely, the public/private spectrum of property rights discussed earlier. Indeed each of the characteristics may be depicted on sub-spectra similar to the public/private spectrum. At one extreme, the characteristic would be completely privately held with no restrictions placed on the property holder. At the other extreme, the government could completely restrict the actions of the firm.⁹ For example, in the case of transferability, tenure holders could be allowed to sell their rights to any party at any time. At the other extreme, no transfers may be permitted. Between these two extremes numerous possibilities exist. The level of freedom which a firm has with regards to each characteristic then, in sum, defines the extent of private vs. public ownership.

Given the characteristics of property as defined above, one approach to designing a tenure system would be to consider the appropriate specification of each characteristic spectrum in turn. Such an approach would involve assessing the social costs and benefits of alternative specifications along each spectrum, and choosing that specification which maximizes the difference between benefits and costs.

3. Problems Which Governments Face in Designing Forest Tenure Systems

The following discussion will use the framework developed above to highlight the tradeoffs associated with alternative tenure specification across each characteristic spectrum. As will become evident, several of these tradeoffs are the result of incentives which alternative specifications of property rights provide to private firms. Following this section, further complications associated with the pursuit of an optimum tenure structure will be explored.

3.1 Benefits and Costs of Alternative Property Right Characteristic Specifications

Comprehensiveness.¹⁰ Specifying the level of comprehensiveness involves considering tradeoffs between integrated management and specialization. Comprehensive property rights (i.e. rights to minerals, water, trees, recreation, etc.) create incentives for firms to coordinate the production of all valued goods and services so as to maximize the sum of their individual potential resource values. On the other hand, forest tenure holders may find that the management of some resources lies beyond their area of specialization (e.g. oil and mining resources). Therefore, property rights to different resources on one piece of land may be assigned to separate specialized firms. In such cases, integrated resource management will only exist to the extent that it is in the interest of firms to cooperate in undertaking their operations.

⁹ Notable exceptions to this depiction include the characteristics of allotment type and exclusiveness. In the case of allotment type, there is not a continuum of possibilities, since only options of area based and volume based tenures exist. In the case of exclusiveness, as private rights are made less exclusive, the control of the resource is not passed on to the government, but to the public at large. Likewise, the government may have exclusive rights and release them, to some degree, to individuals (e.g. harvesting rights), groups (e.g. community forests), or the public at large (e.g. non-exclusive open access).

¹⁰ For a more detailed discussion on issues associated with the characteristic of comprehensiveness, see Luckert (1993).

It may be argued that the tradeoffs associated with integrated and specialized management will be considered in market trades of property rights to the extent that rights are divisible and market transfers are possible. However in many cases, forest resources, such as wildlife, are not marketed. In these cases, policy makers generally retain public control over the resource and attempt to coordinate their operations with private firms which hold rights to marketed products. In such cases, governments face problems involving the coordination of interrelated resource management activities with firms whose objectives are likely very different from those held by the public.

Duration. If firms are given property rights in perpetuity, then they have incentives to maximize the net present value of a perpetual stream of benefits. Truncating this benefit stream provides incentives for firms to accelerate the receipts of benefits and to postpone costs (Pejovich, 1984). Despite the distortion which truncated rights may present, governments may desire to grant less than perpetual rights in order to maintain flexibility to respond to changing resource values (Pearse, 1976). The longer the duration of tenure, the more difficult it is to re-allocate property rights to facilitate emerging values. One option which governments have adopted to attempt to minimize the costs associated with these tradeoffs has been to establish "evergreen" clauses. Such provisions allow tenures to be renewed, or replaced with a new agreement, well before their expiration date. While such provisions may be successful in lengthening the time horizons which tenure holders face, there may still be a great deal of uncertainty regarding the conditions under which an agreement may be renewed or replaced.

Transferability. The transfer of resources is central to notions of economic efficiency, where private markets direct resources to their highest use, and allow for flexibility to respond to changing values.¹¹ In the absence of transfers, property rights may be stuck in sub-optimum uses, thereby decreasing their values. In contrast to these arguments, there may also be reasons why governments may wish to restrict transfers (Pearse 1976). First, transfers may be restricted in order to control the concentration of property rights which may cause impediments to competition. Furthermore, restricting transfers may prevent the "consolidation or relocation of industrial activity which seriously conflicts with community or regional stability or development objectives" (Pearse, 1976). Finally, governments may seek to maintain control over proportions of foreign and domestic ownership.

The right of tenure holder to economic benefits. In a broad sense, any variable which influences the right of a tenure holder to economic benefits has the potential to influence the behavior of a firm.¹² This point is quite evident in the literature dealing with how the collection of rent may influence firms.¹³

¹¹ See for example De Alessi (1980), Demsetz (1967), Pearse (1976) and Scott (1984).

¹² This point will be further addressed under the section "Further Complications" and is more fully developed in Luckert (1991a).

¹³ For examples of works in this literature, see Nautiyal and Love (1971), Hyde and Sedjo (1992) and Luckert and Bernard (1993).

Governments may wish to collect fees from firms in order to redistribute wealth among income classes or sectors and/or return to the public treasury proceeds which are derived from public resources. The collection of revenues from tenure holders may be structured in many ways. Some of these methods may be neutral in that the decisions of firms are not affected by government collection procedures. However, many methods may cause the production and investment decisions of firms to be distorted - increasingly so as larger amounts of rent are collected. No matter what the means of collection, there is a limit to rent collection which, if exceeded, will effect the behavior of firms.

Exclusiveness. If individuals or groups are not allowed to exclude other resource users, then the well documented problems associated with open access resources occur.¹⁴ Individual users have little incentive to conserve or invest in a resource because the benefits from such practices may be captured by others. However, several authors have pointed out that the transactions costs associated with establishing exclusive rights to some types of resources may be prohibitive.¹⁵ In such cases it may be preferable to retain open access rights because the costs of establishing exclusive rights may be greater than the gains created by granting exclusive rights. Furthermore, with some resources, such as public forests, the public may regard free and unlimited access as a basic human right. In such cases, efforts to establish some means of excluding, or rationing use, may not be politically acceptable.

Use Restrictions. Uses of resources are often restricted in order to prevent incompatible uses from conflicting with one another. For example, use restrictions governing wilderness areas may not allow forested lands to be logged for timber. In this example, use restrictions serve to protect a non-marketed use from an incompatible market use. However, use restrictions may also prevent conflicts between marketed goods, such as logging which could leave unsightly clearcuts in the vicinity of commercial campgrounds. Despite the benefits from preventing such conflicts, use restrictions may also prevent resources from finding their highest use. For example, if a piece of forested land is designated to be used for timber production, but over time, social values change to favor recreational values, then use restrictions may cause resources to be stuck in a second best use.

Allotment Type. If tenure holders are granted rights to harvest timber within a specific area, then the tenure holder is able to accumulate site specific experience which may be used to increase the efficiency of harvesting and management operations. Furthermore, area based tenures allow their holders the potential to benefit from improvements conducted within their areas, thereby possibly creating incentives to invest.¹⁶ As with area based tenures, holders of volume allotments are guaranteed some annual harvestable amount. However, this volume must be taken from wherever the government directs. Therefore, although volume based

¹⁴ See for example Scott (1955) Hardin (1968) or Cheung (1970).

¹⁵ See for example Cheung (1970) or Pearse (1980).

¹⁶ Although area based tenure may be necessary to create investment incentives, several other factors must be considered. This point is further discussed under "Further Problems".

tenures do not display the above mentioned advantages, they do allow governments more flexibility in directing cuts than is afforded with area based tenures.

Size Specification. Determining the optimal size of a tenure involves assessing the tradeoffs associated with economies of scale and the potential to create concentrations of market power. Small tenures, awarded to diverse firms, may facilitate competitive markets. Under perfect competition, tenure holders must respond to market prices because individual firms are unable to exert influence over the market. If large tenures are granted, then holders may be able to exercise market power, allowing them to pay lower than competitive prices for their inputs (e.g. labor and logs), and obtain higher than competitive prices for their products. However, if economies of scale are such that average operational costs are higher with small sized tenures than with large sized tenures, then awarding small tenures to diverse firms may prevent efficiency gains from large operations, thereby hindering international competitiveness.

Operational Stipulations. Requirements placed on holders of forest tenures may play an important role in controlling externalities (such as the potential for harvesting practices to damage wildlife habitat). If a firm does not hold property rights to all of the resources which its operations are affecting, then governments may benefit from restricting a firm's operations in order to protect external resource values. Similarly, governments may wish to restrict a firm's operations when private and public evaluations of resource use differ. For example, governmental concerns over the failure of markets to account for inter-generational equity frequently result in sustained yield policies.

Despite the potential benefits of operational stipulations, reducing the discretionary freedom of tenure holders has its costs. Costs to tenure holders are increased by such requirements as they are forced to modify their profit maximizing behavior. Furthermore, requirements are generally specified for groups of tenure holders, each of which is likely operating under very different circumstances. If tenure holders are all required to perform according to common standards, then alternative practices, which may achieve public objectives at lower costs, are precluded. Operational stipulations may be more specific in an attempt to take into account the particular situation of each tenure holder, however, such procedures increase the administration costs of monitoring and enforcement.

Operational Controls. If tenure holders are being required to alter their profit maximizing activities, governments require some means of assuring that regulations are followed. Without some kind of penalty for non-compliance, tenure holders have little incentive to follow government guidelines which reduce their potential profits. Accordingly, governments establish measures designed to ensure some level of compliance. If governments wish complete compliance with regulations, then penalties, multiplied by the probability of being caught, must be at least as great as the cost being imposed on tenure holders. The enforcement of operational stipulations can be costly to both governments and firms. Governments must bear the costs of auditing and policing the actions of firms, while firms bear costs associated with demonstrating their compliance, and/or with trying to detect when and where they will be policed.

Security.¹⁷ Secure tenures afford licensees a stable institutional environment within which to make investment decisions. To the extent that tenures are insecure, returns to investments must be discounted, thereby reducing investment incentives. While secure tenures may be desirable from the viewpoint of tenure holders, such stability comes at the cost of flexibility to governments. As social values change, governments may wish to alter tenure characteristics to accommodate emerging resource issues. However, these alterations frequently come at a cost to those firms which have historically held tenures, thereby reducing the security of their property rights.

3.2 Further Problems

The above list of considerations present a formidable array of factors affecting the optimal specification of individual tenure characteristics. However, several additional problems arise if one attempts to optimally specify each characteristic spectrum, and then combine these characteristics into an "optimal tenure". To begin with, the appropriate specification of the above characteristics requires that costs and benefits of alternative strategies are sufficiently defined so that difficult tradeoffs can be made. Such information is rarely available. On the benefits side, social gains from regulating firms are frequently dependent on vague and sometimes conflicting public objectives. Furthermore, many of the costs, frequently borne by private firms, of achieving public objectives are unknown.

Even if the individual characteristics could be optimally specified, another complication arises when interdependent characteristics are amalgamated into a single tenure. For example, it was suggested above that every restriction which constrains tenure holders' profit maximizing behavior imposes costs on them. Therefore, every specification of a property right characteristic which transfers control from the private sector to the government affects the rights of tenure holders to economic benefits. Because the economic behavior of firms is determined by the net returns they receive from their activities, constraining their benefits may radically affect their actions. Indeed, Luckert and Haley (1989) have shown that the property rights of tenure holders in Canada have been constrained to the point where it appears that they do not have rights to manage second growth crops. Instead, management activities are frequently dictated by operational stipulations and controls with their accompanying problems as outlined above.

Finally, the creation of an optimum tenure would be dependent on the specification of other property rights within a given jurisdiction. For example, if a jurisdiction contains large tracts of forested land under property rights which tend towards the private end of the regulatory spectrum, benefits associated with creating a new forest tenure based on more stringent public regulation may be greater than in a setting where previously existing forest tenures are more heavily regulated. In short, the benefits derived from regulating firms will be dependent on whether such benefits are readily available under other pre-established property rights.

¹⁷ For a more comprehensive discussion on security see Luckert (1991b).

4. AN OVERVIEW OF CANADIAN FOREST TENURES

The framework presented above may not only be used to consider tenure design issues, but it may also be used to describe forest tenure policies. In the following section the policies which provincial governments have adopted in Canada are described, following information collected by Haley and Luckert, 1990)

Across Canada, there are 24 principal types of forest tenures, which govern a large majority of the wood harvested in Canada, plus numerous licenses and permits. The principle types of tenures may be roughly categorized into two sets: 1) area based tenures which delegate significant management responsibilities to tenure holders, who generally manage large, integrated logging, sawmilling and pulp operations and 2) volume based agreements which delegate fewer management responsibilities, are shorter in duration, and are often held by smaller integrated logging and sawmill operators.

With regards to Comprehensiveness, while all tenures grant exclusive rights to harvest timber, no tenures grant rights to other forest resources such as water, recreation or wildlife. Furthermore, as discussed above, it is doubtful whether many tenures provide rights necessary to provide tenure holders with incentives to voluntarily invest in the establishment of second growth forests. Most tenures are transferable with Ministerial approval. However in some provinces, transfers of certain tenure types are legislatively forbidden. There may also be conditions associated with transfers of tenures whereby a portion of the harvesting rights revert to the Crown every time a tenure is sold. In all provinces, exports of unprocessed timber products are restricted by federal, and sometimes provincial regulations.

Types of fees paid by tenure holders vary greatly across Canada. In many cases, tenure holders pay stumpage, ground rents, and protection fees. These fees may be adjusted to site specific conditions of individual tenures, and may also be adjusted over time to reflect changing market conditions.

Numerous types of operational stipulations are attached to forest tenures. On the larger tenures, licensees are generally required to carry out basic reforestation, sometimes at their own expense. Tenures may also require licensees to assume forest protection responsibilities. All tenures contain harvesting stipulations which seek to control the timber harvesting practices of licensees. Responsibilities for road building may also be placed on tenure holders, with costs sometimes reimbursed by provincial governments. Finally, larger tenures generally require that licensees operate a wood processing facility, as a condition for gaining access to Crown timber.

The duration of tenures range from a few months to 99 years. The principle tenure types generally contain "evergreen" clauses where tenures are renewed or replaced for a full term before their expiration date. Many of the smaller tenures are non-renewable.

5. Summary and Conclusions

Forest tenures represent property right structures which are specified by placing social conditions on the behavior of firms as they seek to maximize the net values of their rights. In designing tenure systems, the debate should not be limited to questions of public/private, or common/private property. Numerous possible combinations beyond these dichotomous choices exist - as numerous as are the variations in conditions which may be placed on the resource user.

Designing an "optimal forest tenure system" involves considering the economic tradeoffs associated with specifying various property rights characteristics. These characteristics represent choice variables of forest tenure systems which governments may specify in pursuit of social objectives. A general principal which may be used to guide choices in the specifications of these variables is to regulate the behavior of private firms with property right conditions in cases where, due to market failures, private and social interests diverge. Likewise, to the extent that private and social interests coincide, private firms may be allowed freedom to exercise their property rights. It should, however, be noted that regulatory actions taken to correct market failures may undermine the ability of firms to exercise their property rights in areas where market failures are absent.

In Canada numerous different types of tenure policies have been adopted which may be described using the framework presented above. The vast variety of different arrangements suggests that tenure policies are tailored to local resource conditions and governmental objectives.

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THE DEVELOPMENT OF LEGISLATION AND POLICIES FOR COLORADO'S NATIONAL FORESTS

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Until the mid-nineteenth century, Colorado's mountains were inhabited primarily by nomadic American Indians. From the 1860s, discoveries of gold and silver and other opportunities brought many immigrants. Thus, when the major mining booms ended at the close of the century, the state's population was mainly of European descent. Within a few decades, the landscapes of Colorado's mountains had changed substantially, particularly through the loss of forest cover from logging and fire. The mountains' population decreased rapidly after the mining era, subsequently fluctuating at low levels until the past three decades, when it again reached the levels of the mining era as recreation and tourism became the mainstay of the economy.

This paper traces the development of legislation and policies for the management of Colorado's mountain forests since European settlement. Throughout this period, the majority of these forests have been under the jurisdiction of the federal government, so that policies made both at the national level and within Colorado have affected their management. The evolution of policies at both national and regional levels is discussed within the framework of common-pool resources.

1. THE OUTPUTS OF TEMPERATE MOUNTAIN FORESTS

A common-pool resource is defined as "a natural or man-made facility that produces a flow of use units per unit of time (or several flows of different types of use units) where exclusion is difficult or costly to achieve and the resource can potentially be utilized by more than one individual or agent simultaneously or sequentially" (Ostrom 1986). The concept is roughly equivalent to, and has been used interchangeably with, those of commons (McCay/Acheson 1987) and common-property resources (*res communes*). These concepts should all be differentiated from unowned, open-access resources (*res nullius*: Ciriacy-Wantrup/Bishop 1975).

Temperate mountain forests clearly fall within the definition of a common-pool resource, providing the wide range of outputs shown in *Table 1* (Price 1990). These outputs are classified according to the ability to provide values for them in real or simulated markets and the size of community which can benefit from their use. While many forest outputs have values that can be determined in commercial markets, these outputs also have more intangible benefits, so that they can also be defined as impure public goods (Cornes/Sandler 1986). The benefits of such outputs are partially rival and/or partially excludable; i.e., the consumption of the output by one individual or group affects its consumption by others and/or certain individuals or groups can be excluded from the benefits of the output.

Table 1: Classification of forest outputs

Ecosystem Diversity	OUTPUT		TYPE OF GOOD	
	Private (Market)		Impure Public	Pure Public Option/existence
Fish	As input to economy (sold)		Recreational use	
Forage	Grazing permits sold on open market		Community use	
Game	As input to economy (sold)		Recreational use	
Genetic Diversity				Option/existence
Hazard Protection			Individuals' life, property, safety	Public land, facilities
Landscape			Limited access, view-points	Public access, viewpoints
Recreation	Developed: ski areas, private campgrounds etc.		Undeveloped: trails, campsites, picnic areas	
Water Quality	Industrial, municipal, domestic use		Recreational use	Perception
Water Quantity	Industrial, irrigation, municipal use		Recreational use (type of craft)	Perception
Wilderness			Perceived environment for recreation	Existence value
Wood	Sold on market: stumpage fees, market products		Community use	Long-term security of supply

Although nearly all forest outputs, in some sense, are impure public goods, many are also pure public goods for other communities, in that each individual's consumption of the good, once made available, has no effect on any other individual's consumption (Samuelson 1954). One instance is protection from fire, which provides an example of the fact that avoidance of a public bad (e.g., loss of property by fire) is a public good. Other public goods have existence value: the mere knowledge that they exist. In this case, as with the value of preserving a landscape or the gene pool of a forest ecosystem, consumers do not have to be present in space or time to derive benefits. The preservation of a resource for unknown long-term benefits provides option values (Krutilla/Fisher 1985).

Throughout this paper, three forest outputs are emphasized. Each of these was chosen because it falls primarily within one of the three classes shown in Table 1, and was identified as important in the development and implementation of policies for Colorado's forests. Wood was chosen as an example of a market good; recreation as an impure public good; and protection (from fire and of watersheds) as a pure public good.

2. LEGISLATION AND POLICIES IN THE NINETEENTH CENTURY

2.1 Colorado government

Colorado was recognized as a Territory in 1861. The only laws of the Territorial government pertaining to forestry concerned the prevention of wildfire. In 1876, Colorado became a State of the Union, and the first to mention forestry in its constitution. This unusual provision derived from the efforts of Frederick Ebert, a member of the constitutional convention who

had trained as a forester in Germany (Morrill 1927). Ebert also drafted a memorial to the U.S. Congress, asking that jurisdiction over the forests should be transferred to Colorado because the federal government was not attempting to protect them. The rapid loss of forest cover by logging and fire was perceived as likely to result in timber famine, floods, loss of water for irrigation, and irregular streamflow and rainfall. Thus, all aspects of Colorado's economic life were likely to suffer (Wilson 1876).

No further action on forestry was taken until the Colorado State Forestry Association, founded in 1884, persuaded the Legislature to pass a law in 1885. This created the post of Forest Commissioner and designated existing officials to act as forest officers "to prevent depredation and fire, and to encourage and promote forest culture" (Ensign 1885). However, the Legislature made no appropriations for these officials' activities until 1887. In his reports (Ensign 1885, 1886, 1888a), the Forest Commissioner identified the cutting of wood for railroad ties, construction, fuel and charcoal, and fire as continuing factors in the rapid loss of forest cover. In 1890, he resigned, frustrated by lack of response to his proposals for legislation, forest management, and policing (Ensign 1888a). A new commissioner was not appointed, and forestry remained off the agenda of both the Legislature and governors for the rest of the century (McCarthy 1977).

2.2 Federal government

The development of early federal forest policy has been presented in detail by many authors (Ise 1920; Cameron 1928; Dana 1956; Kirkland 1971; Miller 1973; Wengert et al. 1979), and is presented here with emphasis on Colorado's forests and the role played by Coloradans. In 1876, Franklin Hough was appointed to "study and report on forest supplies and conditions"; two of his reports (Hough 1878, 1882) described the rapid depletion of Colorado's forests. In 1877, the Commissioner of the Land Office instituted a corps of special agents to "suppress depredation of timber on the public lands." They had little success, having little power and being spread very thinly (Fernow 1888). Many proposed that the forests should be leased or sold to local people, as this would allow them to fulfill their duties more successfully (Public Lands Commission 1880).

One of the problems faced by the agents related to the provisions of the 1878 Free Timber Act. This was introduced by a senator from Colorado, and pushed through in the House by representatives of Colorado and other western states (Ise 1920). The Act permitted residents of western states to cut dead timber for building, agricultural, mining, or other domestic purposes. The cutting of green timber was forbidden, but Coloradans soon found a way to ensure supplies of dead timber: surreptitiously-started fires. Thus, rather than providing a basis for rational timber harvesting, the Act exacerbated the problems described by Ensign and listed above.

A Division of Forestry was established in the federal Department of Agriculture in 1881. However, as noted by its first chief, German-trained forester Bernhard Fernow (1887), its

effectiveness was limited since the Department of Interior held jurisdiction over the forests. Many of the Division's reports in the 1880s, especially one on the forests of the Rocky Mountains (Ensign 1888b), emphasized the need for a coherent national forest policy. By 1890, President Harrison had also been persuaded of this, and he submitted memorials to Congress. In 1891, the Creative Act was passed, allowing the President to reserve public forest lands. By the end of 1892, President Harrison had set aside 12,558 km² in five reserves in Colorado, at the urging of local residents and the Secretary of the Interior.

Few, if any, Colorado politicians at the state or the federal level, supported reservation and, in 1893, one representative introduced a bill to have two of the reserves abolished (McCarthy 1977). However, opposition was not very great, as the Creative Act said nothing about forest policing or management, and thus had little effect on logging and burning in the reserves. From 1892 to 1897, 27 bills to protect and administer the reserves were introduced. Members of the Colorado delegation introduced and supported bills which emphasized free use of timber for local benefit; otherwise they were in opposition (Ise 1920).

In 1897, the Organic Act was passed with the full support of the Colorado delegation (McCarthy 1977). The Act's primary purposes were to allow free use of timber, prospecting and mining by local people; and to protect and improve forests, in order to provide reliable supplies of water and timber (Wengert et al. 1979). From 1898 onwards, appropriations for these purposes were included in federal legislation (Cameron 1928) and officers were appointed to police Colorado's reserves (Shoemaker 1958). Thus, by the century's end, the *de facto* status of Colorado's public forests had changed from *res nullius* to *res communes*, and three distinct outputs were recognized in federal legislation: wood, an impure public good (for local residents) and a pure public good (in terms of long-term supply for the nation); and fire and watershed protection, impure public goods of benefit to local communities and pure public goods of benefit to the national community.

3. LEGISLATION AND POLICIES, 1900 - 1960

By the end of 1907, a total of 41,900 km² had been designated as National Forests in Colorado (Shoemaker 1944), including well over half of the land in the state's mountains in the upper watersheds of four major river systems: the Arkansas, Colorado, Missouri, and Rio Grande. By this time, these lands were managed by the Forest Service, founded in 1905 when the Department of Agriculture gained jurisdiction over the forests under the terms of the Transfer Act (Steen 1976).

For the first six decades of this century, the primary policies guiding management of the National Forests were the Organic Act and a letter sent by the Secretary of Agriculture to Pinchot, the Chief of the Forest Service, on the day the Transfer Act was signed. The letter, written by its recipient, recognized that the forests were common-pool resources, stating that "all land [in the National Forests] is to be devoted to its most productive use for the permanent good of the whole people.... where conflicting interests must be reconciled the

question will always be decided from the greatest good of the greatest number in the long run." The letter had three major themes: a sound technical basis for conserving and using National Forests; decentralized administration, with discretion exercised locally to fit local conditions; and a commitment to economic stability of communities in and near these forests (Dana/Fairfax 1980).

The first theme of the letter, in particular, reflected the training in forestry that Pinchot had received in France and Germany. The primary means for ensuring that the National Forests would provide their legislated outputs was to be planning. This required detailed resource inventories, to be used as the basis for sustained-yield forestry (Wilkinson/Anderson 1987). At the same time, the primary duty of Forest Service officers was fire prevention (U.S. Forest Service 1907); a management activity that, unlike harvesting and reforestation, was not specifically considered in Pinchot's planning process. As Pyne (1982) has commented, "The fire scenes of western America and western Europe were irreconcilably different.... Forestry's vaunted technical skills amounted to little in the actual practice of fire control."

3.1 Wood production

The belief that European principles of forestry were applicable throughout North America applied not only to the officials at the headquarters of the Forest Service, but also to the graduates of the fast-growing number of forestry schools (Clepper 1971). Yet, as late as 1917, written plans for Colorado's forests, based on detailed inventories and estimates of demand, were the exception rather than the rule. Even where plans existed, their prescriptions were of little practical importance (Lowell 1917). Timber management plans were prepared for most forests in the 1920s and 1930s, though they were often based on inventories of questionable validity (Price 1988). However, during this period, there was generally little active management (e.g., thinning, reforestation); harvesting depended mainly on local demands, tied closely to the fortunes of rail and mining companies.

3.2 Fire prevention

For the first half of this century, the main emphasis of forest management in Colorado was not the wood production foreseen by Pinchot, but fire prevention. This emphasis can be discerned as early as 1909 (Riley 1909). A significant stimulus to this activity was the loss of two million ha of National Forest and 85 lives, mainly in Idaho and Montana, to fires in the summer of 1910 (Pyne 1982). Though these losses did not occur in Colorado, they strongly affected management policies and activities there. During the next decade, Forest Service personnel considerably extended the road and trail network in the National Forests, built look-out towers, and began a widespread public education program (Price 1988). Yet, as late as 1927, there were no written fire plans for these forests (Waha 1927).

A review of the success of fire prevention programs in Colorado up to 1942 (Brown 1942) concluded that they had primarily been successful in persuading the public that "Preventing Fires was a good thing". However, the emphasis on fire prevention had made Forest Service

personnel bored and had limited resources for other critical activities. In addition, the number of fires was increasing, mainly started by campers and smokers. Just as the rangers were losing their enthusiasm for the crusade, the forests were being increasingly used for recreation by people who were unindoctrinated or forgetful about the importance of fire prevention.

3.3 Recreation

Recreation was not mentioned as a forest output in the Organic Act or the "Pinchot letter," and only in passing in other early official Forest Service documents. At least one early official in the Washington headquarters recognized recreation as a growing and legitimate use of the National Forests (Cleveland 1910), but this view was rare. However, recreational use was mentioned in national annual reports from 1912 (Maughan 1932), and in 1915 Congress passed a law authorizing the Forest Service to grant permits for the private construction of summer homes, stores, and hotels in National Forests. Around the same time, three factors began to stimulate the Forest Service to consider planning for recreation: the formation of the National Park Service, in 1916; the arrival of automobiles as a reliable and affordable form of transport; and federal highway building programs (Gilligan 1953; Cate 1963).

In a report to the Chief of the Forest Service, Waugh (1918) described recreation in the National Forests as "a public utility of great value," and emphasized that it was a paramount, if not exclusive, use in some forests, and that clear planning and policies were vital. These conclusions, among others, led the Chief to formally recognize in 1919 that recreation should be considered in management planning and, in 1921, to declare that recreation was a major use of the National Forests (Wilkinson/Anderson 1987). However, this use was not legitimized until 1960, and Congress, many Secretaries of Agriculture, and many foresters continued to regard it as unsuitable and in conflict with the ethos of forestry. Thus, in general, adequate funds were not available, and personnel were unwilling to spend their time, to plan and develop recreational facilities to manage rapidly-increasing levels of recreational use (Maughan 1932; Gilligan 1953; Cate 1963).

Waugh's (1918) conclusions were not surprising to Forest Service personnel in Colorado. Even before they were legally designated, some National Forests had received considerable recreational use, from both local residents and tourists arriving on the railroads. In 1909, 100,000 people visited the Pike National Forest; this rate was increasing at 10 percent a year. In 1916, 400,000 people visited the Forest (Price 1988), the most heavily-used in Region Two of the National Forest system, which includes Colorado. Region Two had a total of 667,097 visitors that year (Waugh 1918).

Faced with these statistics, Spencer Riley, the Regional Forester of Region Two, became one of the prime movers towards the development of a national recreation policy (Cate 1963). He was faced with a dilemma. Fire prevention was the Forest Service's primary responsibility, requiring the construction of roads and trails. Yet increased access resulted in

increased visitation, particularly with growing automobile ownership. In addition, it was Forest Service policy to provide maps identifying camping and fishing sites and scenic areas. All of these factors not only encouraged recreational use, but led to the growing risk and frequency of fire (Price 1988).

Colorado thus led the nation in planning for recreation; a full-time recreation specialist was appointed in 1917, two years before one was appointed in Washington (Cate 1963). At this time, many Forest Supervisors recognized that the forests were public property (i.e., *res communes*), and that careful planning, development, and promotion of facilities were needed (Price 1988). Regional documents identified recreation as a major forest output by 1919 and, by 1928, classified it as one of the formal outputs to be considered within Pinchot's policy-setting framework (U.S. Forest Service, 1919, 1928).

In 1930, Colorado's National Forests received 2.34 million visits (Johnson 1930); Spencer (1930), the Supervisor of the Pike National Forest which received a third of this use, foresaw that recreation would become the dominant use of most of these forests. However, most Forest Supervisors did not share this view, describing watershed protection, timber production, and grazing as the most important current and future forest outputs (Maughan 1932). One likely reason, apart from the widespread antipathy of foresters to recreation and the lack of funds for developing facilities, is that recreational use in most of Colorado's forests was not increasing as rapidly as in the Pike Forest, close to the rail-served cities of Denver and Colorado Springs. The trend of increasing recreational use slowed, and then decreased, in the Depression of the 1930s. This period was also marked by the construction of many recreational facilities through New Deal programs (Cate 1963).

3.4 Multiple use

After World War II, recreational use of Colorado's forests rose rapidly. Forest Service employees realized that overall forest planning would have to balance the provision of recreation with other forest uses, including timber production, watershed protection, and livestock grazing (Spencer 1946). The need for planning was underscored by the fact that recreational use was increasing not only in summer, but also in winter; nearly all potential downhill skiing sites were in the National Forests.

As described above, the concept of multiple-use planning had been recognized in policies in Region Two since the late 1920s. Again, Colorado had led the nation; the concept was only defined at the national level in 1933, with the publication of "A National Plan for American Forestry" (U.S. Senate 1933). At this time, the concept of multiple use was better received outside the Forest Service than within (Steen 1976). However, after the War, demand for many forest outputs grew quickly: "there was no longer sufficient land to accommodate all uses without conflict: (Dana/Fairfax 1980). Furthermore, many of these uses were not legislatively recognized.

In spite of the lack of legal mandate, both multiple-use and recreation plans were prepared for Colorado forests from the early 1950s. The first bill recognizing the concept of multiple use was introduced in the Senate in 1956, but did not pass (Steen 1976). By 1960, supporters of the concept had persuaded recalcitrant members of the Forest Service and members of opposed interest groups and Congress of its public benefit (Cate 1963). The 1960 Multiple-Use Sustained-Yield Act provided recognition that "the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes."

4. LEGISLATION AND POLICIES, 1960 - PRESENT

While the Multiple-Use Sustained-Yield (MUSY) Act explicitly stated that the National Forests were to be managed for the production of a variety of outputs - two of which (recreation and wildlife) had been previously recognized only in policy, but not in legislation - the very broad legal definition of multiple use provided the Forest Service with little direction for managing the forests to fulfill the Act's objectives (Nelson 1985). However, two types of legally-sanctioned multiple-use planning began. The first was the preparation of regional planning guides, which were then used as the basis for land management plans (LMPs) for ranger districts, the smallest subdivision of the National Forest system. The second was the preparation of plans for each resource in individual National Forests (Wilkinson/Anderson 1987). All of these plans were completed for Colorado's National Forests during the 1960s. The LMPs tended to be descriptive, rather than prescriptive, mainly containing brief, generalized statements which were not site-specific. In contrast, timber management plans defined silvicultural practices in considerable detail, even in areas where timber harvests were of little economic importance (Price 1988).

Since 1960, planning has been a major activity of the Forest Service, undertaken in a milieu of increasing complexity. One measure of this is the fact that, while 71 Acts of Congress relating to National Forest management were passed from 1872 to 1959, 76 were passed in the following 23 years (U.S. Forest Service 1983a). The recent evolution of federal forestry legislation has been considered in detail by many authors, including Dana/Fairfax (1980), Hewett/Hamilton (1982), LeMaster (1984), and Wilkinson/Anderson (1987), and is discussed below with reference to Colorado.

After the MUSY Act, the next law of major significance to National Forest planning and management was the 1964 Wilderness Act. This gave statutory recognition to the concept of wilderness, established a National Wilderness System, and provided means for expanding it. Wilderness had previously been administratively designated as a land use since 1924, and was mentioned as a forest output in the MUSY Act. Wilderness areas (then called primitive areas) had been designated in Colorado from 1926 (Gilligan 1953). There are now 1,036,350 ha of designated wilderness in the state, 25 percent of the Forest Service lands (U.S. Forest Service 1983b).

In 1969, the National Environmental Policy Act (NEPA) was passed. Unlike the legislation discussed previously, NEPA applies to all federal agencies. It affects the planning and management of the National Forests in two main ways. First, an Environmental Impact Statement (EIS) must be filed for every proposed federal action "significantly affecting the quality of the human environment." Second, other government agencies and the public are to participate in the development and review of each EIS. One result of this is that Forest Service policies and plans can be challenged in court; the agency lost its almost total immunity from judicial oversight (Wilkinson/Anderson 1987). To bring Forest Service planning into line with the EIS requirements, a new approach was established in 1973. The Chief developed broad policies, which were interpreted in Planning Area Guides in each Region. These gave direction for individual National Forests' land use plans which, in turn, guided the preparation of unit plans for areas within the Forest. In Colorado, these areas were typically smaller than a ranger district; work began on plans in the mid-1970s.

Almost as soon as the requirements resulting from NEPA had been incorporated in the planning process, new legislation led to another redirection of National Forest management policies; as LeMaster (1984) has commented, the "statutory authority for the [Forest Service] was effectively rewritten." The process began with the passage of the 1974 Forest and Rangeland Resources Renewable Resources Planning Act (RPA). Like the Organic and MUSY Acts, this was supported by a wide variety of industry and environmental groups (LeMaster 1984). Its main effect was to emphasize national-level planning, subject to Congressional review, on a five-year time-scale. These plans are to be based on a comprehensive assessment, prepared every ten years, of "present and anticipated uses, demand for, and supply of renewable natural resources... through analysis of environmental and economic impacts, coordination of multiple use and sustained yield opportunities..., and public participation."

RPA specifies the provision, management, or improvement of not only the "renewable" resources specified in the MUSY Act, but also wilderness, and water, air, and aesthetic quality. RPA emphasizes cost-benefit analyses of investment alternatives, to maximize economic efficiency in the allocation of resources. This was a new approach to planning for the Forest Service, and assumed that values can be obtained and compared for all forest outputs, in "an overwhelming expression of faith in the utility of accumulating and analyzing data" (Dana/Fairfax 1980).

Two years after RPA was passed, and before it was implemented in any more than a rudimentary fashion, it was amended by the National Forest Management Act (NFMA). The main changes that NFMA made to RPA concern timber management, a reflection of NFMA's history (LeMaster 1984). It also introduced the concepts of ecosystem and genetic diversity as forest outputs. The NFMA further changed the Forest Service's approach to planning and management in two significant ways. First, a committee of independent scientists was to develop regulations, subject to public comment, to guide the Act's implementation. These

were published in 1979 and revised substantially in 1982. Second, interdisciplinary teams are to prepare plans for each element of the National Forest system, assessing the potential for change in all forest outputs.

The first significant policy document to be produced in Colorado as a result of these new laws and policies was the Regional Guide (U.S. Forest Service 1983b). This guided the preparation of Land and Resource Management Plans (LRMPs) for each National Forest. All of these have been completed, but some are still under administrative or judicial review. These documents all illustrate the tension between the approaches to planning mandated in RPA and NFMA. The RPA emphasizes the setting of national targets for the production of the resources it mentions. These targets are then divided up between Regions and National Forests. In contrast, NFMA emphasizes planning at the regional and, particularly, National Forest levels. As Wilkinson/Anderson (1987) have noted, the result is an "uneasy compromise" which has resulted in "confusion and dissension" in the Forest Service.

5. CONCLUSIONS

With the passage of NFMA, federal forestry legislation explicitly considered all of the outputs provided by Colorado's forests. However, these cannot be compared on an equal basis because of their different natures as market and public goods. In the current goal-setting and planning process, values for market goods are derived from recent trend data, which may not be applicable in the horizon of the plans. Values for impure public goods considered in RPA are administratively assigned or derived from empirical research (Peterson/ Randall 1984). No values are assigned to pure public goods; however, these can be considered when constraints are set in the definition of the linear-programming models which are used to compare alternative management strategies (Iverson/Alston 1986). The final alternative, embodied in the LRMP for each National Forest, is supposed to maximize "net public benefits" (Beuter/Iverson 1987), balancing the outputs to local industries and communities with those to national and even international communities.

In summary, the history of the development of legislation and policies for Colorado's National Forests is complex and still unfolding. This century has seen significant changes in the outputs explicitly and implicitly considered in these documents, with especially rapid changes since 1960. Up to the 1950s, Colorado's National Forests, like most, were managed in a custodial sense (Wilkinson/Anderson 1987). Fire prevention and watershed protection were the primary outputs, increasingly balanced against demands for recreation; an activity which at times endangered the supply of the dominant outputs. In spite of the professed emphasis on sustained-yield forestry, wood production was primarily a function of local demand, and was spatially limited because of highly variable access.

Since the 1950s, wood production became even less important, as national and international transportation networks made cost-effective the import of wood and wood products from elsewhere, and demands for agricultural uses and fuelwood declined. The access provided

by these transportation networks also provided a demand for recreation which was intensified by the rapid growth of Colorado's population. Urban growth also led to increased demand for water, further underlining the importance of watershed protection. In the same period, the primary locus of decision-making has tended to move away from the local to the regional and national levels, with increasing involvement of both the Forest Service headquarters and Congress.

At present, a vast range of laws and policies, at all levels from the national to the local, influence forest management in Colorado. In many cases, these act in opposing directions. For these, and other reasons, there is increasing discussion of the need for another major redirection of Forest Service policy (e.g., O'Toole 1988). A major reason, especially in the Rocky Mountains, is that dominant forest outputs (e.g., recreation) are not adequately considered in a planning process that is still implicitly oriented to wood production through sustained-yield forestry.

Although the traditional concept of sustained-yield forestry has implicitly guided National Forest management until the present, there are many reasons why a concept originally developed in nineteenth-century Germany (Clawson/Sedjo 1984) remains unsuitable for Colorado's forests. First, many parts of these forests are inaccessible. Even in the accessible parts, inventories have only recently provided reasonably accurate information to plan logging. Second, demand has been highly variable. Recent increases in levels of logging in many areas have been to remove trees damaged by insects or disease; in other areas, because of demand for wafer board production. For years, most timber sales in Colorado have lost money (Wilderness Society 1988). Finally, the implicit assumption of sustained-yield forestry - that the optimal method of regenerating forests is to cut trees - does not apply in Colorado. Most of Colorado's forests are fire ecosystems (Peet 1981). Yet this primary successional agent has been excluded throughout this century in the interests of implausible sustained-yield forestry.

The suppression of fire has led to large areas of Colorado's forests being composed of trees that are increasingly susceptible to disease and fire; a paradox of policy. Apart from logging, which is a highly uneconomic proposition under conditions of limited access and demand for wood, these trees could be removed by prescribed burning. This technique has been successfully used in other parts of the United States to increase the diversity of forest stands and decrease fuel loads (Pyne 1982, Lotan et al. 1983), and is increasingly being used in Colorado (Colorado State Forest Service 1988). Yet there are many constraints on its use (Price 1989), and it has been given minimal consideration in Forest Service policies. Since the dominant outputs of Colorado's forests are now, and likely to remain, recreation and watershed protection, the optimum method of providing these outputs should be used.

In the alternative view of sustained-yield forestry developed by Wiebecke/Peters (1984), prescribed fire could be one of many techniques used to ensure the provision of all outputs

desired by present and future generations. There is no question that considerable evolution will continue to take place in the legislation and policies affecting Colorado's National Forests; it is to be hoped that these will include approaches that consider all outputs, and the most suitable means for providing them.

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THE UNITED STATES FOREST SERVICE'S EXPERIENCE WITH LONG-TERM TIMBER SALE CONTRACTS IN ALASKA: WHAT WE HAVE LEARNED IN THE PAST FORTY YEARS¹

Anne E. Huebner

1. INTRODUCTION

The purpose of this paper is to present a history of, and discussion of the long-term timber sale contracts in Alaska; specifically, what are the questions that need to be asked to determine the human, natural resource, and monetary trade-offs of offering a nationally-owned resource (e.g. timber) in a long-term sale to private industry. The paper is intended for politicians, managers, scientists, and all persons interested in their country's natural resources in assessing the circumstances under which a long-term commitment of public goods to the private sector will be in the national and/or local interest.

A number of Forest Service people have provided insights on the aspects of selling timber or any natural resource from public land to the private sector of the economy. There are a few persons whom I would like to personally acknowledge for their contributions. Mike Barton, Dave Hessel, Stanley Krugman, George Leonard, Dave Rittenhouse, and Robert Williams provided insights into the strengths and weaknesses of the long-term timber sale contracts in Alaska. Robert Lynn and Fred Norbury provide a valuable service of reviewing the paper and offering suggestions to clarify the text and additional thoughts that I had not previously considered. Additionally, I would like to acknowledge the many members of the American public who sent in letters providing their opinions on the management of the long-term contracts. Lastly, I am very grateful to live in a place and during a time where I have the opportunity to mutually share personal and professional knowledge and values with other people in a spirit of world community and cooperation.

Please note that throughout the paper, the terms National, Federal, and public can be used interchangeably.

2. BIOGEOGRAPHY OF SOUTHEAST ALASKA

Geographically known as the Alexander Archipelago, southeast Alaska is a coastal strip of land and numerous off-shore islands some 871 kilometers (540 miles) long in the Pacific ocean, extending along the Canadian province of British Columbia.

There are 17,742 kilometers (11,000 miles) of shoreline along the islands and the mainland. Ice fields, some of them covering over 2500 square kilometers (1000 square miles) produce numerous glaciers, many of them reaching saltwater. Southeast Alaska contains the greatest

¹ The views expressed are the authors and may not represent the official views of the Forest Service.

temperate rainforest in the Western hemisphere, comprised primarily of western hemlock (*tsuga heterosh Ylla*). Sitka sDruce (*oicea sitchensis*), western red cedar (*thuja plicata*), Alaska- (yellow) cedar (*chamaecyparis nootkatensis*), and red alder (*alnus rubra*). The climate is temperate and maritime. Annual rainfall may exceed 635 centimeters (250 inches) in some locations and annual runoff may be as high as 508 centimeters (200 inches).

Southeast Alaska is relatively undeveloped, sparsely populated, and isolated. Most of the area is accessible only by floatplane or boat. The population of Southeast Alaska is approximately 73,300, and the largest city is the capital of Juneau, with a population of 29,200 (1995 figures). It contains 9.7 million hectares (24 million acres) of land area which is approximately 6 percent of the entire State. The Tongass National Forest covers 6.8 of the 9.7 million hectares. Of the 9.7 million hectares, only 4.5 million hectares (11 million acres) are forested and of the forested acres, only 2.43 million hectares (6 million acres) are capable of producing financially profitable crops of wood. The Tongass National Forest has 2.3 of these 2.43 million hectares; .68 million hectares (1.7 million acres) are managed for wood production. In spite of these limited hectares, Southeast Alaska contains the majority of Alaskas Timber reources.

Much of the commercially productive forest land is highly valuable as habitat for wildlife and fishery resources. The thousands of Alaskan streams support one of the most significant anadromous fisheries in the world. Brown bears roam some of the islands in greater numbers than any other place on earth. Deer, black bear, wolves, and bald eagles also exist in record numbers relative to the rest of the United States. Because of the abundance of wildlife and fish habitat, the most productive forest lands are also the most intensely used lands by Native Alaskans and rural residents who continue to practice (and are promised through existing national laws) ancient cultural and traditions ways of life, including spiritual traditions as well as providing food for their families and for barter (trade). Many families still depend on wild game, fish, and berries as their primary food source.

Additionally, unique resources are continuously being discovered. For example, on the southern portion of the Tongass National Forest, at least 1813 square kilometers (700 square miles) has been found to be karst. Karst is a three dimensional terrain developed on, and within, soluble bedrock. Karst features include caves, springs, and sinkholes. In 1993, a panel of nationally-recognized karst and cave experts explored and reported this resource to be both of national and international significance. Due to Forest Service recognition of the importance of cave resources and the enactment of the Federal Cave Resources Protection Act of 1988, future timber harvesting in and near these areas will require alternative and/or less harvesting activity.

3. ECONOMY OF SOUTHEAST ALASKA

A great part of Southeast Alaska's economy in the past and present is based on natural resource use, including logging and pulp and lumber mills, fishing and seafood processing, and mining. Prior to the 1950's, the economy was based on seasonal industries such as commercial fishing, a small local timber industry, and some mining. However, many rural communi-

ties maintain a relatively stable economy based on seasonal work, which often pays a higher than average wage, and a barter ("disintermediation") economy.

There have been changes in the economy in the past 40 years. Table 1 lists the number of jobs for the primary sectors of Southeast Alaska's economy in 1994 and 1995. A consistently growing sector is the tourism "industry". Over one half million visitors tour Southeast Alaska each summer, many of them on chartered cruiseships. Expanding tourism has helped increase employment in the trade and service industries. The town of Sitka is both a regional education and health care center. Juneau is the capital and therefore supports many State government jobs. The Federal government remains the state's largest single employer. While military-related jobs have decreased, civilian agencies have grown due to an increased population and demand for services.

Table 1: Nonagricultural Wage and Salary Employment by Place of Work

Southeast Region	10/95	10/94
Total Wage & Salaw	35,900	36,100
Goods-producing	6,100	6,500
Mining	200	200
ConstnJction	1,850	1,850
Manufacturing	4,050	4,050
Durable Goods	1,800	2,050
Lumber & Wood Products	1 650	1 950
Nondurable Goods	2,250	2,400
Seafood Processing	1,500	1,700
Pulp Mills	550	500
Service-Droducino	29 800	29 600
Transportation	2,800	2,950
Trade	6,750	6,700
Wholesale Trade	500	550
Retail Trade	6,250	6,150
Finance-Ins. & Real Estate	1,550	1,600
Service & Misc.	6,350	6,250
Government	12 350	12 100
Federal	1,850	1,900
State	5 350	5 300
Local	5,150	4,900

Source: Alaska Economic Trends, January 1996

4. HISTORY OF TIMBER MANAGEMENT IN ALASKA

The United States Congress established the 6.85 million hectare (16.9 million acres) Tongass National Forest in 1907. There were numerous attempts in the early 1900's to develop the timber industry as one of the economic bases of Southeast Alaska. Several papers were completed in the 1920's which assessed the volume and potential value of sawlog and pulp-

ood on the Tongass NF. Utilization of Tongass timber requires markets for both high and low quality hemlock and spruce logs. Nowhere on public forest land was the need for pulpmills more important than in Alaska, where a large amount of the old-growth timber is hemlock which was not considered suitable for sawn lumber products in the 1950's. Pulpmills prevent waste by providing a market for low-grade logs that might otherwise be left on the ground. In addition to the high amount of defect in timber stands in Southeast Alaska, other financial considerations include high capital investment (mill) costs and a long distance to domestic markets. A large volume of high quality water was also available in Southeast Alaska.

Table 2 lists the annual volume harvested on the Tongass National Forest during the period of 1940 through 1995.

Table 2: Annual Timber Harvest - Tongass National Forest 1940-1995

Year	Volume (MMBF)	Year	Volume (MMBF)
1940	30.9	1968	541.3
1941	35.8	1969	518.7
1942	38.5	1970	493.0
1943	73.6	1971	584.2
1944	86.8	1972	532.4
1945	58.3	1973	590.7
1946	48.6	1974	559.6
1947	83.4	1975	462.4
1948	81.0	1976	109.6
1949	49.2	1977	456.3
1950	54.4	1978	414.0
1951	52.9	1979	422.2
1952	58.0	1980	480.1
1953	49.5	1981	386.7
1954	66.8	1982	370.7
1955	179.3	1983	250.5
1956	215.8	1984	261.0
1957	253.6	1985	231.3
1958	195.7	1986	290.5
1959	218.3	1987	336.2
1960	314.8	1988	396.2
1961	347.8	1989	443.1
1962	339.2	1990	471.0
1963	180.5	1991	363.3
1964	415.7	1992	369.7
1965	424.6	1993	325.0
1966	439.6	1994	275.8
1967	450.5	1995	221.1

Source: USDA Forest Service Region Ten, Timber Management

Between the years 1920 and 1950, several long-term contracts were signed, but never became operational due to high mill construction costs. In the 1950's, the two pulp mills were successfully established under two 50-year contracts. The two pulp mills are operated by Ketchikan Pulp Company (KPC) and Alaska Pulp Corporation (APC). The KPC was initially awarded 39.1 million cubic meters (1.38 billion cubic feet or 8.25 billion board feet) and began operating in 1954 and the APC was awarded 24.8 million cubic meters (.88 billion cubic feet or 5.25 billion board feet) and began operating in 1961. Both companies built dissolving sulfite-based mills with a combined capacity of 1127 metric tons (1240 tons) per day or 363,636 metric tons (400,000 tons) per year. The Alaska Pulp Company also operated a sawmill in Wrangell. Although the sulfite base is lower in capital cost than the sulfate process, the sulfate process is now the dominant one in the world due to its general application to all wood species. Large capital investments have and will be required to bring all pulp mills into compliance with environmental standards in the United States.

The Alaska Pulp Corporation suspended operation of its pulp mill on September 30, 1993. On April 14, 1994, the Regional Forester in Juneau, in his capacity as the contracting officer on the long-term contracts, notified the Alaska Pulp Corporation that the 50-year contract was being terminated as a result of the pulp mill shutdown. The Alaska Pulp Corporation's sawmill in Wrangell continued to operate until November, 1994. We do not know at this time if someone will purchase and re-open this sawmill or not.

5. OPERATIONS OF 50-YEAR TIMBER SALES CONTRACTS IN ALASKA

5.1 Pricing

In 1944, a forest inspector (timber analyst) advised the Regional Forester that a company would be willing to build a pulp or paper mill in Alaska only if the cost of logs would be low enough to offset the higher costs of a mill as compared to the States of Oregon or Washington. The first prices on Alaska stumpage were set based on the prices of the State of Washington-Puget Sound stumpage and adjusted downwards so that the prices charged in Alaska were no greater than 75 percent of the stumpage prices in the Puget Sound area. An example of Alaska prices is a timber sale sold in 1947 on Admiralty Island that was appraised and sold at \$.44 per cubic meter (\$2.10 per MBF) for Sitka spruce and \$.24 per cubic meter (\$1.15 per MBF) for hemlock.

In 1954, pulp operations began in Ketchikan at the rate of 455 metric tons (500 tons) per day. The stumpage prices for the Ketchikan pulpwood sale included \$.31 per cubic meter (\$1.50 per MBF) for pulp material, \$.66 per cubic meter (\$3.10 per MBF) for spruce sawlogs, \$.44 per cubic meter (\$2.10 per MBF) for hemlock and other logs, and \$.34 per cubic meter (\$1.60 per MBF) for cedar logs.

I would like to explain a little more about the timber sale appraisal system, in general. By law, National Forest timber cannot be sold for less than appraised rates. The appraisal system in effect for most of the Forest Service history is the residual value system. This system starts

with the selling value of the basic end product manufactured from the timber such as lumber or pulp and then subtracting the costs of harvesting, hauling, and manufacturing of the end product. Costs for logging camps, road maintenance, logging slash disposal, and other contractual requirements for operating the sale in an environmentally sound manner are also subtracted. The difference, or residual, is divided between profit and risk for the purchaser and stumpage revenues for the Government. The remaining stumpage portion to the Government is called the appraised price. Reforestation costs are paid for from collected stumpage revenues. The costs of the resource professionals to inventory the area, mark and administer the timber sales, and complete the environmental impact analysis is paid for by the Forest Service. Regardless of the result of the appraised price, this stumpage price must cover the estimated reforestation cost and a minimum of \$.50 return to the Federal Treasury. If the appraised rate does not cover reforestation costs and the minimum dollar return to the Government, the sale cannot be sold or the price must be increased to cover these two things. If the price is raised, this is called the base price and this is the minimum price the Government will accept as a bid on the sale.

National Forest timber sales are appraised and then advertised for normally a thirty day period and then sold either on a sealed bid basis or sealed bids followed by oral auction. The timber purchaser is required to cut and remove the timber. Payments are either made prior to cutting when payments are based on the volume cruised, or made after cutting when payments are based on the scaling of the removed timber.

This residual value appraisal requires the collection of sales data and costs from a representative sample of timber purchasers for the development of selling values and processing costs. The residual value appraisal is being phased out in favor of the transaction evidence appraisal system. The transaction evidence appraisal is based on the actual prices that timber sold for over the previous 1 to 3 year period and adjusting those prices to the market and sale conditions of the sale being appraised. The main difference between the two appraisal systems is that the residual value system is tied to the end product market such as the lumber market, so when the price of lumber increases, the appraised value of stumpage also increases. The transaction evidence appraisal system is tied to the stumpage market which often varies from the end product market.

Both the Ketchikan Pulp Company and the Alaska Pulp Corporation 50-year contracts were charged "base prices" through the 1980's. The average base price was \$.42 per cubic meter (\$2.00 per MBF). These companies were usually required to utilize all wood fiber removed, regardless of its value. Having to harvest the low-value timber effectively reduced the price of the higher value timber also.

In November, 1990, the Tongass Timber Reform Act (TTRA) was passed to address the public disagreement over the amount of timber harvesting by the long-term contract holders, as well as the prices the long-term contract holders were paying for the public's timber. Section 301 (c)(8) of the Act requires the Forest Service to modify the long-term contracts to assure

that the price of timber offered under the contracts be comparable with those of independent purchasers in competitive sales.

Since the TTRA was passed, the long-term sale stumpage prices are adjusted to be similar to the prices bid on competitively advertised sales by independent operators. As a result, average stumpage prices paid by the long-term contract holders from the years 1991-1995 has ranged from approximately \$6 per cubic meter to \$17 per cubic meter (\$30 per MBF to \$80 per MBF), as compared to the average base rates of approximately \$.42 per cubic meter (\$2 per MBF) paid during much of the previous 35 years.

Because of the price increases, the Ketchikan Pulp Company filed two breach of contract claims in 1991 and 1993, claiming that the Forest Service made changes to the contract (per direction of congressional legislation) without KPC's consent. In July, 1995, they filed another lawsuit for \$33 million based on rates charged from 1989-1991. The Alaska Pulp Company asserts that the Forest Service's interpretation of the Tongass Timber Reform Act made it impossible for APC to operate their pulp mill profitably and closed the pulp mill on September 30, 1993. In December, 1994, APC filed a \$1.1 billion lawsuit against the Forest Service for breach of contract. As mentioned above, the Forest Service contracting officer terminated the contract on April 14, 1994, asserting that APC was obligated to continue operation of the pulp mill through the life of the contract. As of January, 1996, these cases have not been resolved.

5.2 Capital Investments- Mill Construction, Logging Camps, and Roads

The private companies paid for the costs of building the mills. The cost of building permanent roads are paid for by the Forest Service. The private companies receive credits towards the value of the timber they purchased for building roads or installation of logging camps. For example, the timber company may build a road on Federal land into the area where they purchased the Federal timber. Roads that initially were built for timber harvesting activities often remain open for public use after the timber sale activity is completed. If a company spends one million dollars to build the road to the government's specification, the company may receive up to one million dollars as a credit against the price of the stumpage. If the roads cost more than the value of the stumpage, the road may be paid for by dollars appropriated by the U.S. Congress.

In order for timber companies to obtain bank loans to finance capital investments like a pulp or saw mill, some volume of timber must be guaranteed under contract. Historically, purchasers of Federal timber and the banks financing the investments like to maintain 2 1/2 years of timber supply under contract.

5.3 Manufacturing and Value-Added

A Federal law passed in 1926 prohibits exporting logs harvested from Federal lands in the United States without some further processing. An exception is Alaska where the Regional Forester may consent to export of logs on Federal lands depending upon whether one or more mills exist to process the species and grade of logs. With the exception of cedar, re-

quests for exports of logs has always been denied by the Regional Forester. Even if the logs can be sold for a higher value than the processed wood, the Forest Service and the State of Alaska feel that it is still a net benefit to have primary manufacturing of the logs within the State and provide jobs for U.S. citizens. Logs from private ownerships have no such restriction on them. In the past 5 years, approximately 12 percent of Tongass National Forest timber has been exported, compared to almost 100 percent exported from private lands.

5.4 Environmental Analysis and Timber Sale Administration

In the early days of the contracts, road locations and sale unit boundaries were often determined by the private company. The National Environmental Policy Act of 1969 required that projects on public lands must complete analysis of environmental impacts and disclosure of these impacts to the public prior to making any project decision. In the 1970's and 80's, environmental impact statements were prepared every 5 years for each of the long-term contracts. The TTRA, passed in 1990, directed that timber provided to the long-term companies be analyzed, appraised, and administered in the same way as sales offered to independent purchasers on national forests in the lower 49 states. This means that additional environmental impact statements are being prepared and more field reconnaissance is completed prior to offering sale areas to the long-term contract holders.

Timber sale appraisals have always been completed by the Forest Service to determine the value of the timber being sold. The appraisal takes into account the average costs of a logger and allows for some percent of profit, which may vary from sale to sale. Please refer back to the discussion on pricing for further information on the appraisal system. Some critics have argued that the Federal government does not need to appraise a sale because the competitive bidding process will reflect current stumpage and wood products prices.

After the environmental analysis is complete and the sale has been appraised, a Federal forester (sale administrator) will visit the logging operations to ensure they are using the harvesting techniques described in the environmental assessment and that they are obeying all Federal laws.

6. RESULTS AND CURRENT CONFLICTS OF THE LONG-TERM CONTRACTS

There are many differences in public opinion over the 50-year contracts in Alaska. One of the primary objectives identified in the 1950's was to establish a stable wood products industry through capital investments in pulp and saw mills. This objective has been met in the past 35 year as the pulpmills have provided stable employment of approximately 900 full-time jobs annually in recent years. Additionally, lumber and wood products employment currently provides approximately 2000 direct jobs. Many of the logging jobs (included in lumber and wood products) have historically been connected to the existence of the pulpmills as some independent loggers sell hemlock logs to the pulpmills.

Table 3 lists the number of jobs in the wood products industry in Southeast Alaska from 1985 through 1995.

Table 3: Employment in the Wood Products Industry¹ - Southeast Alaska. Fiscal Years 1985-1995

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Logging ²	1,004	1,239	1,545	1,981	2,113	2,144	1,554	1,415	1,344	1,177	1,185
Sawmill	363	331	375	468	478	500	604	538	447	513	301
Pulpmill	580	772	861	892	925	899	911	910	859	533	516
Total Direct Employment ³	1,947	2,342	2,790	3,341	3,516	3,543	3,069	2,863	2,650	2,225	2,002
Indirect Employment ⁴	1,500	1,825	1,950	2,350	2,550	2,570	2,226	2,077	1,935	1,624	1,461
Total	3,447	4,167	4,740	5,691	6,066	6,113	5,295	4,940	4,585	3,849	3,463

¹Figures reported here include employment related to the harvest and processing of timber from all ownerships in Southeast Alaska.

²Jobs related to logging operations, such as road construction, are counted as indirect employment.

³Source: Alaska Department of Labor and USDA Forest Service Region 10, Ecosystem Planning and Budget.

⁴Two computer simulation models (PASS and IMPLAN) were used to estimate indirect employment. "Indirect" employment refers to the persons employed in all business supporting operation of the wood products industry.

The long-term contracts has been the source of increased export trade with a number of countries, including Japan, South Korea, China, and Taiwan. Logs are exported in the round from Native Alaska Corporation lands, and pulp, sawn logs, and a small amount of cedar logs are exported from Federal land.

Now that only one pulp mill is operating, we do not know yet whether technology or markets have changed enough in the past 40 years to accomodate a number of operators, most of whom can afford only small scale capital investments, to utilize all the wood fiber in some profitable and sustainable manner. It is doubtful if the Federal government can continue to supply the same level of stumpage that it has in recent years. There is increasing demand for natural resources, in addition to wood fiber, which may not be compatible with some pre-determined annual timber harvest.

The long-term sales have not been without a dollar cost to the public taxpayer. A country must determine its financial status and the people's desires before committing public dollars to one region. For example, roads are a benefit to the rural people of Alaska, but the cost to pay for the roads is shared by the American public. Some of the American public finds the environmental effects of building the roads to be unacceptable. Even though the two companies in Alaska paid higher stumpage prices since 1990, the costs (includes road building costs) to the Federal government continues to exceed the revenues received.

The rate of harvesting has been questioned in reference to whether or not pulp mill jobs can be sustained for another 10-15 years, and what will happen to the economy of Southeast Alaska once the contracts expire. In other words, if the rate of harvest on commercial forest lands does not provide for a sustainable harvest for future years, the existing industry struc-

ture, numbers of jobs, and wood products cannot be expected to remain the same in future years.

Another concern is over water pollution from emissions of the pulp plants. In recent years, the amount and type of polluted water released has been a concern of, and monitored by, the U.S. Environmental Protection Agency. Increasing costs to comply with environmental standards may force an otherwise financially secure mill to shut down.

The Alaska Natural Interest Lands Conservation Act (a federal law passed in 1980) grants priority hunting and fishing rights to rural residents and Alaska Natives. In recent years, there has been increasing conflicts over the amount of timber harvesting and its effect on wildlife and fish habitat and species populations. Even though the total number of acres available for timber harvest is relatively small compared to all of Southeast Alaska, the areas that are being harvested are also some of the best habitat for wildlife and are the closest areas to human settlements.

7. DECISIONS TO BE MADE IN MOVING FORWARD WITH A LONG-TERM CONTRACT

There are many intermediary decisions to make and many factors to consider in entering into a long-term contract which allows harvesting of the public's timber by private companies (or any exclusive private use of a public natural resource). The following are a few of the decisions and factors to consider. This is not an exhaustive list nor can it address all unique situations which must surely exist in every country.

1. First, a decision must be made on the the technique and number of hectares to be inventoried to find out the status of the existing condition of natural resources.
2. Marketing research and a marketing strategy will identify if there may be private buyers for the government timber.
3. Ongoing coordination and cooperation between the Federal or National government and communities adjacent to the public land will help determine some mutually inclusive short- and long-term national and community goals of a contract. The government may also work with the collective public to ask them to agree with the community goals within a constraint of a nationally acceptable level of resource use and related ecological impacts. An alternative is for the government to work with individual communities or regions to develop a forest resource management plan, and allow them to take over the management of the public lands for a specific area.
4. If local community employment is a goal, there should be some stipulation about who can share in the operation and profits of the mill. Also, capital must come from some source for the initial investment. Local capital is preferred to capital from outside the community or region, but often local capital is not available.
5. Related to number four, the region or country must decide whether it wants to allow for free trade or to require that logs from public lands be processed to some level before leaving the local area.

6. A Contract written to provide for resource management flexibility will allow the Government to practice "adaptive management" as new biological data or social demands become known. This could be accomplished by writing into the contract some periodic intervals of review and updating the contract, either jointly or unilaterally.
7. Carefully consider what types of forest industries can operate on a flexible or cyclical timber supply or market demand schedule. For example, the start-up costs of a pulp mill are much higher than for a particle board plant. However, both can utilize similar grades and species of logs. This consideration is important where there may be competing uses on Federal lands and a stable supply of timber cannot be guaranteed.
8. The length of time of the contract should be noted, but the time period is less important if the contract allows for resource management flexibility, the mill is of a type that is financially viable given a flexible timber supply, and/or some level of profit is guaranteed to the company.
9. The National or Federal government must be willing to pay for the physical infrastructure such as roads and other social services to help develop the industry or community near the industrial location, unless the private operator can pay for these things while realizing some profit.
10. Related to number 9, identifying any environmental restrictions or requirements prior to opening the bidding on a contract will enable a company to determine if they can make a profitable investment. The government could choose to build a mill and lease it out to a private operator.
11. Periodic evaluation of current markets will help ensure that the wood fiber is being used to its maximum product potential.
12. Consider compensating local governments if National ownership reduces local government's fiscal capacity to provide local services.
13. Planning for utilization of resources must be done within the framework of sustainable resource management, if that is a goal. Natural resource protection and natural resource utilization discussions or decisions must take place with all interested persons or organizations involved. In other words, neither a sustainable wood products industry nor sustainable forest management will be successful in the long run if both are not planned for jointly.
14. All of these decisions and considerations apply to a contract or land leased by the National government to the private sector.

8. RECOMMENDATIONS

I recommend that the National Government come up with a few broad national environmental standards and from there, work with the people who live and work in the areas where a mill might be installed, regardless of who pays. Find economic incentives for local people to improve their social and economic well-being by practicing sustainable forest management.

Allow local people to share most, if not all, of the wealth generated from local resource use. When local people are allowed to share the wealth, it is then appropriate to also hold them accountable for sustainable resource management.

Apply same environmental standards in the less socially visible "backwoods" as you would in the more highly visited or inhabited forestlands. The less visited areas will always become more visible in the future.

Carefully consider whether it is realistic to expect public lands to provide a reliable supply of natural resources that will attract private capital investments. Do not expect that revenues will always exceed costs on national or public lands. The whole point of having national lands is that society believes there are additional long-term societal benefits resulting from national land use decisions as compared to private ownership land use decisions. Remind private users that it is a privilege to use the public's natural resources.

Assess and monitor any decisions to export raw materials. If raw materials are required to be further manufactured, again ensure that the local population benefits from this requirement in terms of jobs and wage income. Continue to explore ways to benefit the local population first or concurrently with the National government, in terms of exports and local manufacturing requirements.

An advantage of working with people directly affected by resource decisions is that public natural resources can be managed in a sustainable manner only when the basic needs of people living near these resources are met.

Plan for social or political institutional structures where scientists, resource managers, and politicians can work together and find agreement, if a goal is have a sustainable natural resource economy. Integration of natural resource disciplines and resolution of conflict are keys to sustainable forest management. One way to accomplish this is to limit the size of the operation whenever feasible. The smaller the investment and resource utilization in one location, the less the political influence on the resource use and the greater the opportunity to reach consensus.

Remember there is rarely any one long-term solution that will satisfy everyone. Sustainable resource management is dependent on the ability of humans to adapt and act on new biological and social information, within some workable timeframe.

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TIMBER ADMINISTRATION IN THE PROVINCE OF ONTARIO

Jean-Louis Wallace

1. GENERAL ASPECTS OF TIMBER ADMINISTRATION

1.1 Concept

The process of administering the public timber resources in Ontario falls within the mandate of the Forest Products and Marketing Branch of the Ministry of Natural Resources. Timber administration actually involves a series of closely related processes including inventory, planning, allocation, licensing, and stumpage collection. This paper deals with the processes of timber allocation and timber licences in detail. It also describes briefly the legislative history and related timber management planning process to provide the reader with a sense of perspective.

For the purpose of clarification, timber allocation as described in this paper is the process of deciding which companies or individuals are provided the opportunity to derive personal or commercial gain from the public resource. Likewise, timber licensing is the procedure whereby the right to harvest Crown timber is conveyed to companies or individuals. In the disposition of Crown timber, the Province gains direct benefits such as stumpage charges and indirect benefits from the social and economic infrastructure required to manufacture forest products.

The allocation and licensing process provides companies with the assurance of access to raw materials. It is directed primarily at the log processor, i.e. mill owners. While mill owners are frequently also timber licensees it is not uncommon for timber to be licensed to individuals or companies not formally linked to the mill owner. To provide assurance of supply in these situations, there are a number of licensing arrangements which will be discussed in greater detail in the paper.

1.2 History and Background

Timber licensing in Ontario dates back to 1827 when the British government, in an attempt to control the contractors cutting squared timber, appointed a Surveyor General of Woods and Forests for Upper and Lower Canada under the Commissioner of Crown Lands.

The first legislation dealing with timber was created in 1849 following a public inquiry into the state of lumber operations on Crown Land. This legislation was titled an Act for the Sale and Betterment of Timber Upon Public Lands. This was Ontario's first Crown Timber Act and all regulations pertaining to timber licensing were specified under this Act.

During the period 1849 to 1869, many of the elements common in today's licensing system were adopted. Such measures as licence deposits, annual area charges, export fees, per-

formance deposits, licence boundary description, and public timber sales came into effect in an attempt to prevent abuse of the public assets and maintain a healthy forest industry.

The authority granted to the Minister in the Crown Timber Act is further conveyed and interpreted to Ministry staff by:

- delegation of authority;
- regulation under the Act approved by cabinet;
- policy and procedural directives approved by the Minister and Deputy Minister.

Because the Ministry of Natural Resources is a decentralized organization, the Minister's authority under the Act has been extensively delegated to staff including the Assistant Deputy Minister of Operations, and Director of Operations, the Director, Forest Products and Marketing Branch; each of the seven Regional Directors and each of the 47 District Managers for their respective administrative areas.

1.3 Timber Management Planning

Timber licences are issued to cut timber allocated for harvest in timber management plans which are prepared for each designated management unit (Crown. Company, F.M.A.). The timber management plans, covering a 20-year period are revised every five years. Prepared by a professional forester, they will contain an analysis of past performance, objectives, strategies, specifications for timber management practices, and forecasts of the amount of timber available for harvest. In summary, they detail the nature, timing, and location of timber operations for a five year term.

Each plan is subject to a process of public consultation and review prior to being approved. Only those operations consistent with plan, including harvesting, can occur without further public review.

Timber management plans for Crown management units will frequently include supplemental detail concerning licensing when the unit represents a timber supply for more than one company. This information will include the allocation of proposed cutting areas, and the estimated volume by species to be harvested for each licensee. Plans for company management units may include similar information providing details for the allocation of timber which is surplus to the company's requirements. This commonly occurs when pulp and paper companies will set aside part of their allocation to support independent sawmills.

Where the management planning review and approval process is not complete, and it is necessary to issue licences for continuity of mill supply, an Interim Management Plan will determine the allocation of timber on a year to year basis, until the final plan approval.

1.4 Timber Allocation Process

Timber allocation is a process of committing timber to individual companies within the general confines of timber availability as identified in the Timber Management Plan. The principle

objective of timber management is to supply the forest industry with their roundwood requirement on a sustainable basis. The priorities for allocating timber are as follows:

- the maintenance of established commitments to existing forest industry;
- the development of new or expanded industry capacity;
- the disposition of timber by public tendered sale where demand exceeds availability for limited or valuable timber.

Decisions to allocate Crown timber for new or expanded facilities will, except for minor processing facilities involve discussion with Forest Products and Marketing Branch staff. For major processing facilities involving substantial commitments of timber, the approval of the Minister and his cabinet colleagues.

The basic objective when committing timber from Crown lands is the optimal utilization of the forest resources to maximize, economic and social benefits recognizing sound environmental practices and the limitations of sustainable harvest levels.

To acquire cutting rights on Crown lands, a corporate mill owner or company:

- must be legally incorporated to carry on timber harvesting activities in Ontario;
- own and operate a mill; or
- have a contract to supply wood to a mill.

More specifically, the factors that may be used to evaluate a request for a timber supply and to prepare a recommendation to the Minister fall into these categories:

- source and tenure of timber;
- land use designation and potential for conflict;
- quantity, quality and tree species available from Crown lands;
- quantity, quality and species desired by applicant;
- status of applicant (established business or a new business)
- applicant's resources and financial responsibility;
- Province's revenues;
- Province's cost for providing infrastructure;
- employment generated;
- market for products;
- economic, social and environmental impacts;
- applicant's willingness to accept Crown's cut control measures.

Once selected, a company will continue to be eligible for additional licences to cut Crown timber consistent with a Timber Management Plan provided, that there is timber of a suitable quality and quantity and that there is no appreciable change in criteria on which it was originally selected.

2. CATEGORIES OF TIMBER LICENCES

2.1 General Requirements and Licence Types

The Crown Timber Act contains provisions which subject licences to certain conditions regardless of whether they are specifically mentioned in the licence document. These conditions are as follows:

- The authority of a licence is always limited in respect to area and species.
- Timber belongs to the licensee only after timber is cut.
- The Crown holds a lien against all cut or manufactured timber subject to the payment of Crown charges.
- The right to cut Crown timber contained in a licence is subject to the granting of an annual cutting approval.
- Crown timber must be manufactured in Ontario unless specifically exempted.
- None of the rights granted by a licence are transferable without the Minister's written consent.
- Every licence is subject to the provision of the Regulations made under the Act unless specifically exempt.
- The Crown has overall responsibility of licence areas for protection, regeneration, and management planning.
- A licence does not convey any rights to Crown land.
- The Minister may direct any licensee to offer products to a particular mill.

There are five types of timber licences which have evolved to meet, in part, the objectives of the timber licensing system. The objectives are threefold:

- to match the requirement of industry with the available and sustainable harvest;
- to allow for the timber requirement of local people;
- to provide contingencies for the salvage of damaged or killed timber.

The five major licence types which provide authority to harvest Crown timber are:

- Licences issued through offering Crown timber for sale by tender (Timber Sale Licences).
- Permit licences which the Minister may issue for areas not exceeding 65 hectares (District Cutting Licences or D.C.L.).
- Licences issued by the Minister with the approval of the Lieutenant Governor in Council. (Order in Council Licences or O.I.C.).
- Licences issued by the Minister to permit the salvage of killed or damaged timber (Salvage Licences).

- Agreements with persons, which in addition to converging responsibility for management and regeneration of timber, may provide authority to harvest timber (Forest Management Agreements or F.M.A.).

In addition, there are two variations of the licensing authority worth mentioning. These are:

- Agreements between companies and the Minister approved by the Lieutenant Governor in Council for the supply of timber from Crown management units (Timber Supply Agreements).
- Licences issued to a third party on a previously licensed area (Third Party Licences).

In the following each of the licence types will be described along with a brief history of evolution, the characteristics of each category and the pros and cons in their respective application.

2.2 Timber Sales Licences

In 1903, legislation was established which provided the basis for timber sales by public tender. Timber licences were granted to the highest bidder over and above an upset price. Up until 1920, practically all Crown timber licences were issued following public sales. These have diminished greatly, being gradually replaced by Order-in-Council licences. In recent years, the area under tendered sale licence has been 30-50 square kilometers (20-30 licences). Currently these licences can be issued, depending on area and term of licence, by the District Manager, Regional Director or Director, Forest Products and Marketing Branch, according to the regulations and specific policy directives. Tendered sales may be restricted or may be open to the public. Both unit price and lump sum sales are used, but the current use of lump sum sales is restricted and is under review.

PRO - Provide direct competition as a method of determining Crown stumpage and allocation of timber rights.

- A fair method of selling a limited resource where high demand for the resource exists.
- A traditional method for granting timber licences.

CON - Tendered sales of timber have declined since 1920 and they now occupy too small a part in the disposal of Crown timber to be effective.

- Only small areas are offered for sale and prices paid are nearly always far in excess of the general stumpage.
- Item 2 can lead to high grading of the licensed area or to a significant lower wage or profit level of the operator.

2.3 District Cutting Licences

District cutting licences in various forms have been issued by the Ministry to authorize local residents to cut fuelwood and other forest products for their own use since around 1900. In 1936, the principles of the present D.C.L. system were introduced but did not receive statutory status until 1942.

Starting in the 1940's, people began to abandon their farms in northern Ontario. Farming became less important as a source of income and more emphasis was placed on the winter logging operations. Through a D.C.L., the local residents could obtain wood from Crown lands for his own use and settlers were able to obtain much needed cash income through the harvest and sale of logs.

Authority to issue a D.C.L. has been granted to the District Manager subject to being consistent with the Regulations and current policy directives. D.C.L.'s are limited to an area of 65 hectares and are administratively limited to a value of \$10,000 (C.D.N.) stumpage. Currently approximately 3,000 permits are issued on an annual basis. In addition, the D.C.L. authority is used to grant approximately 10,000 fuelwood permits issued annually.

The D.C.L. is also used for the purpose of recording financial transactions dealing with Crown timber eg. penalty transactions and sale of cut forest products from silvicultural projects eg. pre-commercial thinning. In addition, the D.C.L. is used to provide interim cutting authority to companies whose Order-in-Council licences are unexpectedly delayed.

- PRO* - Allow a person with a small amount of capital to get into the commercial logging business.
- Provide employment.
 - Cutting authority can be granted with little delay.
 - Convenient for apportioning small volumes of timber for personal and commercial use.
 - Good control over collection of Crown charges.
- CON* - The very small wood operators of the permit holders do not permit the development of generally acceptable woods' living conditions and are difficult to maintain as licence operations become more distant.
- Crown charges are higher than rates usually charged on O.I.C. licences.
 - Extensive staff time required in administering a large number of licensees who harvest a small amount of timber.

2.4 Order-in-Council Licences

The authority of the Minister to issue licences with the approval of the Lieutenant Governor in Council came into effect in 1913. The reasons for requiring an Order-in-Council as a condition precedent to the granting of a Crown timber licence are not entirely clear. The requirement was probably adopted for the following reasons:

- *Protection of the Minister:* The Executive Council. A group of persons, is better able to resist political pressure to grant a Crown timber licence than an individual.
- *Protection of the Public:* A Minister whose power to grant a Crown timber licence is supervised by the Executive Council may be less likely to abuse that power.

Since 1920, the practice of offering timber for sale has gradually been replaced by the issuance of licences on the approval of the Lieutenant Governor in Council mainly to meet the requirements of industry in the light of their substantial investment in plant equipment.

Order-in-Council licences are not limited in size or term; however, smaller licences are generally in the range of one to 50 square kilometers and are issued for terms less than five years. Larger licensees have areas ranging up to 1,000 square kilometers with terms of 10 to 20 years being common. There are 350-400 active Order-in-Council licences in a given year covering 75,000 to 90,000 square kilometers in total.

Stumpage rates on O.I.C. licences are a composite of indexed Crown dues by Regulation and bonus rates negotiated on an individual licence base. Crown dues in total constitute 80% of the current 85 million dollars in stumpage revenue.

PRO - Easy to match the allowable cut and the requirements of industry.
 - Can provide security of tenure for considerable period of time.

CON - Requires up to three months to process.
 - Considerable administrative procedures.

2.5 Salvage Licences

Salvage licences were introduced in the late 1940's to recover dead or damaged trees. Because damage standing timber can deteriorate very rapidly, quick salvage action is necessary. For this reason, the District Manager has been delegated the authority to set prices, terms and conditions for salvage licences on unlicensed Crown lands. He can also negotiate salvage rates for killed or damaged timber already under licence. Salvage licences are not limited in size or term, but they are commonly one or two year licences for small areas. Approximately 15-20 licences are issued annually with a total area of 300-400 square kilometers.

PRO - Licences can be issued very quickly by the District Manager, but negotiations can be rather lengthy.
 - There is no statutory limit on total amount of timber that may be cut on the licence.
 - Very favorable stumpage rates can be offered as an incentive.

CON - Statutorily the salvage licence is limited to killed or damaged timber.
 - Lengthy negotiation on licence conditions or revisions of management plans can defeat the objectives of salvage programmes.

2.6 Forest Management Agreements

There exist a long recognized need for closer integration of logging and silvicultural activities. The division of these responsibilities between industry and government has been unsatisfactory.

In 1979, the Crown Timber Act was amended to allow the Minister to enter into Forest Management Agreements subject to the approval of the Lieutenant Governor in Council. Forest Management Agreements are contractual arrangements between the Crown and certain forest companies, whereby a company undertakes the forest management practices of planning, road construction, harvesting, regeneration, and forest tending on behalf of the Ministry of Natural Resources (M.N.R.). There are currently 30 F.M.A.'s in the province covering a total area of 180,000 square kilometers.

The agreements are essentially the same for all companies, differing only in the particulars relating to specific forest conditions and practices for an area. The purpose of a forest management agreement is to provide for a continuous supply of products to the agreement holder and to ensure that the forests are harvested and regenerated on a sustained yield basis. The terms of the agreement are comprehensive. Some of the key provisions are:

Tenure: The agreement is for 20 years, but at five year intervals performance and obligations are reviewed and revised. If judged satisfactory, the agreement is extended a further five years. This is termed an ever-green agreement.

Planning and documentation: The company must prepare forest management plans for a 20 year period, operating plans for a five year period, annual plans, and annual reports.

Annual allowable cut (AAC): It is calculated in relation to actual depletions of the forest from cutting, fire, insects and disease; and additions resulting from regeneration and growth of the forest. The AAC is to be recalculated every five years at the time of the Ministry's review the of company's performance.

Withdrawals of forest land: Land representing up to 5% of the AAC may be withdrawn by the Minister for other purposes in the public interest. However, land withdrawn in excess of 5% must be replaced with comparable forest lands. The company shall also be compensated for buildings, structures and other items that may exist on the withdrawn lands.

The costs of roads and regeneration: The MNR takes the responsibility for certain basic funding on Crown lands under the agreement. Roads are essential for effective management and use of the forest. The Ministry will therefore fund to a prescribed level the construction, reconstruction and maintenance of specified roads. For regeneration, MNR will pay its own costs for site preparation, planting or seeding, and tending where necessary. MNR will also provide free of charge all necessary tree seed and nursery planting stock.

Prescriptions for forest management practices and standards: They are developed cooperatively by MNR and company staff prior to an agreement, and are contained in the Ground Rules, a schedule of the forest management agreement. Performance standards are included with the prescriptions.

Incentives to increase forest productivity: Where a company undertakes silvicultural treatments at its own expense, the increase in volume attributable to those treatments shall be available at one-tenth of the normal stumpage charges.

Public participation, access and use: The company is required to conduct public meetings during the preparation of management and operating plans. Of particular importance are road corridors and sensitive areas. General public access and recreational uses, that previously existed in licensed Crown forest land, are continued in the agreement area.

From a timber aspect, F.M.A.'s have the following advantages and disadvantages:

PRO - Provide the Minister with good flexibility in dealing with licensing problems like damaged timber and surplus timber.

- Provide long term security of wood supply to the licensee.

CON - Limited to larger companies with considerable forestry staff.

- Complex processes associated with review and administration of F.M.A.'s.

2.7 Timber Supply Agreements

The Minister has been granted the authority to designate areas of Crown land as forest management units and to enter into agreements with individuals for the supply of Crown timber from those areas. These agreements do not convey any right to harvest timber. Licences are offered according to the provisions of the agreement which usually specify the volume and species of timber to be supplied to a specific mill. Timber supply agreements have, for example, been used to commit poplar from areas which have been previously allocated to provide coniferous sawlog or pulpwood volumes.

PRO - Provide opportunity to direct species to specific mills.

- Provide flexibility in matching requirements of industry to available volumes.

CON - Can be awkward to administer when overlapping agreements exist.

- Negotiations and approval of agreements can be time consuming.

2.8 Third Party Licences

Third party licences provide for the licensing of timber on a previously licensed area to a third party where the original licensee has timber surplus to his requirements. The original or prime licensee and the third party are required to enter into an agreement detailing the area, volume, species, and duration of cutting to be undertaken by the third party. The agreement may provide for charges by the prime licensee for reasonable expenses incurred eg. road maintenance.

Third party agreements are treated as partial transfers of licence rights and therefore require the Minister's consent. If it is desirable to shift the responsibility for harvesting operations from the prime licensee to the third party, an overlaying licensee may be issued to the third party. The harvesting authority is commonly an Order-in-Council licence, but District Cutting

Licences are occasionally used. Approximately 90 to 100 third party Order-in-Council licences covering a total area of 6,000 to 7,000 square kilometers are issued annually.

PRO - Allow the utilization of surplus volume on large licences.

- Provide a vehicle for directing timber to appropriate mill.

CON - Requires mutual cooperation of three parties who may have different objectives.

- Can be difficult to negotiate and administer.

- Can increase stumpage prices paid by the third party licensee.

3. EXAMPLES OF LICENCE ISSUING PROCEDURES

Each of the licence types described above has unique processing requirements and to deal with each one of the variations is not practical. To provide a sense of licence issuing procedures, the process for issuing two licence types is described in some detail. The selected examples represent licence administration at the extremes of the Ministerial Organization.

3.1 Order-in-Council Licence Processing

The following, in point form, is the general procedure followed in the issuing of Order-in-Council licences. Staff responsibilities for action at any given stage are indicated in a consecutive order.

Unit Forester:

- Reviews the timber management plan to determine areas to be licensed.
- Prepares a licence proposal report using the prescribed Ministry form. This report will include his/her recommendations for special licence conditions, bonus prices to be paid in addition to Crown dues, and a map outlining the proposed licence area.
- Discusses the proposed licence with the licensee and obtains his verbal agreement on the prices, and special terms and conditions.
- The preparation of the licence proposal will normally involve a field inspection, which may involve the licensee, to determine and confirm such details as:
 - suitability of processed access;
 - nature and extent of forest reserves required;
 - accuracy of inventory data and operational cruise estimated of stand volume and other standing characteristics;
 - suitability of proposed cutting and regeneration operations detailed in the operating plan;
- comments on the licence proposal from other Branch representatives and affected parties.
- Submits the proposal for the approval of his/her Supervisor and the District Manager.

District Manager and Forest Management Supervisor:

- Reviews licence proposals ensuring consistency with the management plan, other licences, and District, Regional and Head Office policy.¹
- Approves the licence proposal unless changes are to be made.
- Submits proposal for the approval of the Regional Director.

Regional Forester:

- Ensures licence proposal is reviewed by the Regional Forester and his/her and by other Ministry staff when appropriate.²
- Forwards the approved licence proposal to the Manager, Wood Allocation Section.

Manager, Wood Allocation Section:

- Reviews licence proposal noting and commenting on Areas of special concern.
- Forwards licence proposal to timber licensing unit.

Supervisor, Timber Licensing:

- Reviews licence proposal to ensure consistency with existing timber licences, directives or volume agreements, Branch policy and the Act and Regulations.
- If concerned about specific recommendations, the licence proposal may be held for additional review and discussion with the Region and/or District staff.
- If licence proposal is satisfactory, forwards for processing to the Senior Timber Clerk.

Senior Licensing Clerk:

- Reviews request for special action by his/her Supervisor and assigns to Timber Clerk for processing, overseeing and supervising the entire processing schedule.³

Timber Clerk:

- Checks with Ministry of Consumer and Commercial Relations to ensure correctness of Company name and address.
- Checks licence area status through Patent office to determine the extent of Crown land and private land.
- Instructs draft person to prepare a map of the licence area delineating the licence boundary and significant geographic features.
- Arranges for the preparation of a description of the proposed licence area.

Licensing Clerk:

- Prepares draft timber licence according to Unit Forester's recommendations.

¹ Where major variation occurs between action proposed in the management plan and the licence proposal, a public review must be undertaken to amend the planning document, if the licence is to be issued as proposed.

² The nature and extent to which the licence is reviewed by Regional staff will depend on the policy of the Region involved, the size and potential impact of the proposed licence, and the extent to which the area may have been reviewed previously.

³ On receipt of each licence proposal, a licence number is assigned and the details of the licence are entered into a computer licence and tracking system which records the progress of the proposal from receipt to the final issue.

- Prepares Routing and Approval Sheet with attached draft licence.
- Obtains approval of the following:
 - Supervisor, Wood Allocation
 - Director, Forest Products
 - Director of Operations
 - Deputy Minister
- Requests District Manager to take the following actions:
 - Collect area charges for initial year of licence.
 - Requests licensee to arrange for collateral deposit with Director, Financial Services Branch.
- Have the licensee sign the original licence proposal.

District Manager (Unit Forester):

- Ensures above action is taken.
- Advises Senior Licensing Clerk by telex of payment of area charges and confirms licensee's agreement with licence proposal.

Senior Licensing Clerk:

- Prepares recommendation to Council with covering memos to the Minister and Director, Legal Services.
- Submits recommendation to Director, Forest Products and Marketing Branch.

Director, Timber Sales:

- Examines draft recommendation, signs covering memo and forwards to Director, Legal Services.

Director, Legal Services:

- Examines draft recommendation.
- Signs recommendation and verifies the licensing authority.
- Forwards to the Minister.

Minister's Administrative Assistant:

- Reviews recommendations.
- Schedules the proposal for cabinet review.

Minister:

- Approves recommendation for presentation to Cabinet or returns proposal with instructions for changes.

Cabinet:

- Reviews Minister's recommendation, approving or returning for changes.
- Forwards approved Order to Lieutenant Governor in Council for signature.

Clerk of Council:

- Returns approved Order to Legal Services.

Legal Services:

- Advises Licensing Unit of receipt of approved Order.

Licensing Clerk:

- Forwards three copies of draft licence for execution by Minister.

Minister's Executive Assistant:

- Dates, seals and signs three copies of the licence.
- Returns copies to Licensing Unit.

Timber Clerk:

- Checks with Financial Services to confirm:
 - area charges received;
 - collateral deposit secured.
- Distributes original signed licences as follows:
 - 1 copy - Licensee
 - 1 copy - Financial Services
 - 1 copy - Licence Files.
- Forwards photocopies of original signed licences to District Manager and Regional Forester.

District Manager:

- On receipt of licence copy, the District Manager may process applications for annual cutting approvals outlining specific conditions to ensure consistency with the timber management plan.

3.2 District Cutting Licence Processing

The following procedures applies specifically to district cutting licences issued for commercial logging operations and does not necessarily apply in the cases where licences are issued for personal use of wood, such as fuelwood.

Unit Forester:

- receives applications (usually verbal) from persons wishing to obtain a district cutting licence.
- Discusses generally the availability of areas with these persons indicating the species of timber available.
- If no timber is available, the Unit Forester may make a written note of the person's request for timber for future consideration.
- If timber is available and is suitable for the prospective licensee, the details are discussed with the timber supervisor.⁴

⁴ The selection of licensees will vary from district to district, but the following methods of selection are commonly used: Selection on a first come first served basis to limit of available timber; Selection on the basis of being a previous licensee; Selection on the basis of a lottery or draw.

Timber Supervisor:

- Reviews (verbally) proposed licence with Unit Forester giving consideration to past licensing practice, availability of timber in the operating plan, District, Regional and head Office policy and other relevant considerations.
- Refers and discusses unusual problems concerning applications to the District Manager.
- Indicates his/her approval to issue district cutting licence to the Unit Forester.

Unit Forester:

- Discusses details of proposed licence with the Timber Clerk. Records details of special conditions to be included in the licence.

Timber Clerck:

- Issues district cutting licence recording the necessary details and any special terms and conditions.
- Has the licensee sign the licence document indicating his/her agreement with the licence terms and conditions.
- Submits the licence for signature by the District Manager.⁵
- Organizes the necessary records to ensure proper recording of volumes cut and Crown dues collected.

The district cutting licence form represents both an authority to cut Crown timber as well as revenue accounting form. Procedures for records associated with district cutting licences and the collection of associated revenue are controlled by the district according to established financial accounting policies.

4. LICENCE CONTROLS

The administrative and legal actions described below have been grouped under the heading licence controls. They describe actions which can affect licences after they have been issued. They are significant in that they provide the Minister and his/her staff with control over Crown timber even though the rights to that timber may have been granted to a company.

4.1 Licence Transfers

None of the rights or responsibilities granted in a timber licence or contained in an agreement may be assigned without the Minister's prior written approval as set out in Section 18 of the Crown Timber Act. Further the Minister is not obliged to grant his/her approval for any licence transfer or assignment request. Licence conditions are not changed on transfer, however, the Minister may impose conditions on companies as a prerequisite to a transfer.

Licence transfers can take several forms, but the most common are:

⁵ Approval to sign district cutting licences has been delegated to the Forest Management Supervisor and the Timber Clerk.

- the Minister's consent to a third party cutting arrangement i.e. third party licences;
- sale of company assets (mills) and transfer associated licence areas;
- pledging of licences as collateral to obtain operating capital (loans).

The authority to approve licence transfers has been delegated to the Director of Operations, Forest Resources Group, and in the case of third party cutting, to the Director, Forest Products and Marketing Branch.

Where a licence transfer involves the sale of large capital assets which have potential impact on employment, companies are encouraged to seek the Minister's approval in principle prior to applying for formal licence transfer.

Companies may effectively avoid seeking the Minister's approval for licence transfers by undertaking corporate changes through amalgamation or share acquisition. Potential problems with this procedure have largely been avoided by encouraging active dialogue between company and Ministry staff.

4.2 Changing Licence Conditions or Areas

Authority granted under section 28 of the Act may be used to vary or change licence conditions or areas. Licence conditions may be changed during the term of the licence with the licensee's consent as in a change of bonus rates following a licence price review. Generally speaking, these types of changes are not controversial since they require the agreement of the licensee. These provisions may be used to change licence conditions which become invalid during the licence term.

Licence areas may be unilaterally varied, with Order-in-Council approval, "having regard to reasonable business requirements of the licensee". This action has generally been used to remove areas from large Order-in-Council licences where it was felt that the licence had timber surplus to their long term requirements. This practice was fairly common in the late 1960's when the Government took action to provide native groups with independent licence areas. In most cases, there is considerable dialogue and discussion with the company involved prior to the actual licence changes.

4.3 Letters of Direction

Directive letters have come to take the general form of letters of commitment which provide assurances of Crown timber resources particularly in situations where it may not be practical to issue timber licences. Such letters are frequently issued by the Minister or other senior staff to document timber supply arrangements which the Ministry has negotiated with mill owners.

In their pure form, directive letters are derived from the Minister's authority in section 17 of the Act. This section allows the Minister to require licensees to offer the "right of first refusal" to purchase logs produced by the licensee to specific mills. Frequently, the Minister will extend these letters using the power of his/her office to formalize complex third party supply arrangements.

Forest Management Agreements are exempt from the provision of section 17, however many F.M.A. holders provide timber to third party on request by the Minister. The Minister also has authority to direct surplus timber within the agreement conditions and has made the continuation of existing supply arrangements a prerequisite to agreement negotiation.

4.4 Penalties and Timber Seizure

The Ministry places emphasis on voluntary compliance with regulations and licence conditions. However, in a situation where there has been flagrant or repeated violation of the Act, there are specific penalties set out in section 52. Currently, these penalties are administrative in nature and may be imposed without reference to the courts. These administrative penalty provisions are considered to be in contradiction to provisions of the civil rights legislation and are being amended. They will be replaced with fines which must be imposed by the courts.

Additionally, Ministry officials have extensive authority to seize Crown timber which they believe was obtained without proper authority or which has outstanding Crown charges owing. Seizure of timber has been an effective mechanism for protecting the Crown's monetary interest in Crown timber. It is generally used as a last resort, particularly where companies are having serious financial problems.

4.5 Canceling Licences and Suspending Operations

Although rarely used, the Minister in some cases with Council approval has broad authority to cancel licences. Somewhat more frequently used is the authority to suspend cutting operations in whole or part. This authority can be used effectively to protect significant natural features which may not have been identified as part of the planning or cutting approval processes.

5. FUTURE LICENSING OPTIONS

One of the major complaints with the existing licensing system is the time required to process and approve licence documents. This time is significant with Order-in-Council licences and can be as great as three months.

The requirement to obtain approval of the Lieutenant Governor in Council for 98% of all licences is a questionable procedure, and one which is wasteful of valuable Government time. Arguably the practice of subjecting all timber management plans to public review provides an adequate check of the Minister's licensing authority. Each plan must contain details on the allocation and licensing of the timber within that forest management unit. Given that licences are issued consistently with the management plans, the further approval by Order-in-Council may be viewed as unnecessary for all but very large or controversial licence areas.

An amendment to the Crown Timber Act which would permit the Minister to grant licences, for terms less than five years without prior Order-in-Council approval have been proposed. Based on the comments received from both industry and other Government ministries, there is general support for such an amendment. The Industry is concerned about the ability of the Minister to issue licences without undue political influence which could weaken security of

tenure. The degree of public involvement in the timber planning process and the degree of integration of timber management planning and timber allocation will limit this possibility. Further, the development of policy directives which would clearly set out those situations in which the use of the licence authority would be applicable.

Without limiting the scope of the policy statement, we see those restrictions as excluding the following:

- all licence proposals where an approved timber management plan does not exist;
- licence proposals which involve publicity controversial or environmentally sensitive areas;
- areas where the potential for conflict of land use is high eg. Algonquin Provincial Park;
- licence proposals involving potential conflict of interest; and,
- licensees in potential conflict with government business issues, eg. pollution control order, working condition violations.

In addition the amended legislation would be written so as to allow any or all licence proposals to be directed to Cabinet.

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EVOLUTION OF TIMBER REVENUE POLICIES ON CROWN LAND IN THE PROVINCE OF ONTARIO / CANADA

Jean-Louis Wallace

1. INTRODUCTION

The difficulty in developing forest policy is related to the perversity of Nature. That is, you cannot successfully determine beforehand which side of the bread to butter. To the people responsible for preparing policy options for the consideration of governments, there is better than a 50:50 chance the bread will fall butter-side down.

The purpose of this paper is to show that choices have been made in Ontario, and that timber revenue policies have been coordinated and developed in the best possible direction. It would be interesting to trace the evolution of timber revenue policies in Ontario from 1867 to the present. Certainly there would be many instances of history repeating itself. Indeed the words of learned political leaders of the early days are often quoted to show that the more things change, the more they are the same.

However, this paper will deal with an overview of major timber revenue policies, basically since World War II. It will deal only with the policy affecting Crown land. The evolution of Crown land forest policy in Ontario is another fascinating study that should await the outcome of current initiatives. Further, it should be understood that the words and ideas presented here are not original, and have largely been written by others.

2. THE EXISTING SYSTEM OF TIMBER ALLOCATION ON CROWN LAND

At present, the allocation of Crown timber in Ontario is effected by the issuing of licences to companies or by entering into volume agreements with them on timber standing on land directly managed by the Crown. When a licence is issued, the title of the timber land is retained by the Crown but the management plan is prepared and executed by the company. The operator is granted only timber cutting rights. The licences which are specified by *The Crown Timber Act* (Ontario 1987) can be of five types:

- Order-in-Council sec. 3 (1)
- Sales sec. 3 (1)
- Small sec. 3 (1)
- Salvage sec. 3 (2)
- Forest Management Agreement sec. 6 (1)

The Order-in-Council licences cover more than 32 percent of the total area presently licensed (*Table 1*). The area covered by individual licences is usually large and, if properly managed, is capable of supplying a sawmill or pulpmill on a "sustainable yield" basis. The duration of tenure of these licences may be up to 10 years and can be renewed. They are normally issued to integrated logging and processing enterprises after negotiations.

Table 1: Number and Total Area by Licence Type

In the past, sale licences covered about 4 percent of the total area under all licences but now constitute less than one half of one percent. These small areas, of interest to independent logging contractors, usually for a period of two or three years, are mostly sold by tender.

The small licences known as "District Cutting Licences" apply to volumes of timber for which the stumpage charges do not exceed \$10,000 and are limited to an area of 65 hectares. These are given to local loggers usually to supply their own sawmills from areas that are not cut by big companies. Sometimes more than one such licence may be held in a year by the same person, but the nature of such operations is generally "small".

Salvage licences are issued for Crown timber that has been killed or damaged by fire, insects, disease or wind.

Forest Management Agreements are agreements with persons, which in addition to conveying responsibility for management and regeneration of timber, may provide authority to harvest timber.

In addition to granting licences, volume agreements are made with existing mills for timber on unlicensed Crown management units for a specific type and amount of raw material for varying periods up to a period of usually ten years. Such agreements reserve a supply of timber under sec. 4 of *The Crown Timber Act* but do not grant the right to cut. Cutting is authorized by a licence issued under sec. 3(1), known as a Third Party Licence. Third party licences provide for the licensing of timber on a previously licensed area to a third party where the original licensee has timber surplus to his requirements. In the last ten years, licences issued under volume agreements have been contributing an increasing proportion of timber harvested from Crown land. This seems primarily because there are no significant areas in Ontario which are still uncommitted and so new demands must be met from Crown management units. Secondly, this method gives the Province some flexibility in regulating the rate of cutting certain species in regions where forest management principles may indicate that cutting is desirable.

In all Order-in-Council licences, the licensee is required to pay tenure charges (per square kilometre of licensed area) in addition to the stumpage charge (per unit volume of wood removed). The timber revenue from licence holders in Ontario can thus be classified as:

- a) tenure charges per square kilometre of licensed area consisting of:
 - management charge (formerly called the ground rent);
 - forest protection charge (formerly called the fire protection charge);
 - as of 1976, the management charge and forest protection charge have been combined and are now referred to as area charge;
- b) stumpage charge (severance) made up of stumpage dues per unit quantity of wood removed.

The stumpage charges in turn are composed of:

- Crown dues which are established by government regulation for different species and represent the minimum stumpage.
- The bonus, if any, settled through negotiations in the case of Order-in-Council licences.
- In the case of sale licences only, a competitive bid over and above the Crown dues plus bonus.

The tenure charges are to be levied at the following rates up to 1992:

Period	Ground Rent Charge Mgmt.	Fire Protection Protection Charge	Area Charge	Basis of Charge
1917-20	\$ 5.00	\$ 6.40		Per square mile of total land area in the licence.
1921-35	NIL	\$ 3.20		Per square mile of total land area in the licence.
1936-49	\$ 5.00	\$ 3.20		Per square mile of total and area in the licence.
1950-52	\$ 5.00	\$ 12.80		Per square mile of total land area in the licence.
1953-67	\$ 1.00	\$ 12.80		Per square mile of productive forest area.
1968	\$ 2.00	\$ 25.60		Per square mile of productive forest area.
1969-87	N/A	N/A	N/A	N/A
1988			\$ 45.00	Per square kilometre of productive forest area.
1989			\$ 47.00	Per square kilometre of productive forest area.
1990			\$ 49.00	Per square kilometre of productive forest area.
1991			\$ 51.00	Per square kilometre of productive forest area.
1992			\$ 53.00	Per square kilometre of productive forest area.

N/A = Not available

Time period represents fiscal year (April 1 to March 31)

Source: Ontario Ministry of Natural Resources Annual Reports (Various Years)

3. TIMBER REVENUE REVIEWS 1950-1979

The schedule of Crown dues established in 1951 was used for more than 15 years before any questions of revising it or the system of charging were raised. In 1967, a report on taxation (Ontario Committee on taxation 1967) recommended that dues be revised so that combined tenure charges and Crown dues for a cubic foot cut by a licensee, whose actual cut is equal to his allowable cut, would approximate the amount of such combined charges under the then current rates. The principle involved in this recommendation was that dues be tied to productive capacity of the forested land as indicated by the calculation of the allowable cut so

that companies would be encouraged to harvest this cut. Such a principle was first suggested by Moore (1957) and by the New Brunswick Forest Development Commission (1957). In spite of the fact that in the long run this principle would encourage a fuller utilization of the forests, it was not adopted in Ontario or elsewhere in Canada. The prime reason, as advanced in Ontario, was that the licences did not have regular age gradations corresponding to a "normal" forest. Therefore, those companies which had an over-abundance of immature crops would be required to pay higher dues on the basis of calculated allowable cuts while there would not be enough operable timber to cut. Similarly, the licensees who had mostly over-mature timber and should be encouraged to cut more than their calculated allowable cut would not be so encouraged. This objection is difficult to understand because surely the forester could adjust the allowable cut up or down for the next 20 years or so in order that the above problems would not arise.

Another report dealing with various aspects of forest management (Forestry Study Unit 1967) also recommended changes in the Crown stumpage charges, but, due to very different reasons: the Province was measuring wood in many different units (cords, cubic feet, board feet, lineal feet, etc.) because stumpage was based on end use of wood. This was causing complications in administering the charges and was also unequitable in most cases. It was only for white pine, red pine, and tolerant hardwoods (ie. hardwoods other than poplar and white birch) that there was such a close relationship between the grade of log input and the value of mill out-turn that stumpage based on end use was justifiable. In these species however, the difference in actual rates charged for various grades was so small and the general level of charges was so high as to cause high-grading.

The method of making detailed stumpage appraisals for different areas, species and end products as used in British Columbia was seen as an extremely time consuming and unrewarding task by the Forestry Study Unit (1967) because precise values for roundwood delivered at the mill and costs of logging operations were not available in Ontario. Setting uniform stumpage rates across the Province was considered highly desirable as it allowed for easy manipulations to account for economic conditions.

Amongst its recommendations, this report included a revised schedule of dues which was essentially the same as that existing before but the rates had been expressed in terms of "per cubic foot", so as to be in line with its main recommendation of adopting only one measure of wood. The report mentioned that the estimation of the correct stumpage values was difficult but the existing rates were reasonable for the year 1965. However, the rates were to be revised from time to time on the basis of the changes in the general wholesale price index or the average selling price index of the main forest products.

In response to one of the above recommendations and in view of the depressed market conditions, a new schedule of Crown dues was instituted in 1971. It differed from the old one mainly in that the dues for jack pine and spruce north of the Canadian National Railway line

(CNR) were reduced below those south of the line. This was intended as a concession to the industry in recognition of higher costs north of the line due to the greater distances to markets.

In 1974, the schedule was revised again. This time it was based on the acceptance of the observation of the Forestry Study Unit (1967), that except in the case of some species and fuelwood, there was really no reason why stumpage rates should differ according to the end products of roundwood. This revision also considered the fact that the Province was moving into the practice of weight scaling and so rates were given in terms of weight as well as volume. Only tolerant hardwoods were considered to have a sufficiently wide range of value between high-grade and low-grade logs to justify progressively higher stumpage charges by grade. Also, the rates were doubled to account for erosion in the value of the dollar since 1951, as reflected by the changes in the implicit price index. The difference in rates north and south of the CNR line was abolished as it had no demonstrable effect on the utilization of wood north of the line.

To this day, the revised schedule recognizes only six kinds of roundwood in the Province for the purpose of charging stumpage, viz:

- wood from all coniferous species;
- wood from poplars and white birch;
- wood from tolerant hardwood species capable of yielding grade 1 logs;
- wood from tolerant hardwood species capable of yielding grade 2 logs;
- wood from tolerant hardwood species capable of yielding grade 3 logs;
- all wood suitable for use as fuel.

As in the past, market valuation of stumpage was not used in setting the charges because there was no open market for the sale of large quantities of timber on the stump in Ontario. In 1974 Ontario effectively doubled its stumpage rates, and in 1974-75, undertook an examination and revision of parts of its forest tenure system. It was seen that compensation for the rights to cut timber could be realized by the Crown in one of three forms: as "tax", as "fees" charged for licensees to use the resources, or as "prices" charged for the volume of resources supplied. The forest revenues collected as logging taxes until 1972 in Ontario fall into the "tax" category. The revenues collected as "area charges" (forest protection and management charges) fall in the "licence fee" category and the stumpage dues charged on per unit volume basis are called "price". The essential difference between the "price" approach to realization of timber revenue and the "tax" and "licence fee" approaches is that if "tax" or "licence fee" approaches are employed, then the additional raw material cost to the user for an extra unit of the commodity is zero. The user pays either for the right to use the resource, or for having made a profit from processing and selling it (Timber Sales Branch 1974).

If the price approach is used and the price is sufficiently high, it can reduce the quantity of resource used. Alternatively, use of a larger volume of the resource can be encouraged by lower prices. The licensing and tax approaches do not permit such regulation. In such cases, once an operator has obtained access to the resource, he is encouraged to use as much as possible of the resource that will generate maximum profits.

The approach or combination of approaches used for collecting forest revenue affects the annual amount of timber cut, the appropriate rotation period and the incentives to invest. The contracts in Ontario are, however, structured so that the Crown regulates the rotation used on and the maximum amount of timber cut from a licensed area. Also, the government recognizes that the companies have little incentives to invest in silvicultural practices affecting production in future rotations and so assumes complete responsibility for these practices.

The 1974-75, examination did not go into the aspects of tenure structure that would affect the above issues. It was confined only to the examination of two questions.

- What is an appropriate level of charge for the use of Crown timber?
- What is the fairest and most efficient method of collecting such timber revenues?

The major change recommended by the Timber Revenue Task Force (1975) to the existing system of collecting timber revenue was the area charges be increased at the rate of 10 percent every year and that the Crown dues be allowed to fluctuate each month on the basis of a three-month moving average of the industry selling price of the product for which timber is used.

It was also recommended that a complete review of the rates should be undertaken every five years. These recommendations were, by and large, implemented in 1978.

In addition, the Crown timber revenue was apportioned with an 80/10/10 distribution among Crown dues, the area charge, and the combined bonus prices and tendered bid revenues, respectively. Further to the recommendations in the 1975 Report, the 80/10/10 split was retained and commitment was made to undertake regular 5-year reviews of the revenue system. The major elements of the recommended and subsequent system were as follows:

- A designation of licensees into one of two categories depending on whether or not they were associated with a pulpmill (integrated or non-integrated).
- The monthly indexing of Crown dues to a moving three-month average of selected Statistics Canada commodity prices indices which reflected the licensees category and species cut.
- A unit area charge which was to increase at a rate of approximately 10 percent per year.

The underlying philosophy of the Crown timber revenue system is based on the principles established by the 1975 Timber Revenue Task Force. By way of review, these principles are:

- The system must be responsive to the forest industry's cyclical movements.
- The system must generate enough revenue to adequately compensate the Province for use of its Crown timber resource.
- The system should encourage maximum utilization of the timber resource.
- The system must be fair and equitable.
- The system must ensure simplicity of administration and ease of compliance.

4. TIMBER REVENUE REVIEWS SINCE 1980

In the 1982 Report of the Timber Revenue Review Group, prepared by a joint Ministry of Treasury and Economics/Ministry of Natural Resources committee, the five principles for establishing timber revenue levels were retained and the indexing concept was found to be effective, but corrective action was recommended to address the increasing gap between timber revenues received and timber management related costs. Specifically, the double-indexing of Crown dues and an increase in area charges by 15 percent were proposed. These proposed increases were delayed however, because of adverse forest industry product market circumstances.

It was not until 1984, however, that the Ministry of Natural Resources, with the support of the Ministry of Treasury and Economics, introduced the following regulatory changes:

- A modification of the indexing formula to make adjustments to Crown dues response twice to fluctuations in the commodity price indices (ie."double indexing").
- An increase in the annual area charge structure to 15 percent per year.
- A commitment to undertake a complete review of the revenue system in 1987.

In late 1987, the third review was undertaken to determine whether or not the current Crown timber charges including the level, system and philosophy of pricing required changes. Specifically, the review focused on resource pricing concepts, philosophies and approaches, trends in revenues and expenditures with a basic focus on recovery, the status of the forest industry relative to economic climate and ability to pay, and recent developments in other jurisdictions principally, British Columbia and Québec. The Crown Timber Charges Review report was submitted after consultation with staff specialist and industry association representatives recommended that the following revisions were required.

- Retain the underlying philosophy that the timber revenue system should recover a fair and competitive proportion of provincial timber management related expenditure through Crown timber charges, weighted by the industry's ability-to-pay (fairness) pricing structures in other jurisdictions (competitiveness).

- Retain the double-indexing formula which has contributed to real increases in revenue and is sensitive to the fluctuating forest commodity prices and the ability of the forest industry to pay.
- Eliminate the anomalies in the existing system including:
 - a) inequities in the amount of Crown dues paid by integrated and non-integrated licensees for timber used in the manufacturing of similar products, especially lumber;
 - b) lack of guidelines for the negotiation of licence bonus prices;
 - c) failure to reflect increased costs borne by producers as a result of the 15 percent Federal export tax on Canadian softwood lumber;
 - d) insufficient differential in species pricing to reflect relative values.

The current mechanism used to establish the level of Crown timber charges levied has not succeeded in substantially improving the proportion of the costs recovered for timber management related expenditures attributed to the industry. This is in spite of the fact that:

- provincial timber management related expenditures have increased by 60 percent since 1982; and
- total Crown timber revenues have increased by 55 percent over the same period.

Over the single-indexing period from 1978 to 1982, the Crown timber revenue system did not result in any real increase in Crown dues, while expenditures on forest management attributed to the industry doubled in real terms.

From 1982 to 1987, the cost recovery level increased by 4.9 percent (ie. from 27.6 percent in 1982 to 32.5 percent in 1987).

In 1988, the Ministry of Natural Resources, with the support of the Ministry of Treasury and Economics, proposed to increase Crown timber charges by amending Regulation 234 under *the Crown Timber Act* consistent with the following objectives.

- To establish a fair and adequate recovery of timber revenues at a rate approaching 40 percent of direct Provincial timber management expenditures attributable to the industry;
- To provide for a single rate of Crown dues to be charged for timber used in the manufacture of lumber irrespective of licence category;
- To avoid significant impact on lumber producers.

The proposed revisions included:

1. An increase of base Crown dues for *integrated licensees only* by 25 percent, effective July 1, 1988.

The integrated licensees are those licensees associated with pulp and paper mills. The rationale for the proposed increase was that since pulp and paper producers were making record profits, that it was the opportune time to increase Crown timber charges levied on this component of the forest industry.

2. *No increase of the base level of Crown dues charged to non-integrated licensees.*

At the time, it was felt that consideration should be given to softwood lumber producers in light of the current downward trend in the softwood lumber market and the impacts associated with the 15 percent Federal export tax on Canadian softwood lumber and the recent increase in the Canadian dollar.

3. *A single Crown dues rate for sawlogs.*

At the time, integrated and non-integrated licensees paid substantially different rates for timber subject to similar manufacturing processes, production costs and market conditions. The proposed revisions have resulted in integrated licensees operating sawmills to be charged for timber, used in the manufacture of lumber, at the lower non-integrated licensee rate.

In 1987-88, 3 major integrated companies closed 4 sawmills. While the ministry has maintained that the differential in crown dues had a minimal impact on the profitability of these sawmills, the forest industry has maintained that the Ontario government should be more sensitive to the possibility of additional closures and the need for a more equitable Crown dues structure. This change has effectively eliminated any inequities in the Crown dues structure while retaining the basic structure and value of the existing system.

4. *An increase of the area charge set out in schedule 3 of Regulation 234 by 25 percent for 1988-89.*

The increase would apply to all licensees including non-integrated sawmills, but the bulk of the area charge payments are attributable to the large licence holdings of the integrated licensees. In addition, the impact of the increase in the area charge relative to other operating costs incurred by the forest industry would be minor.

Combined, the proposed revisions would maintain the 80/10/10 revenue distribution in Crown dues, bonus prices and area charge revenues. These proposed revisions were implemented on July 1, 1988.

In addition to the conclusions that were put forward by the 1987 Crown Timber Charges Review Group, the review group also listed 8 recommendations for changes to Crown timber pricing. The one of interest to the Forest Products and Marketing Branch (formerly Timber Sales Branch) in 1989, stated that Ontario should "Move from the current integrated/non-integrated Crown timber licensee designation to a mill destination designation". This recommendation was made in order to address the previously mentioned inequities between integrated and non-integrated rates, schedule of species prices and the operating problems with the integrated/non-integrated declarations.

The Forest Products and Marketing Branch in 1989 was assigned the task of examining such a mill destination system and reporting on the revenue implications of the proposal. The recommendation put forward by the group was that a review of Crown dues mill destination system be put on hold pending a decision on the Wood Allocation and Pricing Policy study.

Essentially, the mill destination system was put on hold because implementing this system would require statutory and regulatory revision of the *Crown Timber Act*. Secondly, changes of this magnitude to the pricing structure of Crown timber would require substantial modification of the ministry's computerized Timber Scaling and Billing System. Thirdly, convincing the forest industry of the merits of the system could also prove difficult due to general resistance to change in this sector and the increase in stumpage price for the large pulp and paper companies. If changes to the base indexes or base prices raise the Crown dues for other sectors to present rates, they will be at best ambivalent.

Presently, the Ministry of Natural Resources has started to plan and establish its strategy for the fourth timber revenue review due in 1992. In so doing, the Forest Industries Section (within Forest Products and Marketing Branch) has been given the mandate to identify a comprehensive variety of forest-related revenue mechanisms which could contribute towards the province's forest management programmes. In addition, it will be looking into the strengths and weaknesses of each revenue mechanism in the context of each identified policy objective.

As a result of the Ministry of Natural Resources fourth timber review in 1992, the Ontario government introduced, on October 1, 1994, a new stumpage system for companies that cut wood on Crown lands.

Under the new system forest products companies in Ontario will pay a three-part fee to the province for any Crown timber they cut.

1. The forest products company is now required to pay a basic \$1-per-cubic metre fee for any Type of Crown timber that is cut by the company. The monies collected will go into the government's consolidated revenues.
2. The company will pay a per-cubic metre charge ranging from 50 cents to \$6, depending on the type of tree cut. The money collected has been earmarked towards a newly created Forest Renewal Trust Fund. Monies from the trust fund will be used to pay for regenerating the Crown forests cut by the company.
3. The company will also pay a per-cubic-metre charge indexed to the market price of the product, such as pulp or lumber. The rate is to be set every quarter by the market price as measured in the previous quarter. The money raised from this charge will go into the government's consolidated revenues.

It is expected that the new system will be market sensitive and should assist in defending against future U.S. countervail actions.

Although these changes took effect on October 1, 1994 it is expected that the new stumpage system will raise the same amount of money in the current 1994-1995 fiscal year as it would have under the old system with the province collecting between \$150 million to \$160 million.

5. REVIEW OF THE PRESENT TIMBER REVENUE POLICIES

The past policies of Ontario have succeeded in the development of a large forest industry in Northern Ontario. There are towns in the region which owe their existence almost entirely to the forest industry. The forest-based industry is the primary activity in the economy of Ontario's northwestern region, and an important activity in the economy of the northeast. Therefore, even though forest-based industry in all of Ontario may account for only about 5% of total provincial employment, 2.1% of the provincial gross domestic product (GDP), 18% of Canadian forest products and 6% of total provincial exports, any action or lack of action on the part of the government that may adversely affect the profitability of the industry is subject to considerable political and social pressures. Within the framework of forest policy, the major manoeuvrability available with the government is in the adjustment of stumpage charges. Because stumpage charges constitute only about 2% of total factor-input costs, little can be achieved by this instrument. In addition, the forest industry in Ontario is export-oriented and rather insensitive to domestic fiscal measures. Most of the hardships in forest industry and particularly in sawmilling arise from the very pronounced cyclical nature of the industry, yet great pressure can always be brought to bear on the government to keep the stumpage charges very low.

While Ontario has always been subject to this pressure, another kind of pressure has also arisen in recent years. This is the pressure from large urban populations to exclude harvesting operations from some areas for recreational and environmental reasons. Alternative users of forest land have become more prominent and therefore the opportunity cost of forest that was designated for timber production has increased.

The forester must now consider allocations of land among recreational, environmental and industrial forestry. As these newer uses have grown in importance, it has become clear that the old objective of encouraging establishment of forest industry by assigning the resource an opportunity cost of zero is not in the best overall interests of society. A forest is now perceived as being suitable for cutting only if the return obtained for the resource is at least as great as the benefit it is capable of bestowing on society in the form of outdoor recreation and environmental amenities. The government has acknowledged the existence of opportunity cost of industrial forestry by generally accepting that the Province (ie. the public) should obtain a "fair share" of the value of the timber being supplied to forest companies. This has and will lead to a closer look at the system of tenure and timber revenue policies.

Recognizing the fact that forests are a provincial resource in Canada and, in a large number of cases, the companies using them are multinational corporations, what should be the policy followed by Ontario with respect to forest tenures? First of all, let's assume that the objective of the government is to obtain as much economic benefit as possible for the province. The simple solution that the forest should be sold to the operating companies as suggested by Stroup and Baden (1973) and Lortie (1988) is therefore inappropriate. No one knows what benefits may be perceived to be flowing from forests in the future, but it is more likely that their values will exceed the present calculations of "present worth". Retaining the title of forest land will therefore make it possible for the people of Ontario to keep the returns from forests to themselves. Outright sale of land may result in the transfer of substantial benefits outside the province. The policy of keeping a tight governmental control over forest lands therefore seems to be compatible with the objective of obtaining as much economic benefit as possible for the province.

Timber production has strong external effects on the production of outdoor recreation and environmental amenities. The market for the latter two services is either poorly developed or not developed at all. However, Pearce (1990), (Pearce & Turner (1990) and Portney (1990) suggest a number of ways in which we can incorporate outdoor recreation and environmental amenities into the market. A unified management system for timber production, outdoor recreation and environmental amenities is therefore necessary for "internalizing" the external effects. In the absence of poor or no market values for the non-timber outputs of forests, a profit maximizing operator cannot be expected to make proper use of the "internalization" (Fisher et al. 1972). No amount of definition of property rights (Cheung 1970) is likely to be of any use in solving most of the management problems in this case. In addition, the interdependence of forest areas in different geographical locations can also be best taken care of only by continuing the management of all areas together. These considerations also suggest that the policy of keeping most of Ontario forests under public ownership and of enforcing management through a government agency is in accordance with the provincial objective.

However, the acceptance of government ownership of forest land causes difficulties in the most efficient use of forests through private entrepreneurs. Obviously, the private operator cannot be expected to invest in the forest resource over which he does not have complete control. Ontario recognized this situation and as a result in 1979, the Crown Timber Act, was amended to allow the Minister to enter into Forest Management Agreements subject to the approval of the Lieutenant Governor in Council. These agreements provide for a sharing of forest management responsibilities between the Ministry and a Company. In addition, they conveyed harvesting rights to the agreement holders.

In the past, the price at which timber cutting rights was transferred to the operators was usually very much lower than the cost of silvicultural and protection operations. The Timber Revenue Task Force of 1975 proposed that the forest revenues be roughly equal to the costs of maintaining the forests. Thus indirectly, the forest industry is being asked to at least pay a

small price for the timber that may be nominally more than the investment required to keep the forest producing wood for the industry. The Province is thus undoing what it seeks to do by keeping the forest land under its control. By giving timber away at no more than the cost of production, the objective of maximizing the economic benefit may not be achieved.

The value of what is traded depends on the right of action over the physical commodity (Demsetz 1964). The price at which Ontario sells its timber cutting rights is so low as to be barely equal to the costs of forestry in the Province. This seems to be the case because the rights to cut are encumbered in two main ways. First, the amount of timber cut on a licence is regulated by the management plans with such constraints on volume of species and in geographical locations as to reduce the value of wood for the operator. Second, the rights to selling wood cut in one's licence are not free and Government approval is needed for making transfers. As a result, not only are uneconomic rotation lengths adopted, but standards of utilization practiced and the efficiency of allocation of standing wood to various mills are not optimal.

The method of charging the timber price, ie. whether charges are on per unit volume basis or on lump-sum basis, has some effect on the level of utilization of trees in a licence (Nautiyal and Love 1971). Ontario has chosen to charge price on the per unit volume basis, but could perhaps increase the amount of wood removed from a given forest area in a year if it were to charge the price each year as a lump sum based on the average volume removals over the past three or five years.

Because the outright sale of forest lands to private companies / entrepreneurs does not appear to be in the interest of Ontario, the province should seek to evolve a tenure policy that will maximize the economic benefits from forest. From the discussions presented thus far, it seems that steps should be taken to encourage some form of competition between various users of forest land and timber so that the government may be able to obtain a fairly good idea about the market price of the resource it is selling. This can perhaps be done by increasing tenure charges so as to reduce the area under licences at present. The extra timber available for direct management by the Crown should be "sold" through tenders or by auction to highest bidders and administered through volume agreements. In addition, companies should be allowed to freely trade in cut timber. Where competitive sales are not possible, the minimum price at which timber is sold to a single buyer should be estimated by usual "appraisal" methods before negotiations are held. Consideration must also be given to the suggestion that where a lease expires, the renewal should be made at prices that are comparable to the competitive prices for the timber.

The recommendation of the Ontario Committee on Taxation (1967) and Nautiyal (1977) that the annual stumpage charges be based on the allowable cut and not on the actual volume removed should also be seriously considered again in Ontario. Only by having such a set of regulations as will result in the most efficient economic use of public owner forest land by private companies can the assumed Provincial objective of maximizing the economic benefits from forests be achieved. Finally, the 1987 Crown Timber Charges Review Report which

examined the level, system and philosophy of Crown timber pricing in Ontario identified advantages and disadvantages of the current system which are worth repeating.

It was found that the major advantages of the Province's timber revenue system compared to other systems were:

- its basic simplicity;
- its reflection of fluctuations in industry product selling prices;
- its ability to track inflation and maintain relative levels of timber revenue;
- its low administration costs, and
- the ability of industry to project and plan for Crown timber charges.

The major problems in the current system identified were:

- the imbalance between the Province's *direct* forest management, protection and access expenditures and *direct* Crown timber revenues;
- the inability of the system of classifying licensees to reflect cost of raw material to dependent mills;
- the failure of the system to reflect basic value differences of various species to the forest industry;
- the inconsistency of application and purpose of the Crown timber bonus prices;
- the inequity created by charging different prices to integrated and non-integrated timber licensees making the same end product; and,
- the inability of the system to identify the value of non-market products such as recreation and environmental amenities.

SUMMARY OF CROWN DUES FORMULA

Crown Dues Formula (1978-1984)

Single - Indexing Formula

$$\text{Dues} = A \times \frac{B}{C}$$

A = Base Rate

B = Current Index

C = Base Index (1978)
(July 1, 1978 'Norm')

Single - Indexing Effects

- 1) In the long run, ensures that the dues neither increase nor decrease in real terms, ie. simply compensates for inflation.
- 2) In the short run, provides direct proportional response of dues to selling prices.
ie. if prices rise 10%, dues rise 10%.
if prices fall 10%, dues fall 10%.
N.B. 10% rise in newsprint price is \$ 50/ton
10% rise in dues is 80 ¢ (1.6% of value).

Crown Dues Formula (1984 - Present)

Double - Indexing Formula

$$\text{Dues} = 1.25 \times A \times \frac{B}{C} \times \frac{B}{D}$$

- 1.25 = 25% increase
- A = Base Rate
- B = Current Index
- C = Base Index (1984)
(April 1, 1984 'Norm')
- D = 1.640 * Base Index (1984)

Note: In 1978, the base index was (1971=100) and in 1984, the base index was (1981=100). As a result, there was an increase in the industrial commodity price index of 64%. Hence, the value of 1.64 in the calculation of Crown dues.

Double - Indexing Effects

1. In the long run, ensures that dues rise at the rate of inflation plus another real amount equal to this. ie. 5% inflation results in dues rising 10%. (first 5% is only inflation coverage; second 5% is real).
2. In the short run, provides a "doubly-proportional" response of dues to selling prices (both rising and falling).
ie. if prices rise or fall 10%, dues rise or fall 20% (respectively).

Index descriptions

What are the indexes and where does the data come from?

1. Transaction prices are reported voluntarily to the Prices Division of Statistics Canada by the companies within a particular industrial sector producing a particular commodity.
2. Prices are reported by the companies and used in the calculation of a particular index are net selling prices, in other words, F.O.B. producer's mill or plant, in Canadian dollars excluding all trade discounts, taxes or outward transportation charges.
3. The indexes are available some 6 weeks after the reference date by telephone to Ottawa (613-951- 9603) on Statistics Canada letterhead from the Prices Division; or some 4½ months after the reference date in Statistics Canada catalogue, No. 62-011, Industry Prices Indexes (monthly).

Industry and Commodity Selling Price Indexes (1986=100)

Index 1: Lumber, Softwood, Spruce-Pine-Fir, East of the Rockies

Statistics Canada commodity no. 16-36-91-3312- 61 Cansim no. D693606

Description: This index dates back to 1961. It is an aggregate of 7 indices from various regions of Canada, east of the Rockies. 68 price quotations in all weighted by the 1986 value of output; from the sample of 25 firms, 18 quotes came from Ontario firms.

Index 2: Pulp and Paper Industries

Statistics Canada commodity no. 27-271. Cansim no. D694176

Description: The history of this index goes back to January, 1956. This is aggregated by industry. As a result, it is obtained by individual indices and by product. The indices are aggregated based upon the value of output for this industry in 1986.

Index 3: Lumber and Ties, Hardwood

Statistics Canada commodity no. 16-36-1-3311 Cansim no. D691502

Description: This index dates back to January, 1956. This index is an aggregate of two individual indices. One covers the domestic market and the other, the export market. Overall, 8 quotes are collected from the national level, of which 4 come from Ontario.

Index 4: Composite Index

Calculated by taking 25% of the value of Index 1 and 75% of the value of Index 2. Weightings reflect the proportion of lumber production in Ontario accounted for by integrated (sawmill-pulpmill) complexes.

Index 5: Composite Index

Calculated by taking 75% of the value of Index 1 and 25% of the value of Index 2. Weightings reflect the proportion of lumber production in Ontario accounted for by integrated (sawmill-pulpmill) complexes.

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LEGAL LIMITATIONS ON GOVERNMENTAL REGULATION OF PRIVATE FORESTRY IN THE UNITED STATES

Clifford A. Hickman and Maribeth R. Hickman

1. INTRODUCTION

Private forest owners in the United States (U.S.) are subject to a variety of governmental regulations that restrict their land use and management options. These include measures intended to keep forest lands in forest use, insure continued forest productivity, and minimize the impacts of forest practices on air and water quality, soil fertility, endangered species, scenic beauty, and especially critical or sensitive types of ecosystems such as inland wetlands and coastal zones.

For the most part, this regulation finds its legal justification in the so-called "police power" of government. Police power may be defined as the inherent right of government to pass laws restricting the conduct of individuals and the use of their property when such is necessary to protect the health, safety, morals, and general welfare of the public (Arbruck et al. 1985). The concept of police power as it applies in the area of land use traces its origin to both the common law of private nuisance and the legal doctrine of waste (Cubbage/Siegel 1985). The common law of private nuisance, which has been expanded by the courts to protect public as well as private interests, provides that individuals may not use their property in a manner that will injure the real property rights of others (Cubbage/Siegel 1985). The doctrine of waste, which was fashioned by the courts to balance the desire of current owners to make productive use of their property against the desire of future owners to receive the property in a substantially unimpaired condition, holds that owners may only use their property in a manner that will not damage or destroy it (Cubbage/Siegel 1985).

The basic objective of this paper is to provide a brief review of how the use of the police power in the United States is constrained by law. The discussion is intended to clarify both the powers of the regulators and the rights of the regulated with respect to private forest ownership.

2. INTERGOVERNMENTAL RELATIONSHIPS

Before examining the legal provisions constraining use of the police power, consideration must be given to the manner in which the federal, state, and local units of government are related to one another, and to the ability of each to control land-use and other activities affecting the environment. In the United States, federal legislation is considered to be the supreme law of the land and thus takes precedence over state statutes whenever conflicts occur. Similarly, state statutes are held to take precedence over local ordinances in the event of disagreements. However, by design of the nation's founders, the federal government was intended to be a government of limited powers. The federal government possesses only

those powers explicitly or implicitly granted to it by the U.S. Constitution. All other powers are vested in the states and, as dictated by their respective constitutions, to local units of government.

The principal powers of the federal government as enumerated in the U.S. Constitution include: (1) the power to regulate interstate commerce, (2) the power to tax, (3) the power to make all rules and regulations necessary to control the use of its own possessions, (4) the power to enter into treaties, (5) the power to regulate admiralty and maritime activities, (6) the power to provide for the common defense, and (7) the power to form interstate compacts (Soper 1974). As this listing suggests, the states were intended to be preeminent in matters relating to the use and management of all private lands, including forest lands, within their borders. Historically this relationship has existed, but within the last 20 years the situation has changed dramatically. Liberal judicial interpretations of the federal government's powers, in particular its commerce power, have enabled it to have a much greater impact on private land use and management decisions. Simultaneously, mounting pressures on local units of government, to regulate growth and maintain environmental quality, have caused them to exercise their land use control prerogatives with increasing frequency. As a consequence of these changes, private landowners in the United States, including forest owners, may now find themselves subject to federal or local as well as state restrictions.

3. LIMITS ON POLICE POWER

The U.S. Constitution and its Bill of Rights delineate a variety of legal safeguards intended to limit the powers of the federal government in its dealings with individual citizens. Many of these safeguards are reflected in the constitutions of the various states or, if not, are made applicable to the state and local governments by the U.S. Constitution's Fourteenth Amendment (NRDC 1977). Although many of these safeguards have little relevance to governmental applications of the police power to control private land use and management, others are relevant. Included within this latter group are the safeguards discussed in the remainder of this section.

3.1 Searches and seizures

The Fourth Amendment to the U.S. Constitution protects individuals as well as corporate entities from "unreasonable" searches and seizures. The courts have held that an unreasonable search is one that occurs without either a valid search warrant or voluntary consent. Furthermore, in those instances where a warrant is required, it must describe the place to be searched and, if a seizure is to occur, the persons or things that may be seized. In the land use and environmental regulatory areas, these requirements serve to constrain the police power in that where periodic inspections and/or other monitoring activities are needed to assess program compliance, they guarantee that certain protocols must be observed (Arbuckle et al. 1985, Soper 1974).

3.2 Self-incrimination

The Fifth Amendment to the U.S. Constitution prohibits compulsory self-incrimination. The protection is limited in that it applies only to individuals in criminal cases. In the land use and environmental regulatory areas, the prohibition can constrain the police power by denying government the ability to impose certain record keeping and/or reporting requirements (Arbuckle et al. 1985, Soper 1974).

3.3 Due process and equal protection

The Fourteenth Amendment to the U.S. Constitution guarantees that no person shall be deprived of life, liberty, or property without "due process of law" and that all persons are entitled to "equal protection of the law." In the land use and environmental regulatory areas, the courts have held that the due process clause requires essentially two things: (1) that all regulations must address some recognizable public interest, and (2) that there must be some reasonable relationship between an imposed regulation and the public interest being protected (NRDC 1977, Stoebuck 1982). Additionally, the courts have held the equal protection clause to mean that a regulation must not be discriminatory in its impact or, if it is, that there must be some reasonable basis for the distinction (Arbuckle et al. 1985, NRDC 1977). These requirements serve to constrain the police power by insuring that statutes that fail to adhere to their implicit standards may be invalidated by the courts.

3.4 Takings

The Fifth Amendment to the U.S. Constitution provides that private property shall not be taken for public use without just compensation. This provision was originally intended to be a restriction on the government's "eminent domain" power - i.e., on its power to appropriate private property for its own use through condemnation. However, in the 1922 case of *Pennsylvania Coal v. Mahon* [260 U.S. 393], the U.S. Supreme Court extended the restriction to governmental regulations enacted pursuant to the police power. Writing for the majority in *Pennsylvania Coal*, Justice Holmes established the following principle:

"The general rule at least is, that while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking." (Quoted in Bosselman/Callies/Banta 1973, p. 136)

In the land use and environmental regulatory areas, the takings clause creates the following dilemma for government officials - in their efforts to achieve some public purpose, they must be able to discern at what point of stringency or pervasiveness their restrictions are likely to be deemed a taking; or, alternatively, they must be prepared to pay just compensation for the value of the property infringed upon.

3.5 Relative importance of the limitations

Those constraints on government's police power relating to searches and seizures and to self-incrimination are generally of little importance concerning land use and environmental regulatory matters. In the vast majority of actual situations, search warrants never have to be

obtained because consent is voluntarily given for such things as on-site inspections and the gathering of essential information (Arbuckle et al. 1985). The prohibition against self-incrimination, as previously noted, only applies to individuals in criminal as opposed to civil actions. Furthermore, there is a significant amount of judicial precedent which indicates that routine record keeping requirements, when established in furtherance of some clearly non-prosecutorial governmental goal, will not be held as violating this constitutional safeguard (Soper 1974).

The due process and equal protection clauses place more serious constraints on the use of the police power, but if public officials exercise proper care when formulating and drafting legislation, they should not have great difficulty in implementing regulatory initiatives that will withstand judicial scrutiny. In terms of meeting the requirements of due process, the courts have interpreted the concept of "public interest" or "public welfare" so broadly that it is relatively easy to argue that desired regulations promote this end. The following excerpt from the majority opinion in the 1954 Supreme Court case of *Berman v. Parker* [348 U.S. 26,33] is illustrative.

"The concept of the public welfare is broad and inclusive The values it represents are spiritual as well as physical, aesthetic as well as monetary. It is within the power of the legislature to determine that the community should be beautiful as well as clean, well-balanced as well as carefully patrolled." (Quoted in NRDC 1977, p. 6)

Similarly, regarding the requirement that there must be a reasonable relationship between an imposed regulation and the public interest being protected, the judicial branch has, in general, been willing to grant the legislative branch wide discretion for determining when such a relationship exists. The following statement from the majority opinion in the 1894 Supreme Court case of *Lawton v. Steele* [152 U.S. 133] confirms this point.

"The State may interfere wherever the public interests demand it, and in this particular (sic) a large discretion is necessarily vested in the legislature to determine, not only what the interests of the public require, but what measures are necessary for the protection of such interests." (Quoted in Hippler 1987, p. 662)

Considering the requirements of the equal protection clause, most environmental regulations have proven invulnerable to claims that others who are similarly situated have not been dealt with equally harshly (Soper 1974). However, some problems have arisen in connection with the application of zoning restrictions to control land use and regulate growth. The courts have struck-down a number of so-called "exclusionary zoning" statutes on the grounds that they discriminated on the basis of wealth or race, or that they unreasonably interfered with the rights of people to travel and choose their place of residence (Arbuckle et al. 1985, Soper 1974). Legal principles which have operated to minimize the impacts of the equal protection clause include the following: (1) the concept that a statute is not invalid under the Constitution because it might have gone farther than it did; (2) the concept that a legislature

need not strike at all evils at the same time; and (3) the concept that reform may proceed one step at a time, addressing itself to those phases of a problem that seem most acute to the legislative mind (Soper 1974).

The most important of the constitutional provisions that restrict applications of the police power in the land use and environmental areas is the Fifth Amendment's requirement that when private property is taken, just compensation must be paid. If the courts were to routinely find that police power regulations amounted to takings, the costs of achieving many of society's land use and environmental quality goals, including those related to forests, would soon become prohibitive. On the other hand, if the courts were rarely willing to declare a police power regulation a taking, the concept of private property would become essentially meaningless. Because of the significance of this issue, it will be the focal point for the remainder of the paper.

4. JUDICIAL TESTS OF TAKINGS

Prior analyses of the relevant cases indicate that the courts have developed several alternative tests for determining when governmental actions constitute takings. These may be identified as follows: (1) the physical invasion test, (2) the nuisance abatement test, (3) the balancing test, (4) the bundle of rights test, and (5) the diminution in value test (Hippler 1987, Large 1987, Soper 1974). Each of these tests will be briefly explained, demonstrated, and evaluated. Not all of them have proven sufficient - i.e., in some fact situations the courts have found it necessary to apply more than one test to determine if a taking had occurred, but generally one test can be identified as having been of paramount importance to the final decision. On another point, not all of the tests are equally useful in assessing when police power regulations amount to takings.

4.1 The physical invasion test

Under the physical invasion test, a governmental action constitutes a taking if, by trespass or some other means, it causes private property to be physically appropriated (Soper 1974). A classic example of a case decided primarily under this test is *Pumpelly v. Green Bay Company* [80 U.S. 166 (1871)]. This case concerned a state statute which had authorized the construction of a dam to control flood waters. When the dam's pool was filled, it spread farther than expected and covered the plaintiff's land. The Supreme Court agreed with the plaintiff that a taking could occur without the government actually putting private property to public use and consequently ruled that, in this instance, just compensation was due (Large 1987).

In attempting to apply the physical invasion test, the problem of identifying what constitutes a "physical invasion" must always be confronted. In *Pumpelly* it was fairly obvious that the plaintiff's property had been effectively appropriated. Consistent with the principle established in that case, it seems relatively clear that additions of soil, sand, or other similar materials would also constitute takings - but the determination is not always easy to make in a given fact situation. To illustrate, consider the case of *Bedford v. United States* [192 U.S. 217

(1904)]. In this instance, revetments constructed by the government to improve navigation along the Mississippi River caused a gradual erosion of the plaintiff's land. However, the Supreme Court failed to find a taking, arguing that there was only incidental damage, not an actual invasion (Large 1987).

4.2 The nuisance abatement test

The nuisance abatement test, also known as the "noxious use" or "private fault" test, expresses the idea that when private property is being used in such a way as to harm the general public, there is no taking that requires just compensation when the government acts to protect the public interest (Soper 1974). Probably the best known court decision illustrating the application of this test is *Mugler v. Kansas* [123 U.S. 623 (1887)]. This case concerned a Kansas law that prohibited the manufacture and sale of intoxicating liquors within the State. The plaintiff, who owned breweries, argued that the law effectively took his property by greatly reducing its value. The Supreme Court rejected his claim for compensation - reasoning as follows:

"A prohibition simply upon the use of property for purposes that are declared to be injurious to the health, morals, and safety of the community, cannot be deemed a taking or an appropriation of property for the public benefit. Such legislation does not disturb the owner in the control or use of his property for lawful purposes, but is only a declaration by the State that its use by anyone, for certain forbidden purposes, is prejudicial to the public interest." (Quoted in Large 1987, p. 9)

The principal problem that arises in applying the nuisance abatement test is making an equitable determination of what constitutes a nuisance. Situations involving typical common law nuisances - e.g., smoke, fumes, odors, and noise - are easily resolved; but identifying what actually constitutes a nuisance in a particular situation can be difficult. In *Miller v. Schoene* [276 U.S. 272 (1928)] for example, the Supreme Court upheld a Virginia law requiring the owners of cedar trees infected with cedar rot to destroy their trees without compensation. The law was passed because cedar rot, although not fatal to cedar trees themselves, was, in its second stage of development, capable of killing all apple trees within a two-mile radius of an infection source. The State wanted to avoid this possibility because of the commercial importance of the apple crop (Large 1987). This decision of the Court might be viewed as harsh because: (1) the growing of cedar trees is not an activity that would normally constitute a nuisance, and (2) the cedar tree owners were clearly not responsible for the contagion that infected their trees.

Another factor that can complicate the task of making a fair nuisance determination is the passage of time. The case of *Hadacheck v. Sebastian* [239 U.S. 394 (1915)] provides a good illustration. This litigation concerned the operation of a brickyard which, at the time it was established, was located some distance outside the City of Los Angeles, California. After years of growth, the City annexed the area where the brickyard was situated and passed an

ordinance prohibiting continued clay mining and brick production. This action caused the estimated value of the plaintiff's property to drop from over \$800,000 to \$60,000. Despite this fact, the Supreme Court failed to uphold a takings claim. The Court reasoned that certain land uses with significant spillover effects, although once deemed non-noxious, can become noxious as the surrounding land uses change; and that it is entirely within the prerogatives of the legislature to recognize this and abate the nuisance without regard to any detrimental impacts on the individual (Hippler 1987). While this position may seem harsh, closer examination reveals that perhaps it is not. One can argue that in the case of activities with clear potential to harm, and where the only missing ingredient is people in close enough proximity for the harm to be realized, prudent entrepreneurs should anticipate the likelihood of future regulations (Soper 1974). Indeed, viewed from this perspective, the Court's decision in *Mugler* is probably more difficult to justify than its decision in *Hadacheck*. In the former case the nuisance emerged as a consequence of changing social values, not as a result of any inherently dangerous spillover effects associated with the activity being conducted. Therefore, the question becomes whether or not it is reasonable to expect entrepreneurs to anticipate changes in public morals.

4.3 The balancing test

The balancing test holds that the importance of the public goal to be achieved through a governmental action should be weighed against the intrusion into private property - the more important the goal, the less the likelihood there will be a taking; the higher the costs to property owners, the greater the likelihood there will be a taking (NRDC 1977). This test has been used quite extensively by the courts to uphold zoning regulations.¹ Zoning has been an essential tool for state and local governments to gain control over both the character and rate of growth occurring within their borders, but it has been recognized that zoning restrictions can cause dramatic reductions in property values outside of any normal nuisance type of situation. Indeed, the objective of zoning is to foresee nuisances so they can be prevented from occurring.

In more recent years, as the many important public benefits derived from undeveloped wetlands have become apparent - e.g., flood control, water quality improvement, and habitat for wildlife - the balancing test has been used also to support legislation intended to preserve such areas. Illustrative is the case of *Sibson v. State of New Hampshire* [115 N.H. 124, 336 A.2d 239 (1975)]. The Sibsons had purchased a six-acre tract of saltmarsh in 1968 for \$18,500. They had subsequently filled two acres, built a \$50,000 house, and sold the developed parcel for \$75,000. Concurrent with these events, the state had passed a wetlands protection statute that required all landowners to obtain a permit before conducting future fill operations in such areas. When the Sibsons, pursuant to their development plans, sought to obtain a permit to fill their remaining four acres, their application was denied. They

¹ *Village of Euclid v. Ambler Realty Company* [272 U.S. 365 (1926)] and *Agins v. City of Tiburon* [447 U.S. 255 (1980)] are representative of the zoning cases that the balancing test has helped to resolve.

argued that this action left their land economically worthless and therefore constituted a taking (McCraw 1976). The *New Hampshire Supreme Court* rejected their claim, reasoning as follows:

"The validity of the state action is determined by balancing the importance of the public benefit which is sought to be promoted against the seriousness of the restriction of a private right sought to be imposed. The state action is sustained in these cases unless the public interest is so clearly of minor importance as to make the restriction of individual rights unreasonable." (Quoted in NRDC 1977, pp. 10 and 11)

Although this test has the merit of being able to handle any possible taking situation, its doctrinal basis can be questioned. If the likelihood that a governmental action will be designated a taking decreases as the public benefit to be realized increases, then conceivably any action, including one that totally destroys or appropriates property, could be justified under the police power - thereby avoiding the need to pay just compensation - if the public goal to be achieved is important enough. Such a result would render the concept of private property meaningless, and would be contrary to the whole of eminent domain law (Stoebuck 1982). Additionally, a strong argument could be made for the opposing view that it is in cases where the public benefits are great that society should be most willing to bear the costs of realizing its interests (Soper 1974).

4.4 The bundle of rights test

The bundle of rights test is rooted in the common law concept that property is not a thing or an object, but rather a bundle of rights relating to a thing or an object. This bundle includes: (1) the right to possess the thing, which by implication encompasses the right to exclude others; (2) the right to use the thing; (3) the right to any benefits produced by the thing; and (4) the right to dispose of the thing by sale, gift, bequest, or some other means (Oakes 1983). Under the bundle of rights test, a governmental action will be deemed a taking when it deprives a property owner of too many of the rights that normally accompany property ownership (Hippler 1987). This test was used by the *Supreme Court* in arriving at its decision in *Penn Central Transportation Company v. New York City* [438 U.S. 104 (1978)]. This case concerned the constitutionality of the City's Landmarks Preservation Law. Pursuant to the objectives of this statute, Penn Central was denied permission to construct a multistory office building on top of its Grand Central Terminal - on the grounds that such a development would destroy the aesthetic features of a "historic landmark." A six-to-three majority rejected the company's takings claim, arguing that it had not been denied all reasonable uses of its property, nor had its reasonable investment-backed expectations been frustrated. The property had been used as a railroad terminal for sixty-five years and, under the law, could continue that use (Hippler 1987).

The principal problem that arises when applying the bundle of rights test is making an equitable determination of how many rights have to be lost before a governmental action

becomes a taking. The *Supreme Court's decision in Andrus v. Allard* [444 U.S. 51 (1979)] suggests that the right to sell is not critical. In this case, the Court upheld regulations of the Secretary of Interior prohibiting the sale of feathers or other parts of protected birds, even though the birds had been obtained prior to enactment of the Migratory Bird Treaty and Eagle Protection Acts (Oakes 1983). In contrast to this situation, the Supreme Court's decision in *Kaiser Aetna v. United States* [444 U.S. 164 (1979)] suggests that loss of the right to exclude others is critical. In that case, the Court struck-down a Corps of Engineers demand that Kaiser Aetna allow free public access to a lagoon it had created on the Coast of Oahu in Hawaii, and around which it planned to build thousands of homes. The Corps argued that since the lagoon had an opening to an adjoining navigable bay, it was part of the navigable waterways of the United States. In its ruling, the Court stated that the "right to exclude" is such a fundamental element of "property" that it falls within the category of property interests which government cannot infringe upon without just compensation (Hippler 1987).

4.5 The diminution in value test

The diminution in value test is the most widely used test in takings law; it is considered in the analysis of virtually all fact situations except those involving physical invasions or nuisances. The test holds that a governmental action constitutes a taking when its economic impact on property owners is so great that for all practical purposes it is a confiscation of property (Soper 1974). The test has its origins in the previously cited case of *Pennsylvania Coal Company v. Mahon* [260 U.S. 393 (1922)]. The Mahons owned a house built upon land which had been acquired from the coal company in 1877. In their deed, the company had expressly reserved the right to remove any coal from under the land by any means whatsoever. In 1921, the State of Pennsylvania passed legislation, the Kohler Act, prohibiting the mining of coal if such was likely to cause the subsidence of buildings on the surface. The Mahons argued that this law prevented the company from removing the coal from under their home. The company argued that the Act was an unconstitutional taking of its property (Large 1987). A majority of the Supreme Court Justices found in favor of the company, thereby striking-down the Pennsylvania statute. In writing for the majority, Justice Holmes set-forth the diminution in value test in the following language:

"One fact for consideration in determining the limits of the police power is the extent of diminution. When it reaches a certain magnitude, in most if not all cases there must be an exercise of eminent domain and compensation to sustain the act." (Quoted in Soper 1974, p. 56)

The principal problem that emerges in applying the diminution in value test is very similar to that associated with the bundle of rights test. In this context, however, one has to address the question of how great do the economic impacts of a governmental action need to be before the action will be held to constitute a taking. At one extreme, the rule established by the Supreme Court in *Pennsylvania Coal* makes it clear that property owners cannot be denied all potential uses, because to do so would amount to a confiscation of their property. At the other extreme, it also seems clear that owners do not have to be allowed to make the most profitable use of their properties, or to realize speculative investment potentials (Soper

1974). The case of *Just v. Marinette County* [56 Wis. 2d 7, 201 N.W. 2d 761 (1972)] provides a good illustration of this last point. In this case the Justs, pursuant to the objectives of the County's shoreline zoning statute - which restricted the use of their land, without special dispensation, to fishing, hunting, forestry, or the harvesting of wild crops - were denied permission to conduct a fill operation necessary to the completion of their development plans. The Wisconsin Supreme Court rejected their takings claim reasoning as follows:

"The Justs argue their property has been severely depreciated in value. But this depreciation of value is not based on the use of the land in its natural state but on what the land would be worth if it could be filled and used for the location of a dwelling. While loss of value is to be considered in determining whether a restriction is a constructive taking, value based upon changing the character of land at the expense of harm to public rights is not an essential factor or controlling." (Quoted in Soper 1974, p. 68)

The level of permissible regulation lies between the two preceding extremes, but cannot be precisely defined. The available evidence suggests that property owners cannot be denied all "reasonable" uses of their property. Furthermore, an analysis of the relevant cases indicates that "reasonable" generally means a use which is both feasible and economically profitable (Soper 1974, Stoebuck 1982). Some investigators have sought to develop quantitative estimates of the average point at which the courts have held diminutions in value to be takings, but for the most part these efforts have proven unsuccessful (NRDC 1977). However, one study placed the critical loss level at two-thirds of property value (NRDC 1977).

In any given fact situation, the task of estimating the economic impact of a specific governmental action can be greatly complicated by the need to arrive at an equitable definition of what constitutes the "affected property." In *Pennsylvania Coal*, the majority, adopting a convention existing under Pennsylvania law, assumed that the affected property was the so-called "support estate" (Hippler 1987).² Viewed from this perspective, the State statute at issue caused an essentially 100 percent diminution in property value. However, Justice Brandies, in a dissenting opinion, argued that it would have been more appropriate to consider the company's total coal holdings as the affected property (Large 1987). Viewed from this perspective, the state statute would have had very little impact on the value of the company's holdings - and thus a different decision would likely have been reached.³

² This estate was separate from the surface and subsurface mineral estates; it consisted of the right to support or not support the surface estate.

³ It is interesting to contrast the Supreme Court's ruling in *Pennsylvania Coal v. Mahon* with its ruling in *Keystone Bituminous Coal Association v. DeBenedictis* [107 S. Ct. 1232 (1987)]. Both cases involved very similar fact situations, yet opposing conclusions were reached. The differing outcomes can be attributed, to a large degree, to the fact that in *Keystone* the State of Pennsylvania was successful in convincing the Court that the purpose of its Bituminous Mine Subsidence and Land Conservation Act was to eliminate a public nuisance. This being the case, virtually any diminution in value could be justified under the nuisance abatement test. In *Pennsylvania Coal*, the Court's ma-

The widely differing results that have been obtained in cases where the diminution in value test has been employed can be explained partially by a number of theories which have emerged from various court decisions and have gained some degree of judicial acceptance. These include the critical natural features, reciprocity of advantage, and moratorium theories (Hippler 1987, Soper 1974). Each theory merits brief clarification.

The critical natural features theory holds that some types of lands - e.g., wetlands - serve such important public functions in their natural states that restrictions on the rights of private property owners to develop them should not be viewed as takings, regardless of the value impacts. This theory appears to have played a role in the Wisconsin Supreme Court's decision in the previously cited case of *Just v. Marinette County* (Soper 1974).

The reciprocity of advantage theory holds that some types of governmental actions - e.g., zoning restrictions - produce not only general public benefits, but also specific benefits for the private property owners being regulated - and in these instances no additional compensation is either necessary or desirable (Hippler 1987). This theory appears to have played a role in the Supreme Court's analysis in *Noble Star Bank v. Haskell* [219 U.S. 104 (1911)]. This case concerned the constitutionality of an Oklahoma law that required all banks in the State, including the solvent plaintiff bank, to place one percent of their average daily deposits into a Depositors' Guaranty Fund. The Court rejected the plaintiff's takings claim reasoning that the benefit which each bank would receive from such a scheme of mutual protection was sufficient compensation for the correlative burden that each was compelled to assume (Hippler 1987).

Finally, the moratorium theory holds that because natural ecosystems are often interrelated in complex ways that make it difficult to foresee how changes in one element will affect the remaining elements, governmental actions which temporarily restrict the rights of property owners to make alterations, pending the compilation of more complete information as to the probable effects of those alterations, should not be viewed as takings - regardless of the value impacts (Soper 1974). This theory appears to have been employed by the U.S. Court of Appeals for the First Circuit in reaching its decision in *Steel Hill Development, Inc. v. Town of Sanbornton* [469 F. 2d 956, 3ELR 20018 (1st Cir. 1972)]. This case concerned the validity of the town's zoning statute which imposed a six-acre minimum lot size requirement on over 70 percent of the plaintiff's land. In its ruling upholding the law, the Court stated the following:

"At this time of uncertainty as to the right balance between ecological and population pressures, we cannot help but feel that the town's ordinance, which severely restricts development, may properly stand for the present as a legitimate stop-gap measure. In effect the town has bought time for its citizens not unlike the action taken in referendum by the City of Boulder, Colorado to restrict

majority believed that State's Kohler Act had abrogated private property and contractual rights to confer benefits on a small number of private individuals (Hippler 1987).

growth on an emergency basis until an adequate study can be made of future needs. (Quoted in Soper 1974, p. 70)

5. IMPLICATIONS AND OUTLOOK

As the preceding review indicates, the law concerning police power takings is a gray area in American jurisprudence. The judiciary has failed to develop a unified and consistent methodology for determining when governmental regulatory actions constitute takings that require the payment of just compensation. Instead, a variety of alternative takings tests have emerged, and they often produce conflicting results in very similar fact situations. It seems clear that governmental actions causing physical invasions of private property will always represent takings, while actions that simply remove private nuisances never will. However, beyond these generally accepted principles, confusion appears to be the rule.

The uncertainty that surrounds the takings issue has important implications for both public officials and private property owners. Before they can assess their fact situations and evaluate the likelihood that a particular regulatory action will be sustained upon litigation, they and their respective counsels must first decide which of the alternative takings tests the court is likely to emphasize. The unsettled state of the law can make this a very difficult and costly process.

As a practical matter, only a small proportion of governmental regulatory actions - including those related to forest ownership and forestry practices - have not been upheld by the courts in the past. A number of studies have confirmed this fact. To illustrate, Bosselman/Callies/Banta (1973) concluded their comprehensive examination of takings cases by making the following observation:

"Our strongest impression from this survey is that the fear of the taking issue is stronger than the taking clause itself. It is an American fable or myth that a man can use his land any way he pleases regardless of his neighbors. The myth survives, indeed thrives, even though unsupported by the pattern of court decisions." (Quoted at pp. 318-319)

Similarly, Cabbage/Siegel (1985), after examining a variety of takings cases with strong forestry implications, concluded with the following statement:

"Regulation of private forestland practices is likely to continue to pass most legal tests. In almost all conceivable instances, forest owners will not be deprived of their land. At the same time, they will be providing valuable public benefits of environmental protection and future wood production." (Quoted at p. 545)

Looking to the future, some commentators have detected what they believe may be early signs of a somewhat more conservative judicial stance on takings matters - i.e., a stance supporting greater protection of private property rights (Kusler 1987, Rudolph 1988). Recent Supreme Court decisions in two takings cases - *First English Evangelical Lutheran Church of*

Glendale v. County of Los Angeles [107 S. Ct. 2378 (1987)] and *Nollan v. California Coastal Commission* [107 S. Ct. 3141 (1987)] - have been cited as evidence of this trend.

First English concerned interim floodplain regulations that had been adopted in 1978 by the County of Los Angeles in southern California. These regulations prevented the plaintiff church from rebuilding a summer camp which had been destroyed in a previous flood (Kusler 1987). The case is significant because, it is the first time the Supreme Court has ruled that property owners are entitled to compensation for temporary takings - i.e., in situations where governmental actions are ultimately determined to be takings, the Court stated that property owners can receive compensation for any losses incurred between the time the regulation is imposed and the time it is finally declared a taking (Rudolph 1988). Prior to this decision, injunctive relief - i.e., a setting-aside of the disputed statute or ordinance - has been the only remedy available to property owners who suffer from regulatory takings. Clearly this decision signals a need for governmental agencies to be much more cautious regarding the regulatory proposals they implement.

Nollan concerned a requirement of the California Coastal Commission that as a condition for the plaintiff landowners to obtain a permit to build a house on their ocean-front property, they would have to grant an easement giving people the right to walk along the shoreline. The regulation had been adopted by the Commission in accordance with a state statute enacted to ensure continued public access to the sea. The Commission felt the granting of the easement guaranteeing lateral access was a reasonable means of off-setting the loss of visual access that would result from construction of the beach residence (Kusler 1987). The Supreme Court disagreed and struck-down the requirement. This case is significant because some of the language in the majority opinion, written by Justice Scalia, seems to suggest that a more stringent judicial standard will be used in reviewing governmental police power regulations in the future. Specifically, the opinion implies that for regulations to pass constitutional challenge they must "substantially advance" a "legitimate state interest." Furthermore, in this context "substantially" appears to mean that the regulations must be more than "reasonable" or "rationally-related" to the goal to be achieved (Kusler 1987).

Although it may be premature to conclude that these two cases are indicative of a long-term conservative shift of the Supreme Court on takings matters, they do suggest that in the United States this will continue to be an evolving and unsettled area of law. This is significant because recent trends in population and real property values virtually ensure an increase in land use conflicts including many pertaining to forestry. While it is desirable that government know the limits of its powers, and property owners know the extent of their rights, such a harmonious relationship is unlikely - at least in the near-term - in this inherently volatile area of law.

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LEGISLATIVE REGULATION OF PRIVATE FORESTRY PRACTICES IN THE UNITED STATES - RECENT TRENDS

William C. Siegel

1. INTRODUCTION

Whether or not government should formally regulate private forestry practices has been debated by foresters and policy makers in the United States for more than 70 years. The issue has its roots in the early 17th century when the Plymouth Colony passed a statute that prohibited the cutting of trees without government permission (Huffman 1978). Many other forestry regulatory laws were later passed in the British colonies (Kawashima and Tone 1983). Once the United States became an independent nation, however, regulation faded and the first century of independence was marked by extensive forest exploitation (Scheiber 1983). This situation eventually led to a new forest conservation movement in the late 19th and early 20th centuries.

2. EARLY HISTORY

The first extensive discussion of regulation of private forestry in the United States actually began about 1917 and continued through the mid - 1920's. Emphasis was exclusively on regulation at the federal level (Siegel/Cubbage 1985). Nearly every issue of the *Journal of Forestry* published by the Society of American Foresters during that period contains some discussion of the failure of private owners to practice good forest management. Various methods for improving their stewardship were proposed, with most focusing on federal regulation (Salazar 1985). All federal regulatory legislation introduced in Congress, however, failed to be enacted into law.

Federal regulation became an issue once again in the late 1930's when Congress formed a joint committee, composed of members of both the House of Representatives and Senate, to examine forestry issues. The committee's report was published in 1941 and proposed that regulation of private forestry be a combined federal-state effort. Fearing that comprehensive federal legislation would be passed if state action was not forthcoming, five western states and ten eastern states enacted regulatory laws between 1937 and 1949 (Cubbage and Ellefson 1980). Most of these statutes addressed reforestation after harvest, usually by the mandatory leaving of seed trees. Again, no federal law was passed.

The drive for regulation faded during the 1950's and 1960's. Only one additional state forest practice act was passed during those two decades (Siegel/Haines 1988).

3. RECENT HISTORY

The United States is currently experiencing a renewed environmental protection movement which began in the early 1970's. This has led to stricter forest practice regulatory legislation

that has superseded or amended many older state laws and even to passage of a number of new forest practice laws in states that previously had none. Some of these statutes were enacted to meet the mandates of federal environmental law, with the western states passing the most comprehensive legislation. Problems are perceived to be less severe in the eastern United States and most state legislatures there, particularly in the south, are more conservative (Cubbage/Siegel 1984). Local zoning regulations and ordinances affecting forest operations have also become prevalent in the last decade, on both the east and west coasts of the United States. As a result, laws governing the practice of forestry on privately-owned lands are today an important factor in the decision making processes followed by many U.S. forest owners.

4. THE LEGAL BASIS OF REGULATION

A solid legal basis has been established for regulating forestry practices on private lands in the United States. The courts have consistently ruled that such statutes are constitutional if they do not discriminate among owners and are equally applicable to all. It is a well-established American legal principle, stemming from the English Common Law, that society can - through its police power - restrict, for the public good, the freedom with which owners may use their land and its resources (Roberts 1974, Bosselman et al 1973).

However, the police power exercised by the State for this purpose should not be confused with eminent domain. Under the doctrine of eminent domain, private property is taken for a public purpose and compensation paid. Such public taking without compensation is clearly prohibited by the 5th Amendment to the United States Constitution and the various state constitutions (Roberts 1974). Although regulation of forest properties by use of police power may decrease their value or earning potential, the property is not physically taken, nor is compensation paid. Such action is clearly legal.

Litigation concerning regulation of private land use historically has had a distinctly local flavor (Ryckman 1982). The plaintiffs, whether motivated by private or public concern, typically represent specific local interests and seek correspondingly limited local relief. Thus the judicial arenas for such disputes have usually been state courts.

State v. Dexter (32 Wash.2d 551, 202 P.2d 906, 70 S.Ct. 147 [1947]), the only litigation involving a state forest practice act to reach the U.S. Supreme Court, addressed taking from the standpoint of conservation of resources over time. In 1945, the state of Washington enacted a forest practices act regulating timber harvest on private land. Cutting by Avery Dexter was shut down in 1947 for failure to comply with the act. Dexter had refused to leave uncut all ponderosa pine less than 16 inches in diameter and to apply for a cutting permit. He maintained that the law permitted the equivalent of taking without compensation, thus destroying private property rights (Siegel 1974). The trial court ruled for Dexter, but the Washington Supreme Court reversed the decision and held the law to be constitutional.

The judges broadly defined police power, writing: "Edmund Burke once said that a great unwritten compact exists between the dead, the living, and the unborn. We leave to the unborn a colossal financial debt, perhaps unescapable, but incurred, nonetheless, in our time and for our immediate benefit. Such an unwritten compact requires that we leave the unborn something more than debts and depleted natural resources. Surely where natural resources can be utilized and at the same time perpetuated for future generations, what has been called 'constitutional morality' requires that we do so."

The majority held that the law violated neither the Fifth Amendment taking strictures nor the Fourteenth Amendment due process clause. The court refused Dexter's claim of financial loss as grounds for a constitutional challenge, stating: "It frequently happens that regulatory laws, enacted under the police power in furtherance of some appropriate purpose, impose hardships in individual cases, due to special and peculiar circumstances; but this fact will not subject the law to constitutional objection."

The state supreme court opinion was upheld by the U.S. Supreme Court without comment. The Dexter decision has been used frequently to support laws for regulation, preservation, promotion, and development of natural resources. The Washington act was also held to apply to state as well as private lands (*West Norman Timber v. State*, 37 Wash.2d 467, 224 P.2d 635 [1950]).

In 1955 the New Hampshire Supreme Court (Opinion of Justices, 99 N.H. 532, 114 A.2d 327 [1955]) generally recognized that the encouragement of reforestation and forest conservation affects the public interest and welfare. The legislature could enact laws to prevent indiscriminate damage to, or destruction of, forest and water resources of the state, even though they might involve some regulation and control over private ownership of property.

5. LEGAL PROVISIONS

Despite variations within and among states, most forest practice laws have similar features. The majority of the laws include a statutory purpose, a statement concerning the forest resources to be protected, and a specific method for establishing desirable forest practices. The statutes usually also specify methods for administration, applicability, exemptions, violation criteria and appropriate penalties. Many detail numerous rules that govern forest practices on private land, although some do not. In the latter instances, the rules have been developed administratively. Court decisions have involved most of these legislative components, as well as providing general legal support for regulation of private forest landowners.

5.1 Legislative Purpose and Resources Protected

Most laws have titles or purposes that vary, depending on their detail and scope. The modern state forest practice acts contain detailed purpose and policy statements. For example, the Oregon Forest Practice Act of 1971 vests a State Board of Forestry with authority to develop and enforce regional rules that:

"...assure the continuous growing and harvesting of forest tree species and to protect the soil, air, and water resources, including but not limited to streams, lakes and estuaries."

The California Z'berg-Nejedly Forest Practice Act of 1973 declares:

"...that it is the policy of (the) state to encourage prudent and responsible forest resource management calculated to serve the public's need for timber and other forest products, while giving consideration to the public's need for watershed protection, fisheries and wildlife, and recreational opportunities alike in this and future generations."

5.2 Method of Establishing Practices

A second consideration in forest practice regulation is specificity. Most local law entails specific regulations enacted directly in local ordinances. The old forest practice laws of the 1940s also usually specified regulations directly in the law as passed by the legislature. The modern, broad forest practice acts passed primarily by western state legislatures are usually only general enabling acts, providing for subsequent promulgation of specific rules by state-wide or regional boards.

If regional forest practice regulations are specified, the basic legislation commonly divides the state into physiographic regions. Different standards for environmental protection and regeneration are then promulgated for each region. Rule development may also require varying levels of rule-making boards, hearings, and agency involvement. More complex regulatory processes will require a longer period of time in order to promulgate specific regulations.

5.3 Agency and Method of Administration

Administering agencies and methods of administration vary by state and depend on the level of detail in the law. Comprehensive forest practice acts are usually administered by a department of natural resources or state forestry agency. Local zoning laws are administered directly by local authorities such as county commissioners or municipal agencies.

State laws may also delegate partial administration of the statute to appointed forestry boards, who may not only determine rules and regulations but perhaps may also even adjudicate matters regarding compliance and violations.

The method of administering a forest practice law ranges from mere compliance with enacted regulations to requirements for permits and performance inspections. In Oregon and Idaho, owners must only notify the state forester before an operation begins. The forestry agency then inspects a portion of these. Actions with the most potential for harming the environment are inspected more frequently.

The Washington Forest Practice Act divides potential forest operations into four classes. Severity of regulation varies by classification.

California law mandates preparation of a timber harvesting plan by a state-licensed, registered forester - a de facto permit scheme. However, in both California and Washington, the state environmental quality acts may take precedence over forest practices law when conflicts occur. Nevada requires landowners to report harvests and post a performance bond to insure compliance with its forest practice act. Local laws often require permits before harvesting may begin, and administering bodies have not been reluctant to refuse permission in order to protect wildlife, water, or amenity values (Hogan 1983, Ketcham 1983).

States in the west usually inspect all or a portion of forest practices. Some require inspections before, during, and after designated operations. Areas regenerated are also checked after one year to insure compliance.

5.4 Applicability and Exemptions

Forest practice regulations not only govern private activities, but in some instances may also apply to all non-federal public lands. Although states and localities cannot regulate federal actions, federal agencies usually voluntarily follow the procedural requirements in state laws.

Some legislation specifically exempts operations on very small tracts or those of minor importance. For example, the Massachusetts Forest Practices Cutting Law exempts harvests of less than 50 cords or 25,000 board feet.

Enforcement of forest practice regulations varies greatly, ranging from informal conferences to court-ordered remedial action. Agencies may also issue written orders to cease violation, or deliver stop work orders. They can additionally perform corrective action and bill the landowner or timber operator, with the costs becoming a lien on the land, or on the operator's business. Violations generally are considered civil actions. Penalties can be severe, ranging up to \$500 to \$1000 per violation per day and up to one year in jail in Washington and Oregon.

5.5 Regulated Practices

The specific forest practices that are regulated usually depend on the type of resources each law is designed to protect. In general, legislation may govern logging practices, regeneration standards, prescribed burning, chemical usage, road building, or related activities. Regulation of logging practices to protect the environment or nontimber resources is most common in both the comprehensive state laws and in local ordinances. Criteria such as the maximum slope allowed for skidder operations, methods of logging near streams, the means of making stream crossings, location of log yards, and the amount of shade to be left over streams are specified in the west. Regulation in the east also affects logging practices, including efforts to protect watershed and amenity values and to prohibit logging truck damage to local roads.

All of the comprehensive state forest practice acts contain regeneration standards. Regeneration standards may require not only the leaving of seed trees, but also planting if natural regeneration is not possible or successful. Some western regulations even describe statistical sampling methods for measuring whether adequate regeneration has occurred after one year.

Chemical use regulations typically dictate weather and wind conditions for applications, mixing precautions, proximity to water, cleanup methods, and container disposal procedures. Road building rules govern items such as the maximum permissible slope, protection of unstable soils, methods to make cuts and fills, requirements for reseeding roads, and placement of culverts and water bars. Other activities are also sometimes governed.

6. RECENT TRENDS - THE WESTERN U.S.

Judicial trends have heavily influenced the recent development and administration of forest practice regulatory legislation in the western United States. Most state forest practice statutes in the west contain strong environmental provisions in addition to timber resource standards. For example, California's Z'berg-Njedly Forest Practice Act not only addresses the public's need for timber and other forest products, but also watershed protection, fisheries, and wildlife and recreational opportunities.

The Oregon and Washington laws contain similar language and also list air quality. The Washington statute additionally addresses scenic beauty. The administrative regulations of all three states cover environmental values in detail.

Timber management and environmental protection provisions of forest practice statutes have often conflicted with each other, as well as with other environmental legislation. The forest practice laws usually represent a compromise between environmental and timber production concerns - reflecting the tension between protecting aesthetic and recreational forest uses and preserving the forest products industry (Hansen 1978). The courts have generally ruled that environmental protection for the public welfare takes precedence.

For example, state courts have held that both the California and Washington environmental protection acts prevail when conflicting with the state forest practice acts. In *Nole v. Cole* (No. 9806 Wash. Super. Ct. [Oct 5, 1977]), the court ordered the defendant to prepare a detailed environmental impact statement under the Washington Environmental Policy Act for a timber harvest, even though not required by the forest practice act. In *Natural Resources Defense Council v. Arcata National Corporation* (1 Civ. No. 37555, Cal. Ct. App. 1st Dist. [July 8, 1976]), the court held that the principles and some of the procedures embodied in the California Environmental Quality Act apply to forest practice regulation. The court ruled that when the two statutes overlap, the forest practice act must be construed in ways consistent with the Environmental Quality Act and with other state and federal environmental legislation - such as that dealing with water quality, endangered species, coastal protection, and wild and scenic rivers.

Most of the western states are stringently applying their regulatory statutes, although funds and manpower for enforcement vary widely among states (Cubbage and Siegel 1985). Regulation at the county and other local levels is also increasing rapidly in the west - particularly in Washington, Oregon and California. The more recently enacted of these local laws and ordinances are often more stringent in regulating forest practices than the more traditional state statutes (Lapping 1982, Hogan 1983).

7. RECENT TRENDS - THE EASTERN U.S.

Four states in the east have enacted new forest practice legislation in the 1970's and 1980's. Maryland and Delaware both passed seed tree laws which require the leaving of pine seed trees to ensure future regeneration. Massachusetts substantially amended its Forest Cutting Practices Law, considerably increasing the regulation of forest practices. For many years Maine has strictly controlled forestry practices in about one-half the state by means of regulations enacted by its Land Use Regulation Commission. In 1989, however, Maine enacted comprehensive state-wide forest practices legislation.

Massachusetts: In 1977, the Massachusetts Governor's Committee on Forest Policy recommended that the existing forest practice statute be redrafted and strengthened. A new law was enacted in 1982 and became effective January 1, 1984. The Massachusetts Forest Cutting Practices Act is intended to "ensure that good conservation practices are being utilized so that the land being harvested will remain in a condition that will not jeopardize the public interest" (Massachusetts Department of Environmental Management 1983, Smith 1984). The law was passed with the support of foresters and loggers who felt that they did not have enough input into logging regulations promulgated under the Massachusetts Wetlands Act and who wanted to forestall proliferation of local ordinances. Forest industry was well represented on the committees that drafted the law (Smith 1984).

Under the law, landowners must notify the Division of Forests and Parks and the conservation commission of the town where cutting is to take place. They must also submit a cutting plan before timber can be harvested and notify abutting owners within 200 ft of the area being cut unless separated by a public way. The Division of Forests and Parks must issue a final work order and a cutting practices certificate to the landowner within 10 business days after receiving the notice of intent to cut, or else operations may begin anyway - except in wetland areas. Landowners must post the certificate in plain sight from the highway at the entrance to the cutting area.

The Division of Forest and Parks inspects operations during and after harvest to determine whether cutting has been carried out in accordance with the plan and the statutory practices. When harvesting is complete, landowners must notify the Department of Environmental Management regional office. After final inspection for satisfactory performance, the Department issues a certificate of compliance.

Maryland: The 1977 Maryland seed tree law is patterned after the 1950 Virginia law. The law requires that eight pine seed trees 14 inches in diameter or larger be left per acre on harvest sites that are predominately pine. The law is designed only to promote forest regeneration, and does not specify actual timber harvesting practices. Penalties for violations consist of fines and reimbursement of state-performed compliance costs. In lieu of leaving seed trees, landowners can provide for reforestation by having a management plan approved before harvest begins.

Delaware: The 1979 Delaware seed tree law is patterned after the Virginia and Maryland laws. The law requires that six pine seed trees 14 inches in diameter or larger or eight pine seed trees 12 inches or larger be left per acre on harvest sites that were at least 25 percent stocked with pine. The statute applies to tracts of ten acres or larger. As in Virginia and Maryland, landowners can also provide for reforestation by having a management plan approved by the State Forester prior to cutting.

Maine: Maine's new legislation does several things. It creates a system of state forestry assistance for small landowners similar to a program abolished ten years ago. It also imposes strict reporting rules for harvested timber and requires regeneration after harvest. The number of acres of contiguous land that can be clearcut is limited.

Local Regulation: In addition to state legislation, many local governments in the east have passed ordinances that regulate the harvest or transport of timber. Most such ordinances have been enacted in the last 15 years.

Private landowner regulation in the northeast has been prompted primarily by concerns about logging and its effects on water quality, wildlife, or esthetics. Water quality concerns include nutrients in water, erosion from road building and log landings, streambed disruption by skidders, accidental fuel and lubrication spills, and removal of shade. In addition, many citizens in the Northeast are also concerned about esthetics, noise, increased truck traffic on town roads, and cutting practices used. Frequently, local regulations are enacted in response to a clash between urban and rural values (Popovich 1984, Wolfgram 1984, Youell 1984).

Forestry may be regulated at the local level in the eastern United States in a comprehensive and detailed manner by a separate distinct ordinance, or by concealment in a related ordinance. First, an ordinance regulating tree harvesting may be a small part of a larger ordinance, such as a soil excavation statute. Second, the application of the ordinance to harvesting may not be apparent in its language. For instance, an existing or new ordinance that regulates the extraction of natural resources may be intended or construed to apply to timber cutting. The enforcement and interpretation of these laws is often left with the town building inspector or transportation official (Provencher and Lassoie 1982).

8. RECENT TRENDS - THE SOUTH

Only two Southern States - Mississippi and Virginia - have formal, statewide forest-practice laws. Both are seed tree statutes that stipulate the leaving of a specified number of crop trees following harvest. Enforcement in Mississippi is virtually nonexistent. The legislation in Virginia has been enforced more consistently and is considered to be a rather successful program. Today, the law is well accepted by the state's forestry community. However, in the early years of enforcement, a number of small independent operators were prosecuted for noncompliance.

Each year approximately 40,000 acres are reforested in compliance with Virginia's Seed Tree Law. U.S. Forest Service inventory statistics indicate that the acreage of pine forest type in Virginia declined by 2 percent between the mid-1970's and the mid-1980's (Brown 1986). This is a significant improvement over the two previous decades, during which the acreage in softwood species decreased by 24 percent (Knight and McClure 1978). Most of the improvement is reflected in planted acreage, which increased by 72 percent between 1980 and 1990.

No southern state has enacted any type of comprehensive forest practice regulatory legislation. At this time, passage of such a statute in the South is not anticipated, although there has been occasional mention of the subject in several states.

Each southern state does have a general water quality statute. Although not specifically keyed to water quality and forestry, these laws do contain provisions that apply to pollution caused by human activity in and around forested areas. They generally empower a designated state agency to adopt standards and rules to deal with the consequences of polluting activities in forested areas rather than addressing the manner in which forestry operations are conducted (Goetzl and Siegel 1980).

Despite the south's traditional conservatism, a number of local governments have enacted ordinances to regulate logging practices in order to protect water quality or to prevent damage to local roads. Some urban counties - particularly in Georgia, Florida, and North Carolina - also regulate logging in order to control unbridled development, eliminate trash-covered logging sites, and protect esthetic values.

9. INTERACTION WITH FEDERAL WATER-QUALITY LAW

Much of the state legislation outside the south that regulates private forestry practices has some interaction with the Federal Water Pollution Control Act as amended in 1972 and again in 1977 by the Clean Water Act. Sections 208 and 404 of the Act provide the primary legal framework for control of water pollution from silvicultural activities. Section 208 mandates that each state develop and implement a water-quality management plan subject to approval of the Federal Environmental Protection Agency (EPA). Silvicultural operations are designated as one source of nonpoint pollution that must be addressed. Section 404 addresses point sources of pollution associated with forestry dredge-and-fill operations.

EPA's subsequent aggressive efforts to implement Section 208 planning included strong suggestions for formal regulation of private forest practices by means of state forest-practice laws (Agee 1975). A model regulatory law drafted by EPA contained strict regeneration standards, water-quality protection measures, and even guidelines for protecting esthetic qualities. Critical response from the forestry community prompted EPA to discard the model act in favor of less formal implementing mechanisms. Nevertheless, a number of States outside of the south have enacted specific regulatory legislation for controlling silvicultural nonpoint source pollution. Eight states - Massachusetts, Alaska, Idaho, California, Maine, Nevada, Oregon, and Washington - had incorporated such control into their state forest practice acts by 1990.

10. PROSPECTS AND CONCLUSIONS

Foresters can expect regulation in the United States to increase. Massachusetts has pioneered with a new forest practice act, partially in response to the proliferation of local laws in the state. Proponents of the state law felt that one uniform, statewide statute would be better than operating under a hodge-podge of local legislation. The increase of local ordinances in a number of other states is also prompting those states to consider state legislation.

The South, while usually averse to regulatory legislation, has seen increases in local regulation designed primarily to prevent damage from logging operations to water quality and local roads. Urban governments have been more apt to enact such ordinances. Many are also prompted by esthetic concerns, even though they may not specifically say so. Regulation will increase in the south, albeit more slowly than in other parts of the U.S. Statewide regulation in Florida and county regulation in Georgia seem to presage a renewed interest in forestry and logging controls. A number of conflicts are occurring between loggers and counties or municipalities that are attempting to enact stricter zoning ordinances (American Tree Farmer 1984). Some states are considering uniform statewide legislation to avoid problems with many different local laws.

As eastern and southern states grapple with the regulation issue, they may look to the west coast for precedents. California, Oregon, and Washington are currently experiencing conflicts between state forest practice laws and counties or municipalities that are attempting to enact stricter zoning ordinances (American Tree Farmer 1984). Recent revisions to the Pacific Coast state laws explicitly stated that state forest practice acts would take precedence over local zoning of forestlands. Since state laws prevailed, one might expect an increasing movement for state forest practice acts in the east and south. Either way, regulation is certain to continue to increase; it is only a question of which government body will do the regulating.

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AN EXAMINATION OF FEDERAL ESTATE TAX LEGISLATION DESIGNED TO PROMOTE FOREST MANAGEMENT IN THE UNITED STATES

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1. ARGUMENTS FOR AND AGAINST THE TAX

The federal estate tax is one of the oldest forms of taxation in existence in the United States today. It was first adopted on a temporary basis in 1797, and again as a temporary measure to help finance the Civil and Spanish American wars. It was finally given permanent status in 1916. The estate tax is applied to a deceased person's net estate before the estate assets are distributed to the heirs. It thus differs from an inheritance tax which is utilized by many of the 50 states. An inheritance tax is levied on the separate portions of an estate after distribution. The rates vary among the beneficiaries depending on their relationship to the decedent.

Several philosophical justifications have been cited over the years in support of the federal estate tax, which is levied at high and extremely progressive rates. These include: (1) it meets the social purpose of breaking up and redistributing sizeable concentrations of wealth, which prevents the development of a permanent moneyed caste living solely on property inherited from one generation to the next; (2) it helps to implement the notion that property should be taxed at least once during a generation - that the government has a right to its share since it was a passive partner in creating the estate; and (3) the receipt of an inheritance represents a special type of ability to pay without undue hardship; that is, the tax is not a burden when applied against property not yet belonging to an heir or legatee.

Several arguments have been raised against these theories. Among those heard most often is that an estate tax provides no allowances for the ages and wealth of individual heirs, or for the number of heirs. That is, the same rate is applied to a low income heir's small share of an estate as to a high income heir's large share. Then, too, it has been argued that the estate tax often forces the liquidation or break-up of family owned small businesses to the detriment of the nation's economy.

2. IMPACT ON THE FOREST RESOURCE

The federal estate tax remained relatively unchanged for the first 60 years of its permanent enactment. Nevertheless, it was the subject of considerable controversy, debate and discussion during this time. The purported impact of the tax on the nation's forest resources was a part of this continuous dialogue.

2.1 Differences of Opinion

Opinions have varied as to whether the estate tax has deterred good forest management practices and thereby adversely affected timber supplies. In his book on forest policy, written in

the early 1950's, William B. Greeley flatly stated that of all methods and systems of taxation, the estate tax presented the most serious obstacle to the practice of forestry.

A committee appointed by Resources for the Future in the 1950's to study forest credit also viewed the federal estate tax as a problem of considerable concern, particularly to woodland owners in the southern United States. The organization denounced the tax as constituting a disruptive influence by destroying or damaging viable forest management programs (8). The Committee was able to document numerous case histories - particularly in the south - where the estate tax had forced the break-up of well-stocked timber properties and had reduced growth rates by causing part of the timber growing stock to be liquidated.

The impact of the estate tax on forest productivity was discussed extensively in 1958 at a national tax conference hosted by the Bureau of Business Research at the University of Oregon. The participants were divided as to whether a problem actually existed and called for additional study (1).

George Lucas, based on case studies in the state of Alabama in the early 1960's, reached the conclusion that the estate tax had caused disruption of certain moderate and large size forest holdings, but was of little consequence in the case of smaller properties (6). On the other hand, Ciracy-Wantrup has taken the position that death taxes are neutral with respect to their impact on the decisions of private woodland owners (6).

Those who questioned in the 1950's and 1960's whether the federal estate tax really constituted a serious forestry problem at that time argued that - although the tax was highly progressive and the rates high - large deductions and credits, on the other hand, acted as an offset. They also pointed out that the tax is assessed and collected at irregular and unpredictable intervals. Therefore, its equity and incidence, they said, cannot be measured by the same criteria used to analyze property and income taxes (15). These persons also argued that large estates seldom consist chiefly of forest property and, where there has been an abundance of assets more easily liquidated than timber, the tax has had little or no impact on forest productivity.

2.2 Increasing Evidence of Adverse Effects

Nevertheless, certain underlying facts became apparent in the late 1960's and early 1970's. Ownership studies indicated that a high percentage of the nation's nonindustrial, private woodland owners were over 60 years of age. Also, prices being paid for timberland - and values established for estate tax purposes with respect to such lands - were increasing dramatically, often reflecting non-timber values. Numerous case histories had been cited that described difficulties (8,9,10,12,15). These usually revolved around liquidity problems, made more serious by such factors as: understocked stands, low and intermittent cash flows, impaired access to capital, and difficulty in obtaining credit. The usual results were either premature or inopportune timber harvesting, forced sales, fragmentation of properties, abandon-

ment of forest management programs by the heirs, failure to regenerate after harvest, and conversion of the land to other uses.

3. LEGISLATIVE CHANGES

Congress began to address the timber problems associated with the federal estate tax when it enacted the 1976 Tax Reform Act. The estate tax provisions of this legislation resulted from intense pressures for change that were built around the premise that the old law no longer related to the current economy (11). For the first time the nation's Internal Revenue Code contained estate tax provisions that specifically addressed forest properties (2).

3.1 Special Use Valuation

The 1976 statute outlines special valuation rules, which became effective in 1977, that permit certain farms and closely held businesses to be valued for estate tax purposes on the basis of their current use (termed special use valuation) rather than at a higher fair market value predicated on another use.¹ The term "farm", by legislative definition, includes woodlands - as well as the planting, cultivation and cutting of trees.

The 1976 legislation specified a number of prerequisites and restrictions, however, which - as a practical matter - severely limited utilization of the current use option for farm and forest properties (2,11). Some of these stipulations were subsequently liberalized by the 1978 Technical Corrections Act, the 1981 Economic Recovery Tax Act, and later legislation. The more important current provisions of the law follow.

Pre-death Requirements

Ownership: If a forest property is to qualify for special use valuation, it must have been owned by the decedent, or by a member of his (her) family as defined in the law, for an aggregate period of time totaling at least 5 of the last 8 years immediately preceding the decedent's death, and must pass to a qualified heir or heirs as defined by law. There has been no change in this requirement since 1976.

Use: During this period (periods) of ownership, the property must have been used for farming or a closely held business purpose - including timber growing - by the decedent or a family member. This qualified use has to be in the format of an active business - not a passive investment.

Material Participation: The decedent or a family member must have materially participated in management of the property for at least five years of an eight year period ending on the earliest of - 1. the date of* the decedent's death, 2. the date on which the decedent became disabled, providing that disability continued until death, or 3. the date on which the decedent began receiving social security retirement benefits, providing the benefits continued until the date of death.

¹ Section 2032A, Internal Revenue Code.

Diminution in Valuation: The fair market value of the decedent's gross estate cannot be reduced by more than \$750,000 as a result of electing special use valuation. The 1976 statute established a threshold of \$500,000; this was subsequently raised by later legislation. Beginning in 1999, the \$ 750,000 ceiling will be indexed for inflation.

Fifty Percent Threshold: The total fair market value of all property (both real and personal) in the estate eligible for special use valuation must be at least half of the entire estate's adjusted gross fair market value. Adjusted gross value equals the gross estate value minus certain debts of the decedent, estate administration expenses, and physical losses during estate administration.

Twenty Five Percent Threshold: At least 25 percent of the estate's total adjusted gross fair market value must be attributed to real property that is eligible for special valuation. Prior to enactment of the 1981 Economic Recovery Tax Act, this provision worked a hardship on a number of timber estates because of an arbitrary ruling by the Internal Revenue Service that standing timber did not constitute real property for purposes of the use valuation law. This meant that its value could not be used to help meet the 25 percent test. The result was that many timber estates failed to qualify on the basis of their land value alone. The 1981 legislation corrected this inequity by specifically providing that an election can be made for standing timber to be specially valued as an interest in the underlying real property. However, a recapture tax is imposed if the timber is severed or otherwise disposed of within 10 years of the decedent's death.²

Written Agreement: The agreement to elect special use valuation for the estate must be signed by all persons inheriting an interest in the specially valued property.

Qualified Family Member: For property to be valued based on current use, it must pass to one or more qualified family members as defined by law. The Economic Recovery Tax Act both tightened and liberalized this provision. The term "family member" as redefined now not only includes - as before - parents, grandparents, brothers and sisters and their spouses, grandchildren and their spouses, and husbands and wives, but also - in addition - children and grandchildren of surviving spouses who are not related to the decedent. Aunts, uncles and cousins have been eliminated as qualified heirs; forest property left to these persons no longer qualifies for special use valuation.

Post-death Requirements

For the special use valuation agreement to remain valid, and to avoid recapture of the taxes saved, three basic requirements must be met during the ten year period immediately following the decedent's death. These are:

Ownership: Ownership of the property must continue solely within the decedent's family unless divested because of involuntary conversion or like-kind exchange.

Material Participation: At least one qualified heir (family member) must materially participate in management of the property and maintain an equity interest in it. The 1981 law qualified

² For a full and detailed discussion of this provision, see bibliographical citation 3.

this stipulation with respect to heirs who are surviving spouses, under 21 years of age, or full time students for income tax dependency purposes. These persons are only required to meet a less stringent "active management" test. Active management entails making business management decisions other than daily operating decisions.

Use: The property must continue to be used and managed for timber growing purposes. The 1976 legislation was later amended to provide a two year grace period immediately after the decedent's death for a qualified heir to commence such use and management.

Property Lien

The original 1976 legislation stipulated that a first lien would be held on the property by the U.S. Treasury Department during the recapture period. The 1978 Technical Corrections Act modified this requirement by providing that the Department could, at its option, subvert its lien to that of a commercial lending institution in order to permit the heirs to qualify for a loan using the specially valued property as collateral.

3.2 Extension and Deferral of Tax Payments

A second major provision of the federal estate tax law applicable to timberland is one that permits estate tax payments in certain situations to be made in equal annual installments over a ten year period with the first payment being deferred for up to five years.³ An interest rate of only four percent is charged on the delayed tax payments attributable to the first one million dollars of value; this has been reduced to two percent by 1997 legislation. The applicable federal interest rate applies to amounts over that figure.

This option may be automatically elected for forest property that qualifies as a closely held, active business and which constitutes more than 35 percent (lowered from 50 percent by 1981 legislation) of the fair market value of the adjusted gross estate. There are no material participation requirements, nor is there a restrictive definition of family member, as with the special use valuation statute. However, all unpaid installments become immediately due if half or more of the qualifying property is either disposed of or withdrawn from the qualified use during the period of deferral or extension. All unpaid installments will also become immediately due if either interest or tax or both are not paid within six months after the due date of any installment. Under earlier legislation, all payments were accelerated if the due date itself was missed.

4. ADMINISTRATIVE AND JUDICIAL DEVELOPMENTS, SECTION 2032(A)

With respect to Section 2032(A), the statutory requirements must be complied with for specified periods of years. Careful, long-term planning is therefore often needed to insure that particular property will qualify (4). It has sometimes been difficult to adequately prepare, however, because of the complexity of the basic law, the frequent legislative changes, and the continuous surfacing of new issues not covered in the Internal Revenue Service (IRS) regulations written to interpret the law. Because of this situation, the IRS has issued a number of

³ Section 6166, Internal Revenue Code.

private letter rulings and technical advice memoranda concerning Section 2032 (A) which apply to specific estates. Each type of issuance is publicly available under the Freedom of Information Act and - although they may not be cited as legal precedent by other estates - are often useful for planning purposes as an indication of how the IRS approaches particular issues not addressed in the regulations. Litigation has also resulted due to the many unsettled aspects of the special use valuation law.

4.1 Material Participation

The "material participation" requirement probably has presented the most difficulty for timber estates that have attempted to qualify for special use valuation (10). The term is not clearly defined in the law. Exactly how active a timberland owner or his potential heirs must be in management of the woodland in order to qualify is not at all certain, even though material participation regulations⁴ have been written by the IRS.

Under the regulations, material participation is judged in light of actual personal involvement by the decedent and family members. If other than by full-time employment, it means a regular process of consultation and inspection, and actively making management decisions. Advancing funds or assuming financial responsibility for the operation are also required. If involvement occurs on less than a full-time basis, it must be pursuant to an arrangement entered into by the participant (or a member of the participant's family) calling for the activities that occur. Acts of an agent or an employee are not considered in determining whether there is material participation unless the agent or employee is also a family member.

Particular confusion has arisen regarding the situation of an absentee forest landowner who seldom visits his (her) property and which may be managed by a consulting forester. Will woodland in this category qualify? The regulations imply that in many such cases the test will not be met. They do make it clear, however, that the use of a consulting forester alone - in the absence of other disqualifying factors - will not negate material participation as long as the final management decisions are made by the landowner or a family member. When the 1981 Economic Recovery Tax Act was being considered for enactment, one version would have changed the pre-death material participation requirement with respect to forest land to a less stringent "active management" test, but this provision was deleted and did not become part of the final legislation (11).

4.2 Qualified Use

Generally, to meet the qualified use requirement, the decedent must have had an equity interest, and have been financially at risk, with respect to the specially valued forest property. The regulations require that both tests be met in order for management of the property to qualify as an active business as opposed to a passive investment. This requirement has also presented difficulties.

⁴ Internal Revenue Service Regulation 20.2032A-3.

4.3 Judicial Decisions

Estate of Sherrod v. Commissioner: The qualified use and material participation requirements with respect to woodlands were directly addressed by the 1982 Sherrod decision rendered by the U.S. Tax Court.⁵ The decedent's estate included approximately 1,500 acres of hilly rural land which was mostly stocked in low to medium quality timber, with some crop acreage and pasture. All of the crop land and part of the pasture were cash-rented, with the remainder of the pasture unused. Some of the property had been inherited by Mr. Sherrod in 1917, and the rest purchased between then and 1952. During most of the years prior to his death the decedent had looked personally after his land; during the last few years when his health became poor, his son did so. Management activities were limited to several personal inspections each year to protect against trespass, insects, and disease; maintenance of fire trails; and personal supervision of three selective timber harvests followed by natural regeneration. Mr. Sherrod personally paid the property taxes each year.

The estate elected a special use valuation of \$150,000 for the entire acreage, as opposed to a fair market value of \$565,000. The IRS did not question the valuations, but nevertheless rejected the special use election on the basis that the property was not being used for a qualified purpose and that neither the decedent nor his son had materially participated in its management. The government contended that the activity had not been extensive enough to constitute a business because the decedent had failed to conduct timber stand improvement activities, thin the timber, and artificially regenerate after cutting as recommended in "certain treatises on timber farming". Such practices are also listed as examples of good forestry management in the IRS material participation regulations.

The Tax Court flatly rejected this argument, stating that the IRS had failed to establish that the recommended procedures were practical or feasible for the decedent's property which consisted of rather low value hardwoods on rough terrain. The Court concluded that Mr. Sherrod's management practices had been consistent with the principles of good land management as recommended to and practiced by owners of other properties of similar location, nature and size. It noted that the timber acreage was almost seven times greater than the minimum number of acres considered necessary for a successful timber operation. Because either the decedent or his son had made every management decision necessary under the circumstances with respect to the holdings, the Court ruled that their activities constituted an active business and that there was material participation sufficient to qualify for special use valuation - the activities were not merely reflective of a passive investment.

Although the Tax Court decision was overturned and special use valuation denied, on grounds that had nothing to do with the timber aspects of the case, the material participation and qualified use portions of the holding remain intact.⁶ These are extremely important for several

⁵ Estate of Sherrod, 82 TC 40 (1982).

⁶ Estate of Sherrod, U.S. Court of Appeals for the 11th Circuit, No 84-7682 (1985).

reasons. The expansive reading given by the Tax Court to the qualified use and active business tests indicate that this particular court will continue to reject or substantially modify the narrow reading of those terms by the IRS. The recognition by the Court of local forestry practices and management techniques in determining whether a qualified use is present is a distinct advantage to timber estates. But perhaps the most important implication of the Sherrod decision is that the factors used by the Court as a basis for finding a qualified use are the same as those involved in determining that there is material participation. The Tax Court thus implied that the same activities can satisfy both the material participation and the qualified use requirements. This position is directly contrary to the IRS view of qualified use and casts doubt on the validity of the regulations in that particular regard.

Mangels v. Commissioner: The Mangels case,⁷ heard by the Iowa Federal District Court in 1986, also directly addressed material participation with respect to woodland. For six years before the decedent's death her conservator, a bank, leased her timberland on a cash basis to parties unrelated to the decedent. The Court held for the government in ruling that the conservator's participation in operation of the property was insufficient to satisfy the threshold requirements for material participation. No agent of the conservator lived or did physical work on the property, and participation in management was minimal. The cash lease arrangement with an unrelated third party was held to be a passive investment because the decedent had no equity interest in the property.

4.4 Administrative Developments

Letter Ruling 8408020: The IRS here held that a 167 acre wooded tract which was rented on a cash basis for hunting was a passive investment. The decedent had no equity interest, no active timber management program, nor was he at risk.

Letter Ruling 8729037: The IRS in this ruling addressed special use valuation in terms of tree planting under the Conservation Reserve Program. The decedent had owned several tracts of farmland and the executor of the estate had elected to specially value the property. The qualified heirs planned to participate in the Conservation Reserve Program (CRP) and plant the property to trees. The CRP provides for annual rental payments in cash or commodities to farmers who enter into a contract to convert highly erodible cropland to vegetative cover for at least ten years. The CRP also provides for payment of half of the cost of providing the cover. The IRS ruled that the qualified heirs' participation in the CRP did not result in failure to maintain a qualified use of the land following the decedent's death. It stated that the heirs were to be treated as continuing to use the land as a farm for farming purposes.

5. ADMINISTRATIVE RULINGS, SECTION 6166

The relationship of timber properties to Section 6166 has been addressed by several private letter rulings and technical advice memoranda.

⁷ Mangels c. Commissioner, DC Iowa (1986).

Technical Advice Memorandum 8437001: The ruling involved 5,000 acres of timberland that comprised 88 percent of the decedent's adjusted gross estate. The decedent had regularly visited the property and had followed good forestry practices in managing it. He personally supervised the management activities until bad health forced him to turn the supervision over to his son-in-law. For six years prior to the decedent's death, however, the property had been under a long-term cutting contract with a forest products company. The decedent had granted the company almost complete control over the property during this time, merely receiving a net income based on his ownership. The IRS held that the decedent's activities during the six years prior to death did not rise to the level of a business, but were merely those associated with conserving and managing an investment. The implication of the ruling is that Section 6166 qualification would have been allowed if not for the cutting contract.

Private Letter Ruling 8437043: This ruling concerned an estate in which 86 percent of the adjusted gross value was attributable to timberland. The estate had elected Section 6166 status which had been approved by the IRS. Good forest management was being practiced on the property. The estate was considering entering into a 29 year lease with a forest products company. All existing timber would be cut at the beginning of the lease and the property replanted. The Code states that if one-half or more in value of property that has qualified under Section 6166 is distributed, sold, exchanged or otherwise disposed of, the extension granted will automatically cease and all taxes become immediately due. On this basis, the IRS concluded that if the estate were to enter into the lease it would, in effect, be liquidating its active business enterprise of timber production. Under such a lease, the timber holdings would become merely an investment and Section 6166 status would be negated.

Letter Ruling 8722075: This ruling involved an estate whose section 6166 election had been approved by the IRS. Subsequently the estate partitioned its woodland, followed by a like-kind exchange. The IRS held that these transactions did not affect the estate's eligibility for installment payments of the estate tax. Although more than 50 percent of the property may have been transferred, the exchange did not affect or materially alter the timber business or the estate's interest in it. Accordingly the transaction in question were not considered a disposition for tax acceleration purposes.

Letter Ruling 9015003: The IRS concluded that the decedent's one-third interest in a timber business held in trust qualified as an interest in an active, closely-held business for Section 6166 purposes. The property was under active forest management; daily operations and timber sales were carried out by an independent forest management company. The decedent, individually and through her agents, participated in the decision-making process in running the business. She and the other grantors met annually with the trustee and a representative of the forest management company to review the prior year's forest management activities, to discuss plans for the coming year, and to make long term plans. The decedent also shared equally with the other grantors the income from, and the expenses of, the business - and

thus also shared in the risks involved. For purposes of Section 6166(a), activities of an agent may be attributed to a decedent. In this case the trustee was the decedent's agent.

6. DISCUSSION

What do the timber aspects of the federal estate tax law portend for the forest landowner? Despite the larger credits and deductions now available under current law to all estates, and the liberalization of the special use valuation procedures, and the deferral and extension rules, problems may well continue with respect to some woodland estates - particularly when a surviving spouse dies and there is no marital deduction as there was with the first death. The prerequisites under Section 2032A and 6166, although certainly less onerous than previously, are still quite restrictive (12). This suggests that many estates containing forest assets will continue to fail to qualify, and that the number will steadily increase as timber prices continue to rise with inflation.

Indications are that well-stocked, medium size forest holdings will be most affected by the estate tax - those of perhaps 1,000 to 5,000 acres that share an estate with other somewhat illiquid assets and which do not qualify for special use valuation and the marital deduction (7,14). Most tracts of timber larger than this are either owned by corporations and thus are not subject to the estate tax, or - if individually owned - seldom constitute the only major estate asset. Owners of larger woodlands usually have an abundance of assets more easily liquidated than timber, or have adequately planned in order to avoid the problem. In the case of a closely held corporation, however, the situation may approach that of an individual proprietorship or partnership, and difficulty may prevail.

In some situations, state death taxes may also constitute a problem in the years ahead (5). In many states, exemptions and deductions are considerably lower than at the federal level and have not been changed over the years. Therefore, as woodland values have risen, many more forest tracts have become subject to death taxes imposed by individual states (5).

In contemplating further federal legislative change, several factors should be considered. First of all, the estate tax provides less than one percent of total federal revenue and the proportion may become even lower during the next few years. Thus it might be argued that rates could be reduced even further, at least on timberland, for the public good. The decline in revenue would be slight. However, the basic congressional philosophy behind the estate tax must also be remembered - that no one should have his or her status entirely determined by the fact that he or she inherits a large estate.

A provision sometimes advocated is one found in Great Britain, where death taxes on timber are based on its value at the time of the decedent's death and payments are made only when timber is cut, following good management practices. If, for example, the tax rate is 20 percent, the amount payable each time timber is cut is 20 percent of the net stumpage receipts after deduction of management expenses since death or the last harvest. This procedure continues until the tax obligation is discharged. The plan is well suited to Great Britain where many for-

ests are harvested on a sustained yield basis. In the United States, however, where many woodlands have not yet reached full productivity, such a plan would result in numerous tracts being attached with death tax claims for many years without payment. Thus it would be scarcely feasible to seek this type of legislation in the United States.

7. CONCLUSION

What else can be done? Good estate planning can go a long way in minimizing the impact of the estate tax on forest property (13). This is particularly important after woodland has passed to a surviving spouse. The many estate tax changes promulgated in the Internal Revenue Code during the last five years have made effective planning easier than ever before. Various opportunities are available that can save substantial amounts of money (4). In numerous instances, for example, it may be possible to insure qualification for special use valuation by implementing the proper legal and management techniques. Proper planning in many instances can also help an estate to qualify for extension and deferral of tax payments under Section 6166 (4). Since the value of the qualifying property must exceed 35 percent of the adjusted gross estate, the planner must be familiar with the various elements that will constitute an adjusted gross estate in his or her particular situation. If the timber value is slightly less than 35 percent, for example, consideration should be given to either increasing the value of the timber business or decreasing the adjusted gross estate. In order to reduce the adjusted gross estate, the types of expenses that may be legally deducted should be reviewed for possible changes.

It appears that some medium to large size forest holdings that have been adversely affected by the federal estate tax in the past have often been associated with poor financial management on the part of the decedent. In certain situations a problem has undoubtedly occurred because the owner failed to realize just how much his property had increased in value due to inflation prior to his death. Forest landowners thus need to direct their attention to relevant techniques of estate planning that address both the legal ramifications involved and the forest management options that are available (4). Both of these considerations should be interwoven into the forest estate plan. This is an area that is rapidly coming into its own as a viable tool for alleviating potential death tax problems associated with the forest resource. Research can play an important role in analyzing various planning approaches and their degree of applicability to woodland (14). Moving in this direction is the real key to insuring that the impact of the federal estate tax on forest productivity will be minimal in the years ahead.

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THE APPROPRIATE ROLE OF U.S. GOVERNMENT PROGRAMS IN FOSTERING U.S. FOREST INVESTMENT

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Conventional wisdom in United States (U.S.) forestry holds that the investment capital for improving outputs from the U.S.'s timberlands would come from the owners of that land. But increasingly the U.S. forestry community is recognizing that amount of capital necessary to capture many of the investment opportunities in forestry are not available from most landowners. Forest policy and planning decisions in the U.S. therefore require reliable information on investment opportunities, responses of landowners to opportunities, and on public programs that may elicit landowner response when markets fail to do so.

1. U.S. SUPPLY AND DEMAND

In setting the stage for describing what appear to be economic or profitable timber investments in the U.S., it is critical to examine present and projected timber resources in relation to anticipated demand and probable price trends. The Forest Service report, "*Forest resources of the United States, 1992*" provides the latest basis for examining the timber supply and demand situation in coming decades. This report confirms that about 33 percent the U.S. land area - some 737 million acres - is forest land. However, only about two-thirds of this land, on 490 million acres, is either not set aside for other uses such as parks, wilderness areas, or wildlife refuges, or is capable of producing a commercial crop of timber. These 490 million acres are classified as "commercial timberland" and make up the U.S.'s timber-growing land base.

Timberland in the U.S. is subdivided into three ownership classes: public, forest industry, and nonindustrial private. Public ownership accounts for 131 million acres, or 27 percent of the total, with 84 million of the acres in National Forests. Forest industry owns 70 million acres of commercial forest land representing 14 percent of the timberland base. This leaves a sizable residual, 287 million acres, owned by a vast assortment of landholders categorized as nonindustrial private owners. This class of ownership accounts for 59 percent of the commercial timberland resource and presents, as it so happens, an even greater percentage of acres where profitable investment opportunities exist.

Of equal importance to the number of acres and who owns them is what is growing on commercial timberland. There are more softwoods than anything else, about 449 billion cubic feet, one third of which are in the combined ownership classes in the three Pacific Coast States of Washington, Oregon and California. More than half the softwood inventory stands on the National Forests, much of it, obviously, on National Forests in the three Pacific Coast States. Hardwood inventories are estimated at about 336 billion cubic feet, slightly less than

half the softwood total. Most of the hardwoods are in the hands of nonindustrial private owners in the eastern half of the country and are fairly equally divided between North and South.

This timber resource or wood supply is not static. It is in a continual state of change, due to forces of nature and man. The net effects of both have been positive in the last three decades. Man has contributed to increases in the timber resource through increased technical knowledge and investments in forest management. Softwood growing stock inventories have increased by 7 percent in the last 25-30 years. Increases to hardwood growing stock inventories have been even greater with a 43 percent increase over the same length of time. These gains, however, are not evenly distributed across the country. Almost all gains in both softwood and hardwood inventories have been in young stands in the East, both north and south. Softwood inventories in the West, particularly on the high-value growing sites of the Pacific Coast States, have dropped substantially as a result of harvesting old-growth stands particularly in private ownership's. These sites are now supporting new, fast-growing stands with relatively little volume at present.

2. U.S. TIMBER DEMAND AND RESULTANT PRICES

A far-reaching conclusion of the updated Assessment is that demand for timber will rise even faster than supply. Again, it is helpful to divide discussion into softwood and hardwood.

Actual consumption of softwood fiber in 1991 was 11.8 billion cubic feet. If recent trends of forest management continue, available softwood supply is likely to be only 16.3 billion cubic feet per year by 2030 (Haynes, et al.). Under these circumstances, prices will rise to the extent necessary to equate supply and demand. Projections of probable price changes in softwood stumpage vary by region, but there is one consistent theme: real prices in all regions will rise. In the South, expected real price increases for softwood stumpage are substantial. Prices in the South, net of inflation, are expected to rise between 2 and 3 percent at an average annual rate between now and 2030. In the Pacific Northwest and the North, projected increases are slightly lower at 1.8 and 1.9 percent, respectively. These are the U.S.'s major timber producing regions, and in each promises rising prices as inducement to investors.

Hardwood supplies appear adequate to meet demands for the next 20 years with prices rising no faster than general rates of inflation. Soon after the turn of the century, however, demands for hardwood are expected to intensify, with upward pressure on stumpage prices.

The Assessment, therefore, points to softwood timber investments as the most promising. However, data that describe U.S. opportunities for investments in forestry are rare. The information that is provided here is a Southern subset from a nationwide study undertaken jointly by the USDA Forest Service and forest industry (Fecso et al.).

In this study, more than 400 university, industry, and government forest managers in 7 timber supply regions and 25 individual States selected what they considered significant opportunities to increase timber supplies through intensified forest management. Panelists prescribed specific forest management actions to correct existing conditions on commercial timberlands, assigned probable costs to undertake the recommended action, estimated increases in timber yield from the action, and outlined ranges of existing stumpage prices. Forest service resource analysts added acreage estimates for each opportunity selected by the panelists in the 25 major timber-producing States. Rate of return on investment and present net value were the criteria selected to measure economic efficiency.

Five treatment classes were dealt with as follows:

1. Stocking control intermediate stand treatments to accelerate growth or to improve species composition.
2. Stand conversions - harvest existing stands of low value and replace them with favored softwood species.
3. Regeneration of nonstocked acres - site prepare and plant pines where land is nonstocked.
4. Regenerate hardwoods - harvest mature hardwoods in fertile bottomlands and prepare the site for natural regeneration of desired hardwood species.
5. Harvest and regenerate - harvest mature and overmature stands of softwoods and regenerate by natural or artificial means.

First, these forest management options for nonindustrial private lands in the South were ranked in terms of expected rate of return - in real terms net of inflation.

Investment Opportunity	Rate of Return (%)	Total Acres in the South (MM)	Average Costs per Acre (\$)	
			1978	1983
Stocking control	18	17.7	30	40
Regenerate nonstocked acres	12	13.6	95	130
Harvest and regenerate	11	27.6	105	140
Stand conversion	10	24.5	115	160
Regenerate hardwoods	8	4.7	45	60
Total South		88.1		

Two items in the list warrant additional comment. First, stocking control offers the highest rate of return on investment because per acre costs are low, resulting growth increments of about 35 cubic feet of wood per acre per year are fairly sizable, and the period between making the investment and realizing the return is much shorter than most forestry options.

The other item of note is the number of acres where harvest followed by regeneration or stand conversion is the recommended forestry action. Over 52 million acres fall in these

categories. Thus, 59 percent of recommended treatments on nonindustrial private ownership in the South involve removal of existing stands and replacement with pines. In fact, across the South about 1 of every 8 acres of forest lands controlled by private owners would benefit from conversion to southern pines. This is one of the largest single opportunities for forest investment in the United States. And the rate of return, about 10 percent, is competitive in real terms.

Next, these lands were examined to determine where profitable opportunities are located in the South. In this analysis we use present net values as our criterion of profitability. Discount rates, prices, and costs are in real terms, so these acreages represent opportunities for returns above the level of inflation. We used two cut-off rates, 4 and 10 percent, and list the privately owned nonindustrial acre in each State that promises to return at least the indicated cut-off or minimal acceptable return rate.

Acres that Promise Positive Present Net Values at Indicated Discount Rates

State	MM acres	
	4%	10%
Alabama	13.6	9.3
North Carolina	10.8	2.3
Georgia	9.8	3.3
Virginia	9.8	1.1
Mississippi	9.1	5.5
South Carolina	6.4	2.5
Arkansas	6.4	4.5
Florida	6.3	4.4
Tennessee	5.6	4.4
Louisiana	5.2	3.4
Texas	5.1	3.2
Total	88.1	43.9

These results are significant in terms of investment opportunities. More than 88 million acres of nonindustrial ownerships in the South promise returns of 4 percent or more above the level of inflation. Fifty percent of these acres offer returns of 10 percent or more. Even if we assume that stumpage prices exhibit zero real increase, that is, if they parallel inflation or actually fall below the rate of increase of other prices, most of the 10 percent forestry investments are still profitable. Stand improvement where young pine plantations now are overrun with unwanted brush and regenerating pine on good sites after harvest represent investments that earn 4 percent even if real prices decrease annually at 5 percent.

3. LANDOWNER RESEARCH

A vast amount of literature on landowners and landownership has accumulated in the past several decades. Some 100 to 150 empirical surveys of landowners have been conducted since the 1940's. These, together with numerous related studies, offer us a legacy of infer-

ence, speculation, debate, and innuendo on the forestry-related behavior of landowners. Without new modeling efforts, we must depend on these past studies to piece together a composite view of landowner performance and begin building theories of behavior. But past data are piecemeal, fragmented, and often narrowly focused, making the exercise of model building analogous to predicting human behavior from a series of old and faded snapshots. Because of methodological deficiencies and lack of continuity of data over time and across geographical regions, past studies afford us only limited opportunities to draw definitive conclusions about the market as an allocator of timber resources and the potential success of remedial public programs.

A project to develop new insights on landowner behavior was conducted in the 12 southern states comprising the U.S. southern pine region. To find out the importance of government incentives for investing in pine reforestation, 759 nonindustrial forest landowners throughout the South were asked about the potential impacts of additional tax incentives, costsharing, price information, additional technical assistance, special loans, forestry insurance, and education programs on their reforestation investments. Southern nonindustrial forest landowners were asked their perceptions on the effects of these alternative public policies and programs. The purpose was to evaluate the importance of various incentives for reforesting their lands with landowners who have harvested at least 10 acres of timber in the last 10 years. Interview results were weighted by the land area harvested.

The survey revealed that the key motive for owning and managing harvested forest lands in the South is oriented more toward the building of an estate (that is, a long-term, family-oriented investment) than toward deriving short-term profits (Fecso, et al.). Evidence to support this contention can be found in the large proportions of harvested lands owned by individuals who (1) have inherited their land (48%), (2) feel timber management is very important (62%), and (3) have no intentions to sell to nonfamily members (86%). Further supporting this conclusion was evidence showing most timber was sold (64%) because it was perceived as being mature and a suitable price was offered. Most active reforestation efforts following harvesting were prompted by the feeling that the land should be kept in timber production (91%) and in anticipation of returns from the timber production (80%).

Investment in intensive pine management, however, was limited on the harvested parcels. An examination of post-harvesting activities on the clearcut acreages revealed that less than one-half of those acres were purposely managed for pine following harvesting. Site preparation was conducted on 38% of the clear-cut lands, with mechanical preparation and controlled burning the most commonly employed measures. Seedling were subsequently planted on 35% of the clear-cut acres; another 9% of the clear-cuts were reforested using seed trees. This left over 50% of the clear-cut acreage not being actively managed for pine after harvesting. On partially cut acres only 9% were prepared for reforestation after harvest.

Table 1: What effect, if any, Government programs would have on the landowner's decision to reforest after harvest

Programs	High	Moderate	Low	None	D'ont know	Total
	(Percent)					
Increasing education on/or demonstration of forestry practices	7	24	24	35	9	100
Making more free technological forestry advice available from professional forester	19	29	15	32	5	100
Increasing availability of cost-sharing money to help reforesting land	47	16	13	20	4	100
Modifying tax laws which allow to recover reforestation costs through additional tax credits or tax deductions	46	24	9	16	5	100
Offering loans at market rates which provide yearly periodic income and which you repay at time of harvest	9	17	16	49	9	100
Providing better, more accessible information on prices for standing timber	26	24	14	30	6	100
Making forestry insurance available to insure against losses due to fire, insect, or disease damage to trees	11	15	27	39	8	100
Improving capital gains tax treatment for timber income	46	22	11	14	7	100
Reducing the tax burden on heirs by lowering inheritance and estate taxes	57	19	8	13	3	100
Permitting lower property tax assessment because land is in forestry use	61	20	6	9	4	100

Public policies that would offer potentially effective pine reforestation incentives to the owners of a large majority of harvested timberlands were identified as follows (Table 1):

- Reduced property taxes (to ease the annual financial burden of owning and managing pine).
- Reduced estate and inheritance taxes (to minimize the financial penalties and the need for hasty decisions regarding pinelands following the death of the landowner).
- More favorable tax credits and tax deductions (to encourage investment in pine reforestation at the time of harvest).
- More favorable capital gains treatment for timber revenues (to increase the availability of pine reforestation investment dollars).
- Increased public cost-sharing (to defray partially the high costs of pine reforestation to the private landowner).

Instituting these public policies should alleviate some of the pressures perceived and expressed by landowners who face reforestation decisions. However, the reforestation study showed that pine forestry on nonindustrial private holdings in the South continues to be one of the most perplexing challenges to the forestry community. Although the economic climate for pine forestry in the South has steadily improved in recent years, pine management, particularly intensive pine management, is not widely recognized as being needed, nor is it in

the personal interest of the owners of many of the South's harvested acres. Without a recognition of the need for forest management following harvesting and an investment by most landowners, little can be expected in terms of pine regeneration. A large number of harvested acres are held by individuals who questioned the long time horizons (42%) and high cost of intensive pine management (49%). Foremost to the question of pine reforestation is reshaping the perceptions of the owners of some 80% of the harvested lands on which no actions were taken following harvesting and on which the present perception of the owner is that cutover lands will adequately reforest naturally. Therefore, management of and investment in pinelands in the South present a unique challenge to the U.S. forestry community.

4. SOME CONCLUDING THOUGHTS

New dimensions of U.S. forestry must be considered because most U.S. Government agencies will be functioning in a new arena in the new millennium. The decade will be one of quantification and accountability, with growth in federal budgets projected to lag behind growth in the 1960's and 1970's. Cost-effectiveness and attainment of social goals will be criteria for the establishment and survival of government programs. Only by analyzing investment responses among the owners of the nation's forest lands and translating that information into information for congressional and administrative budget analysts can we identify the proper share of dollars for public forestry programs.

Just as the 1990's differed from the 19680's , the new millennium will bring changes that will influence resource supply and demand and, consequently, planning.

Inflation, energy, transportation systems, international relations, and urbanization will all have impacts on the supply and demands for output from nonindustrial private forest lands. Shifts in planning will necessitate new approaches based on a revised understanding of the factors that influence supply and demand.

Designing a model system to track all data needed for planning is not feasible because of costs. We must determine which data are important and the various factors that influence landowner behavior. We must then relate resource information to planning processes, design systems to monitor trends, and develop models to evaluate alternative plans in light of social goals.

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LOCAL GOVERNMENT FOREST REGULATORY ORDINANCES IN THE UNITED STATES

William C. Siegel and Chris E. Martus

1. INTRODUCTION

Environmental issues have become an increasingly important topic of discussion in the United States during the last twenty five years. Environmental quality now receives unprecedented attention. Expanded public interest in international environmental problems such as global warming, tropical deforestation and acid rain have sensitized the American people to national environmental concerns. This heightened awareness has been translated into increased regulatory action by all levels of government. In the last two decades, dozens of environmentally motivated laws have been enacted by the federal and state governments. Local governments below the state level have also become active in regulating environmental quality. These trends have greatly impacted the manner in which forestry and silvicultural activities are conducted on private land.

2. LOCAL GOVERNMENT REGULATION

2.1 Historical Context

Public regulation of private forestry is not a new development in the United States. Conserving natural resources in North America began with laws passed by the early colonists. State laws which restrict forestry and silvicultural practices on private land have existed for over sixty years. In the 1970's, federal laws to protect water quality were enacted. These statutes empowered state governments to further restrict forestry activities (18).

Local government regulation of forestry practices is also not new. Local forest laws were enacted in California in the late 1930's (4); local timber harvesting ordinances have existed in southern New York state since the late 1950's (26). Forestry regulation below the state level, however, did not become pervasive until the late 1970's and early 1980's, which witnessed a rapid proliferation of ordinances being passed by counties and other local units of government. During this period such regulation became common, especially in the states of New Jersey, New York, Connecticut, Pennsylvania and Georgia (12, 20, 31).

2.2 Reasons for Enactment

The nature, scope and purpose of regulatory ordinances differ greatly. They have been enacted for a number of reasons that include environmental protection, natural feature and habitat preservation, protection of public property and preservation of forestland. They vary considerably in their regulatory requirements. Some ordinances simply require notification of local officials before timber harvest or hauling activities begin (29); others are highly restrictive and even prohibitive of forestry activities (16).

Writers on local government forest regulation have interpreted the proliferation of ordinances as being the result of social conflicts between urban and rural residents in rapidly urbanizing communities (12, 28, 32). In many parts of the United States there has been a marked population shift from urban to more rural areas. Urbanites who move to rural settings are generally unfamiliar with agricultural and forestry management practices, and have few economic and social ties to the resource values of the land (22). They may initiate regulation to protect suburban/rural fringe areas from perceived damage arising from rural land management activities (11). The maturation in recent years of previously unmanaged woodlots, strong markets for products such as firewood, and the "home rule" government status of some municipalities have also contributed to the growth of local forest laws (19, 21, 42).

Some local regulation has been imposed in response to certain state and federal programs established to protect natural features. Connecticut's Housatonic River Corridor legislation, the Chesapeake Bay preservation laws of Maryland and Virginia, and New Jersey's Pinelands Protection Act are all examples of states empowering local governments to regulate forestry activities. The federal and some state governments have also authorized local officials to regulate forestry practices under the auspices of wetland protection statutes (18).

2.3 Limitation of Local Government Authority

In some cases a backlash has occurred. As a response to the growing number of local regulatory ordinances, several states now limit the authority of local governments to restrict forestry activities. Massachusetts' 1982 Forest Practice Act, Georgia's Open Burning Law and New Hampshire's 1990 "Right-to-Harvest" law were all adopted, at least in part, to protect forestry operations from unreasonable and diverse local regulation (3, 18, 30). Despite the emergence of state preemptive measures, however, those who have studied local forestry regulation feel - without exception - that local ordinances will continue to increase in number (10, 12, 19, 21, 30, 42).

3. LOCAL DISCRETIONARY AUTHORITY

3.1 Types of Local Government

Local governments must be granted authority by the state in which they are located in order to regulate forestry practices and other land use on private property. The processes through which local governments are given such authority is central to a discussion of local forestry ordinances.

The form of local government usually dictates its function. Therefore, knowledge of the government structures used by the states to organize land areas within their boundaries is useful in understanding the methods of delegating authority. According to the U.S. Census Bureau, local communities must possess the following attributes to be counted as a government: (1) existence as an organized entity; (2) government character; and (3) substantial autonomy (36). Governments must have some form of organization; the power to own property; and the authority to enter into contracts. They must have the power to create budgets, enforce laws, and

raise revenues (24). In 1987 the Census Bureau counted over 83,000 local governmental units in the United States. This includes 3,045 counties; 19,200 municipalities; 16,691 towns and townships; and 44,252 special governments (37).

Counties: Counties are found in every state except Connecticut and Rhode Island. In Louisiana and Alaska they are called parishes and boroughs, respectively. Counties are legally designated as "quasi-municipal corporations", meaning they are subdivisions of the state. Unlike municipal corporations (cities and incorporated towns), quasi-municipal corporations act as agents of the state (23). Although counties are a common unit of local government, they are not uniformly important. In the northeast, counties have limited functions. By contrast, counties in the south and west are the principal unit of local government.

Municipalities: A municipality is essentially a municipal corporation established to provide services for a population concentration within a defined area. Municipalities are created at the request of citizens, through a charter, rather than by the will of a state legislature, as are counties (14). Local custom and statutory provision usually require that municipalities be known as cities, towns, villages or boroughs. The smallest unit of municipal government is commonly termed a village. Connecticut, New Jersey and Pennsylvania legally designate small municipalities as boroughs.

Townships: Governmental units known as townships are found in twenty states. Like counties, townships are usually quasi-municipal corporations created by the state to administer state services. Townships usually represent the basic unit of rural government.

3.2 State-local Relationship

The granting of regulatory authority by states to local governmental bodies has generally taken two forms: statutory and constitutional amendment. Constitutional authority is vested, free from state control, by an amendment to the state constitution. Statutory authority, in contrast, involves the grant of local authority through legislative action. Constitutional "home rule" is generally viewed as a stronger grant of authority. It is usually easier for a state legislature to revoke statutory powers. The true degree of authority is ultimately determined by the wording, use and interpretation of the provision in question.

3.3 Legal Issues

A key issue associated with all forestry regulatory legislation in the United States concerns the question "when does a law that restricts the use of private land constitute the taking of property rights? This is an important consideration, since the protection of private property from public seizure without just compensation is guaranteed by Article V of the United States Constitution. Courts in the United States have traditionally ruled that compensation is not required if a law regulating land use is a proper execution of government police powers. This liberal interpretation of Article V has given federal, state and local governments considerable latitude to regulate forestry operations on private land without violating constitutional limitations on the taking of private property. The scope of local government regulatory ordinances

has been defined by court decisions involving the authority to regulate land use under state and federal law. State courts have heard numerous cases involving the authority of local governments to regulate land use (5, 6, 34). A number of judicial decisions have upheld broad powers granted to counties, townships and municipalities to regulate forestry activities on private land. On the other hand, several legal challenges to local government forestry ordinances have prevailed on the grounds that the ordinances in question were excessive use of the local government's police powers (9,31).

4. STUDY OF LOCAL GOVERNMENT ORDINANCES

4. 1 Study methods

A 1991 study (25) updated in 1993 (16), identified 508 local government forestry regulatory ordinances in the eastern half of the United States. The majority of these laws, approximately 70 percent of the total, were found in New Jersey, Pennsylvania, New York, Connecticut and Maine. Nearly 20 percent of the ordinances had been enacted in the four southern states of Louisiana, Georgia, Florida and Virginia.

Local forest practice regulation is a very dynamic segment of public policy. Three-quarters of the ordinances identified were enacted in the previous ten years and almost half in the previous five years. New local laws are continually being enacted as older ones are replaced, repealed or amended. The recent trend in American government toward more state and local political autonomy has undoubtedly contributed to the proliferation of local government forestry ordinances. This article discusses the current status of such ordinances in the eastern United States as reflected in the findings of the 1991 and 1993 studies.

The study of local regulation was complicated by the number of governmental entities (83,000) and their diversity. Further, local government ordinances are not systematically incorporated into any form of centralized legal or legislative reporting system. Thus forestry ordinances were surveyed using a variety of methods. Existing ordinances were identified by reference to published articles, and by mail and telephone inquiries. Authors who had written on this subject, state forestry agencies, state forestry associations, extension foresters, university faculty, loggers, industrial and consulting foresters, local government officials, and government associations were the primary contacts. They were asked to provide the names, addresses and telephone numbers of additional sources of information. This process was continued until all leads were exhausted.

In most cases, only the names of local government entities that had enacted ordinances could be provided. These were contacted, either by mail or telephone, to obtain copies of the ordinances themselves. Five items of information were then tabulated; name of the government entity, legislative citation and date of adoption, purpose and intent of the ordinance, important regulatory provisions, and the enforcement individual or agency.

4.2 Ordinance Classification and Analysis of Data

All ordinances were classified into one of five categories based on their regulatory objective. Most contain an introductory statement that outlines the purpose of enactment. These state-

ments provide insight into the attitudes and motivations of the governmental unit and its citizens. In many cases, a single ordinance has several objectives; nevertheless, each was placed into the category that most nearly described its objective. The categories are: public property and safety; tree protection; timber harvest; environmental protection; and special feature and habitat protection.

The data were analyzed in terms of type of ordinance, regional differences, legislative history, and national and regional trends. The social, political and economic characteristics of the communities that had enacted forestry ordinances were also examined, as were evolutionary changes in purpose and intent.

5. DISTRIBUTION AND GROWTH

5.1 Regional Distribution

The 508 individual forest regulatory-related ordinances identified had been enacted by 475 separate units of local government in 19 states in the eastern half of the country. A forest regulatory-related ordinance was defined as any ordinance, zoning law or tree protection article which had been or could be used to restrict logging or silvicultural activities, or the hauling of forest products. Local government refers to any unit of political subdivision below the state level (counties, townships, municipalities, villages and boroughs).

Of the 475 local governments identified as having enacted ordinances, 443 passed only one. Thirty-one local governments had enacted two ordinances each, and one had enacted three.

The largest number was found in the Northeast - 359 ordinances, in 332 communities in eight states. Pennsylvania, New York, New Jersey and Maine have over half of the ordinances identified. In the south the 141 local forest laws were distributed among 135 individual government units in seven states. Virginia and Georgia each account for nearly thirty percent of the southern total. Only eight ordinances were found in the north central states.

5.2 Date of Adoption

Most ordinances (ninety-four percent) had identifiable adoption dates. Of these, nearly 80 percent had been adopted in the last ten years, and half had been enacted in the last five years. The oldest ordinance still in effect was passed in 1951.

5.3 Type of Government

The number of ordinances varies considerably among states and regions. This is largely attributable to the differing political heritage of each area. The number enacted is associated with the level of local authority or "home rule". Possessing the authority to act is unquestionably a requisite condition for those governments that wish to control forestry activities.

The degree of local autonomy differs greatly among states and regions. Local governments in the Northeast have traditionally exhibited a larger level of local autonomy as compared with other regions of country. This is because they possess greater constitutional and statutory

grants of authority than elsewhere. The northeastern states, and in particular those in New England, have a long tradition of strong localized government that dates to colonial times. The South, on the other hand, has an equally long tradition of centralized state government (13).

Thus, it is not surprising that the Northeast has historically relegated more authority to small units of government, as compared to other regions:

"...in New England where the natives, land and climate were all hostile, fearful immigrants huddled together and used the town as the basic unit of governance. In the more friendly environs of the South people could safely separate themselves by larger cuts of land and used the larger county as the basic unit of self government" (15).

Townships, towns, villages, boroughs, and municipalities serve as the fundamental forms of local government in the Northeast, with the county usually providing only an auxiliary function. Of the 359 local units of government in the Northeast identified as having forestry regulatory-related ordinances, 90 percent were at less than the county level. In contrast, nearly nine of every ten ordinances in the South were enacted by counties.

5.4 State Government Policy

State government policy is also an important impetus for the creation of local forest laws. Local government is often used to implement a wide variety of state environmental programs. In Maine, organized towns are required to adopt environmental standards to comply with the provisions of the "Mandatory Shoreland Zoning Act".¹ These often impact forestry operations. Maryland's twenty-three counties are mandated by the state to enact sediment and erosion control ordinances.² Maryland also requires counties adjacent to the Chesapeake Bay and its tributaries to regulate land uses within wetland areas.³ Virginia, too requires localities to regulate forestry activities adjacent to the Chesapeake Bay. Silvicultural practices must adhere to "Best Management Practices" outlined by the Virginia Department of Forestry.⁴ The Pineland Protection Act establishes standards for municipal master plans and land use ordinances for localities in New Jersey's Pinelands Area.⁵ Thus, programs such as these are becoming an increasingly significant source of local regulation in all regions.

6. LOCAL REGULATORY PROVISIONS

Local forestry ordinances can be distinguished largely by their regulatory intent, since most contain an introductory statement that outlines the purpose for enactment. The legislative intent of the identified ordinances differs dramatically in scope and perspective among states and regions of the country. In most cases, an ordinance has several objectives; however, each can be placed into one of five categories that most nearly describes its purpose.

¹ 38 M.R.S.A. Section 435-449.

² Title 8, Subtitle 11, Natural Resources Article, Annotated Code of Maryland.

³ Chesapeake Bay Critical Area, 1984 Laws of the State of Maryland.

⁴ Section 10.1-2103 and 10.1-2107, Chapter 21, Title 10.1, Code of Virginia.

⁵ New Jersey Statutes Annotated 13:18 A-6j.

Timber Harvesting Ordinances: These ordinances were passed explicitly to regulate timber harvesting and silvicultural activities. Their purpose generally is to limit site degradation and environmental damage associated with commercial forestry operations. Environmental protection and the conservation of aesthetic values and wildlife habitat are the primary concerns voiced by the governments. Common requirements include: timber harvest permits; management and harvest plans; buffer zones; restrictions on silvicultural practices; and standards for forest road construction and maintenance.

Public Property Protection Ordinances: These are generally enacted to accomplish several objectives. The primary purpose is to protect public investments in roads, bridges, ditches, and rights-of-way by placing restrictions on the use of logging machinery and equipment. A secondary objective is to protect motorists from potentially hazardous driving conditions. Damage to roads and bridges, mud and logging debris on or near public roadways, and interference with traffic flows are often cited forest related traffic hazards. The removal of debris and mud from local roads and ditches, the use of gravel mats at entrances to public roads, and restrictions on hauling during certain times and weather conditions are common provisions. Some ordinances of this type also mandate harvesting permits and plans, and inspection of operations.

Tree Protection Ordinances: Tree protection ordinances are associated with the preservation of trees and wooded plots in urban and suburban areas. They generally apply to the removal of trees on private forest land associated with land clearing and development. They are not to be confused with urban or municipal street or shade tree ordinances, which usually govern the removal of individual or small groups of trees. These laws are virtually never enacted to restrict commercial forestry operations per se. They do affect commercial timber harvests, however, by restricting the removal of large groups of forest trees for any purpose within the regulated area. Aesthetics, noise reduction, and water and air quality are common concerns. Common provisions include the requirements of permits for tree removals, mandatory site plans and replanting specifications.

Environmental Protection Ordinances: These ordinances have been adopted primarily to protect natural features from "land disturbing activities". They are usually worded so that silvicultural operations, tree removal, site preparation, and road construction are considered land disturbing activities. They are usually written as erosion and sedimentation ordinances, stormwater drainage laws or zoning codes. Air and water quality, soil productivity and wildlife habitat protection are common concerns that have led to their enactment. Harvest permits, erosion control plans, leaving buffer zones and restrictions on harvest methods are frequent regulatory provisions. This type of ordinance is also used to regulate the use of prescribed burning and herbicides.

Special Feature Ordinances: Special feature ordinances have been passed for the specific purpose of protecting designated areas because of scenic or environmental value. Unlike environmental protection and timber harvesting laws, special feature ordinances rarely pertain to all areas within a local government's jurisdiction. They usually apply only to environmentally

sensitive or fragile areas, containing unique environmental attributes or resources. Scenic river corridors, shoreline and coastal zones, wetlands, recreational districts, viewsheds and habitats of threatened or endangered species are all examples of zones that have received special protection. Some ordinances of this type severely limit the volume of timber which can be removed from protected areas, while others prohibit forestry activities all together.

Geographical Distribution by Category: Timber harvesting ordinances are the most numerous. Of the 527 local forest practice ordinances identified, 203 (39 percent) were of this type. Special feature and environmental protection ordinances each accounted for about one-fifth of the total. Tree protection and public property ordinances each represented 12 percent. The Northern states have enacted the majority of the ordinances in all categories except public property protection. Interestingly, only five percent of the public property ordinances are in the North with the remainder in the South. Only five timber harvesting ordinances were identified in the South. This variation in the number of timber harvest and public property laws underscores important regional differences.

7. SHIFTS IN THE TYPE OF LOCAL REGULATION

During the past 10 years there has been a significant change in the type of forestry regulatory ordinances enacted by local government. The shift has been away from public property and tree protection ordinances. These have a relatively minor impact on private timber harvests. More special feature protection, environmental protection, and timber protection ordinances - which have a greater impact - are now being passed.

The Northeast: The shift has been most noticeable in the northeast. Here the proportion of ordinances in the last three categories grew from three-fourths among those enacted before 1983 to 90 percent among those passed after 1987. Half of the ordinances identified in the northeast are in the timber harvesting category. In contrast, public property ordinances are less than one percent of the northeastern total.

Virtually all of the environmental protection ordinances in the Northeast are "erosion and sedimentation" laws. All twenty-three Maryland ordinances cited in this category were adopted pursuant to a state mandated program to limit soil erosion and stream sedimentation. State mandated programs are also important in the creation of special feature ordinances. Those in the special feature category in Maine, Maryland and New Jersey were enacted to comply with state programs. Local forest ordinances adopted in accordance with state programs accounted for roughly fifty percent of the environmental protection ordinances and ninety percent of the special feature ordinances in the northeast.

Nearly 70 percent of the ordinances in the northeast require permits to harvest and haul timber. Just under two-thirds require that forestry activities be carried out under the provisions of a written forest management plan prepared by a professional forester. Only one-fourth of the ordinances, however, limit timber harvests to the selection method. Most of these expressly prohibit clearcutting.

The South: A shift in type of ordinance is also occurring in the South. This applies especially to the special feature protection, environmental protection and timber harvesting categories. Their proportion increased from 23 percent among those enacted before 1983 to 66 percent among those enacted after 1987.

Nevertheless, public property ordinances still represent the largest category in the South (42 percent). Special feature ordinances are the second largest category at thirty-three percent. Timber harvesting ordinances account for less than three percent of the southern total. Ninety-seven percent of the public property ordinances identified in the south are found in Georgia and Louisiana.

One-third of the southern ordinances require permits to harvest and haul timber. Just one-seventh mandate that forestry activities be carried out under a written, professionally prepared forest management plan. The majority of local special feature laws enacted in the South have been adopted pursuant to state programs.

8. SOCIAL AND CULTURAL DIFFERENCES

There are fundamental differences with respect to local government regulatory intent between the North and the South. These are evident by examining the proportion of timber harvesting and public property ordinances in each region. Half of northern ordinances restrict timber harvesting activities, while those in the public property category represent less than one percent of the regional total. In contrast, forty-one percent of the southern ordinances are public property laws, and only three percent are in the timber harvesting category. The majority of southern ordinances do not regulate forestry activities per se. They primarily regulate hauling activities. This contrasts sharply with the northeastern ordinances that were adopted for the sole purpose of limiting environmental damage.

These relationships can be illustrated by typical "statements of regulatory intent" for each of the two types of ordinances. The primary intent of most timber harvesting ordinances is the protection of environmental features. This objective is reflected in the following excerpt:

"These regulations are intended to protect the rights of the residents of the Township to enjoy clean air, pure water and the natural, scenic, historic and aesthetic values of the environment..."⁶

This differs from the regulatory intent of most public property ordinances. The stated objective of the Banks County, Georgia hauling ordinance is typical of this type:

"protect the county road system, ditches, and bridges from damage and excessive maintenance costs in connection with pulpwood, logging and timber operations"⁷

The purpose here is to safeguard public financial interests, not environmental quality.

⁶ Ordinance No. 3155, Lower Marion Township, Pennsylvania 5/17/89.

⁷ Pulpwood, Logging or Timber Harvesting Operation Resolution, Banks County, Georgia 9/12/89.

Explanation of Differences: One explanation for these differences lies with social and cultural differences between the two regions. Regional culture and tradition have a strong influence on how individuals view natural resources and the perceived role of government in regulating their use. The Northeast has been industrialized for well over one hundred and fifty years, whereas the South has been heavily dependant on its natural resources throughout much of its history. The southern economy has a long tradition of reliance on agriculture, forestry and mining.

Southerners have typically shown less interest in participating in environmental activism as compared to other regions of the country. The conservation movement of the late nineteenth century, for example, was limited primarily to the industrial North and the western United States (8). Similarly, the environmental movement of the late 1960's and early 1970's found little support in the South. Despite the growth of environmental sentiment across the country, and the support of President Jimmy Carter, the movement had very little southern grassroots appeal. Many southerners view environmentalism as an attempt to impede economic growth and development in their region (7,8).

The initial growth of local regulatory ordinances in the Northeast generally coincides with the advent of the modern environmental movement in the early 1970's. This does not mean to imply a cause and effect relationship between environmentalism and local forest ordinances. The environmental movement has, however, increased public awareness of environmental problems. It also has convinced many people that a role exists for government in the regulation of land use and natural resource utilization (26, 38). Adding these factors to strong traditions of self-government and "home rule", may have resulted in environmentally motivated local ordinances in the Northeast.

The situation in the South is different. Few ordinances were enacted before the 1980's. The vast majority of the early ordinances were not environmentally motivated, but rather financially influenced. New mill openings and "wetter than average" weather conditions may have contributed to the growth of local ordinances in the South (17). Changes in federal, state and local highway funding, and innovations in the manner in which forest products are hauled, are additional reasons for this proliferation.

Highway Funding Allocation Changes: The 1970's witnessed major increases in state financial aid to local governments for a wide variety of public programs. Since 1980, however, state and federal funding to local governments has shown little growth - and for several programs has actually declined (2, 14, 35). Traditionally, federal and state highway aid has represented a major component of local highway budgets (1). In a study conducted in the early 1980's state highway aid was found to be the slowest growing category of local assistance (14). Since 1981, state highway aid, in real dollars, has decreased in Georgia, Louisiana, Mississippi, New Jersey, South Carolina, and South Dakota (2). Interestingly, this group includes three of the four southern states that have enacted county forestry hauling ordinances. Forest harvesting operations have been tempting targets for local governments wishing to reduce road, bridge, and right-of-way maintenance costs.

Hauling Changes: The growth of local hauling ordinances in the South is also associated with changes in the manner in which pulpwood and logs are transported. Changes in harvesting technology and mill furnish requirements have prompted logging and pulpwood contractors to move to larger equipment capable of hauling heavier loads. Bobtail and tandem-axle trucks which once carried relatively light loads of shortwood have been replaced by tractors and trailers capable of carrying large, heavy loads of tree length material. These vehicles can easily haul loads well in excess of 80,000 pounds. The shift from small to large log and pulpwood hauling equipment is dramatically shown in studies conducted by the American Pulpwood Association (39, 40). In 1977, tractors and trailers represented only twelve percent of all timber hauling vehicles inventoried in the South. By 1987, the proportion had risen to sixty-two percent. As equipment and load size has increased, so has the possibility of damage.

9. CONCLUSIONS

Local government regulation of private forestry practices in the United States has increased dramatically - more than four-fold - in the last ten years. Local ordinances differ widely in their stringency and potential impact on timber supply. Nevertheless, the recent increases have been most prevalent in the three categories - special feature protection, environmental protection, and timber harvesting - with the greatest potential effect on forest management and harvesting.

Local regulation of private forestry can be expected to expand further. The primary reasons are demographic. Population is continuing to shift from urban to more rural settings. Former urbanites have few ties to traditional agriculture and forestry. They are generally seeking a lifestyle with high amenity values and respond publicly when this lifestyle is perceived to be threatened by unregulated forestry operations.

On the other hand, certain factors could slow the future spread of local forestry regulatory ordinances in some states. The heterogeneous pattern of regulation created by diverse and confusing ordinances could so disrupt the forest economy that forest landowners would press for state-level forestry regulation that would preempt or limit local regulatory authority. This is already occurring, on a limited scale, in some states.

Another factor that could slow the spread of local ordinances is public education. Forestry operations - even though carried out in a responsible and professional manner - are often criticized because they look bad. A better informed public could help circumvent some local regulation that would otherwise be enacted.

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THE ROLE OF POTENTIAL TAX SAVINGS IN STIMULATING ENROLLMENT IN WISCONSIN'S WOODLAND TAX PROGRAM

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Incentives for participation in Wisconsin's Woodland Tax Law were examined to determine whether variations in enrollment are positively related to variations in expected tax savings. A state level time series model of participation was estimated by least squares regression. Following a period of rapid land development and escalating prices beginning in the mid-1970s, results indicate that expected tax savings provided no incentive for enrollment. These results suggest the need for better measurement of the opportunity costs of participation and further examination of the behavioral assumptions underlying current optional forest tax programs.

1. INTRODUCTION

It has long been recognized that an unmodified ad valorem real property tax on standing timber is a disincentive to forest management (Fairchild 1909). Specifically, the ad valorem tax penalizes capital intensity, encouraging the premature harvest of timber and deterring investments in forestry. Moreover, such a tax is neither neutral nor equitable as it places an excessive burden on deferred yield enterprises like forestry, relative to other uses which generate annual income (Klemperer 1974, 1976, 1977; Hickman 1983; Rideout and Hof 1986).

To mitigate the negative impacts of the ad valorem property tax and conserve the forest resource, virtually every U.S. state has enacted some type of alternative tax system for forest land (Hickman 1982). Since 1960, many states have adopted forestry use-value laws that are similar in concept to the agricultural use-value programs widely available throughout the United States (Hickman 1983). The majority of these forestry programs are voluntary in nature, relying on the lure of lower property taxes to elicit landowner participation. Yet, despite their widespread availability, enrollment in optional forest tax programs is quite limited (Hickman 1982, 1983; Clements et al. 1986). The low levels of participation together with high administrative costs have raised concern about the effectiveness of voluntary use-value programs in preserving the forest land base and fostering forest stewardship.

Little effort has been directed toward empirical analysis of landowners' decisions to enroll in such optional forest tax programs. Previous studies have largely been anecdotal, noting that substantial variation in enrollment occurs among substate political units, but these studies fail to examine which factors influence program participation (Krietmeyer et al. 1987). For example, Flick (1988) observed that landowners who entered their lands in the optional use-value program in Alabama were apt to have the highest taxes, and thus could be expected to receive the greatest financial benefit from participating, but he did not test this proposition

empirically. In a comprehensive survey of Wisconsin forest owners, Roberts et al. (1986) found conflicting evidence of the effect of tax savings on landowner participation in the state's two optional forest tax programs. Half (51%) of the total respondents were not interested in implementing a forest management plan regardless of the tax incentive. On the other hand, of those landowners who had already enrolled in Wisconsin's optional Woodland Tax or Forest Crop Law programs, 86 percent reported that tax savings were a very important reason for their participation.

This paper looks at a particular optional forest tax program, the Wisconsin Woodland Tax Law, and seeks to test empirically whether program participation was stimulated by the lure of reduced taxes. The Woodland Tax Law (WTL) is of special interest because it is a relatively simple program that is unencumbered by special provisions, such as a yield tax or a requirement for public access, which can complicate the entry decision.

2. THE WISCONSIN WOODLAND TAX LAW

Wisconsin passed the Woodland Tax Law in 1954 (Wisconsin Statute 77.16) to promote the sound management of nonindustrial forest lands and to conserve the forest land base. To be eligible for entry into the WTL program, forest land must be in a contiguous tract of 10 to 39 acres, and may not include a full government lot regardless of size. Landowners enter into a contract with the State for a period of 15 years (prior to 1977 the contract length was 10 years), during which time they are required to pay only an annual "acreage share", which is a nominal levy that is fixed for ten-year periods. The acreage share is currently \$1.49 per acre, and is to be adjusted following recalculation in 1992. For purposes of comparison, the average Wisconsin ad valorem real property tax levy on forest land was \$6.01 per acre in 1987.

In return for property tax reductions, landowners must agree to develop and follow a forest management plan that is acceptable to the Department of Natural Resources (DNR). The management plan emphasizes timber production and prohibits burning and grazing of woodlands. It may also require landowners to implement prescribed silvicultural treatments such as tree planting and timber harvesting. If the property is withdrawn from the program prior to expiration of the contract, or if the DNR declassifies the land for failure to follow the management plan, a penalty is imposed equal to one percent of the average forest land value in the county times the number of acres in the tract times the number of years the property was enrolled in the program.

Area enrolled in the WTL increased rapidly from the late-1970s through the mid-1980s (Figure 1), but by 1985 totalled only about one-half million acres, or 6 percent of the eligible acreage. Numerous reasons have been suggested for this lack of participation including inadequate information, reluctance of landowners to relinquish control to a government agency, disinterest in forest management (particularly timber production), lack of appreciation of the benefits of a management plan, concern over implementation costs, and insufficient tax savings (Roberts et al. 1986).

Fig. 1: Area enrolled in Wisconsin's woodland tax law program, 1960-1985

To test the influence of reduced taxes on the decision to enroll land in the WTL, we formulated and estimated a time series model of forest owner participation.

3. MODEL SPECIFICATION AND ESTIMATION

The decision to participate in the WTL is a complex activity involving expectations about future development potential, forest management costs and revenues, and tax savings. We hypothesize that in making their enrollment decision, landowners weigh the present value of expected tax savings over the contract period against the costs of participation, including foregone development opportunities. Our hypothesis is that WTL participation is positively related to expected tax savings from enrolling in the program.

Knowledge of the WTL is a prerequisite for entry. In the early years, little area and few landowners were enrolled. However, as the program expanded over time to include more participants, a demonstration effect occurred which increased awareness of the program among potential participants. Thus we include time as a proxy for the level of program awareness in our model.

The influence of tax savings and awareness on the pattern of WTL enrollment can be represented using a logistic model of adoption; i.e.

$$(1) \quad Y = \frac{K}{\left[1 + e^{-(\beta_0 + \beta_1 x_1 + \beta_2 x_2)}\right]}$$

where Y is the cumulative acreage of land enrolled in the WTL, K is the ceiling or equilibrium enrollment acreage, x_1 is a measure of potential tax savings, and x_2 is a time trend, which is used as a measure of awareness of the WTL program.

During the period 1969 to 1976, WTL enrollment seems to have reached an equilibrium of approximately 157 thousand acres. However, beginning in 1977, a dramatic shift in participation occurred when Wisconsin experienced a period of aggressive land development and increasing property values. The publicity surrounding surging land prices may have altered landowners' expectations of future property tax levels, leading them to seek ways of reducing their property tax. Consequently, we have modified Equation 1 to allow for changes in forest owner behavior in response to discrete changes in the decision-making setting. The expanded model is then

$$(2) \quad Y = \frac{K_1 + K_2 D}{\left[1 + e^{-(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 D x_1 + \beta_4 D x_2)}\right]}$$

where Y , x_1 and x_2 are as previously defined, K_1 is the ceiling acreage for the period 1960-1976, K_2 is the post-1976 change in ceiling acreage, and D is a dummy variable equal to 0 for the years 1960 to 1976, and equal to 1 thereafter.

The model was estimated with annual observations on state data using iterative nonlinear least squares regression. Cumulative enrollment figures (Y) were obtained from the Department of Natural Resources for the period 1960 through 1985, the last year the program was open to enrollment. Data on statewide property taxes collected from forest land and area in the forest land tax base were taken from Department of Revenue records and used to calculate average tax levy per acre. The measure of potential tax savings was calculated by subtracting the acreage fee from the average tax levy, and converting to real values using the Consumer Price Index (1967 = 100).

Landowners were assumed to base their expectations about future taxes and tax savings on experience from the recent past. Generally, annual property tax bills are issued in December, and it takes approximately one year to process an application into the WTL. Therefore an arithmetic average of tax savings over the previous three years was used as the explanatory variable. The appropriateness of this lag structure was confirmed by statistical tests.

Estimation of Equation (2) produced the following results:

$$Y = \frac{158,309 + 1,083,777D}{\left[1 + e^{-(\begin{matrix} (3,160) & (695,792) \\ (-4.600 + 8.519x_1 + 0.385x_2 - 8.443Dx_1 - 0.233Dx_2) \\ (0.158) & (0.433) & (0.027) & (0.423) & (0.054) \end{matrix})}\right]}$$

where the values in parentheses are standard errors of the estimates.

The estimated coefficients K_1 and β_0 through β_4 were significantly different from zero at the 0.01 significance level. Although K_2 denotes a discrete increase of 1.084 million acres in the equilibrium ceiling beginning in 1977, this result was not statistically significant at the 90 percent confidence level.

Closer inspection of the coefficients reveals that the model was well behaved over the period 1960-76. The estimated ceiling value, K_1 , approximated well the equilibrium level of enrollment from 1969 to 1976; the coefficients β_1 and β_2 possessed the hypothesized signs and indicate that enrollment responded directly and strongly to both the potential for tax savings and the level of program awareness.

Although providing an excellent fit of the data, some results are initially difficult to explain. Specifically, the negative estimates for β_3 and β_4 were contrary to expectations. These sign reversals suggest that rapid land development and advancing prices might have reversed the role of potential tax savings in shaping landowners' enrollment decisions. Indeed, during the years 1977-85, the net effect of the tax savings coefficient ($\beta_1 + \beta_3$) was not statistically different from zero.

Two findings presented by Roberts et al. (1986) might help explain this result. First, the survey revealed that in the early to mid 1980s, over one-half of Wisconsin's woodland owners reported they would be unwilling to develop and follow a management plan regardless of the size and availability of property tax reductions. And secondly, 60 percent of those landowners who said they would be willing to implement a forest management plan also stated that they would require a minimum tax reduction before they would participate in the program. The median value of this minimum reduction they said they required was \$5.00 per acre, whereas the average nominal tax savings resulting from participation in the WTL from 1977 to 1985 was only \$3.66 per acre, i.e. significantly less than the threshold level reported by Roberts et al.(1986). Thus, the observed amount of potential tax savings appears to be insufficient to motivate program participation even among those landowners who by their own admission are willing to implement a timber management plan.

4. DISCUSSION

The basic postulate underlying optional forest tax programs is that those who have the most to gain in the form of reduced taxes will be the most likely to participate in such programs. Wisconsin's WTL is a relatively simple program that is not encumbered by complex restrictions. As such, it should be possible to isolate more readily the effects of potential tax savings on landowners' decisions whether or not to enter the program. The analysis indicates that from its inception in 1954 until the mid-1970's, potential tax savings provided a significant incentive to enroll in the WTL. However, when land prices escalated rapidly in the late 1970's, potential tax savings no longer functioned as a sufficient incentive to stimulate enrollment in the program.

This finding is not unique to Wisconsin's WTL. Studies of agricultural programs have concluded that reduced property taxes alone are insufficient to preserve open space and retain land in agricultural production (Carman 1977; Coughlin et al. 1978; Dunford 1980). Two explanations have been offered: First, property owners are generally unwilling to give up the opportunity for potentially large capital gains from land development, and second, any advantage from reduced taxes only benefits the initial property owners because future tax savings are ultimately capitalized into higher land values.

It appears that these same forces have been at work in Wisconsin since 1977. Rapidly increasing land prices did bring corresponding property tax increases for forest land and, hence, larger potential tax savings from participants in the WTL. However, it appears that the potential for capital gains, either through land development or sale, offset any potential tax savings and discouraged entry into the WTL.

These results challenge the efficiency of voluntary enrollment programs and suggest a need to move beyond mere optional property tax reductions if significant impact is going to be made on the millions of acres of small forest holdings in Wisconsin and elsewhere.

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ANALYZING THE EFFECTIVENESS OF VERMONT'S MODIFIED ASSESSMENT PROGRAM FOR FOREST LAND

Donald F. Dennis and Paul E. Sendak

1. INTRODUCTION

Private forests in the United States are expected to play an important role in meeting future demands for both timber and outdoor recreation. Seventy-two percent of the Nation's timberland is privately owned, being particularly concentrated in the eastern hardwood region. Almost 249 billion cubic feet (approximately 7 billion cubic meters), 82% of the Nation's hardwood growing stock is in private ownership.

Forest fragmentation, or the division of large forest tracts into smaller ownerships interspersed with development, may make timber harvesting uneconomical over large areas. Supplies may be further restricted by an increasingly affluent landowning population, who are more interested in the nontimber aspects of forest ownership. Several empirical studies provide evidence to support these concerns (e.g. Binkley 1981, Dennis 1989, and Widmann and Birch 1988).

Many states have enacted legislation designed to prevent burdensome property taxes from forcing agricultural and forest land into development (Hickman 1982). The laws vary widely in methods and stated objectives but all attempt to reduce inequities in the traditional ad valorem property tax and preserve open land. Generally, taxes are reduced on undeveloped land by modifying either the assessed value or the tax rate. In exchange, the landowner usually must pay a penalty if the land is developed or converted to a non-qualifying use. Since tax burdens are shifted these programs come under frequent scrutiny.

This study examines Vermont's modified assessment property tax program. Probit analysis is used to analyze the relationship between the probability of enrollment in Vermont's alternate tax program and characteristics of the parcel, owner, and surrounding community. Insight is provided that will aid in identifying beneficiaries, predicting future enrollment, and assessing whether or not the program is meeting its stated goals.

2. VERMONT'S USE VALUE APPRAISAL PROGRAM

Private forests are particularly important in Vermont where only 10 percent of the timberland is publicly owned. In 1977, Vermont enacted a Use Value Appraisal (UVA) property tax program designed to address problems, such as tax inequity and development of rural land, created by taxing agricultural and forest land based on speculative values. Vermont's program requires a forest management plan that includes scheduled harvesting, an annual conference report, and periodic inspection by State foresters. Enrollment has been rapid and by 1988, 21 percent of the State's eligible forest land was enrolled. Taxes were reduced an average of 75-percent for enrolled land.

Vermont's legislation was designed to achieve six goals:

1. To encourage and assist the maintenance of Vermont's productive agricultural and forest land.
2. To encourage and assist in their conservation and preservation for future productive use and for the protection of the natural ecological system.
3. To prevent the accelerated conversion of these lands to more intensive use by the pressure of property taxation at values incompatible with the productive capacity of the land.
4. To achieve more equitable taxation for underdeveloped lands.
5. To encourage and assist in the preservation and enhancement of Vermont's scenic and natural resources.
6. To enable the citizens of Vermont to plan its orderly growth in the face of increasing development pressures in the interest of the public health, safety, and welfare (32 V.S.A. Chapter 124).

Entry into the program is optional, but each parcel must be at least 25 acres (10 hectares) and be managed according to a forest plan approved by the State. The plan is generally prepared by a private consulting forester and must meet certain requirements. A penalty, equivalent to 10-percent of the fair market value, is assessed if the land is converted to a non-qualifying use. Failure to comply with the approved forest management plan may be deemed conversion to a non-qualifying use. This obligation is guaranteed by a lien, which is placed on the property at the time of enrollment.

Tax relief is provided by modifying the assessed value of the land to reflect its value for growing timber, instead of development potential. The modified or use value, which is based on a capitalization of expected returns from timber growth, is determined annually by the Current Use Advisory Board. The 1989 use values for forest land were \$65 per acre for productive forest land (USDA Forest Service Site Classes I to III) and \$10 per acre for non-productive and open land. In contrast, Armstrong (1988) reported that in 1987 state-wide average per acre prices for forest land were \$296 for parcels larger than 250 acres, \$509 for parcels between 100 and 249 acres and \$658 for parcels 75 to 99 acres.

3. DATA SOURCES

The sample consisted of 338 parcels of at least 25 acres in size located throughout the State. Forest characteristics were measured on sample plots located on each parcel by the USDA Forest Service, during its periodic survey of Vermont (Frieswyk and Malley 1985). This included information on species composition, basal area, timber volume, road access, elevation, and a variety of other physical characteristics. State forestry personnel identified sample plots located on parcels that were enrolled in the UVA program. In addition to the forest plot data, each owner was sent a 12-page questionnaire that requested the owner's age, education level, occupation, tenure of ownership, income, and many other characteris-

tics. Population density, town growth rate, and the town tax rate were obtained from State census and property valuation data.

4. RESULTS

Probit analysis was used to estimate the relationship between a dichotomous dependent variable, coded 1 if a parcel was enrolled in the UVA program and 0 if it was not, and variables that measured characteristics of the forest, owner, and surrounding community. A brief description of each variable and the regression results are provided in Tables 1 and 2, respectively. The upper portion of Table 2 (N = 338) shows results for the entire sample of privately owned parcels. So that the effects of individual owner characteristics, such as education, could be analyzed, parcels held by organizations or business were excluded to form a subsample of individually owned parcels. These results are reported in the lower portion of Table 2 (N = 252).

Tab. 1: Variable Summary

Variable	Definition
LF	Natural logarithm of acreage of forest ownership
ROAD	Coded 1, if parcel is within 1/4-mile of a maintained road; 0 otherwise
FI	Coded 1, if parcel is owned by a forest industry; 0 otherwise
DEN	Population per square mile in town where plot is located
TGRO	Population growth rate in town where plot is located
TR	Equalized town property tax rate
ED	Years of formal education

A positive relationship was estimated between ownership size and enrollment in the UVA program. Larger parcels are more likely to be held for long-term timber production due to economies of scale in harvesting and management. Also a larger potential property tax liability provides greater incentive for enrollment.

There was concern among the public and lawmakers that large industrial owners might be the primary beneficiaries of the UVA program and that little benefit would be obtained since these owners were likely to manage and keep their forested holdings intact, regardless of tax liabilities. Although sizable industrial holdings are enrolled in the program, the regression results do not substantiate these concerns. A negative relationship was estimated between forest industry ownership and enrollment in the modified assessment program. It appears that, all else being equal, forest industry is less likely to enrol their lands in the program.

Since development potential is generally enhanced by proximity to a maintained road, a negative relationship was anticipated between ROAD and enrollment in the UVA program. A negative, but not statistically significant, coefficient was obtained for this variable.

Development potential and speculative values were expected to be higher in densely populated towns or those with high growth rates. A negative relationship was obtained for both

population density and town growth rate. Landowners appear less willing to give up their option to profit from the anticipated increases in land prices that appear more likely in these areas.

Tab. 2: Probit Results

Explanatory Variable	Coefficient	Standard Error	Mean in UVA Program	Mean Not in UVA
N = 338 All parcels				
Constant**	-2.6739	0.5766	1.00	1.00
LF**	0.2186	0.0618	6.48	5.76
ROAD	-0.1583	0.1732	0.55	0.66
FI**	-0.7725	0.3668	0.15	0.13
DEN	-0.0018	0.0018	37.38	41.06
TGRO**	-0.0305	0.0143	6.85	8.84
TR*	0.6603	0.2036	1.71	1.57
Likelihood ratio statistic = 30.11				
N = 252 Individually owned parcels				
Constant**	-3.1657	0.8421	1.00	1.00
LF**	0.1626	0.0729	5.59	5.04
ROAD	-0.1878	0.2172	0.61	0.71
ED**	0.0935	0.0309	15.53	14.17
DEN	-0.0045	0.0032	34.36	42.94
TGRO**	-0.0584	0.0192	6.42	8.98
TR*	0.4799	0.2515	1.75	1.65
Likelihood ratio statistic = 30.28				

* Significant at the 10-percent level

** Significant at the 5-percent level

We expected a greater propensity to enter the UVA program in areas with high tax rates. Indeed, this appears to be the case; program enrollment was positively correlated with the equalized town property tax rate.

More educated landowners were more likely to enrol their land in the UVA program, but other owner characteristics that we tested were not significantly correlated with enrollment. An owner's age, income, occupation, tenure of ownership, and whether he or she was brought up in an urban or rural environment did not appear to significantly influence enrollment.

Forest conditions did not appear to effect the probability of enrollment. No significant correlations were obtained between enrollment and per-acre timber volume, basal area, and variables that measured species composition. These regression results are corroborated by a comparison of state-wide forest inventory statistics, which found little difference in quality and volume of timber between lands enrolled in the program and those not enrolled (Sendak and Dennis 1989).

5. DISCUSSION

Examining trends in the variables provides insight into what these results imply for future enrollment. Continued fragmentation of the forest and population growth should tend to slow enrollment. However these effects may be mitigated by responses to other changes. In 1983, two-thirds of the individually owned forest land in Vermont was held by owners who had formal education beyond high school (Widmann and Birch 1988). An estimated elasticity of approximately 2 suggests that continued increases in education will have a relatively strong positive impact on enrollment. The regression results also support our expectation that continued increases in assessed values and property tax rates will increase the likelihood that additional parcels will be enrolled in the UVA program.

Thus far, Vermont's Use Value Appraisal program appears successful. Enrollment has been rapid and by 1988, 21-percent of the State's eligible land was enrolled and under a forest management plan. Other studies (Binkley 1981 and Dennis 1989) have shown that more educated landowners were generally less interested in timber harvesting. Since more educated landowners are more likely to enroll their land, the program is particularly useful in introducing forestry to those who would otherwise not manage their land. According to Brighton (1988), 40-percent of the participants had never worked with a forester prior to enrollment. Improved silvicultural practices and supervision of logging by foresters should increase the long-run productivity and health of Vermont's forests.

Basing property taxes for forest land on the value for growing timber, as opposed to development value, reduces the inequity inherent in the unmodified ad valorem property tax. The resultant reduction in tax liability relieves development pressures and to some extent compensates private landowners for the externalities, like wildlife habitat and improved water quality, that their land provides. The strong positive correlation between parcel size and enrollment suggests that the program is effective in helping to maintain large parcels of undeveloped land, which public sentiment has shown to be desirable. The positive correlation between enrollment and town tax rates indicates the program's effectiveness in areas where the property tax is most burdensome. Providing equitable taxation in these areas is a goal of the UVA program.

Although the overall success of the program is supported, these results point to one troubling aspect. Since enrollment was negatively correlated with both population density and a town's growth rate, the program may be least effective in attracting participants in areas where it is needed most, from the perspective of maintaining open space. However, each undeveloped parcel is likely to provide significant aesthetic benefits to local residents in densely populated areas.

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STRENGTHS AND LIMITATIONS OF WISCONSIN'S MANAGED FOREST LAW IN PROMOTING FOREST MANAGEMENT

Jeffrey C. Stier

Wisconsin has had 65 years' of experience with an optional yield tax for forestland, and participation is high relative to that in other states. Major policy changes introduced in the 1986 Managed Forest Law include an option for landowners to close some land to public access, a lower yield tax rate, and a broadening of acceptable forest management objectives and practices. Landowners in the more populated southern part of the state exhibit a strong preference for retaining control over public access to their land, whereas in the more remote, less populated northern half, the public access requirement is less objectionable. The Forest Crop Law and Managed Forest Law both offer a choice of 25- or 50-year contracts and there seems to be a preference in recent years for a shorter commitment. A system of shared revenues and state aids spreads the cost of the forest tax laws across all taxpayers in the state. While the forest tax programs are generally considered to be successful, there is no hard empirical evidence on what effect they have had on forest management.

1. EVOLUTION OF PROGRAMS PROMOTING FOREST MANAGEMENT

Wisconsin's experience with the optional yield tax for forestland dates back to the 1927 Forest Crop Law (FCL). The FCL was modified several times over the years, but its essential features were largely preserved over time. Eligible land had to consist of a complete legal description. While this typically meant a minimum of a quarter-quarter section (40 acres), smaller platted fractional lots and government lots were also eligible. Lands had to meet a modest minimum standard of forest productivity and forestry had to be the best use of the land.

Participation in the FCL program takes the form of a contract between the landowner and the state and, unless the land is withdrawn prior to transfer, the contract carries over to the new owner as well. The FCL offered landowners a choice between 25- and 50-year contracts, but landowners had to agree to follow "sound forestry practices" and to permit public access for hunting and fishing. In return, lands under the FCL are exempt from the ad valorem real property tax. Instead, landowners pay a small annual acreage share (currently 83¢/acre), which is recalculated at ten-year intervals, and a 10% yield tax on the assessed value of timber harvested. Wisconsin is currently divided into 13 zones for yield tax purposes. The Wisconsin Department of Natural Resources (DNR) estimates the stumpage values upon which assessments are based using a weighted, three-year rolling average of prices for each zone. If a contract expires and the landowner elects not to renew it, an "exit" payment is assessed in the amount equal to 10% of the stumpage value of timber on the land at the time of withdrawal. Withdrawal from the program prior to completion of a contract also subjects landowners to a penalty consisting of the difference between the ad valorem property tax that would have

been paid annually during the time the land was in the program, minus the sum of the acreage shares and yield taxes actually paid, plus simple interest of 5% or 12% per year depending upon the date of entry.

A companion program, the Woodland Tax Law (WTL) applies to lands 10-40 acres in size. This program imposes no yield tax and does not have a public access requirement. The acreage share is twice that of the FCL (that is, \$1.67/acre) and contracts run for only 15 years. Landowners must also agree to follow a management plan approved by the DNR and withdrawal prior to completion of the contract triggers a withdrawal penalty equal to 1% of the average per-acre full value assessment for forestland in the county in the year prior to withdrawal times the number of acres being withdrawn times the number of years in the program.

In 1985 the Wisconsin Legislature closed the WTL and FCL programs to further entry and enacted the Managed Forest Law (MFL). Because the MFL was an evolutionary change in Wisconsin forest policy, the law contains the main features of its predecessors; e. g., the minimum size limit of 10 acres, the choice of 25- or 50-year contracts, the combination of an acreage share and a yield tax, and the requirement for an approved management plan. However, some of the carryover provisions were modified. For example, the MFL yield tax is 5% rather than the 10% that applies under the FCL. And the withdrawal penalty is now computed as the greater of 1) 5% of the stumpage value of timber on the land in the year of withdrawal minus the sum of acreage shares and yield taxes paid, and 2) the ad valorem real property tax that would have been levied in the year prior to withdrawal had the land not been in the program, times the number of years the land was in the program, minus any acreage shares and yield taxes paid.

A new feature incorporated into the MFL is the option for landowners to close up to 80 acres of land in a township to public access. Closure requires payment of two dollars per acre per year in addition to the acreage share. Acreage shares are to be recalculated at five-year intervals, with the next adjustment coming in 1997. The FCL required that lands be accessible to the public only for hunting and fishing whereas the MFL also includes hiking, cross-country skiing and sightseeing as permissible activities.

The FCL was born in a time of great concern for prevention of wildfires and reforestation of the cutover. The 1927 law was designed to promote good forestry and to ensure that towns were not disadvantaged financially by taking forestland in the program off the general property tax rolls. In 1971 the FCL was amended. Commercial timber production was still included as the primary objective of the law, but the requirement for public access for hunting and fishing was added by the Legislature, which recognized "... public hunting and fishing as extra public benefits ..." provided by the program. The policy objectives the law was intended to served had clearly been expanded. However, the MFL goes much further in this regard.

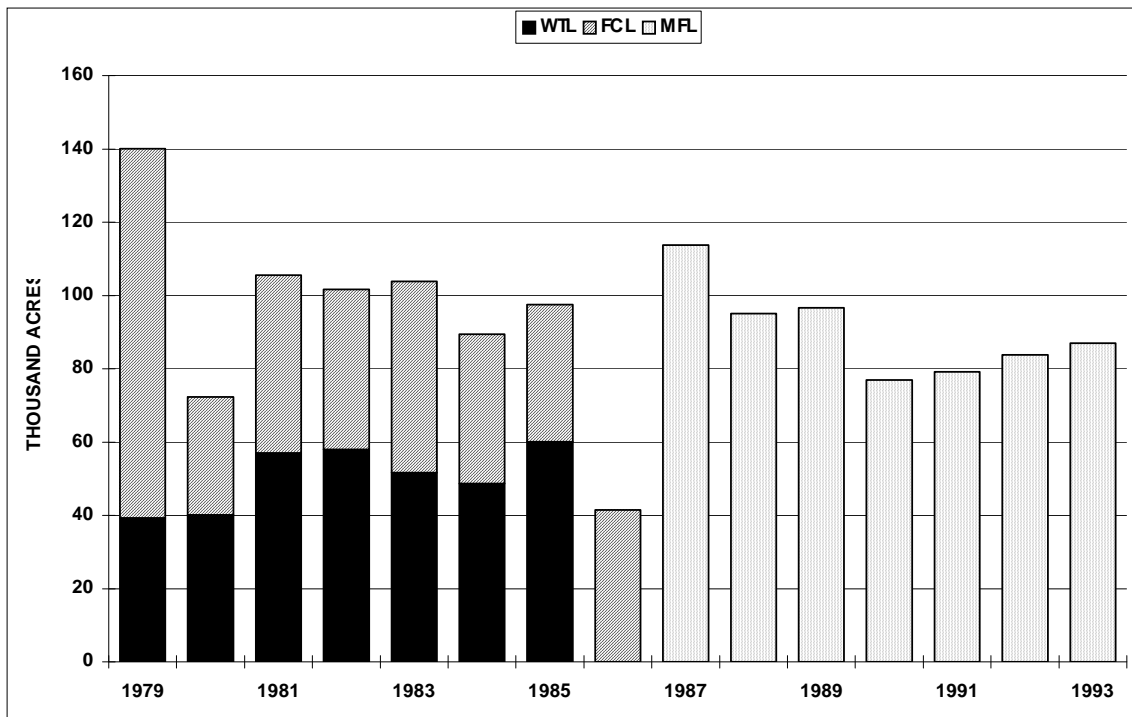
Under the MFL, production of timber for commercial use must still be one of the management objectives, but landowners have greater flexibility to incorporate aesthetic, wildlife, recreation

and wildlife considerations into their management plans. This evolution towards a philosophy of more integrated resource management did not come easily (Tlusty and Jordahl, 1988; Stoddard 1988).

2. EARLY EXPERIENCE UNDER THE MANAGED FOREST LAW

The MFL was intended to consolidate the two previous forestland tax programs and to remove some of the features which had been thought to be discouraging participation. The average annual enrollment for the first seven years under the MFL was approximately 90,000 acres, which is roughly the same as the combined annual enrollment into the WTL and FCL programs when the year-to-year variation is taken into account (*Fig. 1*). Thus, in its initial years, the MFL does not appear to have been any more or any less successful in attracting participation than its predecessor programs.

Fig. 1: Area of forestland entered under the Wisconsin Woodland Tax Law (WTL), Forest Crop Law (FCL) and Managed Forest Law (MFL), 1979-1993



The three optional forest tax programs cover 2.4 million acres, or about 25% of all privately owned commercial forestland in the state. The FCL and WTL tax programs pertain only to lands that were enrolled prior to 1987. The greatest area of land - about 1.5 million acres - is under the FCL, and three-quarters of it is in corporate ownership. Many corporate landowners are industrial forestry firms and since the MFL yield tax is only half that of the FCL, it would be logical to expect the MFL to be at least as attractive as the FCL to this group of landowners. A recent review of the MFL recommended that the yield tax rate be increased to 10% to maintain parity with the FCL rate (Craven et al., 1991). However, even if this change is adopted, the more flexible MFL program should still be equally or more attractive than the FCL program was. A major test of this assumption will be possible when many of the existing FCL contracts expire.

Most of the land that has been entered under the MFL (82%) is in noncorporate ownership, probably because the large industrial ownerships are already enrolled in the FCL program. Twenty-five and 50-year contracts were equally popular among noncorporate owners who placed land under the FCL, but three-quarters of both corporate and noncorporate lands in the MFL program are under 25-year contracts. These differences might be a function of underlying differences among populations of landowners in the two programs, but they might also be signalling a generic preference among all landowners for shorter contractual commitments.

The public access requirement was believed to be an important negative feature of the FCL in the more densely populated lower half of the state where hunting pressure is heavier than it is in the northern portion, which is more distant from population centers and where there is generally more forested land available. Giving landowners the option to close up to 80 acres per township to public access under the MFL was expected to remove a major impediment to participation.

Slightly over half of all lands that have been enrolled in the MFL program beginning in 1987 are open to the public (*Table 1*), but they are not distributed uniformly across the state. The two northern forest survey units have greater numbers of absentee landowners and access is both more difficult to control and less important because of lower hunting pressure. Consequently, landowners have elected to keep more of the land open to the public. However, in the central and southern forest survey units where population density and hunting pressure are greater, landowners have exhibited a definite preference for retaining control over access (*Table 1*).

Table 1: Area and accessibility of lands enrolled in the Managed Forest Law-1993

Access Status	Forest - Survey - Unit					All Units
	North-East	North-West	Central	South-East	South-West	
	1,000 Acres					
Open	103	102	47	46	10	308
Closed	71	26	115	54	43	309
Totals	174	128	162	100	53	617

The Department of Natural Resources, Bureau of Forestry administers the three tax programs. A recent policy change in the Bureau of Forestry directs field staff to place top priority on tax law lands for technical assistance to landowners. The DNR estimates the total administrative costs for all three programs to be approximately \$1.7 million, or about 71¢ per acre. The workload requires approximately 39 full time positions.

Wisconsin currently has three separate and distinct forestland tax programs in force (*Table 2*), and within the FCL there are three distinct sets of requirements related to the time of entry. This is because participation takes the form of a contract between the landowner and the state and subsequent changes to the laws cannot be made retroactive to existing contracts. A recent legislative proposal provided a voluntary mechanism to "roll over" FCL contracts into

the MFL program in an effort to streamline administration. Contracts on large areas of FCL lands will expire during the period 1996-2000 and this should reduce the administrative workload somewhat.

Table 2: Main provisions of the Wisconsin Forest Crop Law (1927-1985), Woodland Tax Law (1954-1985), and Managed Forest Law (1985-Current)

Forest Crop Law	Woodland Tax Law	Managed Forest Law
<p>Tax Rate: 10¢ or 83¢/acre/year depending on the year of entry. Lands must remain open to public for hunting and fishing. Rates to be readjusted in 1992 and every 10 years thereafter.</p>	<p>\$1.67/acre/year Lands not open to public hunting and fishing. Rates to be readjusted in 1992 and every 10 years thereafter.</p>	<p>Owner has option of leaving land open or closed to public. Maximum of 80 acres/town-ship may be closed. Rates are 85¢/acre/year on open lands, and \$2.00/acre/year for closed lands. Rates to be re-adjusted in 1992 and every 5 years thereafter.</p>
<p>Contract Period: 25 or 50 years.</p>	<p>15 years.</p>	<p>25 or 50 years.</p>
<p>Yield Tax: 10% based on stumpage rates determined by the DNR. State recovers 20¢/acre aid payment to towns and returns excess to towns which share 20% with the counties.</p>	<p>None.</p>	<p>5% based on stumpage rates determined by the DNR. Half goes to DNR conservation fund, the other half goes to towns which share 20% with the counties.</p>
<p>State Payment to Towns: 20¢/acre/year.</p>	<p>None.</p>	<p>20¢/acre/year.</p>
<p>Minimum Acreage: Full quarter-quarter section, fractional or government lot.</p>	<p>Minimum of 10 contiguous acres not to include a full quarter-quarter section, fractional or government lot.</p>	<p>Minimum of 10 contiguous acres.</p>
<p>Withdrawal Penalty: Difference between ad valorem tax and forest crop tax paid, with credit for annual acreage share payment to towns plus 5% or 12% simple interest minus any yield tax paid plus interest.</p>	<p>1% of average F1 value in county in year prior to withdrawal times number of acres times number of years in the program.</p>	<p>The greater of: 1) a 5% yield tax on standing timber, and 2) the regular property tax in the year prior to withdrawal times the number of acres times the number of years in the program.</p>
<p>Termination of Contract: Nonrenewal results in a 10% yield tax assessed against value of standing timber.</p>	<p>No obligation.</p>	<p>No obligation.</p>
<p>Landowner's Responsibility: Use sound forestry practices.</p>	<p>Follow signed management plan.</p>	<p>Follow signed management plan.</p>

3. ISSUES NOT YET RESOLVED

A basic public policy concern is whether alternative forest tax programs induce landowners to adopt management practices that they otherwise would not, or whether such programs merely provide participants with a "reward" in the form of tax savings for doing what they would do on their own anyway. This question is so fundamental that one might suppose the answer to be well documented. But such is not the case. Despite the long history of alternative forest tax

programs throughout the U.S. and considerable theoretical analysis, there is virtually no empirical evidence on the incremental difference such laws have on the nature and intensity of forest management. Wisconsin is no exception in this regard.

The requirement of an approved management plan in the Wisconsin tax laws ensures that some forest management takes place, but there is no documentation of how it might differ from what landowners would have done in the absence of the programs. One approach which might prove useful for studying the marginal impact of the MFL would focus on landowners who enroll only a portion of their total holdings in the program. Careful analysis of the nature of the two categories of land and the management practices for each might reveal differences which could be ascribed to the program. However, to date this has not been done.

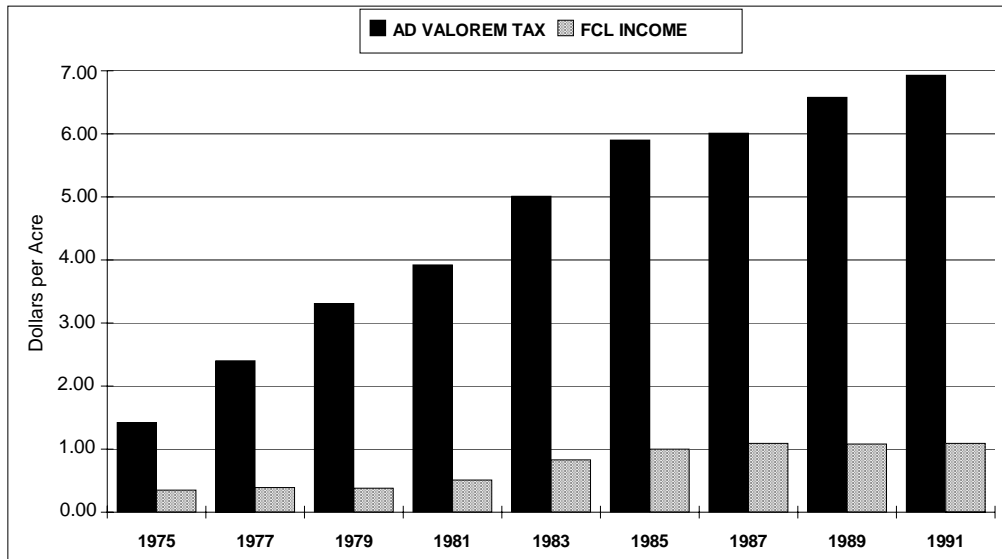
The total area enrolled in Wisconsin's three forest tax programs is about 2.4 million acres, or approximately one-quarter of all privately owned forestland. Some forestlands are in ownerships less than 10 acres and others do not meet the minimum productivity requirements for eligibility. Thus, while accurate estimates of the total eligible acreage are not available, it is clear that no program or combination of programs could realistically be expected to apply to all forestland.

Participation has always been used as a measure of the "success" of forestland tax programs. Wisconsin's FCL is reported to have the highest percentage of eligible lands enrolled of any optional forest yield tax program in the nation (Kronrad and Hickman, 1986), and the percentage of land enrolled in the second-ranked state-Massachusetts-is only one-fourth that of Wisconsin. But it is not clear what the optimal level of participation for the MFL should be, and there is little room for providing additional incentive through tax savings.

The average annual payment per acre made by landowners is greater for the FCL than the MFL because timber is more mature on lands in the former program. However, even for FCL lands, it is only about 20% of the average annual ad valorem property tax on forestland not in the programs, and the spread has been increasing quite rapidly (*Fig. 2*). Wisconsin has a complex system of shared revenues and state aids that are designed to assist local units of government that have relatively less taxable real property from which to derive revenue. Lands in the forestland tax programs are taken off the ad valorem property tax rolls, and some or all of the lost property tax revenue is made up through the state aid formulas. In this way, the cost of the tax programs is shifted from non participating property owners in the township and county to all taxpayers in the state.

Lands in the three tax programs would have generated approximately \$16.3 million in real property taxes in 1991. Actual payments made by landowners amounted to just under \$2.0 million. The difference - \$14.3 million - is the amount of tax burden that is shifted to other taxpayers. Increasing participation in the tax programs would result in even greater tax shifting and it is not clear how much additional cost the public is willing to accept.

Fig. 2: Average annual real property tax versus landowner payments on lands under Wisconsin's Forest Crop Law, 1975-1991.



4. WHERE TO FROM HERE?

Wisconsin policy makers are currently examining the MFL to determine what changes might be appropriate, but it is unlikely that the program will be modified in any major way. The consensus seems to be that the MFL is working quite well and that switching to a totally new program would not be desirable. Several technical adjustments are being considered. One would change the penalty is determined for withdrawal prior to completion of a contract. The current formula, while simple, can produce a penalty that exceeds the value of the land in some circumstances. That result was not anticipated when the law was passed. Another adjustment that is being looked at involves either increasing the acreage payment and doing away with the yield tax altogether, or increasing the yield tax rate. The current 5% rate does not raise enough revenue to cover the cost of administration so some modification is likely.

Perhaps the greatest challenge to the Managed Forest Law in the last year has come from environmental groups which object to the requirement that landowners agree to practice commercial production of timber in some form as a condition of entry. They argue that the tax program should be open to landowners who wish to pursue the principles of ecosystem management without any intent to harvest timber. Depending upon the outcome of this debate, the MFL could undergo significant change in the future.

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