

**REGULATION OF FORESTRY PRACTICES
ON PRIVATE LAND IN THE UNITED STATES:
ASSESSMENT OF STATE AGENCY
RESPONSIBILITIES AND
PROGRAM EFFECTIVENESS**

by

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EXECUTIVE SUMMARY

A wide-ranging assessment of state-governed regulatory programs that are focused on the application of forestry practices applied to private forests was undertaken in 2004. Involved was extensive review of the literature and contact with regulatory program administrators in all 50 states. The review was limited to programs applied statewide and to only those regulations affecting forestry practices. The review led to a number of findings, of which the following are highlighted.

Summary of Conditions

•***State Regulatory Programs Embrace a Complex Set of Broad Cultural Attributes.*** They often include protection of rights to certain conditions in private forests, presumption of an ability to control uncertainty, adherence to prior-approval processes, standardized policies and procedures, complex administrative processes, fragmented regulatory authority, disfavor with alternatives to regulation, combative politics fostered by rigid processes, and uncertainty over the results of regulatory initiatives. Encapsulated in such a context, the deterrent fear of regulation is often an important motivator for the public to meet desired civic obligations.

•***State Regulatory Authority over Private Forestry Practices Is Extensive.*** Authority can emanate from environmental law generally and from state law focused directly on forestry practices. Regulatory authority can originate from a single law (often known as a forest practices act), a number of separate and specially-focused laws (for example, wetland protection acts and endangered species acts), or laws authorizing conditional regulation which is to be applied in certain circumstances (for example, contingent or bad actor laws).

•***State Regulatory Programs Are Focused on a Wide Range of Forestry Practices Applied to Private Forests.*** Administrators in nine of 10 states consider such practices to be *often* or *sometimes* correctly applied to private forests. In two-thirds of these states, forest practices were subject to some form of regulation, especially practices involving roads and trails (44 states) and chemical applications (40 states). Least regulated were cultural practices (30 states) and reforestation activities (27 states).

•***State Agencies Regulating Forestry Practices on Private Land Is Extensive.*** An average of six state agencies per state (276 state agencies nationwide)

are so involved. Over two-thirds coordinate (extensive or moderate) their regulatory initiatives with a state's lead forestry agency, although one-third have minimal or no involvement with such an agency.

•State Agencies Are Responsible for Substantial Investment in Forest Practice Regulatory Programs. About 1,040 full-time staff equivalents are so engaged (by 276 agencies), nearly one-third of which are part of an agency whose primary purpose is the management of forest resources. Slightly more than one-quarter of these staff equivalents are affiliated with air and water pollution control agencies. Assuming \$55,000 per full-time equivalent, staff assigned to state regulatory programs implies an annual nationwide investment of about \$57 million.

•Regulatory Programs Focused on Private Forests Are Especially Prominent in Certain States. In 15 states with prominent regulatory programs, annual regulatory program investments (by a state's lead state forestry agencies) are more than \$42 million and involve nearly 620 full-time equivalent staffs. Revenue for these programs comes primarily from state government appropriations (49 percent) and is invested for the most part in review of notifications and permit applications (28 percent) and in monitoring and evaluation activities (21 percent).

•Evaluations of Regulatory Program Efficiency and Effectiveness Have Produced Mixed Results. Review of nearly 50 past evaluations of regulatory initiatives leads to mixed conclusions. This uncertainty occurs because of differences in the conceptual approaches used to evaluate, variability in regulatory programs being compared, poorly defined objectives of some regulatory programs, difficulties in identifying and specifying program benefits and costs, and deficiencies in the type, amount and precision of data needed to conduct with-and-without analyses. These analytical deficiencies have, in part, contributed to divisiveness regarding the role of regulation as a policy tool to be focused on the application of forestry practices to private forests.

•State Administrators of Regulatory and Nonregulatory Programs Provide Some Insight to Performance of Regulatory Programs. Two-thirds of the administrators contacted consider forestry practices in their state to always or often be correctly applied (in contrast to sometimes or never). Of this two-thirds, over half (17 states) indicate all or some forestry practices are regulated in their state. If states that regulate forestry practices under certain conditions are included (eight states), the portion regulating forestry practices in order to have forestry practices always or often

correctly applied rises to nearly two-thirds (25 of the 34 states considered). However, nearly one-third of the responding states do not regulated forestry practices, yet they report that forestry practices in their state are always or often correctly applied.

Current and Potential Issues

The intensity of debate over regulation of forestry practices applied on private forests is unlikely to subside in the future. Whether it rises or falls as an important political issue will depend on the set of values ascribed to the benefits that forests are capable of producing and on the political strength of the persons and entities that represent and subsequently advocate those values. There are, however, some discernable trends that are important to the environment of forest practices regulation, including increasingly better balance of public versus private responsibility for the application of forestry practices, greater empathy for private-sector operating environments, more regulatory focus on prevention of misdeeds rather than on the misdeeds themselves, improvement in administration and effectiveness of regulatory programs, additional and more professionally diverse regulatory staffs, demand for accurate and reliable information and its management, and growing interest in certification programs and the reality of effluent load limits assigned to certain waters in forested areas.

Future Research and Evaluation

Information about the design and performance of regulatory programs is of considerable concern. The reality that substantial political energy is often devoted to debate about regulatory programs, and that respectable sums of public and private resources are invested in their implementation would suggest that they are an important focus of public policy that is worthy of greater attention by the research community. This attention needs to be more than simply supplying information that promotes the often limited interests of those that advocate or loathe regulatory approaches. Examples of areas in need of research and policy analyses are assessment of forest and forest landowner sectors that require regulation; evaluation of creative and imaginative alternatives to regulation; analysis of regulatory program performance; assessment of equity (distributional) consequences of regulatory programs; examination of regulatory responsibilities (federal, state, local) and program design and implementation; and evaluation of systems that can quickly and effectively process information that is required to improve the performance of regulatory programs.

CONTEXT FOR REGULATORY PROGRAMS

Regulation of private forestry practices has a long and colorful history. Some of forestry's most notable personalities have often been at the center of debates over the appropriateness of regulation as an instrument of public policy. In large measure, the history of regulation reflects struggles with anticipated federal regulations, early state responses with cooperative and incentive-based programs, and intense pressures for forestry practices to be applied in a more environmentally sensitive fashion. All of these encounters have been played out within the context of strong political resistance to regulation by private owners of forest land and by persons engaged in the harvest of timber from such land (Pinchot 1947, Clepper 1971, Cabbage 1995, Ellefson 2000,).

Political and Administrative Setting

Regulation of forest practices is one way society attempts to ensure its interest in private forests. But the public interest is not easily defined. Public sentiments may simultaneously favor uniformity and diversity, safety and risk, freedom and control, and equity and efficiency (Ellefson 2000). These and other conflicting values create a complex and continually evolving culture of forest practices regulation, a culture that is characterized by conditions including the following.

Protection of Access to Rights. Regulatory programs emerged during an era of heightened interest in moral rights to equality, justice, and fairness. Activist movements worked to convert these rights into protected legal rights, including the right to clean air, clean water, diverse wildlife, and biologically diverse forests. Viewing problems in terms of legal rights implied the eradication of activities that tend to deny access to a right, often through adoption of regulatory standards that are enforced by fear of penalties. For some, state laws regulating forest practices on private forest land embody a “bill of rights” in private forests (Bromley 1991).

Control of Doubt and Uncertainty. Regulatory programs rest heavily on presumptions of certainty about the forestry practices being regulated. Society has grown increasingly intolerant of risk, the result of which are forest practice regulations that seek to prevent *possible* harmful effects rather than any *probable* lasting harm to humans and forest environments. In such an environment, detailed regulatory standards are often specified for the use of pesticides, the management of riparian areas, and the safety of species from extinction – all of which are fraught with uncertainty. In some cases, these

standards are set forth in state law (for example, stocking levels, riparian zone widths) (Davies and Mazurek 1998).

Regulated Public Beholden to Prior-Approval. Unlike earlier post-inspection regulatory programs (for example, seed tree laws), most modern forest practice regulatory systems require private landowners and timber harvesters to provide proof in advance that the practices and methods they intend to use are lawful and technically adequate. This encumbrance usually takes the form of a notification of intent to harvest or a permit-inspection process wherein the landowner or harvester must demonstrate via a plan that the forest environment will be protected. In either case, the burden to conduct business is on the landowner and timber harvester (Ellefson and others 1995).

Standardized Policies and Procedures. Regulatory programs typically embody complex rules and procedures that invite rigorous and exacting enforcement (“go by the book”). Dimensions of growing legalization of an agency’s operations include increased use of formal, standardized policies and procedures; increased use of protective measures stemming from concern over potential litigation (for example, elaborate record keeping, ridged judicial-like procedures); avoidance of management strategies that might result in dissent and protest; and tendencies toward dispute resolution processes that are adversarial in nature (for example, formal administrative hearings) (May 1993, Sitkin and Bies 1993).

Complex Administrative Systems. Regulatory programs typically involve very structured administrative processes and extensive detailed specification of standards to be applied. In such an environment, administrative discretion is limited and the accommodation of change is difficult, the result of which are regulatory systems that tend to be conservative in terms of adopting new technologies and efficient procedures. Forestry practices embodied in a set of rules or a set of best management practices are useful only to the extent that they reflect the best art and science available. Cumbersome administrative approaches discourage change, which can in turn discourage the adoption of newly developed, science-based forestry practices (May 1993).

Fragmented Authority and Responsibility. Regulatory programs are seldom the responsibility of a single government agency. More often than not, regulatory responsibilities are spread among different levels of government as well as among different entities within a particular level of government. In such an environment, the regulated public may face dissimilar permitting and notification processes as well as forest practice standards that have been interpreted in dissimilar ways. Fragmented regulatory

responsibility can have many negative consequences, including an inability to integrate comprehensive solutions to forest practice problems, difficulty in establishing priorities on the basis of a common scale and risk involved, and problems arising from administrative processes that are disjointed and cumbersome (Davies and Mazurek 1998, Ellefson and others 2001 and 2002).

Avoidance of Alternatives to Regulation. Regulatory programs are but one of many types of programs that are available to government, including education and technical assistance, fiscal and tax incentives, self-regulation through certification and voluntary action, and performance bonds and voluntary compliance with standards. Even though the public interest in private forests might be attained by a nonregulatory approach, sentiment is often in favor of regulation as the quickest, simplest, and least costly (to the public) way of dealing with the application of forestry practices. Because of these impulses, alternatives to regulation are often dismissed, including program combinations that may be complementary with regulation (Gunningham and others 1998).

Confrontational and Factious Politics. Regulatory processes can breed hostility and confrontational politics, in large measure because of the legalistic tendencies of regulation. Instead of promoting an environment of positive relationships between regulators and the regulated public, the structured format of regulatory programs tends to isolate interested parties from each another and to breed suspicion and distrust (May 1993). Negotiated rule-making has been a positive step toward addressing these problems (Langbein and Kerwin 2000).

Uncertain Program Outcomes. Regulatory programs are often advocated by many and scorned by many more, yet trustworthy information about the consequences of regulatory programs is often in critically short supply. As such, policy makers and administrators are often faced with piercing cries for more, or less, regulation, but have little evidence on which to base a choice that will lead to the public interest in the application of forestry practices on private land. These concerns become especially acute in an era of limited government resources, where inspections are infrequent, industry is relied on to self-monitor, and necessary prosecutions are difficult to launch (Gunningham and others 1998).

The a-for-mentioned culture of regulatory environments do not fairly characterize all regulatory initiatives. Forest landowners and timber harvesters in some states have cooperated in the establishment of forest practice standards and in the implementation of efficient regulatory processes. Never-the-less, the regulatory setting within which modern

forest practice regulatory programs operate is often less than ideal. Such is epitomized by strongly held views, pro and con, that are focused on regulatory initiatives. For example,

Policymakers, prodded by politicians and public interest groups, have indulged in over-regulation that has generated unreasonable and inflexible behavior on the part of [government officials] which, in turn, has bred resentment and resistance among [those being regulated] (Bardach and Kagan 1982, pg x of preface).

Reliance on private, high-stakes individual actions to police our environment, as well as to substitute for administrative agency regulatory enforcement, appears ill advised . . . [such] ignores the benefits provided by efficiently and professionally-prosecuted regulatory agency enforcement (Brunet 1992, pg 323).

Views that are more conciliatory recognize that regulatory programs are but one means of operating in the complex world of forestry practices applied to private forests. For example,

We do not claim that regulation is necessarily the most important means of addressing every major environmental problem. However, we do claim that regulation has a very substantial role to play in protecting the environment. So complex are the causes of environmental problems that their solutions are also likely to be multifaceted, with regulation being but a logical component (Gunningham and others 1998, pg 4).

The traditional approach often consists of governmental enforcement of mandatory requirements; the voluntary approach consists of government calling attention to potential harms and facilitating actions to address them. These approaches are best thought of as ends of a continuum rather than sole choices. In combination, the deterrent fear of regulation and the civic sense of duty to comply can be important motivators for action (May 2005).

Program Structure and Governance

Forest practice regulatory programs implemented by state governments are extremely diverse in their intentions and in the structures and processes they use to accomplish such intentions. Some states are concerned about the effect of forestry practices on the wide range of benefits that forests are capable of providing (for example, aesthetics, water, range, timber, wildlife), while others focus their regulatory structures on a single benefit that is considered to be an extremely important contributor to the overall

quality of a state's environment (for example, riparian areas, forested wetlands). Administratively, state programs are also diverse. Some delegate rule-making authority to governing boards or commission, while others rely on a lead forestry agency to establish and ensure compliance with forest practice standards. Others are more passive in their regulatory approach, simply establishing forest practice standards and hoping that the standards will be adhered to by landowners and timber harvesters, while others have forgone statewide regulation in favor of county-by-county regulatory programs. To assume that state regulatory programs are uniform in their intent and application is improper. California's regulatory program is a far cry for those that exist in Kentucky or Connecticut, and the regulatory program implemented by Utah is simply not a match to the programs being implemented in Virginia and West Virginia.

Regulatory programs are the product of incremental policy development processes. In few cases have state governments established, at one setting, a full-fledged, complex regulatory program that embodies all the elements of a sophisticated command-and-control system. Even where such has occurred, the programs are continually being refined in light of structural and administrative challenges that require attention. Most states — but certainly not all — have experienced an evolution from purely voluntary forest practice guidelines to the more complex notification or even inspection-permit type programs. This progression often takes the following form, with some states beginning or stopping at any one of the steps identified.

- Guidelines are developed by a modest community of interests (such as a state agency or a private concern) and are presented to landowners and timber harvesters for voluntary adoption. *If guideline adoption rates are not acceptable, then . . .*
- Guidelines are aggressively marketed to landowners and timber harvesters to enhance adoptions. *If guideline adoption rates are not acceptable, then . . .*
- Authority is granted to impose stop-work orders on landowners and harvesters who fail to adopt guidelines voluntarily. Repairs, at the landowners or harvesters expense, may be ordered. *If guideline adoption rates are not acceptable, then . . .*
- Authority is granted to require that all landowners and harvesters notify an agency of intent to harvest. In response, the agency provides information about guidelines. *If guideline adoption rates are not acceptable, then . . .*
- Authority is granted to require that all landowners and harvesters submit a harvest plan to an agency, including response to guidelines or rules, prior to harvest activities. If the agency does not comment within a specified period, operation can proceed. Failure to adhere to the plan leads to stop-work orders and penalties. *If guideline adoption rates are*

not acceptable, then . . .

- Authority is granted to require that all landowners and harvesters notify and submit a professionally prepared harvest plan, including response to guidelines and rules, prior to harvest activities. Multiagency review and pre- and post-harvest inspections are conducted. Failure to adhere to the plan leads to stop-work orders and penalties.

Regulatory systems are commonly defined as those that are composed of laws and rules that limit or confine behavior and that rely on coercion (penalties), rather than voluntary behavior (goodwill and positive incentives), as a way of securing compliance with established standards (Davies and Mazurek 1998). Although such systems are diverse in intent and administration, there are certain common components of regulatory systems that are worthy of note, including the following.

- *Statute*: Law establishing in broad terms the objectives of regulation, the activities to be regulated, the manner in which activities are to be regulated, the responsible administering agency, and penalties to be served for noncompliance.

- *Rule-Making Body*: Body (board or individual) authorized to promulgate rules (standards) with which private sector must comply.

- *Rules*: Rules (such as reforestation standards) which are enforced by an administering agency and are to be complied with by a resource owner or user.

- *Administering Agency*: Public agency (or agencies) responsible for carrying out the intent of a regulatory law. Responsible for issuing permits, monitoring status of compliance, and imposing penalties.

- *Interested Publics*: Organized or unorganized publics having an interest in regulation of and activity. Includes the regulated public, the anti-regulation public, and the pro-regulation public.

- *Related Regulatory Systems*: Additional and separate regulatory systems with which private sector activities must comply (such as air and water quality standards). A specific regulatory program may be but one component of a more comprehensive state system used to further society's interest in environmental quality.

Within the a-for-mentioned components of a regulatory system, the administration of regulatory programs can assume a number of approaches. For example, regulatory focus can be on a specific forestry sector (for example, private forests), a certain pollutant (for example, pesticides), a particular forestry practice (for example, forest roads), or a distinct geography (for example, forested wetlands). Likewise, a regulatory program can

be administered by a single regulatory agency that has authority over literally all forest practices occurring on private forests, or by a number of agencies, each of which has been assigned regulatory responsibility for certain practices, certain geographic areas, and certain sources of pollutants. Even within such administrative contexts, ultimate regulatory responsibility may rest with an environmental pollution control agency that has broad regulatory responsibility over many sources of pollutants (for example, department of environmental protection), a lead forest agency within a larger natural resource agency (for example, division of forestry in a department of natural resources), or responsibility may rest with an independent board or commission composed of elected or governor-appointed citizens that determine the manner in which a regulatory program is implemented (for example, forest practices board).

Regulatory programs typically require landowners and timber harvesters to seek prior-approval – or at least inform a regulatory agency of intent to conduct timber harvesting. The most common approaches are notification systems and permit-inspection systems. In the former system, a landowner or timber harvester informs the regulatory agency of intent to harvest and then proceeds with plans to do so if the agency does not respond within a specified period of time. The agency response may be as modest as providing the notifier of documents describing recommended best management practices. In contrast, a permit-inspection system requires a landowner or harvester to notify the regulatory agency (usually with a harvest plan) and then wait until the agency inspects (review of written plan, on-site inspection, or both) the manner in which the landowner or harvester intends to proceed. If the inspection results are satisfactory, a permit is issued and the harvest activities may commence. In some states, a surety bond in an amount equal to the value of the timber to be harvested must be posted prior to the granting of a permit.

The enforcement tools available to regulatory programs are numerous. They include informal on-site conferences, written notices to comply, stop work orders, suspension of licenses, court ordered injunctions, and the levying of civil and criminal penalties. In some states, agencies may take action to correct miss-applied forestry practices. Such can involve agency costs charged to the landowner or harvester, placement of a lien on the property involved, or the forfeiture of a surety bond posted prior to the commencement of harvest. As for monitoring the progress made by regulatory programs, monitoring of at least three types are possible, namely compliance monitoring (are the regulated practices being applied?), effectiveness monitoring (are the applied practices providing the desired level of protection?), and administrative monitoring (are administrative processes [for example issuance of permits] operating effectively?).

Objectives of Review and Assessment

National reviews of state government programs regulating forestry practices have been periodically undertaken by various organizations since the 1980s (Cubbage and Ellefson 1980, Henly and Ellefson 1986), of which the most recent national review occurred in 1992 (Ellefson and others 1995). Since such reviews were undertaken, a number of significant changes have occurred in the way and the intensity with which state governments engage in the regulation of forestry practices. For example, many state programs have been severely impacted by statewide budgetary shortfalls, state agencies involved in the regulation of forestry practices have increased substantially in number, responsibility for forestry initiatives once considered federal have been devolved to state governments, reviews and analyses (often critical) of regulatory approaches in general have led to changes in the way regulatory programs are structured and administered, and certification programs and criteria and indicators of sustainability have often diverted attention away from regulatory programs to less assertive programs for addressing concerns over forestry practices.

Changes in the environment of state government regulation of forestry practices prompted this review and assessment. The overall intent was to determine the status of state government programs that regulate the application of forestry practices on private forests and to develop information that will enable such programs (and alternatives to them) to be more effectively implemented. More pointedly, the review's objectives were to:

- Assess the current status of forest practice regulatory programs implemented by state governments, focusing on programs implemented by both a state's lead forestry agency as well as programs carried out by other agencies of state government.

- Assess the effectiveness of state government regulatory programs, focusing on accomplishments of existing programs as well as the effectiveness of regulatory programs relative to other types of programs that might accomplish similar objectives.

The scope of the review and assessment was limited in a number of ways. Of concern to the review were (a) regulatory programs implemented by state governments (excluded were federal programs, multi-state programs [state regulatory compacts], and programs of local units of government); (b) regulatory programs applied statewide to forests (excluded were regulatory programs focused only on geographically special areas

[for example, a particular watershed] or on unique ecosystems [for example, privately-owned natural areas]; (c) regulatory programs focused primarily on privately owned forests (excluded were state and federally owned forests); (d) and regulatory programs defining the type and way in which forestry practices are applied (excluded, for example, were regulatory programs affecting health and safety, transportation and shipping, product licensing and certification, and international trade).

Information required to accomplish the assessment's objectives was gathered from a number of sources. Especially important was information from published literature and various web sites, and from data bases administered by states that are responsible for the implementation of regulatory programs. In addition, information about specific programs was gathered, by mail questionnaire, from middle and senior-level administrators (or their representative) of regulatory programs and certain programs focused on private forest management. A program administrator in each state received a questionnaire requesting information about forestry practices regulated, agencies responsible for regulatory programs, intensity of program implementation, and judgements about the efficiency of regulatory programs relative to nonregulatory programs (for example, technical assistance, fiscal incentives, tax incentives). Fifteen states with extensive statewide regulatory schemes were asked for additional information concerning notification and enforcement history, administrative costs and monitoring activities, and emerging policy and management issues. All 50 states responded to the questionnaire's request for information (example titles of those responding are Director, Management Division; Director, Forest Resources Program; Director, Forest Practices Program; Director, Forestry Commission; Director, Division of Forestry; Division Manager, Forest Practices Program; Coordinator, Bureau of Forestry Assistance; Director, Resources and Planning; Director, State Forest Service; and Director, Division of Resources Protection and Stewardship).

The assessment often involved analyses which respected regionally uniform forest resource conditions or regionally consistent patterns of regulatory program organization and administration. For such purposes, states were grouped into three major regions, namely the *North*: Connecticut, Delaware, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin; *South*: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia; and *West*: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming.

EXTENT AND INTENSITY OF REGULATORY PROGRAMS NATIONWIDE

Regulatory Authority

State governments have substantial authority to regulate forestry practices applied to private forests. This authority has historically been well grounded in a variety of state laws and administrative rules, many of which have forestry as their exclusive focus while others are rooted in environmental and natural resources law generally. Because the legal roots of this authority are so diverse, seldom – if ever – does there exist a preeminent state statutory source that is the sole authorizing agent for the comprehensive regulation of all forestry practices applied to private forests. This diversity of regulatory authority stems in large measure from legislative responses to a plethora of special interests that advocate favored uses of forests and that seek limits on the type and way in which forestry practices are applied. Advocated at different times and with varying degrees of intensity, these preferences eventually become codified in state law and are subsequently expressed through a variety of programs that are implemented by a number of different state agencies (Ellefson, Moulton and Kilgore 2001 and 2002).

Environmental Centered Authorities

Regulatory authority over the application of forestry practices on private land can emanate from state law that addresses the public interest in broad sets of resources (air, water, soil, wildlife, wetlands, coastal zones) that can be impaired by the introduction of assorted pollutants (noise, pesticides, hazardous waste, thermal discharges, urban development, transportation systems). The substance of state environmental laws addressing these pollutants often shadow the provisions of federal environmental laws (for example, the Clean Water Act's [P. L. 95-217] Dredge and Fill exemption for forest roads [Sec. 404] requires use of state best management practices). Furthermore, these provisions are often administered in a regulatory fashion by state agencies that have similar, and sometimes identical, agency counterparts at the federal government level (Goble and Freyfogle 2002; Schoenbaum and others 2002; U. S. Department of Agriculture, Forest Service 2002).

The extent to which state environmental law serves as a basis for regulating forestry practices depends on the exactness of statutory directive. Where statutory accounts of intent are focused and uncluttered, the regulatory implications for forestry practices can be obvious and very forthright. For example, Kentucky environmental statutes authorize the

Kentucky State Nature Preserves Commission to “. . . promulgate administrative regulations identifying species of plants as endangered or threatened [and specifying protective actions resulting from] present or threatened destruction, modification, or curtailment of its habitat or range.” In contrast, state environmental law may embody comprehensive statements of legislative intents that require considerable administrative and judicial interpretation if they are to be successfully accomplished. Examples are “. . . control and manage water pollution and surface water use to protect the environment and the health of humans” [Georgia], “. . . establish regulations concerning disposal of hazardous wastes . . . as deemed necessary to protect public health, safety and welfare and the environment” [Massachusetts], and “. . . provide for the protection of existing water rights [and] encourage efficient and nonwasteful use of limited water supplies” [Nevada]. If these broad statements of intent are construed to include concerns over activities involving forests and forestry, they can lead to regulatory frameworks that have important consequences for the way in which forestry practices are applied.

State environmental laws that include within their domain a potential for regulatory actions focused on forestry practices are large in number and are diverse in purpose, complexity, and intensity of required enforcement. Comprehensive water laws administered by state agencies are an example, especially those laws that seek to curb nonpoint sources of water pollution (Environmental Law Institute 1997 and 1998). In an effort to address the latter, such laws typically declare water pollution resulting from nonpoint source activities as unlawful, in need of change by regulatory measures, and requiring the imposition of penalties on persons and organizations that fail to conform to established water quality standards. Some laws require prior approval of a state environmental agency for any nonpoint source activities that may lower water quality, although the water polluting results of certain activities and sectors are oftentimes exempt from the permitting processes of these agencies (for example, agricultural and silvicultural activities are considered to be unintentional or normal in Florida, Ohio, Louisiana, Massachusetts, Michigan, New Jersey, Tennessee) or may be assigned to other state agencies that have exclusive regulatory jurisdiction over forestry practices applied to private forests. Comprehensive water quality laws typically authorize agencies to forthrightly address nonpoint sources that violate state water quality standards, with such implying the use of stop-work orders, judicially prescribed injunctions, civil actions for damages, civil penalties and criminal penalties when willful violation or gross neglect is determined to have occurred. In 2001, all states had comprehensive water quality laws, of which at least 37 had some regulatory provisions focusing directly on nonpoint forest sources of water pollutants (Appendix Table A-1).

The range of state environmental laws that have potential to serve as the foundation for the regulation of forestry practices can be further appreciated by examples. Consider the following:

- *Endangered Species* (California): All state departments and agencies shall . . . utilize their authority in furtherance of . . . programs for the conservation of endangered or rare native plants, [including] identification, delineation and protection of habitats critical to the continued survival of such plants. Where the owner of land has been notified that a rare or endangered native plant is growing on such land, the owner shall notify the department at least 10 days in advance of changing the land use to allow for salvage of such plant. Submission of a timber harvesting plan (Z'Berg-Nejedly Forest Practices Act of 1973) shall constitute notice under this section [*California Fish and Game Code Sec. 1911 and 1913*].
- *Chemicals and Pesticides* (Minnesota): A person may not use, store, handle, distribute, or dispose of a pesticide, pesticide container, or pesticide application equipment in a way: (a) that is inconsistent with labeling as defined by [federal law]; (b) that endangers humans, damages agricultural products, food, livestock, fish, or wildlife; or (c) that will cause unreasonable adverse effects on the environment [*MN Stat. Chap. 18B Sec. 7*].
- *Lakeshore Vegetation* (Montana): A person who proposes to do any work that will alter or diminish the course, current, or cross-sectional area of a lake or its lakeshore must first secure a permit for the work from the local governing body . . . lakeshore being the perimeter of a lake when the lake is at mean annual high-water elevation, including the land within 20 horizontal feet from that high-water elevation. Regulations shall favor issuance [of a permit] if proposed work will not: diminish water quality; diminish habitat for fish or wildlife; interfere with navigation or other lawful recreation; create a public nuisance; or create a visual impact discordant with natural scenic values [*MT Stat. Title 75. Chap. 7. Sec. 204 and 208*].
- *Sediment Reduction* (South Carolina): Department shall promulgate regulations, minimum standards, guidelines, and criteria necessary to carry out the provisions of a . . . [state] sediment reduction program [and shall] assist conservation districts and local governments involved in the development and management of [said program] [*SC Code of Laws. Title 48. Sec. 14-50*].
- *Air Quality* (Colorado): Air Quality Control Commission shall have maximum flexibility in developing an effective air quality control program and may promulgate . . . regulations as may be necessary or desirable to carry out that program . . . persons owning or managing large parcels of land who significantly use prescribed fire as a grassland or forest management tool shall prepare plans addressing the use and role of prescribed fire and the air quality impacts resulting therefrom, and such plans are appropriately subject to review [by the Commission] [*CO Stat. Title 25. Article 7*].

- *Wetlands* (Maine): Application for a permit to undertake activities altering freshwater wetlands up to 15,000 square feet or one acre [with exceptions] must be reviewed in accordance with [specified procedures] . . . alteration must be avoided to the extent feasible . . . area to be altered must be the minimum amount necessary to complete the project . . . erosion control measures must be used to prevent sedimentation of protected natural resources . . . a 25-foot buffer strip must be maintained between the activity and any river, stream or brook. Permit application must be sent by certified mail or hand-delivered to the department [*ME Law. Title 38. Chap. 3. Subchap. 1*].

Forest Centered Authorities

Focus of Authority. Regulatory authority over the application of forestry practices on private land can also emanate from state law whose primary focus is forests and the interest of state government in their use, management and protection (Table 1). This legal authority over forestry practices applied to private forests can be focused or dispersed in source. If the former, a single state law and a lead state agency are responsible for implementing a regulatory program. States with such arrangements include Alaska (Alaska Forest Resources and Practices Act), Idaho (Idaho Forest Practices Act) and New Mexico (New Mexico Forest Conservation Act). In contrast, some states have myriad laws that assign regulatory authority over the application of forestry practices to a number of different state agencies. For example, regulatory authority over forestry practices in New Hampshire originates from nine or more different statutes which may require notices of intent to harvest, conditioned harvesting near wetlands and shorelands, limits on the modification of terrain, special treatment of slash and logging debris, and actions required if insects and diseases invade a forest. Maryland also has a number of different statutes regulating forestry activities, including limits on harvesting in critical areas, reforestation of pine forests, halts to practices causing erosion and sedimentation, and limits on harvesting in nontidal wetlands. And among Washington's diverse forest practices regulatory laws are those intent on protecting forests from wildfires (required burning permits, hazard reduction requirements, closure of roads and trails).

Regulatory authority in some states is quite focused, in that it imposes legal obligations on only those landowners or timber harvesters who have already committed — or are in the process of committing — violations of standards considered necessary to forest sustainability. Such authorities are known as “bad actor laws” or “contingency regulations” and have been adopted by at least 12 states (National Association of State Foresters 2001). Under these types of statutes, the owner or harvester has no prior obligation (for example, to obtain a permit before harvesting) and the enforcement response tools are more limited, more narrowly focused, and less complex than might

Table 1. State Statutes Authorizing Regulatory Programs Focused on Forestry Practices Applied on Private Forest Land, by State. 2004.

Alabama: Watershed Management Authorities (require use of AL Forestry Commission Developed BMPs) AL Code Title 9. Chap. 10A. Sec. 9. Ginseng Regulation. AL Code. Title 9. Chap. 3. Art. 10.

Alaska: Alaska Forest Resources and Practices Act. AK Stat. Title 41. Sec. 41.17.010-41 - 41.17.950.

Arizona: Fire Prevention and Suppression. AZ Rev. Stat. Title 37. Chap. 2.1. Art. 1. Sec. 623.

Arkansas: Notice for Intent to Control Burn. AR Stat. Title 20. Chap. 22. Sec. 302.

California: Z'Berg-Nejedly Forest Practices Act. CA Public Resources Code. Sec. 4511-4628. Wild and Scenic Rivers Act. CA Public Resources Code. Sec. 5093.50 -5093.68. Fire Protection Burning Permits. CA Public Resources Code. Sec. 4421-4446.

Colorado: Permits for Prescribed Burning. CO Stat. Title 24. Art. 33. Part 2.

Connecticut: Connecticut Forest Practices Act. CT Stat. Title 23. Chap. 451a.

Delaware: Pine and Yellow-Popular Tree Conservation and Reforestation. DL Stat. Title 3. Chap. 10. Silvicultural Systems and Sedimentation and Erosion Control. DL Stat. Title 3. Chap. 10. Coastal Zone Act. DL Stat. Title 7. Chap. 70.

Florida: Management and Storage of Surface Waters. FL. Stat. Ann. Title 28. Chap. 373.

Georgia: Vegetative Management in Road Right-of-Ways. GA Stat. Title 32. Chap. 6. Sec. 75. Uniform Local Government Forms for Harvesting Permits. Title 12. Chap. 6. Sec. 24.

Hawaii: Commercial Timber Use in Reserve Zone. HI Rev. Stat. Title 13. Sec. 183-1 to 183-43.

Idaho: Idaho Forest Practices Act. ID Stat. Title 38. Chap. 13. Sec. 1301-1313. Fire Hazard Reduction. ID Stat. Title 38. Chap. 1. Sec. 1-36 and Chap. Sec 1-11.

Illinois: Stream Debris Adverse to Fish. IL Code 515. Art. 5. Ginseng Regulation. IL Code 525. Art. 5.

Kentucky: Forest Conservation Act. KY Stat. Rev. Title 12. Chap. 149. Sec. 342-350.

Louisiana: Terpentine Leave Trees. LA Stat. Rev. Title 3. Chap. 28. Sec. 4293. Reforestation of Public Land or Right-of-Way Land. LA Stat. Rev. Title 3. Chap. 28. Sec. 4271.

Maine: Timber Harvest Reporting Requirements. ME Law Title 12. Chap. 805. Sec. 8881-8883, 8883B, 8885, 8887, 8888. Timber Harvesting Near Rivers and Wetlands and Forest Practices. ME Law Title 12. Chap. 805. Sec. 8866, 8867A, 8867B, 8868, 8869. Slash Disposal. ME Law Title 12. Chap. 807. Sec. 9331 - 9338. LURC Use Regulation. ME Law Title 12. Chap. 206A. Sec. 681 - 689.

Maryland: Forest Practices Applications. MD Code Natural Resources. Title 5. Sec. 602, 604, 608. Fire Hazard Reduction. MD Code Natural Resources. Title 5. Sec. 710. Pine Tree Reforestation. MD Code Natural Resources. Title 5. Sec. 501-508. Chesapeake Bay Critical Areas Commercial Harvests. MD Code. Title 8. Sec. 1808.7. Erosion and Sediment Control. MD Code Environment. Title 4. Sec. 101 - 116. Forest Conservation Act. MD Code Natural Resources. Title 5. Sec. 1601 - 1613. Timber Harvest in Nontidal Wetlands. MD Code Environment. Title 5. Sec. 901 - 911.

Table 1 (continued).

Massachusetts: Massachusetts Forest Cutting Practices Act. *MA Gen. Laws. Title 15. Chap. 132. Sec. 40-51. Slash Management. MA Gen. Laws. Title 7. Chap. 48. Sec. 16 and 16A.*

Michigan: Slash and Debris Removal. *MI Comp. Laws. Chap. 324. Sec. 51901-51905.*

Minnesota: Removal and Transport of Decorative Materials. *MN Stat. Chap. 88. Section 642. Control and Management of Forest Pests. MN Stat. Chap. 89. Sec. 53-57. Wetland Conservation Practices. MN Stat. Chap. 103F. Sec. 616. Shoreland Development Regulation. MN Stat. Chap. 103F. Sec. 201 - 311. Wild and Scenic Rivers System. MN Stat. Chap. 103F. Sec. 305 -331.*

Missouri: Designated Forest Cropland Regulation. *MO Rev. Stat. Chap. 254. Sec. 254.04 and Sec. 254.130.*

Mississippi: Forest Harvesting. *MS Code Title 49. Chap. 19. Sec. 53. Leave Trees Involving Harvest of Naval Stores. MS Code Title 49. Chap. 19. Sec. 55. Pine Tree Stocking After Harvest. MS Code Title 49. Chap. 19. Sec. 57. Hardwood Tree Stocking After Harvest. MS Code Title 49. Chap. 19. Sec. 59. Seed Tree Requirements after Harvest. MS Code Title 49. Chap. 19. Sec. 61.*

Montana: Notification of Forest Practice Application. *MT Stat. Title 76. Chap. 13. Part 1. Streamside Management Zones. MT Stat. Title 77. Chap. 5. Sec. 3-1-307. Natural Streambed and Land Preservation Act. MT Stat. Title 75. Chap. 7. Part 1. Control and Management of Forest Pests. MT Stat. Title 76. Chap. 13. Part 3. Fire Hazard Reduction Permits. MT Stat. Title 76. Chap. 13. Part 4.*

Nevada: Nevada Forest Practice Act. *NV Rev. Stat. Chap. 528. Sec. 10-120. Preservation of Trees, Flora and Timberland. NV Rev. Stat. Chap. 527. Sec. 10-300.*

North Carolina: Forest Practice Guideline Enforcement (Sedimentation Control Act). *NC Gen. Stat. Chap. 113A. Art. 4. Sec 52.1. Insect and Disease Protection. NC Gen. Stat. Chap. 113. Art. 4A. Prescribed Fire Permits. NC Gen. Stat. Chap. 113. Art. 4B-4E. Obstruction of Streams and Drainage Ditches. NC Gen. Stat. Chap. 77. Art. 2.*

New Hampshire: Notice of Intent to Harvest Timber. *NH Rev. Stat. Chap. 227J. Sec. 5. Operations in Wetlands. NH. Rev. Stat. Chap. 227J. Sec. 6. Alteration of Terrain. NH Rev. Stat. Chap. 227J. Sec. 7; and NH Rev. Stat. Chap. 485A. Sec. 17. Cutting Near Certain Waters and Roads. NH Rev. Stat. Chap. 227J. Sec. 9. Slash and Mill Disposal near Waters. NH Rev. Stat. Chap. 227J. Sec. 10. Transport of Coniferous Trees. NH Rev. Stat. Chap. 227J. Sec. 10. Insect and Disease Management Control Areas. NH Rev. Stat. Chap. 227K. Sec. 3. Shoreland Protection Standards (woodland buffer) and Penalties. NH Rev. Stat. Chap. 483B. Sec. 9 and 18. Floating of Timber. NH Rev. Stat. Chap. 485B. Sec. 1.*

New Jersey: New Jersey Freshwater Wetlands Act. *NJ Permanent Stat. Title 13. Chap. 9B-4. [also woodlands assessment/plan approval requirements]*

New Mexico: Forest Conservation Act. *NM Stat. Chap. 68. Sec. 2-1 to 2-23. Logging, Fire Prevention, and Reserve Seed Trees. NM Stat. Chap. 68. Sec. 1-1, 1-2 and 1-3. Endangered Plants Act. NM Stat. Chap. 75. Sec. 6.1.*

New York: Removal of Evergreens and Protected Plants. *NY Consolidated Law Chap. 43B. Title 15. Sec. 9. Forest Insect and Disease Control. NY Consolidated Law Chap. 43B. Title 13. Sec. 9.*

Ohio: Forest Fire Hazard as a Nuisance. *OH Rev. Code. Title 15. Sec. 1503.07.*

Oklahoma: Prescribed Burning Notification-Permits. *OK Stat. Title 2. Sec. 16-24.1 through 16-28.2.*

Table 1 (continued).

Oregon: Oregon Forest Practices Act. *OR Rev. Stat. Title. 44. Chap. 527. Sec. 610-992.* Prescribed Burn Permits. *OR Rev. Stat. Title 38. Chap. 477. Sec. 515.* Seeding of Prescribed Burn. *OR Rev. Stat. Title. 44. Chap. 526. Sec. 360 and 370.* Boring Trees for Pitch Extraction. *OR Rev. Stat. Title. 44. Chap. 527. Sec. 260.* Integrated Pest Management. *OR Rev. Stat. Title. 44. Chap. 527. Sec. 310-370.*

Pennsylvania: Fire Protection Nuisance Declarations. *PA Stat. Chap. 3. Sec 302(d).* Ownership of Harvested Trees. *PA Public Law. 257. No. 71.* Erosion and Sediment Control. *PA Title 25. Chap. 102. Sec. 1-7.* Oak Wilt Disease Protection. *PA Title 7. Chap. 125. Sec. 46.* Vegetative Standards Post-Mining Conditions. *PA Title 25. Chap. 88. Sec. 217, 330., Chap. 89. Sec. 86., Chap. 90. Sec. 159.*

Rhode Island: Registration of Wood Cutting Operations. *RI General Laws. Title 2. Chap 2-15. Sec. 1-5.* Forest Fires and Fire Prevention. *RI General Laws. Title 2. Chap 2-12. Sec. 5-13.*

South Carolina: Forest Pest Outbreak Management. *SC Code of Laws. Title 48. Chap. 29. Sec. 10-60.* Emergency Fire Protection Powers. *SC Code of Laws. Title 48. Chap. 31. Sec. 10-40.* Prescribed Fire Management Plan. *SC Code of Laws. Title 48. Chap. 34. Sec. 10-60.* Regulation of Certain Fires. *SC Code of Laws. Title 48. Chap. 35. Sec. 10-60.* Harvesting of Timber In Scenic Rivers Area. *SC Code of Laws. Title 48. Chap. 29. Sec. 160.*

South Dakota: Forest Insect and Disease Control. *SD Stat. Title 41. Chap. 21. Sec. 1-8.* Fire Prevention and Suppression. *SD Stat. Title 41. Chap. 35. Sec. 1-19.*

Tennessee: Scenic Rivers Management Activities Permitted. *TN Code. Title 11. Chap. 13. Sec. 111.* Fire Suppression and Prevention. *TN Code. Title 11. Chap. 4. Sec. 401.*

Texas: Forest Pest Control. *TX Stat. Title 6. Chap. 152. Sec. 1-106.* Prescribed Burning. *TX Stat. Title 6. Chap. 153. Sec. 1-82.* Reclamation of Mined Land. *TX Stat. Title 4. Chap. 131. Sec. 5.*

Utah: Utah Forest Practices Act. *UT Stat. Title 65A. Chap. 8A. Sec 101-106.*

Vermont: Regulation of Heavy Cutting Practices. *VT Stat. Title 10. Chap. 83. Sec. 2621-2625.* Water Pollution Prohibition. *VT Stat. Title 10. Chap. 47. Sec. 1259, 1274 and 1275.* Treatment of Slash. *VT Stat. Title 10. Chap. 83. Sec. 2648.*

Virginia: Conduct of Silvicultural Activities. *VA Code Title 10.1. Chap. 11. Sec. 81.1 - 81.7.* Regulation of Prescribed Burning. *VA Code Title 10.1. Chap. 11. Sec. 42.* Pine Trees Left for Reseeding. *VA Code Title 10.1. Chap. 11. Sec. 64 and 71.* Logging Debris in Streams. *VA Code Title 62.1. Chap. 20. Sec. 194.2.* Mined Land Reclamation Plan. *VA Code Title 45.1. Chap. 16. Sec. 182.1.*

Washington: Washington Forest Practices Act. *Rev. Code of WA. Title 76. Chap. 9. Sec. 10-935.* Fire Protection Burning Permits, Hazard Reduction, Road Closures. *Rev. Code of WA. Title 76. Chap. 4. Sec. 5-900.* Forest Insect and Disease Control. *Rev. Code of WA. Title 76. Chap. 6. Sec 10-130.* Wood Debris in Navigable Waters. *Rev. Code of WA. Title 76. Chap. 42. Sec. 10-70.* Forest Practice Rule Authority re Water Quality. *Rev. Code of WA. Title 90. Chap. 48. Sec. 420 and 425.* Selective Cutting in Shorelands. *Rev. Code of WA. Title 90. Chap. 58. Sec. 150.* Hydraulics Project Approval. *Rev. Code of WA. Title 77. Chap. 55. Sec. 10-370.*

West Virginia: Logging Sediment Control Act. *WV Code Art. 1B. Chap. 19. Sec. 1B.* Forest Insect and Disease Control. *WV Code. Art. 3. Chap. 20. Sec. 3.* Ginseng Regulation. *WV Code. Art. 3. Chap. 19. Sec. 1A-3a.* Coal Mining Reclamation. *WV Code Art. 3. Chap. 3. Sec. 10.*

Table 1 (continued).

Wisconsin: Statewide County Notification of Timber Harvest. *WI Stat. Chap. 26.03*. Fire Prevention and Suppression. *WI Stat. Chap. 26.11*. Forest Insect and Disease Control. *WI Stat. Chap. 26.30*.

Wyoming: Reclamation of Mined Lands. *WY Stat. Title 35. Chap. 11. Sec. 402*.

Note: Statutory authorities identified may include authorities of other state agencies which cooperate with a state's lead state forestry agency. State statutes focused on state owned forestland and on forest protection activities (wildfire, insects and diseases) are identified in some cases, but are generally excluded. Some lead state forestry agency's have minimal or no regulatory authority over nonfederal forests (Indiana, Iowa, Kansas, Nebraska, North Dakota).

Source: State statutes and codes, administrative rules and directives, and related public documents.

occur under comprehensive regulatory laws. States with such laws include Delaware (. . . if a person is conducting silvicultural activities in a manner that is likely to pollute waterways, the state forester can issue special orders requiring cessation of the activities and implementation of corrective measures); Virginia (. . . if silvicultural activities are being conducted in manners that causes pollution, a cease and desist order may be issued and corrective actions may be ordered; orders are enforceable by injunction); Idaho (. . . if a landowner or timber harvester fails to apply appropriate best management practices or is known to have willfully caused degradation of water resources, an operating bond may be required as a condition for continuing timber harvesting activities); West Virginia (. . . if failure to use a particular best management practice is causing or contributing to soil erosion and water pollution, an order for immediate suspension of work may be issued if there is a present danger to life or if the result may be uncorrectable soil erosion); and New Hampshire (. . . state is authorized to issue cease and desist orders to suspend logging or forestry operations in areas where actions are likely to result in pollution of surface water or ground water).

The scope of regulatory authority has been confined in some states by state-enacted "no more stringent" laws. Occurring in about one-third of the states, such laws limit or condition ability to adopt enforceable regulations (including forestry practice regulations) that are more stringent than any federal environmental regulations. They are focused primarily, but not exclusively, on nonpoint sources (including forest sources) of water pollutants. For example, Montana state law prohibits rules "more stringent than the comparable federal regulations or guidelines that address the same circumstances"; Kentucky forbids imposition under any permit "any limitation, monitoring requirement, or other condition which is more stringent than . . . would be applicable under federal regulation"; Oregon bars the Environmental Quality Commission and the Department of Environmental Quality from ". . . promulgating or enforcing any effluent limitation upon

nonpoint source discharges from forest operations on forest lands unless mandated under the Clean Water Act”; and Idaho requires environmental agencies in the water pollution control area to “. . . not impose requirements beyond those of the federal clean water act.” Other states with similar statutory provisions are Florida, Maine, Maryland, Mississippi, Ohio, Pennsylvania, South Dakota, Utah, and Wisconsin. Not all prohibit outright adoption of enforcement standards more stringent than federal law; many require a detailed and complex set of justifications and procedural reviews if proposed state standards are more stringent than federal requirements. Among problems with “no more stringent laws” is the loss of state flexibility to address unique and especially severe environmental problems that may require more severe enforceable measures than authorized by federal law (Environmental Law Institute 1997).

Regulatory authority focused primarily on forests and forestry practices can also be construed to be part of state forestry programs that landowners and timber harvesters voluntarily participate in, but do so conditionally. A prerequisite to participation in a fiscal or a tax incentive program may be willingness to abide by a set of standardized forestry practices. For example, Vermont landowners can voluntarily participate in the state’s forest tax incentive program, but upon doing so they must adhere to forest practice standards set forth in a management plan (including its implementation) and must agree to periodic onsite inspections. Penalties apply for failure to comply with the agreed to forest practice standards. In Ohio and Minnesota, a prerequisite for favorable treatment of property taxes assigned to private forests requires landowner willingness to comply with a state approved forest management plan or the state’s forestry practices guidelines. Failure to do so can result in forfeiture of the tax advantage.

Procedures and Standards. Statutory authority to regulate forestry practices typically includes laudable statements of goals and objectives to be achieved, activities and persons (or organizations) to which the law applies, penalties for failure to comply with the law or subsequently promulgated rules, and the agency or agencies that are responsible for implementing the law. Beyond such information, however, such laws vary considerably in content, scope and specificity. Some state laws simply authorize the regulation of forest practices, with administrative rules specifying exactly how such is to be accomplished (for example, New Mexico), while statutes in other states specify in great detail the entire structure of a regulatory program (for example, Nevada), including statutory specification of exacting standards for forestry practices. Examples of the latter are:

- Reserve and leave uncut . . . all trees measuring twelve inches or less in diameter outside bark, at a point four and one-half feet from the ground and . . . leave not less than two live

wind firm seed trees per acre measuring seventeen inches or more in diameter outside bark, at a point four and one-half feet from the ground (*New Mexico*) [NM Stat. Chap. 68. Sec. 1-2(C)]

- Clear-cut defined as any timber harvesting on a forested site greater than 5 acres in size that results in a residual basal area of trees over 4 ½ inches in diameter measured at 4 ½ feet above the ground of less than 30 square feet per acre, unless, after harvesting, the site has a well-distributed stand of acceptable growing stock, as defined by rule, of at least 3 feet in height for softwood trees and 5 feet in height for hardwood trees (*Maine*) [ME Law Title 12. Chap. 804. Sec. 8868]

- Private forest land adjacent to [a Type A water body] and located in a coastal forest of spruce or hemlock . . . , harvest of timber may not be undertaken within 66 feet of the water body (*Arkansas*) [AK Stat. 41.17.116].

- Area shall be classified as acceptability stocked if either of the following conditions exist within five years after completion of timber operation: (a) area contains an average point count of 300 [seedlings] per acre . . . computed as follows (1) each countable tree which is not more than 4 inches in diameter at breast height to count as one, (2) . . . four inches and not more than 12 inches . . . to count as three, (3) . . . over 12 inches . . . to count as six; (b) the average basal area, measured in stems one inch or larger in diameter, is at least 85 square feet per acre (*California*) [CA Public Resources Code. Sec 4561].

- . . . no cutting for commercial purposes any pine tree under 10 inches in diameter unless there is left standing on each harvested acre, 100 or more well distributed pine trees four inches or more in diameter or at least four pine seed trees of ten inches or more in diameter (*Mississippi*) [MS Code Title 49. Chap. 19. Sec. 57].

- No harvest (type three) within a single ownership shall exceed 120 acres [except as provided for]; no harvest (type three) shall be allowed within 300 feet of the perimeter of a prior harvest (type three) unit if the combined acreage of the harvested areas . . . would exceed 120 acres (*Oregon*) [OR Rev. Stat. Title 44. Chap. 527. Sec. 740].

- After completion of a logging operation, satisfactory reforestation . . . shall be completed within three years . . . [although] a period of up to five years may be allowed where a natural regeneration plan is approved by the department [ten years for low productivity lands] . . . upon completion of reforestation a report shall be filed with the department . . . within twelve months of receipt of report the department shall inspect the reforestation operation (*Washington*) [Rev. Code of WA. Title 76. Chap. 9. Sec. 9.07].

- Every landowner who cuts . . . timber from ten acres or more of land on which loblolly or white pine, singly or together, occur and constitute twenty-five percent or more of the live trees on each acre or acres, shall reserve and leave uncut and uninjured not less than eight cone-bearing loblolly or white pine trees fourteen inches or larger in diameter on each acre thus cut and upon each acre on which such pine trees occur singly or together . . .

Where eight cone-bearing loblolly or white pine trees fourteen inches or larger in diameter are not present . . . , there shall be left uncut and uninjured for each such pine two cone-bearing pine trees of the largest diameter present less than fourteen inches in diameter. Such pine trees . . . shall be healthy, windfirm, and of well-developed crowns, evidencing seed-bearing ability by the presence of cones in the crowns. Pine trees which are left uncut for purposes of reseeding . . . shall not be cut until at least three years have elapsed (*Virginia*) [*VA Code Title 10.1. Chap. 11. Sec. 64 and 65*].

Table 2. Administrative Rules Guiding the Implementation of State Programs Regulating Forestry Practices Applied on Private Forest Land, by State. 2004.

- *Alaska: Forest Resources and Practices Regulations*. Division of Forestry. AK Department of Natural Resources. January 2000. Basic contents: Notification Provisions, Riparian Standards, Road Construction, Timber Harvesting, and Reforestation. Available (October 2004) at <http://www.dnr.state.ak.us/forestry/forestpractices.htm#other>.
- *California: Forest Practice Rules*. CA Department of Forestry and Fire Protection. January 2004. Basic contents: Application of Rules, Forest District Rules (silvicultural methods, harvesting practices, site preparation, water course protection, hazard reduction, fire protection, wildlife protection, coastal area special treatment, roads and landings, county rules), and Administration (operator license, timber harvest plan, appeal procedures, site classification, stocking levels, special plans [nonindustrial and sustained yield], and conversion of timberland. Available (October 2004) at <http://www.fire.ca.gov/ResourceManagement/THinCA.asp>
- *Idaho: Forest Practices Act (Rules Pertaining to . . .)*. Forest Management Bureau. Idaho Department of Lands. January 2004. Basic contents: General Rules (notification, forest land conversion), Timber Harvesting, Cumulative Watershed Effects, Road Construction and Maintenance, Reforestation and Residual Stocking, Chemicals and Petroleum Products, Slash Management, and Prescribed Fire. Available (October 2004) at <http://www2.state.id.us/lands/pdf/Forest%20Practices%20Act/FPA%20Rules.pdf>
- *Massachusetts: Forest Cutting Practices Rules*. Bureau of Forestry. MA Department of Conservation and Recreation. January 2004. Basic contents: Jurisdiction and Procedures, Standards (regeneration, clearcutting, buffers), Guidelines (wildlife, wetlands, riparian areas, endangered species), Harvester License and Administrative Procedures. Available (October 2004) at <http://www.state.ma.us/dem/regs/304011a.htm>.
- *New Mexico: Commercial Timber Harvesting Requirements*. State Forestry. NM Department of Energy, Minerals and Natural Resources. November 2001. Basic contents: Harvest Permits and Plans, Forest Harvest Standards, Alternative Forestry Practices, Administrative Review, Violations and Penalties. Available (October 2004) at: http://www.emnrd.state.nm.us/FORESTRY/Timber/19.20.4NMAC_new.pdf.
- *Oregon: Forest Practice Administrative Rules*. OR Department of Forestry. January 2000. Basic contents: Operational Planning, Reforestation, Slash Treatment, Chemicals, Road Construction and Water Protection (riparian areas, buffers, wetlands). Available (October 2004) at http://arcweb.sos.state.or.us/rules/OARS_600/OAR_629/629_tofc.html.
- *Washington: Forest Practices Rules, Board Manual and Act*. Forest Practices Division. WA Department of Natural Resources. July 2001. Basic Contents: Application and Notification Procedures, Riparian Areas (easements and open spaces), Construction and Maintenance, Timber Harvesting, Reforestation, Forest Chemicals, Consultation and Enforcement. Available (October 2004) at <http://www.dnr.wa.gov/forestpractices/rules/>

Often developed in accord with a state's administrative procedures act, rules guiding the administration of a regulatory program address a wide variety of subjects, including road construction, riparian standards, reforestation, timber harvesting, application of

chemicals, slash management and notification and permitting procedures (Table 2). It is often via such rules that precise statements are made about forestry practices considered acceptable and the manner in which they are to be applied. The extent to which rules are useful is in large measure determined by clarity of expected actions (“harvesting will not occur within 66 feet of a Class I stream”), effort required of regulated public to comply (“see agency web site for reforestation requirements”), and the logic between rules and expected policy outcomes (“150 foot buffer strip is required for fish habitat protection”) (Diver 1993, Kerwin 1999).

Statutorily specifying administrative procedures and forest practice standards in great detail in law can pose significant difficulties for program administrators, the regulated public, and communities generally interested forestry practices. Some have suggested that extensive statutory precision of forestry practices fails to recognize the significant variability in the type and physical condition of forests, both between specific sites and over broader forest landscapes; legitimate differences in landowner objectives and the forestry practices that are needed to accomplish such objectives; changes over time in the biophysical condition of forests and in the interests and purposes that landowners ascribe to their forests; changes in public demands for the goods and services that can be produced by forests and in the public's perception of proper as well as inappropriate forestry practices required to meet such demands; and new science-based technologies that can make inflexible standards obsolete and damaging in application (Kerwin 1999, Society of American Foresters 2002).

Compliance and Enforcement. State agencies that are responsible for administering forest practice regulatory programs focused on private forests have substantial institutional capacity to enforce laws and rules. They do so in a variety of ways, including the use of informal conferences, notices to comply, stop work orders, corrective actions, civil penalties, injunctions, and civil and criminal penalties. Information describing the nature of these enforcement actions is readily available from state agencies that are responsible for such programs. For example, from 1999 through 2003, regulatory enforcement actions in California added up to: misdemeanor actions — 108, civil actions – 49, and corrective actions — 4 (California Division of Forestry and Fire Protection 2004). In Oregon during the period 2001 through 2003, 241 citations were issued, 214 civil penalties levied, and 149 corrective actions were ordered (information from program administrator). And in Virginia for the period 1998 through 2003, 2,550 compliance actions were initiated (orders, fines, corrective actions) (information from program administrator). Similar information exists for other states with regulatory programs focused on forests.

State forest practice laws often authorize state agencies to, as an enforcement mechanism, repair damage caused by violations of forest practice rules. For example, the Washington Department of Natural Resources "may expend funds available to undertake and complete [corrective forest practices], and operator, timber owner, forest land owner shall be jointly liable for the actual, direct cost thereof." Similarly in Oregon, "the State Forester or by contract [shall] repair the damage or correct the unsatisfactory condition . . . and shall prepare an itemized [cost] statement thereof and shall deliver a copy to the operator, timber owner and landowner." Under Maryland's Chesapeake Bay Critical Area Act, illegal timber cutting resulting in failure to reforest can result in circuit court assessing violators the cost of replanting the trees. And in Vermont, the Secretary of the Agency of Natural Resources may "fix and order compensation for any public property destroyed, damaged or injured [as a result of unacceptable discharge in waters]" and may order persons responsible for water pollutants to reimburse governments that have taken corrective action. Other states that have authority to take corrective action include Idaho and Nevada. Operators and landowners that fail to take corrective action and subsequently do not reimburse the state for the cost of doing so may be refused future permits to harvest timber or may have liens imposed on their forest property. In Idaho, for example, the state will not accept an operator's notification of intent to harvest timber until corrective action is taken on a previously harvested site. In California and Oregon, the state has authority to place a lien on property. Oregon's authority in this respect is clear, failure to reimburse the state for corrective actions ". . . shall constitute a general lien upon the real and personal property of the operator, timber owner, and landowner . . . and may be foreclosed in the manner provided by law."

Legal authorities for forest practices regulatory programs establish penalties which are to be imposed for a nonconformity with provisions of the authorizing law or the rules that interpret the law (Table 3). The specific nature of such penalties can be quite diverse, to include court-order injunctions sought by a state's attorney general; denial, suspension or revocation of a license or a permit to conduct business (for example, timber harvester license); required repair of damages incurred as a result of applying inappropriate forest practices; liens against real and personal property; and civil and criminal penalties of varying severity. In some cases, the severity of the penalty is conditioned by the circumstances of the violation. For example, penalties imposed for violating Montana's

Table 3. Penalties for Violation of Statutes and Rules Directing State Programs Regulating Forestry Practices Applied on Private Forest Land, by State. 2004.

- Alaska*: Civil penalty up to \$10,000 per violation (AK Forest Resources and Protection Act).
- California*: Criminal penalty up to \$1,000 and/or six months in prison (Z'Berg-Nejedly Forest Practices Act).
- Connecticut*: Civil penalty up to \$5,000 per day for each day a violation occurs (CT Forest Practices Act).
- Idaho*: Misdemeanor offense and fines, with each day's violation considered a separate offence (ID Forest Practices Act).
- Maine*: Civil penalty for failure to notify (harvest of less than 50 cords -- up to \$50, more than 50 cords -- up to \$1,000 each occurrence), continued operation after cessation order up to \$1,000 per day (ME Harvest Reporting Requirements).
- Massachusetts*: Civil penalty up to \$100 per acre for each acre in violation, harvest without license \$500 per violation (MA Forest Cutting Practices Act).
- Montana*: Civil penalty up to \$1,000 per violation (Streamside Management Zone Act).
- Nevada*: Misdemeanor offense and associated fines (NV Forest Practices Act).
- New Mexico*: Misdemeanor offense, with each violation a fine up to \$1,000 or by imprisonment not to exceed one year or both (NM Forest Conservation Act).
- Oregon*: Civil penalties up to \$5,000 and criminal penalties for failure to notify, leaving certain snags and downed logs, and exceeding specified maximum harvest areas (OR Forest Practices Act).
- Virginia*: Failure to notify civil penalty of \$250 for initial violation and up to up to \$1,000 per violation during 24 month period; failure to obey special or emergency orders civil penalty of up to \$5,000 for failure to obey special orders (Conduct of Silvicultural Operations).
- Vermont*: Civil penalty of not more than \$50,000 for each violation, and, in the case of a continuing violation, a penalty of not more than \$25,000 for each day a violation continues (Regulation of Heavy Cutting Practices).
- Washington*: Civil penalty of \$10,000 each violation (each violation a separate offense), and gross misdemeanor fine of not less than \$100 nor more than \$1,000, or imprisonment for not more than one year or both fine and imprisonment for each separate violation(each day of violation occurs constitutes a separate violation (WA Forest Practices Act).
- West Virginia*: Civil penalty up to \$2,500 first offense and up to \$5,000 subsequent offenses, and criminal penalty not less than \$250 and not more than \$500 for each violation (Logging Sediment Control Act).

Source: State statutes and codes, administrative rules and directives, and related public documents.

streamside management zone regulations must take into account prior violations (if any) of a landowner or timber harvester. In Alaska, the Forest Resources Protection Act conditions the amount of a civil fine according to the character and degree of injury to forest resources and values, degree of intent or negligence of the operator in causing or permitting the violation, character and number of past violations, and, if the information is available, the net economic savings realized by the respondent through the violation (*AK Stat. 41.15.131*). Similarly in Oregon, the state's board of forestry and state forester may weigh the following when considering assignment of a civil penalty (*OR Rev. Stat. Title. 44. Chap. 527. Sec. 685*): gravity and magnitude of the violation; prior violations of statutes, rules, orders and permits; extent to which violation was an unavoidable accident; negligence or an intentional act; past history of person taking all feasible steps or procedures necessary correct a violation; size and type of ownership of the operation; and violator's cooperativeness and efforts to correct the violation.

Regulatory Program Focus

State authority focused specifically on forests and the application of forestry practices to forests is not only extensive among states, but it is also quite variable in intent. In the early 1990s, state regulatory authority involving forestry practices were focused on promoting water quality (24 states with regulatory authority), promoting reforestation (13 states), improving timber harvesting (18 states), protecting from wildfire, insects and diseases (26 states), protecting wildlife and endangered species (20 states), and enhancing recreation qualities (seven states) (Ellefson and others 1995). Further review of state regulatory foci in 2000, determined that forest practice laws focused on: forestry practices generally (11 states), lake and stream protection (27 states), forested wetland protection (23 states), stream crossings (23 states), sediment and erosion control (29 states), chemical applications (15 states), and storm water discharges (10 states). These intentions were often carried out in combination with nonregulatory approaches. For example, 35 percent of states in 2000 used voluntary programs plus legal regulatory authority to impose penalties on landowners and operators for failure to voluntarily apply best management practices (National Association of State Foresters 2001).

A more insightful understanding of regulatory program foci can be obtained from the administrators of such programs. State administrators of forest practice regulatory programs (or state programs focused on private forests) were asked in 2003 to provide information about the application of forestry practices on nonfederal forests, especially as such might be influenced by state regulatory programs. Of interest were seven major categories of forestry practices, namely:

- *Road and Trail Practices* (for example, water crossings, erosion control, material disposal sites, blasting standards, winter use and closures).
- *Timber Harvesting Practices* (for example, landings; skid trails; slash management; equipment; felling, bucking and yarding; residual stand damage; safety).
- *Reforestation Practices* (for example, site preparation, timing, species selection, artificial or natural, regeneration levels, supplemental planting).
- *Cultural Practices* (for example, early release treatments, thinning, pruning, stand improvement cuttings, stand health).
- *Chemical Application Practices* (for example, methods of application, intensity, timing, mixing, spill management).
- *Forest Protection Practices* (for example, fuel loads; fire prevention; disease and insect prevention; animal damage prevention, salvage and sanitation cuttings).
- *Administrative Practices* (for example, planning, notifying, reporting, monitoring, evaluating, enforcing).

Forestry Practices Applied

Program administrators considered all of the above practices to be available for application to private forests. However, in very few cases were all categories of forestry practices viewed as *always* being correctly applied (average of 9 percent of responding states). An average 59 percent of states considered all of them to be *often* applied in a correct fashion, while all practices were only *sometimes* being so applied to private forests in about one-third (31 percent) of the states. As for individual categories of practices, chemical application practices tended toward more correct application (always or often in 78 percent of states) while cultural, protection and administrative practices were more inclined to be *sometimes* or *never* correctly applied (cultural practices 50 percent of states, forest protection 46 percent, administrative practices 44 percent) (Table 4). Regional patterns of forestry practice application were quite consistent with nationwide conditions, although forestry practice applications in the South tended more toward *always* or *often* being correctly applied while in the North the practices were judged more often to be *sometimes* or *never* correctly applied (Appendix Tables B-1, B-2 and B-3).

Forestry Practices Regulated

Nearly two-thirds of the program administrators report that forestry practices applied to nonfederal forests are subject to some type of regulation, even if only under certain special conditions (32 states or 64 percent) (Table 5, Appendix Tables B-4, B-5 and B-6). The most commonly regulated category of forestry practices is roads and trails (44 states) followed by practices involving chemicals (40 states), while least common is regulation of cultural practices (30 states) and reforestation activities (27 states). As for categories of forestry practices where all practices are regulated, such ranged from one state that regulated all cultural and all forest protection practices to 17 states (34 percent) that regulated all practices involving the application of chemicals. Some states take regulatory action only when a forestry practice is applied in such a way that certain standards (thresholds) are exceeded or certain conditions are not met. For example, inappropriate harvesting methods within a streamside management zone (Montana), refusal to apply appropriate water quality best management practices (Virginia), or encountering habitats of rare or endangered species of wildlife (California). Regulatory actions of such a nature occur in 13 states when road and trail practices violate a specified standard and in 15 states when timber harvesting results in the surpassing (or not meeting) of certain thresholds.

Table 4. Extent to Which Forestry Practices Are Correctly Applied on Private Forest Land, by Major Forestry Practice Category. 2003.

Major Categories of Forestry Practices	Degree to which Forestry Practices are Judged to be Correctly Applied on Private Forests (percent of states)				
	Always	Often	Sometimes	Never	Total
Road and Trail Practices (e.g., water crossings, erosion control, material disposal sites, blasting standards, winter use and closures)	10	70	20	0	100
Timber Harvesting Practices (e.g., landings; skid trails; slash management; equipment; felling, bucking and yarding; residual stand damage; safety)	12	70	18	0	100
Reforestation Practices (e.g., site preparation, timing, species selection, artificial or natural, regeneration levels, supplemental planting)	10	66	22	2	100
Cultural Practices (e.g., early release treatments, thinning, pruning, stand improvement cuttings, stand health)	2	48	50	0	100
Chemical Application Practices (e.g., methods of application, intensity, timing, mixing, spill management)	18	60	22	0	100
Forest Protection Practices (e.g., fuel loads, fire prevention; disease and insect prevention; animal damage prevention, salvage and sanitation cuttings)	6	48	46	0	100
Administrative Practices (e.g., planning, notifying, reporting, monitoring, evaluating, enforcing)	8	48	42	2	100
All Major Categories	9	59	31	1	100

Table 5. Extent to Which Forestry Practices Applied on Private Forest Land Are Regulated by State Government Agencies, by Major Forestry Practice Categories. 2003.

Major Categories of Forestry Practices	Degree to which Forestry Practices Applied to Private Forests are Judged to be Regulated (percent of states)				
	All Practices Regulated	Some Practices Regulated	Only If Certain Conditions Exist	No Practices Regulated	Total
Road and Trail Practices (e.g., water crossings, erosion control, material disposal sites, blasting standards, winter use and closures)	22	40	26	12	100
Timber Harvesting Practices (e.g., landings; skid trails; slash management; equipment; felling, bucking and yarding; residual stand damage; safety)	20	20	30	30	100
Reforestation Practices (e.g., site preparation, timing, species selection, artificial or natural, regeneration levels, supplemental planting)	14	14	18	54	100
Cultural Practices (e.g., early release treatments, thinning, pruning, stand improvement cuttings, stand health)	2	20	18	60	100
Chemical Application Practices (e.g., methods of application, intensity, timing, mixing, spill management)	34	38	8	20	100
Forest Protection Practices (e.g., fuel loads, fire prevention; disease and insect prevention; animal damage prevention, salvage and sanitation cuttings)	2	42	16	40	100
Administrative Practices (planning, notifying, reporting, monitoring, evaluating, enforcing)	12	42	12	34	100
All Major Categories	15	31	18	36	100

Note: Certain conditions (thresholds) calling for imposition of regulations could include sedimentary pollutants exceeding a water quality standard or tree planting occurring below acceptable levels of reforestation.

Regulatory Program Administration

Agencies Responsible

State agency responsibility for the regulation of forestry practices is extensive. In 2000, 1,453 state government agencies or entities (departments, bureaus, divisions, commissions) were known to implement policies and programs that influenced the condition (use, management, protection) of nonfederal forests (Ellefson and others 2001 and 2002). Of that total, approximately 540 were engaged in some manner in the regulation of forestry practices on nonfederal forests; 37 of which had regulatory functions as their sole responsibility (issuance of permits, enforcement of rules, licensing of occupations). The remaining 500 or so entities of state government exercised regulatory duties that were viewed as part of broader program responsibilities focused on nonfederal forests (for example, chemical and pesticide abatement, resource protection [fire, insects, diseases], water pollutant management, air pollutant management, forest and wildlife management, mine and mineral reclamation, watershed and wetland management, waste management, and public health programs).

Administrators of state forestry programs in 2003 were asked to provide insight regarding the expansiveness of state agency involvement in the regulation of forestry practices. Averaging approximately six agencies per state, 276 agencies were identified as responsible for regulatory initiatives addressing a broad range of concerns, including illegal placement of hazard waste in forested areas, inadequate reforestation of harvested areas, improper construction and maintenance of forest roads, and improper safety conditions for persons working in forested areas (Table 6). The most frequent focus of state government regulatory agencies involved forestry practices that had potential to adversely affect the quality of air and water resources, namely 29 percent (81) of the 276 agencies identified. Including regulatory agencies addressing air and water quality concerns, focal points for agency regulation of forestry practices are:

- Air and water pollution control and management – 29 percent of agencies (81 agencies)
- Forest resource management – 21 percent (57 agencies)
- Fish and wildlife management – 11 percent (30 agencies)
- Soil and resource conservation – 7 percent (21 agencies)
- Land use planning and management – 4 percent (11 agencies)
- Parks and natural area management – 4 percent (10 agencies)
- Insect, disease and invasive species – 3 percent (8 agencies)
- Economic development and transportation – 1 percent (3 agencies)
- Other regulatory focus – 20 percent (55 agencies)

Table 6. State Agency Involvement in the Regulation of Forestry Practices on Private Forest Land, by Agency Primary Function, Extent of Agency Involvement, and Magnitude of Staff Involved with Regulatory Programs. 2003.

Agency Primary Function	Total (percent)	Extent of Agency Involvement in Regulation of Forestry Practices (percent of agencies)			Magnitude of Agency Staff Involved in Regulation of Forestry Practices (percent of agencies)		
		Extensive	Moderate	Minimal	< 3 FTEs	3 to 7 FTEs	> 7 FTEs
Air and Water Management and Pollution Control Agencies	100 [81]	12	44	44	67	15	18
Forest Resource Management Agencies	100 [57]	49	37	14	28	21	51
Fish and Wildlife Management Agencies	100 [30]	20	43	37	50	17	33
Soil & Resource Conservation Agencies	100 [21]	10	14	76	67	19	14
Land Use Planning and Management Agencies	100 [11]	0	9	90	91	9	0
Parks and Natural Area Management Agencies	100 [10]	0	50	50	50	30	20
Insect, Disease and Invasive Species Agencies	100 [8]	12	12	76	76	12	12
Economic Development and Transportation Agencies	100 [3]	0	0	100	100	0	0
Other Agencies	100 [55]	7	35	58	65	29	6
TOTAL	100 [276]	18	36	46	57	20	23

Note: Other agency primary functions include reclamation and restoration, law and rule enforcement, taxation and revenue collection, professional licensing and certification, human health and safety, trails and roads, archeology and historic preservation, coastal zone management, solid and hazardous materials, agriculture and food provisions, and environmental quality generally. Number in brackets [] is number of agencies engaged in regulation.

The diversity of regulatory functions implemented by state agencies is highlighted by the number of agencies in the “other regulatory focus” category (above), namely 55 agencies or 20 percent of the total. The regulatory focus of these agencies includes reclamation and restoration forested areas, law and rule enforcement, taxation and revenue collection, professional licensing and certification, human health and safety, forest trails and roads, archeology and historic preservation, forested coastal zone management, and regulation of solid and hazardous materials in forested areas.

Regionally, the North accounted for 40 percent (110 agencies) of the 276 regulatory agencies identified nationwide, with the number of agencies in the South (82 agencies, 30 percent of national total) and West (84 agencies, 30 percent)(Appendix Tables B-7, B-8, B-9) being nearly identical. In all regions, agencies responsible for regulation of air and water pollutants are the most common regulators, namely 27 percent of regulating agencies in the North (for example, New Hampshire Department of Environmental Service’s Division of Water), 30 percent in South (for example, Alabama Department of Environmental Management’s Division of Water), and 32 percent in West (for example, Colorado Department of Public Health and Environment’s Division of Air Pollution Control). The second most common (at least in the North and West) were forest resource management agencies and fish and wildlife agencies. Examples of the former are the Arkansas Forestry Commission and the Maine Bureau of Forestry (Maine Forest Service), while the latter include the California Resource Agency’s Department of Fish and Game and the New Jersey Department of Environmental Protection’s Division of Fish and Wildlife. In the south, the second type of agency most commonly involved in regulation of forestry practices was soil and resource conservation agencies such as the North Carolina Sedimentation Commission and the South Carolina Department of Natural Resource’s Division of Land, Water and Conservation.

The variety of state agencies that are involved with regulatory initiatives focused on forestry practices can be further illustrated by examples. Administrators of state forestry programs suggest the following as example agencies engaged in the regulation of forestry practices (most were identified as having extensive or moderate regulatory involvement).

Forest Resource Management Agencies: New Jersey Department of Environmental Protection’s Division of Parks and Forestry, Oregon Department of Forestry, Virginia Department of Forestry, and the West Virginia Bureau of Commerce’s Division of Forestry.

Fish and Wildlife Management Agencies: California Resource Agency’s Department of Fish and Game, Kentucky Department of Fish and Wildlife Resource’s Division of Wildlife, Maryland Department of Natural Resource’s Wildlife and Heritage Division, and the Washington Department of Fish and Game’s Habitat Program.

Soil & Resource Conservation Agencies: Arkansas Soil and Water Conservation Commission, Delaware Department of Natural Resource's Division of Soil and Water Conservation, Virginia Soil and Water Conservation Board, and the North Carolina Soil and Water Conservation Commission.

Parks and Natural Area Management Agencies: Hawaii Department of Land and Natural Resource's Division of Historic Preservation, Indiana Department of Natural Resource's Division of Nature Preserves, Nevada Department of Conservation's Natural Heritage Program, and the Tennessee Department of Environment and Conservation's Division of Natural Heritage.

Air and Water Management and Pollution Control Agencies: Arizona Department of Environmental Quality's Division of Air Quality, Maryland Department of the Environment's Water Management Administration, Rhode Island Water Resource's Board, Tennessee Department of Environment and Conservation's Division of Water Pollution Control.

Economic Development and Transportation Agencies: New Hampshire Department of Resources and Economic Development's Division of Economic Development.

Land Use Planning and Management Agencies: Hawaii Department of Business, Economic Development and Tourism's Office of Planning Land Use, Missouri Commission on Land Reclamation, New York Department of Environmental Conservation's Division of Solid and Hazardous Materials, and North Dakota Department Of Health's Division of Waste Management.

Insect, Disease and Invasive Species Agencies: Indiana Department of Natural Resource's Division of Entomology and Pathology, Michigan Department of Agriculture's Division of Pesticide and Plant Pest Management, Minnesota Department of Agriculture's Exotic Pests Program, and the Virginia Department of Agriculture and Consumers Service's Office of Pesticide Services.

State agencies involved in the regulation of forestry practices are not always uniform in character and intensity of their regulatory activities. For example, the extent of any single agency's regulatory activities depends on conditions such as the (a) existence of a legal assignment of regulatory responsibility (for example, Washington “. . . forest practices board shall adopt forest practices rules that establish minimum standards for forest practices . . .” [RCW 76.09.040]); (b) specification of the natural resources that are to be the focus of an agency's regulatory actions (for example, New Mexico “. . . environmental improvement board shall adopt, promulgate, publish regulations . . . to attain and maintain national ambient air quality standards and prevent or abate air pollution . . . [N.M.S Chap 74. Art. 2. Sec.5]); (c) forestry practices in need of regulatory attention in order to protect specified natural resources (for example, Massachusetts state forestry committee “. . . shall establish minimum forest cutting practices and guidelines. [M.G.L. Chap. 132. Sec. 41]); and (d) intensity with which an agency is able to (or desires to) exercise its regulatory responsibilities (for example, budget and personnel constraints). For purposes of this assessment, the extent of agency involvement in regulatory actions is categorized as:

- *Extensive involvement:* Agency programs involving complex approval processes resulting in the issuance of permits or licenses usually issued prior to commencing the application of desired forestry practices. Such programs often involve a sizeable staff (eight or more full-time equivalents).
- *Moderate involvement:* Agency programs requiring operators and landowners to inform agencies of intent to voluntarily apply desired forestry practices. Such programs generally involve a modest staff (three to seven full-time equivalents).
- *Minimal involvement:* Agency programs in which statute or agency policy requires application of poorly defined forest practice standards (“generous reforestation,” “appropriate slash disposal,” “limit environmental degradation”) and unlikely to be enforced. Such programs usually involve no staff or a very limited part-time staff (fewer than three full-time equivalents).

Administrators of state forestry programs were asked to clarify the extent to which specific agencies in their state were engaged in the regulation of forestry practices. Applying the above categories to the 276 state agencies previously identified as having responsibility for the regulation of forestry practices applied on nonfederal forests, 149 agencies (54 percent) were judged to be either extensively (18 percent) or moderately (36 percent) engaged in forest practices regulatory activities (Table 6). Forty-six percent (127) of the agencies were regarded as having only minimal regulatory involvement. Examples of the latter group are agencies whose primary function involves land use planning, soil and conservation, insect and disease protection, and parks and natural area designation. In absolute numbers, extensive involvement was greatest for forest resource management agencies, namely 49 percent of 57 agencies (30 agencies). A distant second and third were air and water pollutant management agencies (10 of 81 agencies had extensive agency involvement) and fish and wildlife management agencies (six of 30 agencies).

Advisory or governing entities of state government (in addition to cabinet or sub-cabinet agencies) also have regulatory responsibility over forestry practices. Usually appointed by a state’s governor or a chief administrator of a state agency, such entities are variously labeled as “boards,” “councils,” or “commissions” and in some cases are a state’s lead forestry agency (for example, Arkansas Forestry Commission). In 2003, administrators of state forestry programs identified 62 such entities with regulatory program responsibility. Of that total, 16 were judged to be exercising extensive involvement in the regulation of forestry practices, while moderate or minimal regulatory involvement occurred with 22 and 24 advisory or governing units, respectively. Examples of advisory or governing agencies engaged (moderate to extensive involvement) in regulatory activities that effect forestry practices are the California Water Resources Control Board, Maryland Chesapeake Bay

Critical Area Commission, Oregon Watershed Enhancement Board, South Carolina Forestry Commission, Virginia Board of Reforestation, and the Washington Forest Practices Board.

State government's typically assign responsibility for forests and forestry to a particular unit of state government (lead forestry agency). In many cases, these entities (identified variously as "bureaus," "divisions," "services," or "departments") have important regulatory responsibilities. In 2003, state forestry program administrators in 37 states indicated the state's lead forestry agency was responsible for some degree of regulatory program implementation. In 15 of these states, regulatory activities by the lead forestry agency were considered extensive, while in 13 states and in nine states it was judged to be moderate or minimal, respectively. Examples of lead state forestry agencies identified by program administrators as involved (moderate to extensive) in the regulation of forestry practices are:

- Alaska: Division of Forestry, Department of Natural Resources
- Arizona: Division of Forestry Management, Department of Land
- California: Department of Forestry and Fire Protection, Resource Agency
- Delaware: Section of Forest Service, Department of Agriculture
- Hawaii: Division of Forestry and Wildlife, Department of Land and Natural Resources
- Idaho: Bureau of Forest Management, Department of Lands
- Illinois: Division of Forestry, Department of Natural Resources
- Indiana: Division of Forestry, Department of Natural Resources
- Kentucky: Division of Forestry, Department of Natural Resources
- Maine: Forest Service, Department of Conservation
- Maryland: Forest Service, Department of Natural Resources
- Massachusetts: Bureau of Forestry, Department of Environmental Management
- Minnesota: Division of Forestry, Department of Natural Resources
- Nevada: Division of Forestry, Department of Conservation and Natural Resources
- New Hampshire: Division of Forests and Lands, Department of Resources and Economic Development
- New Jersey: Division of Parks and Forestry, Department of Environmental Protection
- New Mexico: Division of Forestry, Department of Energy, Minerals and Natural Resources
- North Carolina: Division of Forest Resources, Department of Environment and Natural Resources
- Oregon: Department of Forestry
- Vermont: Department of Forests, Parks and Recreation
- Virginia: Department of Forestry
- Washington: Division of Forest Practices, Department of Natural Resources
- West Virginia: Division of Forestry, Bureau of Commerce.
- Wisconsin: Division of Forestry, Department of Natural Resources

Table 7. State Agency Involvement in Regulation of Forestry Practices on Private Forest Land, by Agency Function and Region. 2003.

Agency Primary Function	Region						Total	
	North		South		West			
	Agencies Engage in Regulation	Agencies per State	Agencies Engage in Regulation	Agencies per State	Agencies Engage in Regulation	Agencies per State	Agencies Engage in Regulation	Agencies per State
Air and Water Management and Pollution Control Agencies	30	1.5	24	1.8	27	1.6	81	1.6
Forest Resource Management Agencies	23	1.2	15	1.2	19	1.1	57	1.1
Fish & Wildlife Management Agencies	12	0.6	8	0.6	10	0.6	30	0.6
Soil & Resource Conservation Agencies	5	0.2	11	0.8	5	0.3	21	0.4
Insect, Disease & Invasive Species Agencies	3	0.2	3	0.2	2	0.1	8	0.2
Land Use Planning and Management Agencies	5	0.2	0	0	6	0.4	11	0.2
Parks & Natural Area Management Agencies	6	0.3	2	0.2	2	0.1	10	0.2
Economic Development & Transportation Agencies	3	0.2	0	0	0	0	3	0.1
Other Agencies	23	1.2	19	1.5	13	0.8	55	1.1
TOTAL	110	5.5	82	6.3	84	4.9	276	5.5

Note: Agencies per state rounded to tenth of an agency.

The number of agencies involved in the regulation of forestry practices within a single state is typically five or six (average of 5.5 per state)(Table 7). Although regional differences are not large, states in the South modestly exceed the top of this range (6.3 agencies per state), followed by the North (5.5 agencies) and the West (4.9 agencies). Fewer regulatory entities exist in state governments located in the West since over the years such states have been inclined to group regulatory programs within fewer

administrating agencies; states in the South and East have been less likely to do so (for example, Indiana, Kentucky, New Hampshire, Virginia) (Ellefson and others 2003a).

The state by state range in the number of regulating agencies per state is substantial, for example, ranging from three in Alabama to 21 in Kentucky, and from two in South Dakota to nine in Washington. Although regional differences are quite minimal, states in the South tend to have more air and water pollution control agencies and soil and conservation agencies regulating forestry practices than occurs in other regions, while states in the West are inclined to have slightly more land use planning agencies engaged in forest practices regulation. States in all regions have nearly an identical number of forest resource management agencies (average 1.1 to 1.2 agencies per state) regulating forestry practices on nonfederal lands.

Program Coordination

Forestry practices regulatory programs are not implemented without some implication for other levels of government (for example, local, regional, state or federal) or other units within the same level. These implications stem in large measure from the reality that forests and the benefits they provide are broad in scope and pervasive to the interests of numerous public agencies. As such, almost all state laws and rules regulating forest practices require some degree of coordinating efforts (for example, memorandums of agreement, joint budgetary commitments, formal mechanisms such as boards and commissions), though differing in intensity from state to state. An example is Oregon where the state's forest practices act directs the State Board of Forestry to (prior to adopting rules) “. . . consult with other agencies of this state or any of its political subdivisions that have functions with respect to the purposes [of the act] or programs affected by forest operations. Agencies and programs subject to consultation under this subsection include, but are not limited to [listing of 11 different state or local agencies]. Board shall consider and accommodate the rules and programs of other agencies to the extent deemed to be appropriate and consistent with the purposes of the Act . . . “ (*OR Rev. Stat. Title 44 Chap. 527. Sec. 710*). The Alaska Forest Resources and Practices Act calls for similar coordination efforts, namely the administering agency “. . . shall coordinate with other agencies and affected coastal districts that have jurisdiction over activities subject to regulation under this [Act]” (*AK Stat. Title 41. Sec. 41.17.098*).

Coordination can be viewed as occurring generally among state agencies that have regulatory responsibility for forest practices and may also be viewed as state agencies

coordinating with a state’s lead forestry agency. Regarding the former, many state agencies have regulatory responsibilities beyond, but including, forestry practices applied to nonfederal forests (for example, issuance of permits for point source pollutant discharges, enforcement of weight limits on transport of timber on public roads). In 2000, the frequency of coordinating activities occurring among these regulatory entities was as follows: regularly coordinate – 42 percent of entities, seldom coordinate – 50 percent, and never coordinate – 8 percent. The extent to which these diverse regulating entities engage in coordination is determined primarily by legal requirements and agency leadership that promotes coordination. Inadequate resources (personnel and finances) and disinterest on the part of one or more units of state government are major conditions that inhibit coordination (Ellefson and others 2001 and 2003).

Table 8. State Agency Involvement in the Regulation of Forestry Practices on Private Forest Land, by Agency Primary Function and Degree of Coordination with Lead State Forestry Agency. 2003.

Agency Primary Function	Portion of Regulating Agencies Coordinating with State’s Lead Forestry Agency on Regulatory Activities (percent of agencies)				Total (percent)
	Extensive	Moderate	Minimal	None	
Air and Water Management and Pollution Control Agencies	26	38	34	2	100 [81]
Forest Resource Management Agencies	88	10	2	0	100 [57]
Fish and Wildlife Management Agencies	40	37	20	3	100 [30]
Soil and Resource Conservation Agencies	29	24	33	14	100 [21]
Land Use Planning and Management Agencies	0	45	55	0	100 [11]
Parks and Natural Area Management Agencies	10	20	60	10	100 [10]
Insect, Disease and Invasive Species Agencies	38	24	38	0	100 [8]
Economic Development and Transportation Agencies	0	100	0	0	100 [3]
Other Agencies	20	34	33	13	100 [55]
TOTAL	38	30	27	5	100 [276]

Note: Other agency primary functions include reclamation and restoration, law and rule enforcement, taxation and revenue collection, professional licensing and certification, human health and safety, trails and roads, archeology and historic preservation, coastal zone management, solid and hazardous materials, agriculture and food provisions, and environmental quality generally. Number in brackets [] is number of agencies engaged in regulation.

A state's lead forestry agency as a focus of regulatory coordination for other state agencies with regulatory responsibilities involving forestry practices is modest. In 2003, administrators of state agency forestry programs reported that of 276 regulating agencies, over two-thirds (68 percent, 188 agencies) sought to coordinate (extensive or moderate) their regulatory program initiatives with the lead forestry agency (Table 8, Appendix Tables B-10, B-11, B-12). One third (32 percent, 88 agencies) of the agencies had none or minimal coordinating involvement with the latter. Fish and wildlife management agencies and air and water pollution preventing agencies were more inclined to coordinate more frequently with a lead forestry agency, while soil conservation agencies and parks and natural area agencies were less inclined to do so. A similar focus of agency programs (namely, natural resources) within the forest resource management category (or the occurrence of the lead forestry agency in the category) partially explains the extensive coordination occurring in that category.

Magnitude of Investments

Implementation of state forest practices regulatory programs by state agencies can require significant investment of finances and personnel. Such resources are devoted to a variety of administrative tasks, including rule-making, issuance of permits, on-site inspections, enforcement actions, and addressing legal challenges made by the regulated public. Administrators are sensitive to these costs and are sometimes directed to (for example) “. . . adopt only those regulations necessary to accomplish the purposes of the [Alaska Forest Resources and Practices Act], and shall avoid those which increase operating costs without yielding significant benefits” (*AK Stat. Title 41. Sec. 41.17.08*). As to the magnitude of state government investments required to implement in regulatory programs, the National Association of State Foresters estimated 2002 total state expenditures on forest practices (regulatory) act administration at \$34.1 million (12 reporting states), 88 percent (\$30.1 million) of which was attributed regulatory programs in California, Oregon and Washington (National Association of State Foresters 2002).

State forestry programs regulating the forestry practices applied on nonfederal forests engage the talents of about 1,040 full-time equivalent (FTE) staff (Table 9). This staff total is distributed among more than 276 agencies that have regulatory responsibilities, 57 percent of which engage three or fewer FTE regulatory program staff, 20 percent three to seven FTE staff, and 23 percent seven or more FTE staff (Table 9).

Table 9. Total Estimated State Government Staff Involved in Regulation of Forestry Practices on Private Forest Land, by Region and Agency Primary Function. 2003.

Agency Primary Function	Number of Agencies Engaged in Regulation	Agency Staff Involved in Regulation of Forestry Practices					
		Region (FTEs)			Total (FTEs)		
		North	South	West	Number	Percent	FTEs per Agency
Forest Resource Management Agencies	57	130	74	118	322	31	5.6
Fish and Wildlife Management Agencies	30	43	42	45	130	12	4.3
Parks and Natural Area Management Agencies	10	24	10	7	41	4	4.1
Air and Water Management and Pollution Control Agencies	81	106	72	88	266	26	3.3
Soil & Resource Conservation Agencies	21	16	31	20	67	6	3.2
Insect, Disease and Invasive Species Agencies	8	11	4	7	22	2	2.8
Land Use Planning and Management Agencies	11	8	0	13	21	2	1.9
Economic Development and Transportation Agencies	3	4	0	0	4	1	1.3
Other Agencies	55	74	56	36	166	16	3.0
TOTAL	276	416	289	334	1,039	100	3.8

Note: FTE is full-time equivalent staff. Based on interpretation of FTE categories as follows: <3 FTEs = 1.5 FTEs, 3-7 FTEs = 5.5 FTEs, and >7FTEs = 8.0 FTEs.

Nearly one-third (322 FTEs) of the staff employed by these agencies are part of an agency whose primary function is forest resource management, while slightly more than one-quarter of the FTE staff are affiliated with air and water pollution control agencies. The size of any single regulatory agency's staff ranges from about one FTE (economic development and transportation agencies) to well over five (5.6) for forest resource

management agencies. Excluding the other agency category, 72 percent of the agencies have 3.2 or more FTE staff assigned to programs that regulate forestry practices. Assuming a full-time equivalent requires an investment of \$55,000, the 1,039 FTE total staff estimated to be assigned to state regulatory programs involve an annual investment of approximately \$57 million.

The number of staff employed by state regulatory programs is not regionally uniform. The North accounts for 40 percent of the total national FTE staff, with an average of 3.9 FTE staff for each of the region's 110 agencies engaged in forest practice regulatory activities (Table 9). The remaining national total staff is employed by agencies in the West (334 FTEs, 32 percent of national total, 4.0 FTEs per agency) and the South (289 FTEs, 28 percent of national total, 3.5 FTEs per agency). In all regions, the portion of staff employed by air and water pollutant agencies is about the same (25 percent to 26 percent of a region's total staff). However, regulatory staff in the North and the West tend to be slightly more concentrated in forest resource management agencies (31 percent in North, 35 percent in West) than occurs in the South (26 percent). In the south, staff with forest practice regulatory responsibilities tend to be more concentrated in natural resource type agencies, especially fish and wildlife agencies and soil and resource conservation agencies.

Summary of Nationwide Conditions

The extent and intensity of state regulatory programs focused on the application of forestry practices to nonfederal forest are extensive. However, as administrators of these programs indicate, there is substantial variability in the type of regulatory program implemented by a state agency (or agencies) and the magnitude of investments and intensity of regulatory enforcement that is associated with such programs. Highlights of nationwide conditions are as follows:

- *Regulatory Authority.* Authority to regulate forestry practices applied on private forest land is wide-ranging, emanating from authorities embodied in environmental law generally and from state laws focused exclusively on forestry practices. In any single state, regulatory authority focused specifically on forestry practices can be concentrated in a single law (for example, the Alaska Forest Resources and Protection Act) or it can be located in a number of separate and specially-focused laws (for example, New Hampshire and Maryland regulatory laws). The former are commonly labeled "forest practices acts."

Authority exists in some states (at least 12, including Virginia) to implement contingent regulatory programs, wherein obligations are placed on landowners or operators about to, or in the process of, applying practices that adversely impact forest sustainability. The laws are referred to as “contingent” or “bad actor” laws.

- *Regulatory Limitations.* Enforcement of forest practice regulatory programs is confined in some states by laws which limit adoption of any regulations that might be more stringent than federal environmental regulations (for example, Kentucky, Oregon, Maryland). Most such laws focus on nonpoint sources of water pollutants and are commonly referred to as “no more stringent laws.”

- *Regulatory Intensity.* The intent and intensity of forest practices regulatory programs varies considerably among states. This variation is defined primarily by the nature of forest resources requiring protection in a state and by a state’s political inclination to engage in regulatory activities. Regulatory programs most commonly focus on forestry practices that could adversely impact (in rank order) lakes and ponds, forested wetlands and marshlands, stream and watercourses, sediment and erosion conditions, and human and animal health resulting from the application of chemicals and pesticides.

- *Law versus Rule Standards.* State law authorizing regulation of forestry practices typically establishes broadly construed goals and objectives for regulatory programs, with detailed statements about procedures and forest practice standards set forth in administrative rules (for example, “Rules Pertaining to the Idaho Forest Practices Act”). However, some states have chosen to statutorily express very exacting language regarding notification procedures and acceptable forestry practices (for example, “leave all trees measuring 12 inches in diameter outside the bark”).

- *Compliance and Enforcement.* Forest practice laws are enforced in a variety of ways, including the use of informal conferences, notices to comply, stop work orders, corrective actions, civil penalties, injunctions, and civil and criminal penalties. Although available, the latter two are used for only the most severe cases of negligence. Some states charge landowners for the cost of repairing the adverse consequences of improperly applied forestry practices (for example, Washington), while others impose liens on private property (for example, Oregon) or refuse permits for future timber harvesting operations (for example, Idaho).

- *Forestry Practices Regulated.* As judged by administrators of state forestry programs, forestry practices are being correctly applied in many states, often with regulatory support. In six of every 10 states, forestry practices applied on private forest land were rated as being *often* correctly applied, with an additional three out of every 10 states indicating practices were correctly applied only *sometimes*. In very few states (about 10 percent) were practices considered to be *always* correctly applied. Forestry practices in two-thirds of the states were viewed as being subject to some form of regulation, especially practices involving roads and trails (44 states) and chemical applications (40 states). Least regulated are cultural practices (30 states) and reforestation activities (27 states).

- *Regulatory Agencies.* The number of state agencies engaged in regulation of forestry practices is sizeable. Averaging between five and six agencies per state, 276 state agencies were so identified – 54 percent of which were rated as being moderately to extensively involved in the regulation of forestry practices. The North accounted for 40 percent of the 276 agencies, with the South and West 30 percent each. Over two-thirds (68 percent) of the agencies sought to coordinate (extensive or moderate) their regulatory initiatives with a state’s lead forestry agency. One third of the agencies had none or minimal coordinating involvement with the latter. Fish and wildlife management agencies and air and water pollution preventing agencies were most likely to engage in coordination.

- *Regulatory Investments.* State agencies (276) involved in the regulation of forestry practices employ an estimated 1,040 full-time staff equivalents. Nearly one-third (322 FTEs) of this total is assigned to an agency whose primary function is forest resource management, while slightly more than one-quarter is assigned to air and water pollution control agencies. Assuming a full-time equivalent requires an annual investment of \$55,000, the 1,039 FTE total staff assigned to state forest practices regulatory programs implies an annual investment of approximately \$57 million.

EXTENT AND INTENSITY OF PROMINENT REGULATORY PROGRAMS

Regulatory programs of state governments vary in the scope of their authority and the intensity with which they are implemented. In 2003, there were a number of states that have forest practices regulatory programs that may be considered prominent in terms of the breadth and expansiveness of their intent and purpose, range of resources and forestry practices addressed, variety of landowner and business categories subject to regulatory standards, rigor and completeness (complexity) of procedures required of the regulated public, and the intensity of enforcement and severity of penalties imposed for failure to comply with laws and related rules. For purposes of this assessment, forest practice laws in 15 states were considered to meet most of these conditions (a summary of authority, governance, administration and investments for each state appears in Appendix Table C-1). They are:

- Alaska Forest Resources and Protection Act
- California Z'Berg-Nejedly Forest Practices Act
- Connecticut Forest Practices Act
- Idaho Forest Practices Act
- Maine Timber Harvest Reporting Law
- Massachusetts Forest Practices Cutting Act
- Montana Notification and Streamside Management Acts
- Nevada Forest Practice Act
- New Mexico Forest Conservation Act
- Oregon Forest Practices Act
- Utah Forest Practices Act
- Vermont Heavy Cutting and Water Pollution Acts
- Virginia Forest Practices Notification Act
- Washington Forest Practices Act
- West Virginia Logging Sediment Control Act

The above laws assign agency responsibility for development of forest practice regulatory programs, including the expenditure of money, employment of personnel, promulgation of forest practice rules, and enforcement of procedures and standards required to meet the intent of the law. In most cases, the laws assign responsibility for program development and implementation to a single state agency. However, there are exceptions, examples being Alaska and Washington. In the latter state, regulatory responsibility is shared by Washington's Department of Natural Resources (responsible for forest practices generally) and Department of Ecology (focus on water quality, a responsibility which is clearly identified in WA Forest Practices Rules WAC 222). In Alaska, state law assigns authority for the regulatory program to three agencies, with the

Division of Forestry, Department of Natural Resources given major responsibility (“ . . . division shall regulate operations on private forest land as authorized by provisions [of the Act]”), while the Department’s Office of Habitat and Restoration [previously in Department of Fish and Game] has responsibility for reviewing harvest permits that may affect fish habitats (“ . . . give due deference to [Office] regarding effects on fish habitats from timber operations”). Furthermore, final authority over water quality and nonpoint pollution matters are assigned to the “ . . . Department of Environmental Conservation as the lead agency for control of nonpoint source pollution . . . and regulations [developed under authority of the Alaska Forest Resources and Protection Act] are therefore subject to approval of the commissioner of environmental conservation . . . [who] may withdraw regulations adopted by the commissioner of natural resources” (*AK Stat. Title 41. Sec. 41.17.020, Sec. 41.17.055 and Sec. 41.17.087*).

Revenue, Expenditures and Personnel

Implementation of a state's forest practices regulatory program can require significant investment of finances and personnel. Among the activities that require such resources are rule-making activities (consultations with state agencies, local governments, advisory boards, general public); administrative activities (review of notifications, issuance of permits); and enforcement activities (on-site field inspections, landowner-operator consultations, initiation of legal actions). In 2003, the lead agencies in the 15 states with prominent regulatory programs invested more than \$42 million in their forest practices regulatory programs and engaged an estimated 618 full-time equivalent staffs in program implementation (Table 10). Not included in these amounts are additional investments made by other state agencies (within the identified 15 states) that have a role in assisting the lead forestry agency in the implementation of a state’s regulatory program (in 1991, such accounted for an additional 20 percent of expenditures and 16 percent of FTE staff invested by lead agencies). In 2003, California, Oregon and Washington accounted for 74 percent of total program investments and 64 percent of total FTEs invested by the 15 states. Total program investments by 14 (data available) of the 15 states for the period 2000 through 2003 has averaged about \$41 million and 614 FTE staff (Tables 11 and 12).

Table 10. State Expenditures and Agency Staff for Prominent Forest Practices Regulatory Programs, by State and State Law. 2003.

State and State Law	Program Expenditures (dollars)	Program Staff (FTEs)
Alaska Forest Resources and Protection Act	718,000	7.9
California Z'Berg-Nejedly Forest Practices Act	13,748,000	124.5
Connecticut Forest Practices Act	165,000	3.0
Idaho Forest Practices Act	1,457,000	20.0
Maine Timber Harvest Reporting Law	1,155,000	16.5
Massachusetts Forest Cutting Practices Act	460,000	16.0
Montana Notification and Streamside Management Acts	614,000	18.4
Nevada Forest Practice Act	704,500	7.0
New Mexico Forest Conservation Act	500,000	9.0
Oregon Forest Practices Act	7,800,000	94.0
Utah Forest Practices Act	220,000	4.0
Vermont Heavy Cutting and Water Pollution Acts	330,000	6.0
Virginia Forest Practices Notification Act	4,000,000	50.0
Washington Forest Practices Act	9,656,000	176.0
West Virginia Logging Sediment Control Act	760,558	66.0
TOTAL	42,288,058	618.3

Note: Expenditures estimated for Maine and Vermont. Staff estimated for Utah and Washington.

The forest practices regulatory programs of the 15 states identified here required financial support from a number of sources. However, the dominant source was state government general appropriations (49 percent of funds invested by reporting states), which ranged from 25 percent of total funding in Utah, to 100 percent in Maine, Montana, and Massachusetts. In no case were private foundations or private special interest groups cited as a source of financing. For the state programs described here, operating funds in 2003 originated from the following sources (not all 15 states reported funding sources):

- State government general funds – 49 percent of funding (13 states), approximately \$20.5 million total.
- Dedicated funds generated by special sources (special tax levies) – 10 percent of funding (three states), approximately \$4.1 million total.
- Dedicated funds generated by regulatory program (fees for permit issuance) – 5 percent of funding (three states), approximately \$2.1 million total.
- Special funds from federal government programs (Section 319 Water Quality Act) – 2.5 percent of funding (six states), approximately \$1.0 million total.

Table 11. State Agency Expenditures for Prominent Forest Practices Regulatory Programs, by State. 1985, 1991, and 2000 through 2003.

State	Year and Program Expenditures (thousands of current dollars)					
	1985	1991	2000	2001	2002	2003
Alaska	364	224	527	678	701	718
California	4,833	8,690	12,972	12,651	13,828	13,748
Connecticut	-	210	198	187	176	165
Idaho	108	685	1,171	1,462	1,505	1,457
Maine	-	340	952	1,020	1,088	1,155
Massachusetts	480	560	570	570	570	460
Montana	-	83	518	529	603	614
Nevada	875	1,250	884	549	617	704
New Mexico	190	217	500	500	500	500
Oregon	1,600	3,300	7,000	7,000	7,600	7,800
Utah	-	-	-	-	-	220
Vermont	-	-	300	310	320	330
Virginia	-	-	4,500	4,500	4,000	4,000
Washington	2,200	6,600	7,560	10,802	9,313	9,656
West Virginia	-	-	466	447	492	761

Note: Entry of a "-" indicates program was not in existence or information is not available. Estimates made for selected years for Connecticut (2000 through 2002), Maine (2000 through 2003), Nevada (2000), Utah (2003), Vermont (2000 through 2003), and West Virginia (2000 and 2001).

Source: Ellefson and others 1995 and information provided by program administrators.

Table 12. State Agency Staff Assigned to Prominent Forest Practices Regulatory Programs, by State. 1985, 1991, and 2000 through 2003.

State	Year and Full-Time Equivalents					
	1985	1991	2000	2001	2002	2003
Alaska	6.5	3.0	5.1	7.9	7.9	7.9
California	68.0	94.0	124.5	124.5	124.5	124.5
Connecticut	-	4.0	3.0	3.0	3.0	3.0
Idaho	4.5	13.7	19.0	20.0	20.0	20.0
Maine	-	6.0	14.1	15.0	15.9	16.5
Massachusetts	16.0	15.0	18.0	18.0	16.0	16.0
Montana	-	2.0	16.3	16.8	17.8	18.4
Nevada	5.0	5.0	5.0	6.0	6.0	7.0
New Mexico	7.0	7.0	8.0	8.0	8.0	9.0
Oregon	44.1	64.3	103.0	103.0	110.0	94.0
Utah	-	-	-	-	-	4.0
Vermont	-	-	6.0	6.0	6.0	6.0
Virginia	-	-	57.0	57.0	54.0	50.0
Washington	58.1	112.8	137.0	196.0	169.0	176.0
West Virginia	-	-	61.0	61.0	66.0	66.0

Note: Entry of a "-" indicates program was not in existence or information is not available. Estimates made for selected years for Maine (2000 through 2002), and Washington (2000 through 2003).

Source: Ellefson and others 1995 and information provided by program administrators.

Implementation of a state's forest practices regulatory program requires investments in at least seven major expenditure categories, namely review of plans and notifications, monitoring and evaluation, general program administration, enforcement actions, landowner and timber operator education, equipment and supplies, and employee continuing education. Nearly all states had expenditures in each category (two states, no landowner or operator education; one state, no enforcement and review; and one state, no equipment and supply expenditures). Review of permits and notifications (average of 31percent) and monitoring and evaluation (average of 28 percent) were leading expenditure categories. Well over half of program investments in Massachusetts (55 percent), California (55 percent) and Vermont (80 percent) were devoted to the former. Most states devoted 10 percent or less to enforcement activities (six reported 6 percent or less), with notable exceptions being West Virginia (50 percent, or \$380,000), California (25 percent, or \$3,437,000), and Virginia (25 percent, or \$1,000,000). Oregon reported spending 2 percent on research with cooperating agencies. The distribution of funds by expenditure categories for 14 of the 15 states described here is as follows (average percent each state):

- Review of plans and notifications – 31 percent of expenditures.
- Monitoring and evaluation – 21 percent.
- General program administration – 17 percent.
- Enforcement actions – 13 percent.
- Landowner and timber operator education – 12 percent.
- Equipment and supplies – 8 percent.
- Employee continuing education – 6 percent.

Organization and Administration

Regulatory programs focused on the application of forestry practices must embody certain organizational and administrative features if they are to be successful. The literature suggests a number of characteristics that are considered hallmarks of well-developed regulatory enterprises. For example, statutory (law) intent is constructively and accurately promoted, strategic plan guides the regulatory program, regulatory authority is clear and unambiguous, regulatory authority is concentrated in a single agency, benefits occur and are measurable (reduced pollution), information for decision-making is abundant, rule development is open and constructive, compliance with rules is technically (physically) possible, the focus of rules is on desired outcomes rather than practices, rules are clear and unambiguous, especially sensitive resources are targets of some rules, incentives

(cost-offsets) are available to foster desirable behavior, discretionary enforcement authority is substantial, and the program is cost-effective. Program administrators were asked to judge whether their program conformed (always, in most situations, in some situations, seldom or never) with the a-for-mentioned characteristics.

Administrators for all 15 states indicated that their program always or in most situations accurately promoted the intent of the law, was based on clear and unambiguous legal authorities, embraced rule development that was open and constructive, set forth rules (standards) that were physically possible to achieve, was particularly caring to especially sensitive resources (for example, endangered species habitats) and was generally cost-effective and administratively efficient in its operation. Although less frequently cited, but common none-the-less, were judgements that regulatory programs in most situations have rules that are clear and unambiguous (nine administrators), focus on desired outcomes (for example, reduce sediment) rather than application of forestry practices (eight), and provide for substantial discretion in enforcement situations (eight). Most administrators (11) indicated that their program always or in most situations met the positive standard of having forest practices regulatory authority concentrated in a single state agency.

Program administrators were less positive in their views of program ability to meet certain other characteristics. For example, six administrators indicated that only in some situations was their program guided by a strategic plan for forestry generally, while but five reported that only in some situations were benefits of their program clearly identifiable and measurable (for example, amount of reduction in stream sediment). Most critical were administrator judgements about the availability of incentives (payment for private cost of regulatory compliance by landowners and timber harvester). Eleven of the responding administrators indicated such occurs in only some situations (six administrators) or seldom if ever occurs (six administrators) as part of their regulatory program. Such is consistent with the reality that in some states, incentive payments to encourage compliance with regulatory standards are discouraged or are illegal. Only one of the responding administrators judged the state program as seldom or never being cost effective.

Forest practice regulatory programs are often perceived as rigid in their expectations and inflexible in the manner in which they are administered. Often at issue is whether there is sufficient staff discretion to interpret and apply statutory authorities, promulgated rules, and agency policy directives. Such is considered especially critical given the diversity of forest conditions to which regulatory programs must apply and the existence of a wide

range of landowner forestry objectives and timber harvester business interests. Given the opportunity to judge the sufficiency of current discretion (insufficient, sufficient, excessive), all accept one responding administrator considered discretion to be sufficient with regards to statutory authority, promulgated rules and agency policy directives (none thought discretion to be excessive). The lone administrator judging discretion to be insufficient directed such judgement at state laws and rules, suggesting that they were “. . . excessively detailed, overly restrictive and cumbersome to change.” As for the future, all but two administrators expected program discretion to be the same five years hence. Two administrators indicated more discretion in the future, especially with regard to rules and agency policy directives affecting regulatory programs.

The administration of forest practices regulatory programs are not without organizational and managerial obstacles that detract from their efficient operation. Examples of potential obstacles are inadequate or unclear legal authority, lack of (or deficiency of) information or knowledge base, fragmented structure of regulatory programs and agencies, inadequate staffing and financial resources, unclear or questionable program benefits, regulated public's intense resistance to program, inadequate agency direction or leadership, and certain resource professionals' resistance to program. These obstacles can be judged as to their importance, namely very, moderately, minimally and not important.

Administrators were mostly concerned about the lack of resources needed to operate an effective regulatory program, especially inadequate financial resources and insufficient number of staff. Eleven responding administrators indicated such inadequacies to be either very or moderately important. Queried as to most important obstacles to program administration, the following were specified (in rank order): inadequate staffing and financial resources, regulated public's intense resistance to regulatory programs, fragmented structure of regulatory programs and agencies, and lack of (or deficiency) information or knowledge base from which to operate an effective program. Not all administrators agreed that involvement of numerous programs and agencies was a problem, “. . . having all [regulatory] authority in one agency isn't always a desirable characteristic — the balance of agency interests can be beneficial.” Administrators from two states cited as very important obstacles the many issues (including current litigation) involving the federal Clean Water Act and the Endangered Species Act. As for obstacles considered *minimally or not important* at all, the following were most frequently identified:

- Inadequate or unclear legal authority (10 administrators)
- Unclear or questionable program benefits (10)

- Certain resource professionals' resistance to program (10)

State law provides authority and direction for regulatory programs. In most cases, this authority is specified in a general fashion with more exacting details specified in administrative rules. The states whose regulatory programs are considered here all have some sort of forest practices rules (examples in Table 2). The appropriateness of processes and standards presented in rules is determined by a number of often changing conditions, including grounding in strong science, ability to apply in practice, acceptance by stakeholders, and willingness of the regulated public to accept the rules. In order to meet such conditions, rules are periodically changed; in some cases change can be considered major (significant overall shift in direction and substance). Examples of the frequency of major changes in rules are as follows: Alaska (1999 and 2003 for specific regions), Connecticut (1998), Idaho (1995, 1996, 2000), Massachusetts (1996), Montana (2000), Nevada (2002), New Mexico (2001), Oregon (1995, 1996, 2002), Vermont (1998), Virginia (1997, 2002), and West Virginia (2002).

Conditions or circumstances prompting a major change in rules and standards are many. They include the advent of newly available findings from research programs, judicial rulings that force change in the interpretation or application of laws and rules, intense political pressure by organized interest groups, legislative action (proposed or enacted) prompting reconsideration of current processes and standards, requirements of a federal law or federal agency's rules or policies, agency internal review and second thoughts about existing approaches, regulatory program's governing body (board or commission) insists on change, realization that regulated public (landowners, timber harvesters) fails to consistently apply rules, and resources available to an agency are inadequate to realistically enforce application of certain rules. These conditions can also be judged as to their importance, namely very, moderately, minimally and not important.

Program administrators viewed agency internal reviews and legislation actions as the most common agents prompting a change in administrative rules. Ten administrators considered such circumstances to be very or moderately important (seven considered legislative action to be a very important factor). As to their view of conditions considered most important, the following (in rank order) were identified: agency internal reviews, legislative actions, organized interest group insistence, and inadequate agency resources. Four other conditions were considered most important by one administrator each (judicial rulings, federal requirements, compliance failures). As for conditions considered of minimal or no importance in the aggregate, the following were specified: regulated public's failure to consistently apply rules (10 administrators) and judicial interpretations and orders (nine administrators). Seven administrators considered federal agency or state governing body

requirements and limited agency resources to also be minimally or not important as factors prompting a major change in forest practices rules.

Notifications, Monitoring and Enforcement

Permits and Notifications

The core of most regulatory programs is a requirement that landowners and timber harvesters alert government in advance of their intent to carry out a forestry practice. It is via such declarations that government becomes aware of the potential application of practices and is subsequently presented with an opportunity to influence the manner in which such practices are applied. Most forest practice regulatory programs employ either a notification system or a permit inspection system as means of becoming aware of the pending application of a forestry practice. The former system requires the landowner or harvester to notify an agency of intent (possibly with a proposed harvest plan), after which the notifier may proceed if the agency does not respond or if the agency provides information to guide the proposed practices. The latter system requires the landowner or harvester to inform the agency (with a proposed harvest plan), which must then review the proposal and subsequently issue a permit that verifies that the proposed activity is in accord with established rules. In some cases, notification and permit inspection systems operate in a tandem. Example states with notification systems are Maine, Oregon, and Utah, while permit inspection systems exist in California, Nevada, and Washington.

The number of notification or permits administered by the agencies described here is substantial. For example, more than 4,800 notifications were received in 2003 by the Maine Forest Service, while notifications in Oregon approached 19,400 in the same year (of which about 2,300 received on-site inspections). In Virginia, nearly 5,200 notifications were received in 2003, at least 85 percent of which must be inspected within 15 days of receipt (agency policy), and in West Virginia, 3,237 notifications were received in response to provisions of the state's Logging Sediment Control Act. Not all states experience large numbers of notifications. For example, Vermont's Regulation of Heavy Cutting Practices Act lead to an average of 57 notifications per year during the period 1999 through 2004 (fiscal years). As for permits issued under a permit inspection systems, California reported 3,671 harvest plans submitted in 2003 – a decline from the 4,259 reported in 1999. For Washington, the number of harvest applications received in 2003 was 5,379.

Monitoring and Assessment

Public and private investments in forest practice regulatory programs can be considerable. To determine whether such investments are producing desired results, nearly all states that administer regulatory programs engage in some type of program monitoring. Although the reasons for doing so vary from state to state, the general intent of monitoring activities, as described by Oregon's program for forest practice monitoring, is "to provide . . . information on, and assessment of, the effectiveness of the forest practices program in accomplishing the intent of the [program]." Information gained from monitoring can serve a number of useful purposes, including clarification of the governance, efficiency and general direction of the program (administrative monitoring); understanding the extent to which the forestry practices being used to accomplish program goals and objectives are actually being applied (compliance monitoring); and determination of the extent to which forestry practices (although complied with) are producing the type and level of resource protection being sought (effectiveness monitoring). Monitoring can also promote intensification of enforcement procedures in cases where compliance with forest practice standards is found to be lacking.

Administrators of 15 regulatory programs considered here were queried as to the extent to which the administration of their program is monitored. Of concern were the relationships and flows of information between various participants involved in program implementation. When presented with possible ways in which the governance of their program could be monitored, the administrators clearly favored internal agency reviews (10 administrators). One administrator suggested that useful information had resulted from ". . . indirect outside monitoring as a result of companies seeking Sustainable Forestry Initiative (SFI) or Forest Stewardship Council (FSC) certification." All identified approaches were ranked as follows (multiple responses were possible):

- Internal unit (entity responsible for program) review and appraisal of program (11 administrators)
- Governing board review and appraisal of program (four)
- State auditor or program examiner review and appraisal of program (four)
- Federal agency review and appraisal of program (four)
- Legislative review and appraisal of program (four)
- Independent (outside) consultant review and appraisal of program (four)

Administrators were also questioned as to how they monitor the extent to which their program requirements are known and understood. Most frequently specified (11 administrators) were on-site consultations with landowners and timber harvesters. One

administrator indicated that such information is often obtained “. . . from surveys conducted by industry associations and the state’s forest products commission.” All identified approaches were ranked as follows (multiple responses were possible):

- On-site consultations with landowners and timber harvesters (12 administrators)
- Public hearings (formal) available to all segments of public (five)
- Surveys of landowner and timber harvesters’ understanding of program requirements (four)
- Surveys of natural resource professionals’ understanding of program requirements (three)

The forestry practices called for by a regulatory program are frequently large in number and extensive in detail. For example, the publication *Oregon Forest Practice Rules and Statutes* embrace 147 pages of text and describe literally hundreds of forest practice standards, while *Idaho’s Rules Pertaining to the Forest Practices Act* is 39 pages long and contains a proportionally similar number of standards (Idaho Department of Lands 1998, Oregon Department of Forestry 2000). When asked which major categories of forest practices (again, previously described) were monitored on behalf of their program, administrators identified road and trail practices and timber harvest practices most frequently (11 administrators each). Cultural and chemical application practices were clearly less frequently monitored (only two states focusing on these categories). All identified categories were ranked as follows (multiple responses were possible):

- Road and trail practices (12 administrators)
- Timber harvesting practices (12)
- Administrative practices (10)
- Reforestation practices (seven)
- Forest protection practices (seven)
- Cultural practices (two)
- Chemical application practices (two)

Program monitoring is not without problems, and administrators clearly identified inadequate financial and staff resources as a major deterrent to their monitoring efforts. Nine program administrators indicated such was a very important obstacle; 10 indicated it to be the most important obstacle. Only one other obstacle was considered most important (by a single administrator), namely perceptions of unclear or questionable benefits of monitoring. All other suggested obstacles were considered by seven or more administrators (most often nine or ten) to be minimally or not important. Beginning with the most frequently cited factor considered to be *minimally or not important*, they are:

- Legal authority to monitor is inadequate or unclear (10 administrators)
- Standards or rules are unclear (ambiguous) or overly complex (10)
- Public resistance to program requirements (privacy-political views) (nine)
- Differing interpretation of rules by different state agencies (nine)
- Unclear or questionable benefits of monitoring (nine)
- Law prohibits access to private forest land (nine)
- Monitoring equipment and methods are unavailable or inappropriate (seven)
- Uncertain (possible change) status of processes or rules (seven)
- Staff knowledge and ability to apply monitoring procedures is limited (seven)

Inspection and Enforcement

Forest practices specified as standards in law or in subsequently promulgated rules are useful to the extent that they are complied with by owners of forest land or by persons that are engaged in the harvest of timber from such land. To ensure compliance with such standards, a variety of enforcement activities are implemented by administrators of forest practice regulatory programs. Often complementing one another, these activities form an enforcement system. Among the potential elements of the latter are reviews of timber harvesting plans, on-site inspections (pre, post and current), informal consultations, stop work orders, fines and imprisonment, damage repair, complaints by citizens and other public agencies, and the licensing of timber harvesters and professional foresters. All such activities are designed to secure compliance with legally prescribed forest practice standards.

Administrators of the 15 regulatory programs addressed here were queried as to the ways in which their program determines if landowners and timber harvesters are applying forest practices in the required manner. The most frequent approaches cited was review of harvest notifications and post-harvest inspections. To emphasize that no single approach is exclusive, one administrator indicated “. . . all or none of the [monitoring approaches] may occur on a given job depending on the risk associated with the job.” In order of frequency identified, compliance with forest practice standards is assessed in the following manners (multiple responses were possible):

- Review of notifications or harvest permit applications (11 administrators)
- Post-harvest inspection of completed harvest operations (11)
- On-sight inspections during harvest operations (10)
- Pre-harvest inspection of proposed timber harvests (eight)
- Regeneration and stand condition inspections several years after harvest (seven)
- Periodic statewide surveys (audits) of forestry practices compliance (seven)

On-site inspections of forestry operations are a common part of the 15 regulatory programs described here. In reaction to the Alaska Forest Practices Act, Alaskan harvesting operations permitted during the period 1994 through 2003 (about 200 operating each year) were inspected an average of 1.3 times, resulting in the issuance of about three violation notices per year. In California, each harvest operation is inspected an average of 1.8 times (average of 2.4 times per 1,000 acres harvested), with an annual average of 832 violations occurring during the period 1999 through 2003. Only 12 percent of the harvest notifications received by the Oregon Department of Forestry in 2003 received an on-site inspection, and such occurred because of special circumstances (for example, potential landslides, endangered species habitats). Virginia's Department of Forestry has established a goal of inspecting (within 15 days of receipt) at least 85 percent of the harvest notifications received by the Department, a goal which in 2002 was exceeded by 2 percent. Of the 3,204 harvest notifications received in West Virginia in 2000, 1,208 required some form of agency-initiated corrective action (for example, stop-work order, license suspension). As a result of inspections, 10 stop-work orders were issued in 2003 in Massachusetts, while the Oregon Department of Forestry ordered corrective actions in 30 cases during the same year.

Regulatory program administrators also made judgements about the sufficiency of forestry practice inspections. The focus was on 1998 through 2002 (five years) and whether the number of compliance inspections (pre and post harvest) during that period was sufficient to assure a high level of compliance with the procedures and practices set forth by a regulatory program. All but one administrator indicated inspections were sufficient in varying degrees – five indicated them to be very sufficient. Specifically responses were very sufficient – five administrators, moderately sufficient – three, minimally sufficient – four, and very insufficient – one administrator. Troubling may be that seven program administrators considered inspections to be very insufficient or only moderately or minimally sufficient. Again, the comments of administrators are instructive.

- “We judge our compliance monitoring to be moderately sufficient, even though audits indicate compliance is high (>90 percent).”

- “We inspect 50 to 60 percent of all jobs; nearly all where critical resources are present or where ‘problem operators’ may be working.”

- “We have very inadequate staffing and [financing] resources for compliance monitoring.”

- “No highly formal inspection process exists. BMP audits occur every two years. Staff check streamside conditions when and if slash conditions are checked. All indications are

we have high compliance.”

- “Inspections are required on all timber sales; inspections carried out by district timber management personnel.”

- “Compliance monitoring project completed in 2002 indicated rule-level compliance of nearly 97 percent for over 13,500 practices on nearly 190 sites.”

- “Emphasis has been placed on more inspections, especially within the first three days [of an operation’s start]; however, staffing levels and other program duties have prevented inspection levels needed to meet goals.”

Although modestly used, statutorily authorized civil and criminal penalties can also be part of a state’s system of regulatory program enforcement (examples in Table 3). In 2003, California levied \$340,260 in fines and imposed 6.0 years of probation for rule violations. The actions involved 11 misdemeanor actions, two civil actions (county attorney initiated), and three administrative civil complaints – all in the context of 3,671 harvest plans and 6,488 on-site inspections. In Maine, nine violations resulted in \$53,250 in assigned penalties in 2003 plus an addition \$19,000 court-ordered decrees, while Oregon levied (during 1990 through 1997) an average \$1,529 penalty per occurrence for violation of reforestation rules. In 2003, the Virginia Department of Forestry issued 25 special orders (stop-work or corrective action) and levied \$199,856 in civil penalties (only \$48,323 of which have been collected as of 2004).

Regulatory program administrators acknowledge that landowners and timber harvesters encounter difficulties when attempting to comply with the procedures and practices set forth by regulatory programs. However, the importance of most problems was judged to be minimal or not important. In fact, when asked to judge nine potential problem areas, twice as many administrators chose minimally or not important as chose very or moderately important. Although not considered the most important single obstacle, the uncertain status (potential for change) of regulatory processes, standards and rules was considered to be a very or moderately important problem by the largest number of responding administrators (seven), although five considered it to be minimally or not important. The single most important obstacle to compliance was viewed to be landowner or harvester resistance to program requirements (concern over privacy and a political distaste for government intrusion in private affairs) (three responding administrators). Such could be misleading in that the response of administrators for a single or most important obstacle was disbursed over six of nine different potential obstacles. An appreciation of exactly how *unimportant* certain obstacles are to administrators can be gained from the frequency with which they are identified an obstacle as *minimally* or *not important*.

- Standards or rules fail to embrace latest advances in science and technology (outdated practices) (11 administrators)
- Standards or rules are unclear (ambiguous) or overly complex (eight)
- Standards or rules are overly ridged and limit ability to accommodate diverse conditions (eight)
- Program requirements are not known (lack of information) (seven)
- Resistance to program requirements (privacy and political views)(seven)
- Financial resources are inadequate to meet program requirements (costly practices)(seven)
- Inadequate or delayed agency response (limited staff or financing) (seven)
- Differing interpretation of rules by different state agencies (seven)
- Uncertain (possible change) status of processes or rules (seven)

Effectiveness and Investment Consequences

The ability of regulatory programs to actually influence the type and way forest practices are applied to private forests is often of major concern. In the same vein, concern is frequently raised over the impact of such programs on investments in private forests and on timberland markets generally. Although their views may be prejudiced by their close personal involvement with regulatory programs, administrators of such programs can shed light on these issues.

For the 15 states addressed here, program administrators' view quite favorably the ability of their regulatory programs to ensure that forestry practices are being properly applied. Consider the seven major categories of practices previously described, namely road and trail practices, timber harvesting practices, reforestation practices, cultural practices, chemical application practices, forest protection practices, and various administrative practices. Forest practice regulatory programs can be judged as to their effectiveness in ensuring proper application of practices in these categories (very, moderately, minimally, or not effective). Administrators judged their regulatory programs to be very or moderately effective when focused on the following:

- Road and trail practices (11 administrators)
- Timber harvesting practices (11)
- Administrative practices (10)
- Forest protection practices (eight)
- Reforestation practices (seven)
- Chemical application practices (seven)

Although a substantial number of program administrators consider regulatory programs a positive influence on the above practices, there are important differences of opinion. Regulatory initiatives are viewed as having a minimal effect on reforestation (three administrators), forest protection practices (two administrators) and administrative procedures (one administrator). Three administrators considered chemical applications to be minimally or not affected by regulatory programs. Regarding the latter, in at least one state such a judgement may be premature since “. . . ground application isn’t yet regulated other than registration and labeling which is under the control of [other agencies] . . . and regulations for aerial spraying of chemicals are currently being developed.” The ability of regulatory programs to ensure proper application of cultural practices (for example, early release treatments, thinning, pruning, stand improvement cuttings) in a forested setting was not viewed with much favor by program administrators. Seven administrators considered their regulatory program to be only minimally or not effective in doing so.

For the 15 states addressed here, regulatory program impacts on private investment in forestry practices have apparently been limited over the past 10 years. Nine administrators indicated no (or neutral) effect, three a positive affect, and one specified a somewhat adverse regulatory effect on forest investments. As for program impact on timberland markets during the same period, 10 administrators indicate no (or neutral) affect, two somewhat adverse effect and one somewhat of a positive affect. Only five administrators indicated that their state provides financial assistance (for example, cost share payments) as a way of moderating adverse regulatory effects on investments (assist landowner and harvester comply with regulatory requirements). Eight administrators indicate no financial support is available (as stated by one respondent, . . . “there is limited logic in paying someone for poorly applied practices”). Administrators’ more freewheeling comments about regulatory impacts on investments and markets are enlightening.

- “Forest practices program has benefitted the industry by providing ‘one stop shopping’ for compliance with state and federal water quality programs and coastal zone management requirements. The program has also provided a stable regulatory environment with standards developed with [industry’s] informed consent.”

- “A more favorable regulatory environment [in our state] has likely resulted in many forestry businesses, contractors and consultants moving offices to the state.”

- “Water protection stream calcification rules [have been] significantly modified; result has been a change (undetermined) in harvesting and investment within riparian areas.”

- “No net change in investment. Largest impact has been due to significant reduction of harvest on federal lands.”
- “Regulatory impact on investments and markets? Do not know. Would not think so.”
- “Regulation processes take significant amounts of time to complete. [State] now has the highest regulatory cost per thousand board feet of timber.”
- “Those lands cut heavily in the past are severely limited [by regulation] in what they can harvest now so that the value [of the timberland] in the market has been reduced significantly.”
- “Voluntary BMPs promote positive investments. There is a strong desire to show improvement in audit results. Such leads to improvement in areas of lower scores and more focused private investment.”

Regulated Community Perceptions

Public perception of regulatory programs can have a significant impact on their success or failure. A properly focused and well-articulated program can lead to supportive clients that are willing to positively respond in order to accomplish broader public interests. In contrast, a program which lacks clear purposes and is embodied in the minutia of detailed standards and in harsh uncompromising requirements for their application can lose support and quickly become put-upon by stubborn public resistance. Within such a context, administrators of the 15 regulatory programs discussed here were asked to assess the current (and five years hence) perceptions of 11 groups that are affected by regulatory activities involving forestry practices.

Administrators were far more inclined to view groups as supportive of their program in contrast to being neutral or opposed to state regulatory initiatives. For each of the following groups, an average of eight administrators viewed a particular group as supportive, four as neutral in perception of regulatory programs, and fewer than one as opposed to forest practice regulatory programs. In fact, only two groups were viewed as opposed to forest practice regulatory programs, namely timber operators (identified by four administrators) and industrial forest landowners (two administrators). The three groups most frequently identified as neutral in their views of forest practice regulatory programs were: nonprofit conservation organizations (eight administrators), local units of government (seven administrators), and nonprofit environmental organizations (6). The ranked order with which administrators perceived groups to be *supportive* (not neutral or opposed) of

regulatory programs addressing forestry practices is as follows:

- Private forestry professionals (12 administrators)
- Public forestry professionals (12)
- State fish and wildlife agencies (11)
- State pollution control agencies (10)
- State water resource agencies (10)
- Industrial forest landowners (8)
- Nonindustrial forest landowners (8)
- Nonprofit environmental organizations (7)
- Timber operators (harvesters) (6)
- Local units of government (6)
- Nonprofit conservation organizations (5)

The attitude toward regulation of the aforementioned groups is most likely to be the same in the future (five years hence) (options of more opposed, no change, more supportive). An average of 11 administrators for each of the above categories expects no change in the degree of program support. Three administrators view more opposition from timber harvesters as do one each for industrial forest landowners, nonindustrial private landowners, and private forestry professionals. None of these four categories is expected to be more supportive of regulatory initiatives. However, more support is expected from state agencies (water, fish and game, pollution control – four administrators each), local units of government and environmental organizations – three administrators each), and conservation organizations (two administrators).

Current and future support (or opposition) for regulation of forest practices rests on a wide variety of technical, economic and political factors. The insights of program administrators are instructive.

•“The entities most involved with the forest practices act – the timber industry, government agencies, and environmental groups – are generally supportive. Most local governments and small landowners are not involved. Environmental groups vary significantly in their opinion by region and group.”

•“Currently widespread support exists for this longstanding and outcome-based [forest practices regulatory] program. Environmental and conservation groups would like more stringent standards, but realize [that renewed legislative discussion] could lead to less stringent standards. Local government has little concern because they have no authority.”

•“Expected that more ‘regs’ will come into play in the future to address Endangered Species Act and Clean Water Act issues. Given the bearish timber market and marginal

operability, expect more opposition from timber operators and nonindustrial private forest landowners. Environmental and conservation groups may never be satisfied and will always demand more regulations.”

- “A small percentage of timber operators and private forestry professionals are opposed to the program. Some timber operators feel that the program is too complex, particularly regarding cutting standards (silviculture). Some private foresters feel that the program is too lax regarding silviculture and call for more stronger regulation. Landowners in general [probably] question the need for regulation at all.”

- “All stakeholders want clear rules and regulations fairly applied by our agency in a consistent manner. I think it is clearly understood that forests are critically important to everyone given the urban nature of our state and the demands placed on forests. That’s good news!”

- “Challenge we face involves staffing, education of landowners, efficient and consistent application of rules, stronger cooperative efforts among stakeholders. Inroads we make in any of these areas will be helpful in gaining stronger support.”

- “Because we have been in the game of forest regulation for a while now with reasonable success, I’m hopeful that we’ll get better at it as time goes on.”

- “In general our programs seem accepted as a reasonable solution to high cost regulation. Environmental and conservation groups would like to see more regulation but don’t push too hard. Industry accepts what we are about – very opposed to any more regulation cost to them.”

Science and New Technology

Forest practice standards and the administrative procedures used to secure their application should reflect state-of-the-art science and technology. Failure to do so can mean that such standards and procedures may become ineffective, improperly focused, or poorly designed. If forest practice standards and program procedures are to be consistent with new technologies, regulatory programs must incorporate processes that will alert program administrators to the results of pertinent research activities, and which are able to respond with changes (as warranted) in rules and administrative procedures with a minimum of difficulty. These processes are especially important, since regulatory programs often involve lengthy time-consuming procedures that can frustrate plans for needed change, and they involve the special burden of procedural complexity and political inertia that frequently accompany efforts to change statutes or subsequently promulgated rules.

A variety of approaches are used by state governments to access new technologies that are important to forest practice regulatory programs. Administrators of the 15 regulatory programs considered here thought most highly of agency staff specialists (identified by 12 administrators), technical advisory committees (11) and the research community (universities, think-tanks, government agencies) (11) as sources of new scientific information relevant to the effective operation of their programs. In fact, these three sources were virtually tied in their frequency of being identified as a most important single source. Administrators had mixed views regarding some sources. Extension agencies and programs and special or ad hoc reviews and investigations had an equal number of administrators tallied as very and moderately important and minimally or not important. The three sources of scientific information identified most frequently as *minimally or not important* were:

- Organized special interest groups (10 administrators).
- Program governing boards and commissions (nine).
- Public hearings involving citizens and organized interest groups (eight).

Program administrators made a number of suggestions as to how scientific information might be better be incorporated into forest practice regulatory programs. They indicated the following.

•“Any comments by the public or other agencies on harvesting plans must to be responded to – the response writers are well versed in the scientific information. The regulated public and the public generally are also well aware of any new scientific findings.”

•“Electronic processes (for example, web sites) that make it possible to access and transfer new technologies have had the biggest impact [on our program], making scientific information easier to obtain and share.”

•“Water quality issues are the driving force behind major changes to our regulations . . . with this renewed interest has come new research and models useful to protecting water quality in our state. Our program has benefitted immensely, particularly in the area of engineering and logging. The result is that the regulatory program has produced demonstratable results in terms of less sediment and erosion and more stable and productive sites.”

•“The [state university] policy analysis group has sprung up as a way to synthesize and consolidate research and bring such information forward into debate regarding the evolution of rules. Also, Total Maximum Daily Load (TMDL) lawsuits have forced [research organizations] to do a better job of quantifying water quality impacts. Yet even though we continue to measure standards, we still don’t know much about thresholds and even less

about individual BMP ‘effectiveness.’”

- “Processes have not really changed over past 10 years. Our audit process is the major source of change. After each audit year there is a team debriefing. Issues are raised and addressed by BMP working group.”

- “There have been several reviews of all or portions of the forest practice act in response to particular issues, or as part of an effort to complete a review of [the correctness] of forest practice standards. Each review has involved a science and technical committee with representatives from federal and state agencies, the university, and the private sector (for example, consultants). These processes are open to the public but don’t involve hearings. Groups representing the timber and fishing industries, landowners, environmental groups and state agencies review committee recommendations prior to their adoption in order to help design practical ways for implementation.”

Future Program Issues and Challenges

Administrators of the 15 prominent forest practices regulatory programs discussed here are seasoned program managers. They have program experiences from which can be gained much insight about the major challenges regulatory programs will face in the years ahead. Consider some of the challenges cited, organized by major categories.

Financing and Staffing

- “Maintaining adequate funding for program implementation and enforcement as the state budget decreases is a major challenge.”
- “Lack of funding to do all that everyone would like us to do is a common problem for all states.”
- “Extreme budgetary and financial problems have entire program under fiscal stress.”
- “Effectiveness monitoring is expensive, especially high travel costs for work in remote locations.”
- “Inadequate financial and human resources to acceptably enforce our program is a problem.”
- “Increasing difficult to adequately fund forest practices program due to constraints on state general fund.”
- “Problems are arising as we seek adequate funding and staffing needed to meet expectations of our regulatory program.”
- “Reducing regulatory costs; we need to make our regulatory program more efficient and more financially acceptable.”

Effective Program Monitoring

- “Institutionalizing compliance monitoring and establishing an effectiveness monitoring program that is cost-effective is essential.”
- “Coming up with an improved monitoring program that is effective – expanding and improving current program is a must.”
- “Monitoring reforestation compliance post-harvest is a challenge. Figuring out how to reforest private lands that are exempt from reforestation requirements due to the extensive spruce bark beetle infestations.”
- “Need to determine ways of monitoring closed operations to determine need for maintenance (roads and stream crossings).”
- “Challenging will be development of an appropriate approach (strategy) for monitoring forest practices generally.”

Allocation of Regulatory Authority

- “Other state agencies wanting a bigger say in the approval of harvesting plans. Consequence to our department is the loss of lead agency status. Water quality agency is most vocal in this respect.”
- “Agencies often work at cross purposes. Huge gaps in understanding of applied science occur between agencies – such hinders appropriate regulation and confuses stakeholders.”
- “The exemption of silviculture as a nonpoint source of pollution under the Clean Water Act has and will continue to be challenged.”
- “Tension will continue between federal laws and policies and state sovereignty to determine their own laws and policy.”
- “Should we make the investment in protecting ourselves from these evil acts (Endangered Species Act and Clean Water Act), or just ignore them in the hope that federal agencies never have the funding or political will to go after our forest practices act.”
- “Conflicts with storm water laws and permit processes involving forest disturbances will heighten in the future.”

Response to Specific Resource Conditions

- “Adapting regulatory programs to address fish passage issues and fire and fuel management will be an issue.”
- “Determining how to steer programs to address concerns over threatened and endangered species will be an issue. Also, how should regulatory program deal with growth and development in forested areas?”
- “Concern over heightened tension between different land uses and different regulatory policy related to water quality and habitat protection.”
- “Regulating silviculture practices continues to be a problem. It is extremely difficult to make significant progress in this controversial area, even though our rules establish cutting standards.”

- “Proposing and implementing statewide riparian management standards and changing our regulatory programs in order to address such standards will be difficult.”

Public Acceptance of Regulatory Approaches

- “See a major challenge in improving cooperation and understanding among environmental agencies, organizations and related stakeholders.”
- “Securing acceptance of our regulatory program by forestry community generally is difficult. We need to inform and educate the public to understand and meet desired outcomes of our regulatory program.”
- “Major problems dealing with intense public debate over compensation for regulatory takings.”
- “Keeping regulatory approaches minimized and abating the public distrust of regulatory agencies will be challenging.”
- “Need to stabilize our enforcement activities and make them consistent between owners and harvesters.”
- “Accommodating the changing nature of the forest products industry, which is moving toward self-regulation (certification), will be interesting. Such may allow us to maintain or gracefully downsize our regulatory program.”
- “How do we ensure greater certainty among the regulated public. Our rules are made to be changed every 5-10 years.”

Summary of Prominent Program Conditions

The 15 forestry practices regulatory programs reviewed here are examples of state programs that are especially prominent in terms of breadth of purpose, range of resources and forestry practices addressed, landowner and business categories considered, rigor and complexity of procedures, and intensity of enforcement and severity of penalties. In some measure, they may harbor clues as to the nature of regulatory initiatives that might be initiated in the future by state governments. A summary of certain aspects of these programs is as follows.

- *Public Investments.* Prominent forestry practice regulatory programs involve substantial public investment. Those programs administered by lead state forestry agencies described here invested more than \$42 million in regulatory activities and engaged nearly 620 full-time equivalent staffs (California, Oregon and Washington account for 74 and 64 percent, respectively). State government appropriations provide 49 percent of the revenue needed to implement regulatory programs. Investments are primarily in review of notifications and permits applications (28 percent) and in monitoring and

evaluation activities (21 percent).

- *Program Administration.* Program administrators unanimously view regulatory programs as always or in most situations promoting the intent of the law, being based on clear and unambiguous legal authorities, embracing rule development that is open and constructive, setting forth rules that were physically possible to achieve, being particularly caring to especially sensitive resources and being generally cost-effective and administratively efficient. Their experiences suggest the existence of sufficient administrative discretion in the application of standards and procedures. However, administrators are less confident that regulatory programs are being guided by an overall strategic plan and that program benefits are always identifiable and measurable.

- *Program Inadequacies.* Inadequate financial resources and insufficient staff are considered major obstacles to the implementation of an effective regulatory program. Administrators consider least concerning any inadequacies in legal authority and any resistance that some resource professionals might have to regulatory programs focused on forestry practices. Change in the organization and administration of regulatory programs is most frequently a response to internal agency reviews and to state legislative oversight of regulatory initiatives. Some administrators favor multi agency regulatory authority as a means of balancing any single agency's interest in regulation.

- *Monitoring Compliance.* Regulatory programs are viewed as fully capable of positively influencing the way forestry practices are applied on private forest land (especially road and trail practices, and timber harvesting practices; less so, cultural practices). This ability is enhanced by regulatory enforcement systems that involve monitoring activities and that engage landowners and timber harvesters in notifications processes and on-site inspections. On-site consultations with landowners and timber harvesters are considered most effective for determining if program requirements are known and understood by the regulated public. Although available, harsher enforcement mechanisms are sparingly used by most states (stop-work orders, corrective actions, and civil and criminal penalties). As for regulatory program affects on private investment in forestry practices, administrators generally view the impacts to be neutral (or no effect).

- *Political Support.* Support for regulatory programs among various groups is viewed as positive by most program administrators and is unlikely to change over the next five years. Groups most supportive (not neutral or opposed) are public and private forestry professionals, state fish and wildlife agencies, and state pollution control and water

resource agencies. Least supportive are local units of government, and conservation and environmental groups. As for sources of new scientific information considered relevant to the implementation of regulatory programs, staff specialists, technical advisory committees and the research community generally were viewed as most useful. Public hearing processes were considered least helpful.

- *Future Challenges.* Major future challenges to the administration of forest practice regulatory programs are limits on financial support, development of effective monitoring systems, conflicting state agency and state-federal regulatory responsibilities, public acceptance of regulatory programs, and design of regulatory programs to meet special resource needs (for example, fuel management, endangered species protection).

EFFECTIVENESS AND EFFICIENCY OF REGULATORY PROGRAMS

The ability of regulatory programs to satisfactorily influence the application of forestry practices on private forest land is often widely disputed by the regulated public, the media, and by government officials, including those that authorize regulatory programs and those that are responsible for their administration. Some in these sectors point to meaningful and tangible improvement in the way forestry practices are applied, while others suggest that regulatory programs are not effective and are, in fact, intrusive in the lives and livelihoods of others. Although the general public may support regulatory approaches, it often mistrusts the government officials that are responsible for their administration and typically opposes paying for the investments that are required to make regulatory programs successful. Given this diversity in views, it is not surprising that past evaluations of the performance of forest practices regulatory programs have provided mixed results.

Importance of Measuring Performance

The importance of evaluating the performance of regulatory programs stems from broader present-day concerns over the efficiency and effectiveness of government in general. The current interest in measuring performance is often grounded in a wide variety of reasons and motivations. For example, evaluating a program's performance responds to citizen demand for evidence of program effectiveness, improves communication between citizens and government, improves program management and effectiveness, helps define goals and objectives and the means for their attainment, makes for better resource allocation decisions, and improves government efficiency by forcing consideration of alternative ways of accomplishing similar tasks (National Academy of Public Administration 1994).

Managers of regulatory programs also seek information that will enable them to improve the performance of programs for which they are responsible. In this respect, evaluation of a regulatory program's performance can be helpful as follows: evaluation (how well is the program performing?), control (how can program goals be better linked to actions taken?), budgeting (what program areas need additional monetary emphasis?), motivation (how can managerial creativity be encouraged?), promotion (how can program effectiveness be communicated?), celebration (what program accomplishments should be given special note?), learning (why is the program not working [or working]?), and improvement (what can be done to improve program performance?) (Behan 2003).

The importance ascribed to regulatory program performance is attested to by recent and extensive attention devoted to government regulatory initiatives. For example, in 1993 Presidential concern specifically addressed (by Presidential Executive Order) federal regulatory activities by calling for additional review and analysis of proposed regulations, greater public access to processes used to develop federal regulations, and increased coordination and more sophisticated planning of regulatory programs generally (National Archives and Records Administration 1993). In response to 1993 Presidential concerns, the Office of Management and Budget initiated a two-year effort to examine alternative approaches to conducting evaluations of regulatory initiatives and to set forth “best practices” for conducting such evaluations (Office of Management and Budget 1996). Partly as a result of this review, the Office of Management and Budget issued proposals for conducting regulatory analyses focusing on emerging issues and the risk of adversity associated with such issues (Office of Management and Budget 2003).

Regulatory program performance has also received the attention of the U. S. Congress, with a focus most notably on risk assessment, regulatory budgets, regulatory sunset provisions, benefit-cost analysis, and judicial review of rulemaking (Congressional Research Service 2001). The Regulatory Right-to-Know Act of 2001 (Section 624 of the Treasury and General Government Appropriations Act) further prodded regulatory reviews by requiring federal agencies to estimate the benefits and costs of federal regulations (Office of Management and Budget 2003). Many of these types of analyses are conducted by agency centers such as the U. S. Environmental Protection Agency’s National Center for Environmental Economics. The latter has a long history of promoting the need for better analysis of proposed environmental regulations, concluding that limitations to such analyses are generally rooted in gaps in available information, deficiencies in analytical techniques, errors and omissions in the execution of analyses, and constraints involving the cost and time required to perform regulatory evaluations (National Center for Environmental Economics 1987).

Although recent reviews of federal regulatory program performance have been common, there continues to be concern over how such reviews are undertaken and the frequency with which they are conducted (U. S. General Accounting Office 1999). For example, of 101 economically significant regulations issued by the U. S. Environmental Protection Agency from 1981 through 1998, only five have been subject to intense retrospective evaluation (for example, regulations involving pesticides, acid rain, and chlorofluorocarbons). In addition, of the more than 2,600 environmental regulations issued during the same period that were not considered economically significant, only 23 were subject to extensive retrospective evaluation. When carried out, the evaluations lead to

regulatory program modifications and insights to more effective procedures for conducting such evaluations (for example, cost estimation). Difficulties encountered by the agency when conducting regulatory program performance evaluations include, isolating the reason for the regulatory action, quantifying the benefits and costs of the program, and determining a baseline from which “with-and-without” measures of performance can be assessed.

Evaluation of state government regulatory program performance has been far less common than that occurring at the federal level (Gerber and Teske 2000, Environmental Council of the States 2001, Organization for Economic Co-operation and Development 1999). One reason for such a vacancy in the environmental and natural resources areas are definitive national regulatory schemes (which allegedly constrain state actions to evaluate) and the often limited availability of evaluation expertise in state governments (Environmental Council of the States 2001). Such is ironic, given the extensive “devolution” of federal regulatory responsibility to state agencies. Such devolution is especially noticeable with regard to regulatory initiatives focused on environmental issues, where the preamble to virtually every federal environmental law includes a theme of state responsibility (including review of regulatory performance):

- Environmental Quality Improvement Act of 1970: . . . the primary responsibility for implementing this [national policy for the environment] rests with state and local governments.
- Clean Air Act Amendments of 1970: . . .the Congress finds that the prevention and control of air pollution at its source is the primary responsibility of state and local governments.
- Federal Water Pollution Control Amendments of 1972: . . .it is the policy of the Congress to recognize, preserve, and protect the primary responsibilities and rights of states to prevent, reduce, and eliminate water pollution.
- Noise Control Act of 1972: . . . while primary responsibility for control of noise rests with state and local governments . . .
- Solid Waste Disposal Act Amendments of 1970 . . . while the collection and disposal of solid wastes should continue to be the primary function of state, regional and local agencies . . .

Where state reviews of regulatory program performance have occurred, such focus has been primarily on social programs (for example, regulation of child care programs) and on certain highly visible industries over which state government has considerable regulatory authority (for example, insurance industry, energy industry). Most evaluations of state regulatory programs have focused on how well principal agents exercised their responsibilities while engaged in the development and implementation of regulatory

initiatives. In such a context, of major concern is the performance of state legislatures, governors, bureaucracies, and various groups representing consumers, industry and diverse social causes (Gerber and Teske 2000).

Conceptual Setting for Evaluation

Approaches to evaluating performance of regulatory programs are many and are varied in their ability to provide useful insights. They include controlled experiments, retrospective studies, constituency surveys, administrative judgments, and comparisons with specified indicators of success (Harris and Scheberle 1998, Worthen and others 1997). Since each approach has its strengths and limitations, the selection of an approach for evaluation of performance necessitates careful consideration of situational circumstances, including the resources available for analysis (for example, time, finances, professional talent), ability to identify and measure outcomes, access to cost and benefit information (for example, proprietary restrictions on data), ability to control application of analytical procedures (for example, analysis of large amounts of information), and the extent to which baselines can be determined as required for with-and-without analyses. These circumstances are often aggravated by incomplete and uncertain information, political disagreements over the need for a particular regulation, and the subjective assumptions that are often embodied in analytical tools (thereby exposing them to bias and manipulation) (Knaap and Kim 1998, May 1993, Morganstern 1997 and 1999, Reams 1995, U. S. General Accounting Office 1999).

Evaluation Models and Methods

Effectiveness. Effectiveness is most often referred to as the ability of a program to achieve its intended goals or to produce a desired outcome or effect (Gaddis 1996). Evaluation of effectiveness is important for defining and modifying program structure and operation, which implies the importance of methods and the accuracy of effectiveness analyses. Unfortunately, there is no universal concept or model for guiding analyses of program effectiveness. In fact, some contend that any agreement regarding “the best, or sufficient, set of indicators of effectiveness is impossible to obtain” (Cameron 1986), and that effectiveness is an ever-changing concept that is often the product of negotiation between the administrators of programs and the clients that seek the benefits provided by such programs (Forbes 1998).

Conceptual Models. Conceptual models of policy and program effectiveness include *goal attainment models* that measure goal achievement or that delineate impacts or consequences (Vedung 1997). Involved is the use of defined and predetermined evaluative criteria which ignore program or policy costs, the latter of which are considered to be defensible since they allegedly mirror social values and preferences. Goal attainment models of effectiveness are limited in their conceptual power in that they often involve (a) poorly defined evaluative criteria stemming from poorly defined program goals (ambiguous, vague, conflicting), (b) disregard for unforeseen or unexpected program side effects, (c) obscure reasoning or rationale for the existence of a program, (d) narrow sets of program goals (and resulting evaluative criteria) that fail to reflect broader citizen interests, and (e) neglect of program implementation as a factor contributing to a program's success or failure. Goal achievement models can be improved by careful identification and assessment of a program's side effects. However, identifying a comprehensive set of program side effects is typically very difficult.

Evaluation of program effectiveness can also be guided by *goal-free evaluation models*, in which evaluators examine policies and programs without knowledge of goals or objectives to be sought. Such enables a more exacting and unbiased focus on results, but ultimately leaves judgement about a program's effectiveness to those responsible for evaluating and administering a program. Effectiveness evaluations can also be guided by *comprehensive evaluation models* which not only consider program outputs (such as considered by goal oriented evaluations), but also consider the processes that occur between inputs and outputs from a program. Doing so allows for assessment of procedural effectiveness, including procedural fairness, legality, openness, and participation in decision-making. *Client or stakeholder models* can also be used to guide evaluation of program effectiveness. Such models make use of evaluative criteria that are contingent on the set of values ascribed to by individuals and groups that have a direct stake in the program being evaluated. Evaluations guided by client models of effectiveness rarely take costs into account, are often extremely resource demanding, and provide little assurance as to who are pertinent stakeholders. Furthermore, their focus on 'the client' fails to acknowledge that government programs often have many, quite disparate constituencies (Boschken 1994, Keeley 1984).

Application to Forestry Practices Regulation. Analyses of the effectiveness of forest practices regulatory programs have been guided by several of the a-for-mentioned conceptual approaches. Their application has at times involved actual measurements, but more often than not has involved substantial estimation combined with healthy doses of

speculation. The variables of concern to such analyses have included the extent to which regulated practices are applied, impact of regulations on harvesting costs, attainment of desired timber supplies, response of landowner to regulated procedures, time limits on rule-making activities, and protection of habitat required by endangered species of wildlife (for example, Cabbage 2004, Egan 1999, Eagen and others 2001, Ellefson and Miles 1985, Ellefson and others 1995 and 1997, Ellefson 2000, Ellefson, Kilgore and Phillips 2001, Gaddis 1996, Gregory and others 1989, Henly and others 1988, Henly 1992, Kittredge and others 1999, Klunder and others 2000, Lickwar and others 1992, McKillop 1993, Oregon Forest Industries Council 1991, Stier and Martin 1997, Vaux 1983, Woodman and Cabbage 1994, Zobrist and Lippke 2003).

Effectiveness evaluations have also focused on the objectives (or outcomes) of forest practice regulatory programs. Are regulatory programs achieving reforestation goals? Are they accomplishing specified water quality standards? And is logging road maintenance occurring at rates required to prevent soil erosion? Although widely disparate, the variables of concern have included air quality (for example, ambient air quality levels, discharge of emissions, human exposure to toxins, impact on human health, and various ecological consequences), water quality (for example, effluent levels, discharge of effluents, human health effects), changes in timber availability and prices, loss or modification of forested wetlands, alteration of the number and types of wildlife, occurrence of hazardous waste material, rates of worker accidents and casualties, change in number and character of forest-sector employees, forest management investments, and stability of the forest land base (for example, Ellefson and Miles 1985, Ellefson and others 1995, Hawks and others 1993, Klunder and others 2000, Lickwar and others 1992, Lorensen and others 1994, Rubin 1997).

Efficiency. Much like effectiveness, efficiency is a concept most often defined within the eye of the beholder, meaning it changes depending on particular perceptions. In a comparative sense, an efficient program is one which accomplishes an objective with fewer resources than other programs (or combinations thereof) that could achieve the same objective (program that offers the most favorable excess of benefits over costs). From a regulatory program perspective, some economists define optimal regulatory program efficiency as when economic welfare is maximized (marginal benefits of regulation equal the marginal costs of regulation) (Hackett 1998), while others define regulatory program efficiency in broad terms such as “the ability of the [regulatory] program to provide a net increase in goods and services produced throughout the economy” (Gaddis 1996).

Despite interest in regulatory program efficiency, concern has been expressed about the application of efficiency notions to regulatory programs. Some note that regulation, as opposed to other policy tools, creates inefficiencies as the marginal cost of compliance varies between affected entities (Karp and Gaulding 1995). Regulation usually affects competitors unevenly, imposing relatively higher costs on some than others and creating advantages for low-compliance-cost firms. Disadvantaged businesses counter by pushing for more equalized regulation, thus promoting further distortions in the marketplace (Bardach and Kagan 1982). Others call into question the very use of efficiency as a desired goal, claiming that other goals and purposes are more important than program efficiency (Spence 2000), while some suggest that efficiency measures are improper in a system where entrepreneurs are not allowed to determine their own means of complying with regulatory standards. Even so, in some cases the realities of regulatory program administration calls for the application of efficiency measures. For example, increased regulatory stringency usually leads to diminishing program returns, a condition that signifies the need for efficiency-based judgments about the usefulness of further investment in regulatory efforts (Viscusi 1996).

Conceptual Models. Conceptual models guiding program efficiency analyses include *benefit-cost analysis*, an approach wherein the efficiency of a program is expressed as the relationship between discounted costs and benefits, usually measured in monetary terms. The approach requires comprehensive specification of program inputs and outputs (tangible and intangible, direct and indirect) and subsequent application of discounting procedures (for example, internal rate of return, present net worth analysis). Also a commonly used conceptual basis for determining efficiency is *cost-effectiveness analysis*, where costs are carefully measured and their relationship to a particular objective (for example, reforestation requirements) is determined and subsequently compared with programs that have similar objectives. Such analyses do not require that benefits and costs be reduced to a common dominator; instead, the effectiveness of a program in reaching its goals is related to the monetary values of the resources going into a program. Also available for guiding efficiency evaluations is the concept of *opportunity-cost analysis*, wherein the cost of choice among competing programs is measured by the worth of foregone options. Since opportunity costs can only be estimated by making assumptions about the consequences of alternative investments, opportunity cost analyses can be a controversial approach to efficiency analysis. Also available to guide efficiency analyses is *input-out analysis*, an approach that defines sector-wide ripple effects of a policy or program (for example, employment changes across levels between sectors). Computable general equilibrium analysis can also be used to track the ancillary economic effects (Braden and Kim 1998).

The a-fore-mentioned models guiding analyses of program efficiency are not without their problems. For various reasons, formal and complete efficiency analyses may be either unwise or impractical (Harrington and others 2000, McGarity 1991, Solomon 1998). Most pressing is that data necessary for undertaking efficiency analyses is not always fully available, “. . . the strength of the analysis is limited by our ability to measure and obtain data about the physical, chemical, and biological effects of the activities being regulated” (Easter and others 1999). By placing economic values on certain input and output measures, intense political controversies may surface and may subsequently obscure the utility of otherwise rigorous and useful analyses. Also concerning is that the technical procedures required to undertake efficiency analyses may be beyond the financial and professional resources available for conducting thorough and rigorous analyses. As for efficiency analyses of regulatory programs, the U. S. General Accounting Office has noted a number of difficulties, including inadequate baseline information for with-and-without analyses, failure of regulated industries to track cost information, difficulties in attributing public benefits to a specific set of regulations, unwillingness of regulated industry to share information (proprietary) (fear of more regulation), and lengthy periods of time between the application of regulatory standards and the realization of benefits from such standards (U.S. General Accounting Office 1999). Nonetheless, even with these and similar drawbacks, the strength of efficiency analysis lies in the discipline it forces on evaluators, policy makers and stakeholders to more clearly articulate the economic situation that surrounds advocacy of a particular program (Rossi and Freeman 1985).

Application to Forestry Practices Regulation. Analyses of the efficiency of forest practice regulatory programs has been guided in some fashion by nearly all the conceptual models mentioned above. As with effectiveness, the variables of concern are numerous, including timber foregone because of regulation, harvest cost impacts of applying water projecting practices, comparison of costs and benefits expected from different types of programs, cost-effectiveness in meeting reforestation standards, stumpage prices for regulated versus unregulated forests, and community and regional employment impacts of regulatory programs. Especially common are evaluations that compare the condition of forests that are unregulated with forests that are regulated, or that compare the efficiency of regulatory programs with the efficiency of other types of programs considered capable of accomplishing the same or similar objectives (regulatory programs versus educational programs, technical assistance, voluntary guidelines, tax incentives, and fiscal incentives). The latter has been often involved comparison of resources and market conditions in regulated versus unregulated states and among developed countries, where the variables used for comparison include resource conditions, stumpage prices, implementation costs, and compliance costs (for example, American Pulpwood Association

1993, Aust and others 1992, Cheng and Ellefson 1993a, Cubbage 2004, Dicus and Delfino 2003, Ellefson and Miles 1985, Ellefson and others 1995 and 1997, Ellefson 2000, Fletcher and others 2001, Gaddis 1996, Greene and Siegel 1994, Hawks and others 1993, Henly and others 1988, Kagan 1999, Kilgore and Blinn 2004, Kittredge and others 1999, Klunder and others 2000, Lickwar and others 1992, Lippke 1992, McKillop 1993, Niemi and Mendelsohn 1989, Oregon Forest Industries Council 1991, Stier and Martin 1997, Vaux 1983, Westland Resource Group 1995, Woodman and Cubbage 1994, Zobrist and Lippke 2003).

Governance. Governance encompasses matters involving the structure of and the processes used by organizations to carry out their assigned tasks. Evaluation of governance structures and processes is viewed as essential to ensuring the effective and efficient performance of the programs (including regulatory programs) that are the cornerstone of an agency's existence.

Conceptual Models. Models of governance are often less well defined than those guiding analyses of effectiveness and efficiency, they are non-the-less important. When properly used to guide analyses of program performance, they can lead to organizational structures and processes that advance efficiency through the use of more appropriate authorities, rules, procedures, and leadership. Models of organizational governance include those that guide structure and design (division of labor, delegation of authority, departmentalization, span of control, complexity), planning and decision-making (authority, leadership, goal-setting,), administration and operations (communication, personnel management), and implementation and execution (resource allocation, performance evaluation) (Gibson and others 1994).

Application to Forestry Practices Regulation. Analyses focused on the governance of forest practice regulatory programs have been driven by a wide variety of governance models. The variables of concern to such analyses have included adequacy of resources (for example, finances, analytical talent), severity of penalties and sanctions (for example, citations and violations), regulatory style of an agency (for example, flexible versus by-the-book), design of legal mandates (for example, standards in law versus standards in rules), ideological views of administrators, agency capacity and commitment, political strength of interest groups, reason for program establishment, cost of administration, multi-agency regulatory involvement, clarity of implementing rules, extent of complementary programs (for example, technical and financial assistance), nature and extent of monitoring, type and amount of enforcement, forestry activities regulated, procedures for rule development and

review, and duplication of public regulatory efforts (for example, Cheng and Ellefson 1993b, Cleaves and Bennett 1995, Cabbage 1996, Dicus and Delfino 2003, Ellefson and others 1995 and 1997, Ellefson 2000, Endter-Wada and Dennis-Perez 1997, Fletcher and others 2001, Greene and Seigel 1993, Greenwood and Smith 1995, Henly 1992, Hickman and Hickman 1997, Johnson and others 1997, Rose and Coate 2000, Siegel 1997, Society of American Foresters 2002, Spink and others 2001).

Performance Standards

Forest practice regulatory programs are judged to be worthwhile in the context of a wide variety of standards, including standards that promote program effectiveness, efficiency and good governance. Although agreement on the specificity of individual standards is often subject for intense debate, program standards that promote results, encourage participation, and seek rich sources of information would probably be agreed to by most. Few would argue that a regulatory program is well designed and properly implemented when opportunity to participate in program design is limited, procedures for rule development are cumbersome, decision-making circumvents access to scientific input, administrators are inexperienced or overly stringent in the application of forest practice standards, and when communication between agency regulators and legislative policy makers is limited. Standards for judging the efficiency, effectiveness and governance of regulatory programs should clearly prevent the occurrence of such conditions. Instead, they should promote effective processes, science-based practices, and predictable outcomes that enhance the quality of forest environments and encourage forest-based economic activity.

Recognizing that regulatory programs are complex systems, each segment of which may warrant a unique standard for judging its merits, the following summarizes standards that have been suggested for judging regulatory programs generally and forest practices programs in particular.

General Regulatory Context. The Organization for Economic Co-operation and Development (OECD) has undertaken extensive worldwide review of regulatory programs and assessed a variety of approaches to regulatory program reform (Organization for Economic Co-operation and Development 1997 and 1999). The experience of OECD member countries reveals that an effective regulatory system requires three basic components, namely regulatory policy adopted at the highest political level, explicit and measurable standards for regulatory quality, and a continuing regulatory management

capacity. These standards are considered to be mutually reinforcing in their impact on the quality of regulatory governance and are described in a more specific fashion as follows. Regulatory decision-making should consider the following:

- *Is the problem correctly defined?* Problem to be addressed should be precisely stated in terms of its nature, magnitude, and cause for concern.
- *Is government action justified?* Government intervention should be based on explicit evidence that government action is necessary and that such action will be effective.
- *Is regulation the best form of government action?* Regulatory action should be selected if an informed comparison of a variety of regulatory and nonregulatory policy instruments demonstrates such action to be appropriate.
- *Is there a legal basis for regulation?* Regulatory action should be authorized by law (or higher level regulations) and should comply with relevant legal principles.
- *Is the appropriate level of government involved?* Regulatory action should be administered by the level of government considered most effective and such action should (as required) facilitate coordination across and between levels of government.
- *Are costs of regulation justified by benefits to be gained?* Investment in regulatory action should be justified by the benefits expected from such action.
- *Are distributional effects transparent across society?* Consequences of regulatory actions for various social groups and economic sectors should be clearly evident.
- *Are regulatory program requirements understandable?* Demands of regulatory actions should be clear and understandable to the regulated public.
- *Are all interested parties given an opportunity to participate in regulatory program development?* Regulatory actions should be developed in an open and fair fashion, using procedures that provide for effective and timely input.

Standards for judging existing and proposed regulatory actions have also been set for by the federal government. In 2002, the U. S. General Accounting Office (2002) suggested that regulations be uniform, provide flexibility, have proper capacity, and should embody processes that promote accountability. In the 1990s, the National Performance review lead to a 1993 Presidential Executive Order that required agencies to take a “minimalist” approach to regulation, by promulgating “. . . only such regulations as are required by law, are necessary to interpret the law or are necessary by compelling public need, such as material failures of private markets . . .” (National Archives and Records Administration 1993). Patterned after OECD recommendations, the order requires agencies responsible for adoption and administration of regulations to:

- Define and carefully assess the significance of problems to be addressed by regulations.
- Identify and evaluate alternatives to regulation, including programs that can change behavior through the supplying of information and incentives (fiscal and tax incentives).
- Reserve regulatory action for problems involving high risks and the likelihood of significant adverse consequences.

- Utilize the best obtainable information when evaluating the need for and consequences of regulation.
- Adopt regulations only after a reasoned determination that the benefits of regulation will justify the costs involved.
- Design the organization and execution of regulatory programs so as to be cost-effective.
- Avoid adoption of regulations that will be inconsistent with or duplicate other regulations.
- Communicate regulations in manners that are easy to understand.

A 1994 national review of federal regulatory performance also suggests standards for effective regulatory program performance (Lubbers 1994). Undertaken as part of the 1993 National Performance Review, the review suggests that regulatory programs should:

- Encourage consensus-based rulemaking (consider negotiated rulemaking processes).
- Heighten public awareness of rules and rulemaking (consider less formal means of making public aware of proposed rules).
- Streamline agency rulemaking procedures (consider focusing primarily on potentially controversial rules).
- Encourage alternative dispute resolution techniques for enforcing rules (consider techniques other than judicial proceedings).
- Focus rule making on high-risk problems (consider ranking problems and developing rules accordingly).
- Improve the flow of science into rulemaking (consider science advisory boards).
- Improve agency-legislative relationships (consider less detailed and less restrictive legislation).
- Provide more educational and incentive opportunities for regulators.
- Strengthen coordination among agencies responsible for regulatory programs (consider interagency coordinating groups).

Policy and program analysts have also set forth standards to guide the design and implementation of regulatory programs. For example, Davies and Mazurek (1998) advise that regulatory programs should have clearly specified achievable goals, focus on the problems that are considered most important, be efficiently managed and effectively accomplish desired purposes, respond to important social values (for example, public involvement, nonintrusive, environmental justice), anticipate and effectively contend with unforeseen future problems, and compare well with effective regulatory systems in other developed countries. As for regulatory program implementation, Mazmanian and Sabatier (1981) suggest regulatory initiatives that have clear and consistent legislative directives; exacting designation of persons responsible for implementation; well-identified and suitably described target groups; active support of key legislators and constituency groups; and lack conflicting statutory goals that confuse implementing actions.

Forestry Practice Context. In a forest resource context, Rose and Coate (2000) suggest that effective regulatory programs are benefitted by clear rules, extensive educational efforts, intensive monitoring, and enforceable penalties for noncompliance. The Maine Forest Service suggests avoiding laws, rules and jurisdictions that have inconsistent and often changing regulatory provisions; establishing forest practice standards that are results oriented and nonprescriptive in nature; funding public regulatory program in amounts that are consistent with the objectives specified in laws and associated rules; and promoting the balanced application of environmental, land use and forest protection laws (Maine Forest Service 2003).

Based on review of a number of forest practice regulatory programs initiated by state governments, Ellefson (2000) observed that the most effective programs had the following characteristics:

- *Benefits occur and are measurable:* Changes in pollutants and forest health conditions exist and are measurable, pollutant reduction or forest health improvements are meaningful, landowners' and harvesters' sensitivity to potential impacts of forest practices is enhanced, and certainty for investors is greater.
- *Compliance with rules is possible:* Forest practice rules are technically and economically feasible to apply, flexibility to meet varying forest resource and administrative conditions exists, and the authority and resources to enforce the rules are available.
- *Program is cost-effective:* Private-sector costs of compliance are considered and dealt with, agency costs to develop, promulgate; and implement forest practice rules are low; and agencies with similar regulatory or resource management responsibilities coordinate their efforts.
- *Rule development is open and constructive:* Processes are clear, predictable, and timely and decision has an endpoint; goals and the forest practice technologies to achieve them are discussed early in the process; specialized approaches (regulatory rule negotiation) for minimizing potential litigation are appropriately used; risks, costs, and administrative procedures can be analyzed; and values such as privacy, due process and private property are accommodated.
- *Information is abundant:* Effectiveness and compliance monitoring systems exist and provide useful information, and research capacity to address critical information voids is available.
- *Statutory intent is constructively promoted:* A healthy balance exists between statutory specification of forest practices and discretionary authority; statutory deadlines for accomplishing legislative intent are reasonable; and legislative overview of regulatory

program progress is constructive.

The Society of American Foresters has established an orderly set of standards that can be used to guide the design of forest practice regulatory programs (Society of American Foresters 2002). Divided into six major categories, the standards are as follows.

- *Governance*. Regulatory programs should be: authorized by bodies that represent a broad range of interests, and designed to embody the interests of all citizens likely to be affected.

- *Knowledge*. Regulatory programs should be: based on the application of scientifically-firm forestry knowledge, clearly stated goals to be achieved by regulatory action, designed to assure the productivity of forest land, and include procedures for incorporating information about regulatory consequences.

- *Flexibility*. Regulatory programs should: accommodate variations in forest resource conditions and landowner interests, emphasize rule-making rather than legislatively established standards, place rule-making responsibilities in representative bodies, and allow for landowner discretion to choose from among different forestry practices that can accomplish the same goal.

- *Application and Enforcement*. Regulatory programs should: clearly define acceptable forestry practices and the land to which they apply; have rules adopted by the highest level of government so as to ensure uniformity and consistency across jurisdictions; avoid enforcement of standards that are ambiguous, inconsistent or subject to construal change; clearly establish precedence among overlapping government regulatory jurisdictions; and consistently enforce standards across ownerships with similar characteristics.

- *Clarity and Simplicity*. Regulatory programs should: inform regulated public about program objectives, forest practice standards, and processes for compliance; define authorities for regulatory actions and the agencies responsible for exercising such authority; and specify responsive and equitable appeal procedures.

- *Incentives*. Regulatory programs should: promote incentives (education, fiscal and tax incentives) that encourage landowner and operator application of regulated practices.

- *Public Investment*. Regulatory programs should: receive levels of public investment that are consistent with desired regulatory program goals, and publically acknowledge the financial costs of regulatory initiatives.

The experiences of persons actively engaged in the administration of forest practice regulatory programs can also be a source of standards for judging regulatory programs. In 1995, experienced administrators recommended the following as characteristics of a well-functioning regulatory program: emphasis on monitoring of accomplishments, way of

accommodating new science and technologies, stress on advanced prevention of problems (not retrospective enforcement), forest practice standards in rules (not in law), single-agency program responsibility (avoid jurisdiction issues), focused enforcement provisions (focus on rebellious operators and landowners), adequate program financing; rule-making processes focused on consensus building, fair and visionary persons on governing boards, and sensitivity to regulatory fairness (large ownerships versus small ownerships, forestry versus agriculture) (Ellefson and others 1995).

A comparison of forest practice regulations in Canada's British Columbia and those implemented by state governments in the U. S. Pacific Northwest was carried out in 1993. The comparison concluded that the following characteristics contributed most to an efficient and effective forestry practice regulatory program (Hoerger 1993):

- Benefits are identifiable and broadly perceived as desirable (measurable reduction in pollutants, measurable increase in public health).
- Compliance is achievable and enforceable (technically feasible standards, sufficiently flexible standards, sufficient enforcement provisions).
- Implementation is cost-effective (prompt development of regulations, agency discretion in specification of standards).
- Rule promulgation is open and constructive (clear and predictable process, specified end point, analysis of optional standards, open discussion of technical feasibility of proposed rules).
- Statutory intent is promoted (broad goals rather than prescriptive deadlines and standards).

A major focus of contention over regulation of forestry practices often involves government taking of private property for public use without appropriate compensation. Cheng and Ellefson (1993b) note that regulatory programs can avoid some constitutional concerns when regulations are:

- Consistent with a history of public policy favoring environmental protection and control over the use of private land.
- Rationally based, reasonably constructed and developed through well-balanced due processes.
- Administered in manners that are not autocratic and applied in ways that are not considered arbitrary and capricious.
- Convincingly intent on being directly beneficial to the long-term protection of the public's health and general welfare.
- Result in benefits that are widely distributed throughout various segments of the public.

Evidence of Regulatory Program Performance

Regulatory Programs Generally

Improving regulatory program performance has been of wide-ranging concern to various regulatory agencies as well as of concern to the regulated public. The extent of this concern prompted enactment of the Regulatory-Right-to-Know Act of 2001 which authorized establishment of the Regulatory Impact Analysis Program (RIA) within the federal Office of Management and Budget. The program is responsible for reporting on the efficiency, accountability and transparency of federal regulatory programs. Specifically, it is to periodically report an estimate of the total annual costs and benefits of federal regulatory rules (in the aggregate, by agency and agency program, and by major rule), and an analysis of the impacts of federal regulation on state, local, and tribal governments, small business, wages, and economic growth (Office of Management and Budget 2003).

In 2003, the Regulatory Impact Analysis Program (RIA) reviewed 4,153 final federal rules (published in Federal Register), estimating that such rules provided \$2.0 billion to \$6.5 billion worth of benefits at a cost of \$1.8 billion to \$2.0 billion (period October 2001 to September 2002). For the 10-year period 1993 to 2002, the program estimated the benefits of federal regulation to be in the range of \$134.6 billion to \$217.5 billion, while the costs associated with such benefits were estimated to be between \$37.7 billion and \$43.8 billion (two categories of U. S. Environment Protection Agency rules accounted for \$96.0 billion to \$113 billion of the benefit totals, namely limits on highway engine particulate matter and limits on acid rain causing sulphur dioxide). Federal regulatory program benefits and costs over this 10-year period were distributed by agency as follows (Office of Management and Budget 2003):

- Department of Agriculture: \$3.1 billion to \$ 6.2 billion benefits; \$1.6 billion to \$1.7 billion costs.
- Department of Education: \$0.7 billion to \$ 0.8 billion benefits; \$0.4 billion to \$0.6 million costs.
- Department of Energy: \$4.7 billion benefits; \$2.5 billion costs.
- Department of Health and Human Services: \$8.7 billion to \$ 11.7 billion benefits; \$3.2 billion to \$3.4 billion costs.
- Department of Labor: \$1.8 billion to \$ 4.2 billion benefits; \$1.1 billion costs.
- Department of Transportation: \$6.1 billion to \$ 9.5 billion benefits; \$4.3 billion to \$6.8 billion costs.
- Environmental Protection Agency: \$108.9 billion to \$ 179.8 billion benefits; \$23.9 billion to \$27.0 billion costs.

The RIA program also assessed the effects of regulation on national economic growth and performance. Using analyses that compared regulatory conditions and growth rates in 130 countries, the program concluded that the United States was among the 10 least regulated countries in the world. The other nine countries were Australia, Canada, Hong Kong, Ireland, Netherlands, New Zealand, Singapore, Switzerland, and the United Kingdom. Given the extent of their regulatory environment, these countries were judged to have experienced relatively good economic performance as measured by economic growth, per capita income, and life expectancy.

The performance of regulatory programs focused on specific economic and environmental sectors has also been subject to analyses, most of which involve a variety of analytical approaches that are applied over different periods of time and that judge regulatory performance with an assortment of standards. Although variation in these conditions is substantial, some observations regarding the consequences of regulation by major environmental and safety sectors are possible. Consider the following.

Air quality: The Clean Air Act 1970 (as amended) authorized extensive regulatory authority that has led to significant reduction in air pollutants. Between 1986 and 1995, the following air pollutants were reduced by the substantial percentages: carbon monoxide – 37 percent reduction; lead – 78 percent reduction; nitrogen dioxide – 14 percent reduction; ozone – 3 percent reduction, and sulfur dioxide – 37 percent reduction (U. S. Environmental Protection Agency 1996).

Water Quality: The Clean Water Act of 1987 (as amended) authorized extensive regulatory authority, the consequences of which are mixed. Focusing only on rivers during the period 1980 to 1989, the following qualitative judgements have been made: dissolved oxygen – better, fecal coliform – much better, dissolved solids – much better, nitrate – slightly better, suspended sediment – much better, total phosphorous – much better (Davies and Mazurek 1998).

Hazardous Waste: The Resource Conservation and Recovery Act of 1976 authorized regulatory authority (for example, the Superfund Program) focused on solids and liquids that pose substantial threats to human health. Although land disposal of untreated hazardous waste has been greatly reduced, the regulatory cause for such change is unclear (Portney 1990).

Toxins: The Toxic Substances Control Act of 1976 authorized regulatory authority over metals and organic chemicals (separate from solid waste, silt, or bacteria). Of 10 especially important toxic chemicals, five have declined in commodity production and consumption (12 percent to 75 percent) while five have increased (23 percent to 177percent). However, significant progress has been made in the reduction of lead (78

percent reduction), PCBs, and certain chlorinated compounds (U. S. Environmental Protection Agency 1995).

Pesticides: The Federal Insecticide, Rodenticide, and Fungicide Act of 1947 (as amended) authorized regulatory authority over pesticides, including authority to ban the use of certain pesticides. During the period 1964 through 1992, the use of insecticides experienced modest declines, although significant increases have occurred in the use of herbicides and fungicides (U. S. Department of Agriculture 1994). Persistent pesticides in humans have declined substantially (Davies and Mazurek 1998).

Occupational Safety: The Occupational Safety and Health Act of 1970 authorized regulatory authority over recognized hazards that can cause or are likely to cause death or serious physical harm to employees. Regulated conditions of safe and healthful employment and places of employment are enormous in number and breadth. Accidental death rates declined more than 35 percent from 1970 through 2000 (Fischbeck and Farrow 2001), although overall injury and illness rates for private industry have fluctuated between 6.7 and 8.9 cases per 100 full-time workers between 1980 and 1998 (Mathews and Lave 2001).

The above are, admittedly, simplified conclusions about very complex federal regulatory programs. Their nature raises a very fundamental implicit question: to what extent are changes in pollution levels attributable to regulatory programs? Davies and Mazurek (1998) point out that “. . . it is neither conceptually nor factually correct to assume that, because declines in many pollutants have followed investment in pollution control programs, the decline is due to a [regulatory] program. In a situation where multiple factors are at work, it cannot be assumed that one thing caused another because one followed the other in time.” Indeed, some previous studies have found little evidence of an association between regulatory actions focused on pollution control and air quality (Alder and others 1993). For air quality, other factors such as climate change and certain industrial activity significantly affect air quality. Regulatory controls are often overshadowed by the impact of other factors, including new technologies, industrial production shifts, consumer lifestyle changes, and modifications in natural systems (for example, weather conditions, vegetative changes) (Davies and Mazurek 1998).

Forest Practice Regulatory Programs

Regulatory versus Non-Regulatory. The ability of different types of programs, including regulatory programs, to actually influence the application of forestry practices on private forest land is often a major concern to policy makers and program administrators. For example, if landowners are applying forestry practices that detract from the flow of

quality water from a forested watershed, should government attempt to alter the application of such practices via a technical assistance program (presume landowners lack technical forestry information), a financial assistance program (presume landowners lack financial resources), or a regulatory program (presume landowners fundamentally oppose change)? The experiences of program administrators can provide useful insights on these matters.

Table 13. Effectiveness of Major State Government Programs in Promoting Correct Application of Forestry Practices on Private Forests, by Major Forestry Practice Category. 2003.

Major Categories of Forestry Practices	Effectiveness of Program in Promoting Correct Application of Each Major Category of Forestry Practices (5 = most effective . . . to . . . 1 = least effective)				
	Extension Education Programs	Technical Assistance Programs	Tax Incentive Programs	Financial Incentive Programs	Regulatory Programs
Road and Trail Practices (e.g., water crossings, erosion control, material disposal sites, blasting standards, winter use and closures).	3.76	3.80	1.67	2.82	2.96
Timber Harvesting Practices (e.g., landings; skid trails; slash management; equipment; felling, bucking and yarding; residual stand damage; safety).	3.90	3.98	1.83	2.52	2.80
Reforestation Practices (e.g., site preparation, timing, species selection, artificial or natural, regeneration levels, supplemental planting).	3.30	3.84	2.46	3.36	2.04
Cultural Practices (e.g., early release treatments, thinning, pruning, stand improvement cuttings, stand health).	3.60	4.16	2.17	3.34	1.74
Chemical Application Practices (e.g., methods of application, intensity, timing, mixing, spill management).	3.76	3.84	1.74	2.49	3.18
Forest Protection Practices (e.g., fuel loads, fire prevention; disease and insect prevention; animal damage prevention, salvage and sanitation cuttings).	3.92	3.88	1.77	2.74	2.60
Administrative Practices (planning, notifying, reporting, monitoring, evaluating, enforcing).	3.72	3.92	1.96	2.38	2.96
All Major Categories	3.71	3.91	1.83	2.81	2.60

Note: 5= most effective, 4=somewhat effective, 3=average effectiveness, 2= marginally effective, 1=least effective.

As part of this assessment, administrators of state forestry programs were asked (in 2003) to judge the effectiveness of various state programs. They were asked to judge how well each program achieved a goal of having private forestland owners correctly apply each of seven major categories of forestry practices. The five types of programs considered were extension education, technical assistance, tax incentive, financial incentive, and regulatory programs, while the forestry practice categories were roads and trails, timber harvesting, reforestation, cultural practices, chemical applications, forest protection, and administrative practices. The responding administrators (from all 50 states) were directly responsible for one or more of the five program types and rated the programs for which they were responsible on a scale of one to five, where “one” was least effective and “five” most effective.

The program managers judged extension education and technical assistance programs to be most effective in obtaining correct application of forestry practices generally, while tax incentive programs were rated last in effectiveness (Table 13). As for the effectiveness of programs focused on specific forest practices categories, technical assistance programs were rated most effective for accomplishing six of the seven forest practice categories considered. Only for purposes of forest protection was the effectiveness of technical assistance programs exceeded by another type of program (extension education programs). From a regional perspective, program managers from all regions considered technical assistance and extension education to be the most effective type of program. Ranking of program effectiveness by region was as follows: North – technical assistance, extension education, regulatory, financial incentives, tax incentives; South – technical assistance, extension education, financial incentives, tax incentives, regulatory; West – technical assistance, extension education, regulatory, financial incentives, tax incentives (Appendix Tables B-13 through B-15).

Regulatory programs ranked fourth (out of five) in effectiveness for all major categories of forestry practices (Table 13). When used, regulatory programs were considered to be most effective for managing the application of chemicals on private forests (ranked third for such purposes) and least effective when focused on cultural practices. Ranked from most to least effective, the forestry practices considered most likely to benefit from a regulatory approach were: chemical application practices, road and trail practices, administrative practices (tied in rank with road and trail practices), timber harvesting practices, forest protection practices, reforestation practices, and cultural practices. Program managers in the North and the West were more inclined to look favorably toward regulatory program effectiveness (ranked third in both regions). Managers in the South ranked regulatory programs as least effective generally, but more effective

than tax incentives (next most effective program type) when focused on roads and trails, timber harvesting practices, and the application of chemicals (Appendix Tables B-13 through B-15).

Interpretation of the above program rankings must be done with some caution. Because of the ranking scale used, there is no basis for judging how much more effective one type of program is than another program. Furthermore, the design of the inquiry did not allow program managers to consider combinations of programs and the effectiveness of various combinations. In this respect, a program manager in a Northeastern state indicated “. . . these are false choices . . . no single policy tool is effective by itself generally . . . a package of policy tools is almost always the best way to address an issue . . . many times a suite of tools generates synergies that make all the tools more effective . . . regulations can make education and technical assistance programs more attractive to the regulated community.”

Table 14. Effectiveness of State Forestry Programs Focused on Private Forestry Activities as Judged by Program Managers, by Activity and Program Type. 1992.

Forestry Activity or Objective	Rating of Program Effectiveness				
	Educational Programs	Technical Assistance	Tax Incentives	Fiscal Incentives	Regulatory Programs
Protect Water Quality	3.70	4.68	2.98	3.85	3.08
Promote Reforestation	3.59	4.54	3.64	4.53	2.60
Improve Timber Harvesting Methods	3.96	4.58	3.58	3.64	2.74
Protect from Wildfire, Insects and Diseases	4.25	4.74	2.78	3.08	3.67
Protect Wildlife and Endangered Species	4.55	4.43	2.77	3.24	3.22
Enhance Recreation and Aesthetics	4.44	4.72	3.22	3.83	1.94
Mean Rank	4.08	4.61	3.16	3.69	2.87

Note: Effectiveness ratings assigned by program managers using an ordinal scale of 1 = very ineffective . . . 6 = very effective.

Source: Ellefson and others 1995.

Also relying on the experiences of program managers in all 50 states, the ability of various types of state programs to promote certain forestry activities (or objectives) on private forests was assessed in 1992 (Ellefson and others 1995) (Table 14). As in 2003, educational and technical assistance programs were considered most effective, while regulatory programs were viewed to be least effective. Only when used to protect from wildfire, insects and diseases, and to protect wildlife and endangered species were

regulatory programs ranked higher than last among the program types considered. For the former activity, regulatory programs were ranked ahead of tax and fiscal incentives but lower than technical assistance and education, while for protection of wildlife and endangered species, regulatory initiatives were judged more effective than tax incentives but less effective than the other types of programs considered.

The efficiency and effectiveness of various state programs designed to mitigate negative externalities often associated with timber harvesting practices was assessed in 2000 (Kilgore and Blinn 2004). Of concern were regulatory and voluntary programs, the latter of which included cost-share payments, technical assistance, various forms of grants and loans, education programs, preferential access to contracts, and primum prices paid for timber harvested in acceptable fashions. Of the 45 responding state forestry agency directors, 16 considered their state to be dominated by regulatory approaches toward timber harvesting practices, 26 indicated a dominance of by voluntary programs, and three state directors indicated a combination of voluntary and regulatory approaches.

State forestry agency directors were also asked to judge the effectiveness and the efficiency of voluntary programs using a scale of one being “low” and four being “high” in either effectiveness or efficiency (Kilgore and Blinn 2004). The assessment’s findings suggest that administrators from regulated states are somewhat more skeptical of the effectiveness and efficiency of voluntary programs than are administrators from states relying primarily on voluntary programs. Responding directors from states dominated by regulatory programs rated the effectiveness of voluntary programs (for landowners, foresters and loggers) an average of 2.84, while the efficiency of such programs was assigned an average rating of 2.81. For states dominated by voluntary programs, the average effectiveness and efficiency ratings were 2.87 and 2.92, respectively. As for the effectiveness of cost-share, technical assistance and education-extension programs, respondents from regulated states viewed educational programs more favorably than technical assistance programs (regulated state rating of 3.20 versus 3.09 for education-extension programs), while cost share programs were considered least effective of the these three programs. Additional detail from the assessment is as follows.

Program Effectiveness Ratings . . .

- Perceptions by states emphasizing regulatory programs. Effectiveness of non-regulatory programs focused on: landowners -- 2.60, foresters -- 2.90, and loggers -- 3.03.
- Perceptions by state emphasizing voluntary programs: Effectiveness of non-regulatory programs focused on: landowners -- 2.57, foresters -- 3.24, and loggers -- 2.79.
- Perception by states emphasizing regulatory and voluntary programs: Effectiveness of

non-regulatory programs focused on: landowners -- 3.00. Foresters -- 3.00, and loggers -- 3.17.

Program Efficiency Ratings . . .

- Perceptions by states emphasizing regulatory programs: Efficiency of non-regulatory programs focused on: landowners -- 2.61, foresters -- 2.84, and loggers -- 2.98.
- Perceptions by state emphasizing voluntary programs: Efficiency of non-regulatory programs focused on: landowners -- 2.77, foresters -- 2.86, and loggers -- 3.14.
- Perception by states emphasizing regulatory and voluntary programs: Efficiency of non-regulatory programs focused on: landowners -- 3.33, foresters -- 2.50, and loggers -- 2.83.

A Southern case example of cost impacts associated with a tract of forest land managed in compliance with voluntarily best management practices (BMPs) versus in compliance with regulations called for by the state of Oregon was developed in 1992 (Haney and Cleaves 1992). The tract was presumed to be 360 acres of pine situated in one contiguous rectangular block. The timber on the land was presumed to be ready to harvest. The forest practice prescriptions and associated returns were as follows.

Voluntary BMP applications: 15 acres of roadway out of production; 14 acres of special streamside management (50 foot average width) requiring additional management costs (\$10 per acre annually); and remaining 331 acres of plantation managed in an unrestricted manner. Financial consequences: internal rate of return: 7.59 percent; net present value: \$64,978; and net present value per acre: \$180.50.

Regulated BMP applications: 15 acres of roadway out of production; 14 acres of special streamside management (50 foot average width), and 28 acres of chemical buffer along either side streamside management zone (100 feet) (\$10 per acre annual management cost plus additional regeneration costs [\$50 per acre] because of brush control and difficult planting conditions); 150 acres of scenic buffer either side of road (\$10 per acre annual management cost due to requirements for more rapid reforestation and harvest cleanup); leave tree requirements (two dead, two live, and one down on remaining acres) (per acre harvest reduced by 0.08 percent or 248 board feet) (\$2.50 per acre annual management cost); and restricted clearcut sizes (120 acres maximum) delays timing of harvest (some units delayed until others are of acceptable size). Financial consequences: internal rate of return: 7.07 percent; net present value: \$2,505; and net present value per acre: \$6.96.

Although the difference in internal rates of return was slight (0.52 percent), the time and capital committed to regulations were significant. The difference in net present value of \$62,473 means that compliance with regulations cost \$173.54 per acre in 1992 (adjusted for inflation).

An analysis of four program scenarios for achieving statewide water quality goals in Virginia was undertaken in 1992 (American Pulpwood Association 1993, Aust and others 1992). The scenarios were: passive voluntary best management practices, aggressive voluntary best management practices (with monitoring), voluntary best management practices with contingent regulatory authority, and regulatory application of best management practices (including approved harvest plans). Except for the regulatory program scenario, all scenarios produced water quality benefits that exceeded costs to landowners. The voluntary program (with contingent regulatory authority and 92 percent compliance with best management practices) produced \$4.8 million in benefits at a cost of \$4.6 million, while the hypothetical regulatory program (with harvest plans and 99 percent estimated compliance) produced \$5.3 million in benefits at a cost of \$9.1 million. The regulatory program produced only \$0.5 million of additional water quality benefits for an additional investment of \$4.5 million.

An analysis of the benefits and costs of regulatory versus voluntary delivery of best management practices in Virginia was also carried out in 1993 (Shaffer and Aust 1994). Assuming the benefits of preventing erosion of a ton of soil to be \$0.70 and an erosion rate of 0.5 tons per acre per year from harvested forest land, BMP compliance (92 percent rate) on all harvested sites in Virginia (over the life of each stand) produced \$4.8 million in benefits. When the latter was compared with the cost of annually implementing the state's voluntary BMP program (\$230,000), the benefit cost ratio was 1.05 to one. If a California-type regulatory program had been implemented (including required advance review of timber harvest plans), program costs would have been an estimated \$9.1 million annually. Assuming the regulatory program would increase BMP compliance to 99 percent, benefits produced would be \$5.34 million. The regulatory program's benefit cost ratio would have been 0.59 to one --- clearly less efficient than the voluntary program.

State forest practice legal requirements in California were compared in 2003 with two popular forest certification systems, namely the Forest Stewardship Council (FSC) system and the Sustainable Forestry Initiative (SFI) program (Dicus and Delfino 2003). Since the certification programs are voluntarily sought by forest landowners, the comparison was really one involving voluntary versus regulatory approaches to promoting the application of sustainable forestry practices. The analysis focused almost entirely on procedures and standards, with little or no attempt to define and compare costs or outcomes of the different approaches. The following are among the conclusions reached by the comparison.

- State-required regulatory standards exceed FSC and SFI certification standards for most categories of environmental protection.
- State-required regulatory standards and processes must be met if a forest property is to be certified by FSC or by SFI (regulatory standards beyond a certification system’s standards must be met).
- State-required timber harvest plans are not long-term plans, nor do they set forth management direction for an entire forestland ownership, as is the case with the FSC and SFI programs.
- State required timber harvest plans provide for a greater level of environmental protection for site-specific operations (through specific prescriptive requirements) than is required by either FSC or SFI (through broad categories of environmental protection).
- External entities beyond the state’s forest practices rule promulgating and enforcing agency (California Board of Forestry) act as third-party audit units (for example, Department of Fish and Game, Department of Parks and Recreation, Department of Geological Survey, Tahoe Regional Agency, Regional Water Quality Control Board).

The 2003 comparison of requirements to fulfill obligations of California’s forest practice regulations and of the FSC and SFI certification systems were denoted as follows (“+” is greater requirements than other systems; “-“ is lesser requirements than other systems; and “=” is equivalent to other systems) (Dicus and Delfino 2003).

Management Certification Category	California Forest Practices Regulations	Forest Stewardship Council Requirements	Sustainable Forest Initiative Requirements
<u>Forestry Practices</u>			
Licensing and Training	+	=	=
Even-aged Management	+	+	=
Uneven-aged Management	+	+	=
Harvesting Practices	+	=	=
Regeneration	=	=	=
Site Preparation	+	=	--
Intermediate Treatments	+	=	=
<u>Environmental Conditions</u>			
Soil	=	=	=
Water	=	=	=
Air	=	--	--
Fish and Wildlife	=	=	=
Forests Protection	=	=	=
Chemicals	=	+	=
<u>Socio-economic Conditions</u>			
Aesthetics	=	=	+
Significant Areas	=	=	=
Community Involvement	=	=	--

The regulatory versus certification analysis concludes by noting that “. . . the approach to environmental protection in California is extremely burdensome to private landowners . . . part of which is attributable to prescriptive standards that allow little flexibility for most forestry practices . . . , and a regulatory process that forces a one-size-fits-all approach that cannot accommodate all the variables of California’s forested landscapes.” Moreover “. . . both the FSC and the SFI certification systems have notable goals, many of which are obtained by simply adhering to state regulations. At present, however, there are few economic incentives to gain certification” (Dicus and Delfino 2003).

A similar comparison between state regulated practices and voluntary certification systems was carried out in Oregon in 2001 (Fletcher and others 2001). The analysis focused on five major certification categories (37 sub-categories), namely program administration and process, forest planning and monitoring, forest management practices, environmental considerations, and socio-economic considerations. The analysis noted that such comparisons are often hindered by the continuing evolution of regulatory and certification systems, especially ever shifting regulatory standards and certification thresholds. Among the conclusions of the comparison are that state forest practice regulatory systems:

- Focus only on certain components of a forest and a forest management system, while certification systems assess entire ownerships and systems.
- Involve development of harvest plans that are not peer reviewed, while certification systems involve broad-based forest plans that are subject to peer review processes.
- Set forth minimum forest practice requirements which are usually adopted as minimum standards by certification systems.
- Prescribe extensive direction for regeneration, air and water quality and fire protection, more so than required by certification systems.
- Commit landowners to only proper harvesting and regeneration activities, while certification systems commit participants to long-term sustainable management of their forests (written plan, periodic inspection).

The Oregon analysis suggests that state regulation of forest practices has placed forest landowners above many of the standards called for by the certification systems examined. If landowners in the state should seek certification of their forests, they will probably be required to make fewer adjustments than landowners in states and countries that lack a comparable legally-prescribed set of forest practice standards. However, they will be required to develop a written plan for the long-range sustainable management of their forests and will be required to incur significant monetary expense for the initial certification

of their property and the audits that are subsequently required (Fletcher and others 2001).

The ability of state voluntary and regulatory programs to influence stream impairments within states was assessed in 2000 (National Association of State Foresters 2001). Amendments to the Federal Water Pollution Control Act required (Section 305 [b]) states to identify stream miles impaired by silvicultural activities. A comparison was made of the state-reported miles of impaired streams, programs used to deliver best management practices, and rate of forest practice compliance with recommended or required best management practices. Analysis of relationships between stream miles impaired, type of program, and rate of compliance with best management practices (BMPs) concluded there were no consistent relationships between any of the parameters considered. Lack of more definitive findings was viewed to be the result of discrepancies in the comparability of the data and the extreme subjectivity of the information used for the analysis. For only those states that specified impaired stream conditions for three consecutive reporting periods (1992, 1994 and 1998), the relationships used to establish the conclusions of the analysis are as follows.

State	Stream Miles Impaired	Type of Program	BMP Compliance Rate (percent)
California	1,453; 1,267; 1,917	Regulatory	95
Colorado	43; 43; 11	Voluntary	95
Florida	154; 1,181; 428	Combination	96
Kentucky	34; 120; 56	Regulatory	57
Louisiana	1,167; 758; 326	Voluntary	83
Mississippi	2,051; 408; 2,120	Voluntary	87
Montana	1,389; 1,640; 1,716	Regulatory	94
New Mexico	121; 131; 229	Regulatory	75
North Carolina	313; 276; 151	Regulatory	83
Oklahoma	126; 126; 217	Voluntary	-
Ohio	23, 34, 5	Voluntary	-
Oregon	7,580; 7,580; 7707	Regulatory	98
Vermont	11; 132; 1	Regulatory	64
West Virginia	391; 725; 1,431	Regulatory	63
Washington	575; 2,970; 2,526	Regulatory	-

A number of analyses have compared conditions in states that regulate forest practices with conditions in states that do not have strong regulatory programs. In 1991, for example, Virginia's voluntary best management program and Maryland's regulatory program were analyzed and compared (Hawks and others 1993). Common to each state was a year 2000 goal of reducing nonpoint-source pollutants into Chesapeake Bay by 40 percent. Focusing on net revenue from a 40-acre timber sale (and excluding costs common to both states, such as a timber sale consulting fee and a county grading permit), the

regulatory approach was \$1,220 more costly than the voluntary approach for a \$20,000 gross revenue sale. Such was the case under the high-regulation permit scenario (erosion control plan, critical area plan, county harvesting plan). Under the more typical permit system (erosion control plan), the regulatory program's impact on net revenue was only \$420 more than the voluntary approach. The analysis also concluded that there was "no direct evidence to suggest that either state's approach [voluntary or regulatory] is better at obtaining BMP compliance; both seem reasonably effective." From a public agency investment perspective, however, the analysis suggests that Maryland is investing approximately five times as much per 1,000 board feet harvested as is being invested in Virginia -- to achieve the same or a somewhat reduced level of water quality protection.

In 1989, the consequences of regulatory requirements to reforest private forestland in Virginia were compared with forest conditions in North Carolina which had no such requirement (Boyd and Hyde 1989). The Virginia law (enacted in 1950) stipulates that pine trees left as seed trees ". . . shall not be cut until at least three years have elapsed." Using regression analysis, the assessment analyzed a number of variables as potential explanations for timber inventories in the two states (for example, reforestation requirement, forest productivity, timber price, property taxes, type of ownership, and forest type). The analysis concluded there was little statistical evidence that the reforestation requirement had brought about a net addition to standing timber inventory in the state. The assessment also concluded that Virginia's law ". . . poses no additional cost on forest landowners, either because they avoid enforcement or because the law requires action that landowners undertaken even in the absence of the law."

In a manner similar to that used to analyze reforestation requirements in Virginia and North Carolina, a 1989 comparison of forest practice regulatory programs in Oregon and Washington sought to determine the impact of regulated practices on long-term timber investment in private forests (Boyd and Hyde 1989). The analytical approach also involved the application of regression analysis to variables considered capable of influencing timber inventories on private forest (for example, forest productivity, timber price, type of ownership, and type of forest) (property taxes were not considered because of their complexity in Oregon and Washington). The analysis did not determine any clear overall consequences for timber volumes that could be attributed to the regulatory programs implemented in the two states. However, there was evidence that regulatory requirements for reforestation were especially effective in promoting reforestation of poor-site nonindustrial forests where stocking per acre was relatively low. Shortcomings of the analysis were acknowledged, including limited quantitative specification of the broad environmental gains (for example, aesthetics) that may result from regulatory initiatives.

A comparison of the impact of regulatory effects on timber prices in Massachusetts and Connecticut was conducted in 1993 (Kittredge and others 1999). Since 1983, Massachusetts forest practice regulations have required review and approval of commercial timber harvests greater than 25,000 board feet or 50 cords. Although in 1991, Connecticut had legislatively authorized the promulgation of harvest practice regulation rules, such rules did not exist during the period of the study. Using 3,755 timber sales (from 1988 through 1993) on private forest land in both states as a data base, analysis determined there existed a significant difference in mean stumpage price for only 15 of the 3,755 timber sales (thirteen of these cases were in Connecticut and were cases in which timber stumpage prices were greater in Massachusetts than in Connecticut). The study's conclusion was that there was no difference between stumpage prices in Massachusetts (a regulated state) and Connecticut (an unregulated state).

Forestry Practice Application. Regulatory programs are often advocated as an effective means of changing the type (for example, clearcutting) and intensity (for example, increase reforestation) of forestry practices applied to private forests. In most cases, desired forestry practices are surrogates for a variety of desired conditions (for example, clean air and water, scenic forest landscapes, plentiful timber supplies). From a performance perspective, the ability of regulatory programs to promote the application of acceptable forestry practices, and consequently desired conditions, is of real interest.

The judgements of persons responsible for administering state forestry programs focused on nonfederal forests can again be useful for assessing the extent to which the application of suitable forestry practices can be attributed to regulatory programs. As previously described, managers of state regulatory and related programs were asked in 2003 to indicate whether forestry practices (by major category) were being correctly applied to private forests and to subsequently specify which practices were state regulated (Tables 4 and 5). Considering only states where forestry practices were judged to “always” or to “often” be correctly applied, 52 percent of 33 states indicated all or some forestry practices were regulated (Table 15). When states that regulate forest practices under certain conditions are included (15 percent of states), the portion rises to 66 percent of the 33 states (examples of certain conditions are sedimentary pollutants exceeding a water quality standard or tree planting activity occurring below acceptable reforestation levels). Nearly one-third (32 percent) of the states indicating all or some practices are being correctly applied, do not regulate forestry practices. Regionally, the South has the highest portion of states that regulate under certain conditions (34 percent of states) and that also indicate no regulation of practices — while also indicating that practices are always or often

correctly being applied. The West and the North are nearly equal in the portion of states that indicate practices are regulated and are correctly applied (always or often), namely 60 percent and 59 percent, respectively.

Table 15. Extent of Forestry Practice Regulation in States where Forestry Practices are Always or Often Correctly Applied on Private Forests, by Region and Major Category of Forestry Practice. 2003.

Region and Major Category of Forestry Practice	States in Which Forestry Practices are Always or Often Correctly Applied			
	Number of States	All or Some Practices are Regulated: Portion Always or Often Correctly Applying Practice (percent)	Certain Conditions Result in Practices Regulated: Portion Always or Often Correctly Applying Practice (percent)	Practices are Not Regulated: Portion Always or Often Correctly Applying Practice (percent)
North				
Road and Trail Forestry Practices	14	86	14	0
Timber Harvesting Practices	14	50	21	29
Reforestation Practices	13	31	15	54
Cultural Practices	9	11	11	78
Chemical Application Practices	12	86	0	14
Forest Protection Practices	11	64	0	36
Administrative Practices	11	82	9	9
South				
Road and Trail Forestry Practices	12	50	33	17
Timber Harvesting Practices	12	33	50	17
Reforestation Practices	12	17	33	50
Cultural Practices	9	0	44	55
Chemical Application Practices	11	55	27	18
Forest Protection Practices	5	20	40	40
Administrative Practices	7	14	14	72
West				
Road and Trail Forestry Practices	14	71	21	8
Timber Harvesting Practices	15	60	20	20
Reforestation Practices	13	38	8	54
Cultural Practices	7	43	14	43
Chemical Application Practices	14	72	0	28
Forest Protection Practices	11	64	9	27
Administrative Practices	10	70	0	30
Nationwide				
Road and Trail Forestry Practices	39	72	20	8
Timber Harvesting Practices	40	50	28	12
Reforestation Practices	37	30	16	54
Cultural Practices	24	17	21	62
Chemical Application Practices	39	72	8	20
Forest Protection Practices	26	58	8	34
Administrative Practices	27	63	4	33

Nationwide patterns of correct forest practice application and extent of regulation indicate varying conditions (Table 15). For example, 72 percent of the 39 states indicating that road and trail practices are always or often correctly applied also indicate they regulate

all of some of the practices within this forest practice category. Only 8 percent of the 39 states indicated no regulation but correct application of road and trail practices. A similarly high portion of states indicate regulation as well as the correct application of certain practices, namely chemical applications (72 percent of 39 states), administrative practices (63 percent of 27 states), and forest protection practices (58 percent of 26 states). In some cases, the portion of practices being correctly applied is appreciable – without regulation. For example, 54 percent of 37 states do not regulate reforestation yet indicate reforestation practices are always or often correctly applied. Similarly, 34 percent of 26 states do not regulate forest protection practices but indicate such practices are always or often correctly applied. As for regulation under certain conditions, timber harvesting practices, cultural practices, and road and trail practices, 28 percent, 21 percent and 20 percent of states, respectively, indicate such practices are always or often correctly being applied.

Compliance with state-established forestry best management practices (BMPs) can also provide insight to regulatory program performance (nationwide average compliance rates were 86 percent in 2000) (National Association of State Foresters 2001). However, the linkage between compliance with BMPs and regulatory programs is not always easy to determine. For example, there can be concern over whether compliance rates (whether high or low) are really attributable to a forest practices regulatory program. Also troubling to interpretation of linkages between regulation and compliance rates is the reality that the rate of compliance with legally required practices may be less than 100 percent. For whatever reason, many states using regulation as their primary means of delivering best management practices have compliance rates that are less than perfect (implying that although legally mandated, practices may not be correctly applied at all times and in all situations). Such suggests the fallacy of presuming that regulatory delivery of standards automatically implies total conformity with standards set forth in law or in rule. In this respect, consider three example states, namely Oregon, Maine and West Virginia.

The forestry practice standards specified by the Oregon Forest Practices Act, and by the rules established subsequent to the act, are considered best management practices (Oregon Department of Forestry 2002a). By directly linking the state's regulatory framework (legally established forestry practice standards) to forest practice compliance rates being experienced, judgements about regulatory program effectiveness can be made. Doing so leads to the conclusion that the Oregon regulatory approach is quite effective. In the 1999 to 2000-field season, the rule level compliance was 96.3 percent for 13,506 best management practice applications (Oregon Department of Forestry 2002a and 2002b). By rule division, the compliance rates were as follows (ORA is "Oregon Administrative Rule").

Reforestation (OAR 629-61) – 100 percent*
Treatment of slash (OAR 629-615) – 98.2 percent
Chemicals and other petroleum products (OAR 629-620) – 94.3 percent
Road construction and maintenance (OAR 629-625) – 97.6 percent
Harvesting (OAR 629-630) – 98.1 percent
Vegetation retention along streams (OAR 629-640) – 96.4 percent
Significant wetland protection (OAR 629-645) – 88.1 percent
Other wetland protection (OAR 629-655) – 69.8 percent
Administrative requirements (OAR all sections) – 100.0 percent

* 1994 -- 97.3 percent, 1995 -- 98.8, 1996 -- 98.9, 1997 -- 99.5, 1998 -- 98.4, and 1999 -- 99.6.

These respectable compliance rates in Oregon are probably the result of many often interacting factors. For example, extensive field inspection of forestry operations (about half the 18,000 operations completed each year receive at least one inspection) and the high number of citations that are issued as a result of such inspections (96 to 98 percent of operations inspected received a citation during the 1999-2000 field season) are probably resulting in the more frequent application of rule-prescribed practices. The Oregon Department of Forestry's ability to impose civil penalties when rules are violated is also a likely contributing factor (authority granted in 1987) (Oregon Department of Forestry 2002a). And because the state's regulatory program is often the only program available for delivering best management practices, it receives full credit for producing the high rates of compliance ("When time and resources permit, forest practice foresters offer landowners assistance in managing their stands. Due to heavy caseloads, they are rarely able to take this kind of proactive approach") (Rose and Coate 2000, pg 26).

Best management practices in Maine are complied with about 71 percent of the time, depending on the category of practice in question (Briggs and others 1998). However, not all forestry practices in the state are regulated by the Maine Forest Service. Those that are include forest practice rules established for harvesting timber near rivers, ponds, streams, and wetlands (Maine Statutes Title 12, Chap. 805, Para 8867-B). In 1995, sites harvested during 1993 and 1994 were surveyed to determine rates of compliance with best management practices (Briggs and others 1988). For streamside management zones, BMP compliance ranged from 42 percent (installation of sediment barriers) to 78 percent (retention of shade over perennial streams), with an average compliance rate of 66 percent. For eight BMPs required for stream crossing, the average compliance rate ranged from 31 percent (log crossings impeding water flow) to 94 percent (stream crossing minimized) with an average compliance rate of 66 percent. The influence of the state's streamside regulations is presumed to be a factor contributing to these compliance rates.

Compliance rates in West Virginia have also been assessed (in 1981, 1986, 1991, 1996)(Egan 1999). The state's Logging Sediment Control Act of 1992 requires licensing and certification of loggers, harvest operation notification (and posting), and enforcement capability for activities causing erosion and sedimentation on logging sites. In addition, the act requires logging sites to be "reclaimed" within seven days of an operation's completion. Pursuant to the act, the state has adopted best management practices (BMPs) for controlling erosion and water siltation from logging operations. The overall BMP compliance rate for operations conducted during 1995 and 1996 was estimated to be 63 percent, a decline from 75 percent in 1991 (part of decline is attributed to modification of BMP guidelines). Average compliance for seven BMPs required for log landings was 76 percent; seven BMPs for skid roads, 62 percent; and six BMPs for haul roads, 52 percent (Wang and others 2004). As a way of enforcing the sediment law's requirement for "reclamation" of harvested sites within seven days, landowner-harvester contracts stipulating implementation of state-promoted BMPs are promoted. A 1995 assessment of these contractual arrangements concluded that the link between contractually required BMPs and high BMP compliance rates was not significant (Egan 1999). Approximately 44 percent of the sales that involved contracts that specified BMP implementation had above average BMP compliance. However, 35 percent of the sales were conducted without the BMP provision in contracts, yet they also had above average compliance rates. The study concludes that ". . . the mere reporting of percent compliance results reveals little about specific causes when compliance is too low."

Effects and Consequences. Regulatory programs can result in a wide variety of physical, economic and political responses, many of which may be desired although some may be unwelcome. Arguments in favor or against the actual or potential effects of regulatory programs are often made with significant force. Although the number of evaluations purporting to demonstrate the consequences of statewide regulatory programs is quite substantial, the actual the actual number of analyses that are rigorous and well-designed is limited. Furthermore, it not the intent here to review all or major portions of the expansive literature on the subject. Therefore consider examples of analyses that shed some light on the consequences of regulatory programs and their ability to cause, for better or worse, various physical, economic and political conditions.

Regulatory programs may positively affect future supplies of timber by requiring that investments be made in timber management activities. Conversely, restrictions on the way in which timber may be managed or harvested, or inability to financially meet legally required forest practice standards, may result in a reduction in timber supplies. The general direction of state and local regulatory consequences for private timber supply (hardwood

and softwood pulp and sawtimber) was regionally assessed in 1992 (Greene and Siegel 1994). Considering only state programs that regulate forestry practices statewide, the timber supply consequences were modest to none, depending on the region (since neither the South or the Rocky Mountain regions had statewide forest practice regulatory programs, regulation of a statewide nature had no impact in these regions). However, in the North there was an expected 1.5 percent increase in timber supply by 2002 and in the Pacific region a 3.0 percent decline. When all types of regulatory programs were considered (namely, state water quality regulation, state endangered species regulation, state forest practice regulation, county and municipal regulation), the regulatory-inspired declines in timber supplies through 2002 were estimated to be as follows: North – minus 10.0 percent, South – minus 14.5 percent, Rocky Mountain – minus 3.2 percent, and Pacific Coast – minus 8.8 percent.

Washington statewide impacts of proposed forest practice rules called for by the Washington Forest Practices Act were estimated in 1991 (Weyerhaeuser 1992). The analysis focused on restricted use of chemicals, wetland buffers, wildlife reserve trees, stream temperature requirements, and the size of clearcuts and their separation. For the state's 4.6 million acres of industrial timberland, analysis indicated harvest volume would be reduced by 102 million board feet (4.6 percent decrease) valued at \$26.5 million (26.5 percent decrease). If critical habitat restrictions (spotted owl) were imposed, total harvest would be reduced by 257 million board feet valued at \$65 million. Employment and related economic changes attributable to the proposed restrictions (including spotted owl habitat) on industrial timber land were estimated to be as follows: direct and indirect job losses 6,457 decrease, direct wages lost \$71.5 million decrease, excise tax reductions \$3.3 million decrease, sales tax loss \$947 million decrease, and unemployment compensation payments \$36.7 million increase. When the analysis was extended to all categories of nonfederal forest landowners in Washington, the aggregate impact (including spotted owl habitat) was a reduction of 543 million board feet of timber worth and estimated \$131 million. Direct lost wages and sales tax losses were estimated to be \$151.4 million and \$2,001 million, respectively.

The regulatory impacts of the Washington Forest Practices Act on global timber supplies have also been assessed (Kelson and others 1994). The bases for the analysis were harvest volume losses in Washington due to the latter's environmental restrictions (clearcut size and separation: 0.3 percent reduction in harvest volume; wildlife reserve trees: 1.3 percent reduction; wetland preservation: 1.4 percent reduction; stream temperature mitigation measures: 0.9 percent reduction); road construction and harvest method restrictions (4.2 percent increase in compliance costs); and general changes in

harvest administrative due to regulatory restrictions (4.2 percent increase in costs). The global impact on timber supply due to these costs and volume reductions was subsequently estimated using the Timber Supply Model (TSM) which projects long-run global industrial wood supply from seven price-responsive regions over a 50-year period. Although the global harvest changes attributable to the prospective regulatory climate in Washington were negligible, significant declines in harvested volume were estimated for the U. S. Pacific Northwest and Nordic Europe, while increases were calculated for Western Canada and the U.S. South. The specific changes by region are as follows.

Region	Harvest Volume Without Regulations (Millions of cubic meters)	Harvest Volume With Regulations (Millions of cubic meters)	Harvest Volume Change (percent)
U.S. Pacific Northwest	79.3	64.0	-19.3
Nordic Europe	133.8	128.8	-3.7
Asia Pacific	62.5	62.1	-0.6
Emerging Nations	222.9	224.2	+0.6
Eastern Canada	76.0	76.9	+1.2
U. S. South	332.4	342.8	+3.1
Western Canada	35.3	38.0	+7.6
Total	942.2	936.8	-0.6

The impact of proposed forest practice rules on timber harvest may impact the timing of future harvest decisions. In 1995, 11 percent of private landowners in Western Oregon considered avoidance of future regulatory restrictions on timber harvesting to be an important consideration when timing the harvest from their forest property. These landowners accounted for 15 percent of the total volume sold by landowners participating in the 1995 study (12 percent of the area harvested) (Cleaves and Bennet 1995). In the same vein, analysis was focused on the likely response of nonindustrial forest landowners to more restrictive riparian harvest rules that might be promulgated five years hence under the Washington Forest Practices Act (Johnson and others 1997). The analysis found that over half (53 percent) the owners were unlikely or not likely at all to harvest sooner; 19 percent indicated they would very likely harvest sooner (owners of larger forests [500 acres plus] were more likely to harvest sooner). As to whether landowners would accept compensation for harvesting restrictions, a majority were willing to modify harvest for an unspecified annual reduction in federal income taxes over a 10-year period.

The potential timber supply effects of forestry practice regulation in California have been periodically assessed since the early 1980s. In 1982, an analysis suggested that

there had been a significant improvement in the protection of non-timber resources since enactment of the California Forest Practice Act in 1973 and that the “. . . rules promulgated under the act have altered management strategies with regard to stream protection efforts and road placement.” Furthermore, the impact of the act on lumber output appeared minimal while reforestation and cultural standards appear to ensure future timber supplies. Based on a sample of 16 landowners, the average increase in logging costs due to forest practice rules was \$10 to \$15 per thousand board feet. Informative of the sophistication of the analysis is the statement that there had been “. . . a significant increase in stream protection efforts and water quality since [passage of the act in 1973] . . . , unfortunately there is little hard evidence to back up the claim.” In defense of the analysis, the investigators recommended that the state legislature mandate more study of regulatory impacts (Green 1982). Although focused more on regulatory procedural matters, a 1994 study was far more critical of the state’s regulated processes for preparing required timber harvest plans, finding that such processes were complex, inequitable and costly (Little Hoover Commission 1994).

A 1983 analysis suggested that California might see significant increases in available timber supplies because of state regulatory initiatives (Vaux 1983). Specifically, assuming that only nonindustrial private timberland reforestation rates would be increased by the program's reforestation requirements, the timber harvest from such lands in the year 2030 was estimated to be 110 million cubic feet greater than available in the absence of such requirements. Such circumstances were viewed as meaning a 11.8 percent higher instate stumpage supply and a 37.7 percent lower stumpage price in the year 2030. A 1993 assessment of regulatory initiatives in California paints a quite different picture. The assessment focused on a proposed regulation that would require private landowners to set aside (exclude from harvest) 10 percent of their forest property that had characteristics of an old-growth forest (McKillop 1993). Using the 1990 California Timber Supply Model, resulting timber harvest was projected to decline by as much as 30 percent (600 million board feet annually); 50 percent per year if all proposed rules were adopted. With a 30 percent harvest reduction, an estimated 3,600 jobs (\$90 million payroll) would be lost by the state’s forest sector.

Reforestation is often a central focus of many forest practice regulatory programs. In 1984, administrators of Washington’s Forest Practices Act indicated that 10 percent more area had been reforested since the act’s establishment in 1974. Likewise in Oregon – 30 to 40 percent more reforested area, and California – 25 percent more reforested area (an estimated \$2 to \$3 million reforestation investment which would not have occurred without the state’s forest practices law) (Henly and Ellefson 1986). When asked again in

1991 to estimate how much more area had been reforested since 1985 because of regulatory actions, administrators indicated the following: Idaho -- 50 percent more area; Oregon -- 25 percent, Washington -- 30 percent, and Nevada -- additional 5,100 acres. However, an administrator in one western state indicated that "80 percent of the land harvested under the [forest practice law] would be voluntarily reforested without regulation," with the remaining 20 percent reforested by landowners in response to the state's forestry practices regulatory program (Ellefson and others 1995).

Forest practice regulations may also influence the ease with which private forest property can be bought or sold. Regulatory program managers in 1991 were instructive in this context when they stated: ". . . perhaps more difficult to sell land that has not been reforested since the new landowner will inherit the regulated obligation to reforest, along with possible penalties for failure to do so . . . ," ". . . regulatory liabilities are only one factor in cases of existing noncompliance on a tract put up for sale . . . ," ". . . some difficulty in sale of reforestation-obligation lands . . . ," ". . . more difficult; uncertainty over whether a new owner can harvest; uncertainty over rules and how they will affect operations [of a new owner]; discourages landowners from converting forest land to other [nonforest] uses; buying land, harvesting it and then selling land is more difficult . . . ," ". . . more difficult; regulations require landowners and operators to meet minimum requirements and standards . . . ," and ". . . no effect; the act does not restrict landowners from harvesting, places some easily met requirements on [new owners]" (Ellefson and others 1995).

The cost of forest practice regulatory programs has received a substantial amount of attention, especially costs to the regulated public (Cubbage 2004, Ellefson and others 1995). In 1983, the reduction in net revenue resulting from possible regulation of sediment reducing forestry practices from 18 timber harvesting operations in the Midwest was found to be extensive – ultimately leading to a 59 percent net revenue reduction if all six proposed forestry practices were required (Ellefson and Miles 1985). Similarly in the Southeast (Georgia, Florida, Alabama), where the aggregate marginal cost of implementing state BMP recommendations on approximately 4,000 acres of forest land was determined to be nearly \$50,000 or 2.9 percent of gross harvest revenue (Lickwar and others 1992). The cost of 1991 amendments to the Oregon Forest Practices Act were reported as: additional logging cost – \$140 to \$300 per acre, leave requirements (buffer strips) – \$600 to \$800 per acre, and clearcut size limits – four to 20 percent decline in timberland value (Oregon Forest Industries Council 1991). In California, the average base cost of preparing a timber harvesting plan as required by the California Forest Practices Act was \$11,465 in 1992. If special consideration must be given to endangered species

of wildlife, the average cost of a harvest plan was \$20,731 (Henly 1992). Regulatory requirements do not always adversely affect the financial condition of forest landowners. In 1995, analysis found that regulatory requirements applied to forests in the Lower Wisconsin State Riverway did not significantly decrease the net present value of timber on a private forest, and in some cases may have even increased such values (Stier and Martin 1997).

The application of special forestry practices in streamside management zones in Georgia was estimated to cost the wood-based industry an additional \$24.33 per acre, while for nonindustrial private forests the added cost was \$41.65 per acre (Woodman and Cabbage 1994). Similar streamside zone cost impacts were estimated for Arkansas, where timber forgone because of special required practices near streams was valued at \$2,530 per acre (Kluender and others 2000). Responding to the listing of salmon under the Endangered Species Act in 2000, the state of Washington imposed new regulatory restrictions on timber harvest in riparian areas. The rules involved varying degrees of allowed timber harvesting in riparian buffers. Subsequent analysis determined the following financial implications for three different nonindustrial private forests: 33 acre forest, 67 percent in riparian buffers – no harvest leads to an 83 percent reduction in forest value; 154 acre forest, 50 percent in riparian buffers – no harvest leads to a 45 percent reduction in forest value; and 67 acre forest, 51 percent in riparian buffers – no harvest leads to a 57 percent reduction in forest value (Zobrist and Lippke 2003).

The cost of applying timber harvesting guidelines in Minnesota was assessed in 2002 (Kilgore and Blinn 2003). Twenty-seven tracts of timber were offered for sale, each offered with and without a requirement to apply harvest guidelines. Using a sealed bidding process, the tracts were offered for sale. For sales where harvest guidelines were required, stumpage prices were \$2.66 per cord lower (average additional cost of \$71.02 per acre), sale preparation by foresters took an average of 57 percent longer (average \$6.80 per acre), and timber volume harvested decreased an average of 2.4 cords per acre because of partial harvesting requirements imposed by the guidelines. Taken together, the total financial cost to forest landowners of incorporating the timber harvest guidelines into timber sales averaged \$143.15 per acre.

The benefits and costs of proposed forest practice rules to be promulgated under authority of the Washington Forest Practices Act were also assessed in 2001 (Perez-Garcia 2001). The proposed rules were structured so as to maintain a properly functioning forest ecosystem that enhances fish species and fish populations while at the same time maintaining an economically viable forest sector. Among the benefits assessed (measured

in net present value for the state) were improved fishery resources, employment benefits, and tax credits to landowners and harvesters, while the costs (also measured in net present value to the state) included lost revenues due to timber asset retirement, road planning and maintenance, income and employment losses, and lower tax revenues. The analysis determined a breakeven point wherein benefits of the proposed rules will exceed costs if fish populations are improved by 5 percent; less than a 5 percent improvement means that the chances of benefits exceeding costs are unlikely. An alternative rule package proposed by tribal and environmental groups would result in six billion dollars of additional costs (more if employment effects were fully incorporated).

The impacts of proposed forest practice rules in Washington was also addressed during the course of developing a model for evaluating such impacts (Gregory and others 1989). The focus was on regulations that would affect riparian zone management, especially ten rules (out of 108 proposed) that were viewed as potentially having a major impact on such resources. Recognizing that the intent of the research was to develop procedures for evaluating regulatory impacts, few actual consequences of the proposed rule changes were determined. However, in the case of one of the more significant rule changes involving buffer strips the annual reduction in timber harvest was estimated to be 87 million board feet. The latter implied a loss of 566 jobs and a total discounted lost-labor-production cost of \$413,180.

The public agency administrative costs required to implement forest practice regulatory programs have been given far less attention (Cubbage 2004, Ellefson 2000). As part of this assessment, 15 states reported investments of more than \$42 million and a staff of 618 full-time equivalents (see Tables 10, 11 and 12) (California, Oregon, Virginia and Washington accounted for 83 percent of the 2003 financial expenditures and 72 percent of the staff). For all 50 states, the total 2003 forest practices regulatory program costs is estimated to be \$57 million (1,039 full-time equivalents) (see Table 9). In 1991, 13 states invested about \$31 million and 320 full-time equivalents in such programs. In the same year, administrative costs of regulation per 1,000 acres ranged from \$7 in Alaska to \$16,234 in Nevada, and from \$20 in Maine to \$836 in Washington (Ellefson and others 1995). As for the total cost (public and private costs) of forest practice regulatory programs, the aggregate estimate for six states (Alaska, California, Idaho, Nevada, Oregon, Washington) in 1984 was \$130.7 million (Henly and others 1986).

Organization and Operation. The manner in which regulatory programs are organized, implemented and evaluated has received very modest attention. Those evaluations that have been undertaken tend to be descriptive of current conditions; few

attempt to analyze alternative approaches to program structure and implementation. The governance issues receiving attention, include the legal and constitutional setting for regulatory intervention, statutory content for regulatory program authority, assignment of authority to responsible agencies, enforcement of rules and regulations, monitoring program efficiency and effectiveness, agency administrative costs, and private sector compliance costs. In reality, however, these governance issues have been given sparing attention, while most concern has been directed to the technology and science of developing forestry practice standards (for example, forest road standards, wildlife habitat standards, riparian zone standards) and the technologies required to monitor their application. Examples of governance and program design evaluations are as follows.

The legal status of forest practices regulation has been evaluated by a number of analysts, with a special focus on program consistency with constitutional provisions (for example, property owner rights and responsibilities). A number of overviews of general regulatory powers and limitations have been made (Bueter 1987, Cabbage 1995, Hickman and Hickman 1997, Siegel 1997). With a focus on program design, a 1993 review was made of the constitutional setting for regulatory programs, the result of which were recommendations that regulatory programs be consistent with a history of public policy favoring environmental protection and control over the use of private land; rationally based, reasonably constructed and developed through well-balanced due processes; administered in manners that are not autocratic and are not applied in arbitrary and capricious manners; convincingly intent on being directly beneficial to the long-term protection of the public's health and general welfare; and result in benefits that are widely distributed throughout various segments of the public (Cheng and Ellefson 1993b).

The design of forest practices regulatory programs has been addressed by some evaluations (Ayer 1973, Cabbage 1997, Ellefson 2000, and Ellefson and others 1995, Henly and others 1988). These evaluations have attempted to describe the evolution of regulatory programs (from voluntary guidelines, to notification schemes, to permit-inspection programs) and have set forth desirable attributes of a forest practice regulatory program. These evaluations have also lead to recommendations for improving the effectiveness of regulatory programs, including reducing regulatory agency fragmentation, establishing procedures for embracing new forest practices technologies, engaging regulated entities in more collaborative rules making, expanding discretionary enforcement capacity, privatizing certain elements of regulatory programs (for example, monitoring), issuing long-term harvest permits rather than individual timber harvest permits, focusing on environmental standards to be met (not forest practice standards), and giving consideration to contingent or bad-actor approaches to regulation.

Assignment of regulatory responsibility to appropriate levels of government or units of government has also received the attention of analyses. For example, extensive assessment has been made of local government regulatory initiatives (Greene and Siegel 1994, Martus and others 1995, Spink and others 2001). In 1992, 524 local ordinances affecting private forestry were determined to be implemented by 495 local units of government (Greene and Siegel 1994). As of 2000, 10 of 13 Southern states had enacted a total of 346 forest-related ordinances (Wear and Greis 2002). The objectives of these ordinances were directed at a variety of forest conditions, including restrictions on timber harvesting, protection of individual trees, special feature protection (scenic areas), and protection of public assets (roads, bridges). Most analyses of local government ordinances avoid the difficult issue of ascertaining which level of government (local, state, federal) is most appropriate as the implementor of regulatory programs. Especially lacking are analyses that describe the consequences of fragmented authority (both vertical and horizontal) on forest ecosystems, public administrative costs, and the regulated public's ability to conform with the forestry practices being regulated.

Regulatory responsibility within levels of state government has also been addressed. In 2000, more than 1,450 state government entities (agency departments, division, sections) implemented forestry programs that affected the condition of forests (Ellefson, Moulton and Kilgore 2001 and 2002). More than 500 of these entities had some form of regulatory responsibility, the dispersed consequences of which was often the lack of an integrated state program focused on forests. The analyses recommended increased coordination and in some cases consolidation of programs in fewer entities. In a similar vein, a 2003 assessment of federal agencies responsible for nonfederal forests identified 187 forest-affecting programs, many of which were regulatory in nature (Ellefson and others 2003b). The federal program links to state governments were judged to working moderately well. Again, the focus on alternative arrangements within and between governments was limited.

Monitoring the performance of forest practice regulatory programs has also received attention. Although most of this attention has been focused on the technical design of monitoring protocols and procedures, the measurement of compliance with voluntary best management practices, some attention has been directed to broader issues involving program design and agency responsibilities (Ellefson, Kilgore and Phillips 2001; Kilgore and others 2004). From a program design perspective, the evaluations recommend the following: focus agency responsibility for monitoring, invest sufficient resources, establish credible processes, respect private property, engage knowledgeable people, provide

accurate analysis and timely reporting, and foster good relationships with private forest landowners. Other evaluations suggest consideration be given to the practicality of implementing monitoring programs (technical, institutional and economic), sensitivity to the temporal (how soon to monitor) and spacial (over what area and resource domain) aspects of monitoring, and enforcement and compliance relationships (Oregon Department of Forestry 2002a, Ice 2004).

Enforcement of forest practice standards is an especially important element of regulatory programs. Analysis has been made of patterns of noncompliance and the enforcement approaches used to improve the efficiency with which violations are processed. Of special concern has been inconsistent application of penalties. Based on various evaluations, Oregon (in 1987) moved away from enforcement through the courts to enforcement via civil penalties (using hearings officers to deal with violations). Helpful were analyses that identified patterns of violations on which penalties could be focused, namely ignorance of the law, ignorance of the biology, evasiveness, contempt, and extenuating circumstances. From a reforestation perspective, the evaluation suggested that the compliance-enforcement interface operates best if rules clearly specify successful reforestation, provide for extensive education regarding rule requirements, ensure timely inspections informing landowners of violations, and provide penalties that are determined in accord with established criteria and can be reduced in exchange for cooperation (Rose and Coate 2000).

Summary of Nationwide Conditions

Forest practices regulatory programs can lead to a wide variety of physical, economic and political responses, many of which may be desired although some may be unwelcome. Arguments in favor or against the actual or potential effects of regulatory programs are often made with significant force, a condition that implores the need for extensive analysis and understanding judgements. However, the number of evaluations purporting to demonstrate the effects of state government regulatory programs is modest, probably fewer than 100 nationwide. Many of these analyses are poorly designed and are carried out in manners that are less than rigorous. Compounding the problem is the often intense political environment in which regulatory programs are discussed. At times this environment has lead to analyses that are weighted against regulatory programs and whatever virtues they might embody (for example, comparisons of highly regulated states with states proposing very modest regulatory initiatives).

The importance of evaluating the performance of regulatory programs stems from broader present-day concerns over the efficiency and effectiveness of government in general. Evaluating a program's performance responds to citizen demand for evidence of program effectiveness, improves communication between citizens and government, improves program management and effectiveness, helps define goals and objectives and the means for their attainment, makes for better resource allocation decisions, and improves government efficiency by forcing consideration of alternative ways of accomplishing similar tasks. The last 20 years have witnessed a nation- and worldwide interest in re-evaluating governments' capacity to implement effective regulatory programs. In large measure, this interest stems from concern over potential adverse impacts of regulatory programs on economic growth and development.

A wide variety of consensus-based standards have been suggested as benchmarks for a well-design and properly operating regulatory program. In large measure, the standards have been established without the benefit of rigorous analyses that could benefit design of effective regulatory programs. The standards usually reflect the views of political constituencies that support or oppose regulatory measures, consequently they are not always uniform in topics addressed nor in accord on the substance of a particular standard. However, most standards are in agreement that regulatory programs should embrace efficient administrative processes, science-based practices, and predicable outcomes that enhance the quality of forest environments and encourage forest-based economic activity.

Evaluation of the performance of forest practice regulatory programs has been guided by several conceptual models, most notable of which involve effectiveness, efficiency, and governance. These approaches have most often been used in analyses that seek to do the following.

- Evaluate the legal and constitutional framework for regulatory programs and landowner rights and responsibilities associated with such frameworks.
- Compare regulatory programs with other types of programs (education, fiscal incentive, tax incentive), including comparison of states with regulatory programs with those that do not have regulatory programs.
- Assess the effects and consequences of implementing regulatory programs (for example, cost of compliance, foregone timber supplies, impacts on employment, wildlife habitat protected, water quality enhanced).
- Seek to define effective regulatory organizations and programs, and the appropriate level of investment in them.

The application of these conceptual models has at times involved actual measurements,

but more often than not has involved substantial speculation and conjecture. Since few analyses of regulatory programs are conducted at regular intervals, there has been little opportunity to analyze trends in the type, magnitude or results of forest practices regulatory programs.

Analyses of forest practices regulatory programs have been oriented around certain themes or broad topical areas, namely analyses that:

- Compare the efficiency and effectiveness of state regulatory programs with programs that are nonregulatory in nature (for example, compare regulatory programs to tax and fiscal programs, or to voluntary educational programs, or to forest certification programs, or to states not making use of regulation).
- Assess regulatory program ability to heighten the rate at which proper forestry practices are applied (or bad practices discouraged) (for example, forestry practices compliance in regulated versus nonregulated conditions).
- Evaluate the physical, economic and political consequences of regulatory programs (for example, regulatory impacts on employment, timber harvest volumes, reforestation activities, future forest investments, sale of forest property, public and private costs of compliance).
- Appraise the governance and organization of regulatory programs (for example, legal authority and constitutional limitations, agency responsibilities and coordination, monitoring and enforcement systems).

Analyses of the performance of forest practices regulatory programs have often lead to mixed results, in large measure because of differences in the conceptual approaches used, variability in regulatory programs being compared, poorly defined objectives of some regulatory programs, difficulties in identifying and specifying program benefits, and deficiencies in the type, amount and precision of data needed to conduct with and without analyses. The latter have been of special concern to analysts who point out that improved environmental conditions cannot always be attributed to regulatory programs just because one followed the other in time (problems of specification). Also concerning to evaluation of forest practices regulatory programs are limited examination of the:

- Benefits provided by regulatory programs; major analytical focus has been on private sector costs, especially foregone opportunities.
- Public agency regulatory program design and implementation; few analyses of government regulatory program patterns and of agency responsibilities within and between governments.

- Public sector costs of administering regulatory programs; few analyses of appropriate levels of investment, including staffing.

The experience of seasoned administrators of regulatory and related programs has often been relied on for assessing the effectiveness of regulatory programs. In 2003, the opinion of administrators representing all 50 states was sought and subsequently analyzed. Nationwide, the respondents considered education and technical assistance programs to be more effective than regulatory programs. However, regulatory programs were most often considered more effective than tax incentives and sometime more effective than fiscal incentives. Regulation was generally viewed as the most effective tool for dealing with the application of chemicals, and least effective when used as a means of for addressing cultural practices. Interpretation of these rankings must be done with some caution since combinations of various programs (including regulatory) and their resultant effectiveness may be a more appropriate measure. As one regulatory program administrator indicated, “no single policy tool is effective by itself . . . many times a suite of tools generates synergies that make all the tools more effective.”

Administrators of regulatory or related programs in more than two-thirds of the states consider forestry practices in their state to always or often be correctly applied (in contrast to sometimes or never). Of this two-thirds, over half (17 states) indicated all or some forestry practices were regulated in their state. If states that regulate forestry practices under certain conditions are included (eight states), the portion regulating forestry practices in order to have forestry practices always or often correctly applied rises to nearly two-thirds (25 of the 34 states considered). However, nearly one-third of the responding states do not regulate forestry practices yet report that forestry practices in their state are always or often correctly applied.

SUMMARY AND EMERGING ISSUES

The long-term conservation and sustainability of forests requires that various biophysical standards (for example, forestry best management practices) and assorted political processes (for example, collaborative processes, legislative processes) be appropriately engaged and properly applied. In many cases, such will occur in response to market systems or to various participatory processes involving assorted segments of the public. There are, however, circumstances when the application of established standards and processes occurs only in response to the fear of penalties and punishment. Some persons or entities are unwilling to voluntarily conduct business in manners consistent with the broader public interest in forests; they respond only to the imposition of (or fear of) regulatory sanctions in the form of an order, fine or incarceration. Forest practices regulatory programs personify these sanctions, although their application implies a delicate balancing of public and private interests. History is replete with examples of rancorous political battles that sought to define the appropriate balance between the two (Clepper 1971, Callicott 2000, Ellefson 2000).

Summary of Conditions

This assessment focused on state-governed regulatory programs that are focused on the application of forestry practices applied to private forests. Involving extensive review of the literature and contact with regulatory program administrators in all 50 states, it was limited to programs applied statewide and to only those regulations affecting forestry practices. The assessment led to a number of findings that are worth highlighting. Consider the following.

- State regulatory programs embrace a complex set of broad cultural attributes. Although not the environment of all programs, many programs are wrapped in a setting of protecting rights to certain conditions in private forests; presuming an ability to control uncertainty; requiring adherence to prior-approval processes; engaging formal, standardized policies and procedures; carrying out complex administrative processes; operating in a setting of fragmented authority and responsibility; demonstrating disfavor with alternatives to regulation; confronting combative politics fostered by rigid processes; and facing uncertainty over the effects of regulatory initiatives. Encapsulated in such a context, the deterrent fear of regulation is often an important motivator for the public to meet desired civic obligations.

- State regulatory authority over private forestry practices is extensive. It emanates from environmental law generally and from state law focused directly on forestry practices applied to private forests. When focused primarily on forestry practices, regulatory authority can originate from a single law (often known as a forest practices act), a number of separate and specially-focused laws (for example, wetland protection act), or laws authorizing conditional regulation which is to be applied in certain circumstances (for example, contingent or bad actor law).

- State regulatory programs are focused on a wide range of forestry practices applied to private forests. Examples are roads and trails, timber harvesting, reforestation, cultural, chemical application, forest protection, and administrative procedures. Administrators in nine of 10 states judged such practices to be *often* or *sometimes* correctly applied to private forests. Two-thirds of the administrators indicated that forest practices were subject to some form of regulation, especially practices involving roads and trails (44 states) and chemical applications (40 states). Least regulated were cultural practices (30 states) and reforestation activities (27 states).

- State agencies regulating forestry practices on private land is also extensive. An average of six state agencies per state (276 state agencies nationwide) are so involved. Over two-thirds coordinate (extensive or moderate) their regulatory initiatives with a state's lead forestry agency, although one-third were judged as having minimal or no involvement with such an agency.

- State agencies are responsible for substantial investment in forest practice regulatory programs focused on private forests. About 1,040 full-time staff equivalents are so engaged (by 276 agencies), nearly one-third of which are part of an agency whose primary purpose is the management of forest resources. Slightly more than one-quarter of these staff equivalents are affiliated with air and water pollution control agencies. Assuming \$55,000 per full-time equivalent, staff assigned to state regulatory programs implies an annual nationwide investment of about \$57 million.

- Regulatory programs focused on private forests are especially prominent in certain states. In 15 states with programs that address a wide range of resources and practices and that implement rigorous and often complex administrative procedures, annual forest practice regulatory investments (by lead state forestry agencies) are more than \$42 million and involve nearly 620 full-time equivalent staffs. Revenue for these programs comes primarily from state government appropriations (49 percent) and is invested for the most part in

review of notifications and permit applications (28 percent) and in monitoring and evaluation activities (21 percent). Administrators of the 15 prominent programs consider their regulatory initiatives as fully capable of positively influencing the way forestry practices are applied on private forest land (especially road and trail practices, and timber harvesting practices; less so, cultural practices).

- Evaluations of regulatory program efficiency and effectiveness have produced mixed results. In large measure this uncertainty occurs because of differences in the conceptual approaches used to evaluate, variability in regulatory programs being compared, poorly defined objectives of some regulatory programs, difficulties in identifying and specifying program benefits and costs, and deficiencies in the type, amount and precision of data needed to conduct with-and-without analyses. These analytical deficiencies have, in part, contributed to continued divisiveness regarding the role of regulation as a policy tool to be focused on the application of forestry practices to private forests. An appraisal by this assessment of nearly 50 past evaluations of regulatory initiatives leads to mixed conclusions. Are regulatory programs the most effective and efficient approach for securing the proper application of science-based forestry practices to private forests? The answer is the ubiquitous “it depends,” in some cases the answer is “yes” and in other cases “no.” Most likely it’s a combination of program types that is most effective.

- State administrators of regulatory and nonregulatory programs provide some insight to performance of regulatory programs. Two-thirds of those contacted as part of this review consider forestry practices in their state to always or often be correctly applied (in contrast to sometimes or never). Of this two-thirds, over half (17 states) indicated all or some forestry practices were regulated in their state. If states that regulate forestry practices under certain conditions are included (eight states), the portion regulating forestry practices in order to have forestry practices always or often correctly applied rises to nearly two-thirds (25 of the 34 states considered). However, nearly one-third of the responding states do not regulate forestry practices, yet they report that forestry practices in their state are always or often correctly applied.

Issues and Concerns

The intensity of debate over regulation of forestry practices applied on private forests is unlikely to subside in the future. Whether it rises or falls as an important political issue will depend on the set of values ascribed to the benefits that forests are capable of producing and on the political strength of the persons and entities that represent and

subsequently advocate those values. There are, however, some discernable trends that have been identified as important to the environment of forest practices regulation (Hoerger 1993, Ice and others 1997, Seigel 1997, Davies and Mazurek 1998, Gunningham and Grabosky 1998, National Research Council 1998, Andrews 2000, Ellefson 2000, Fischbeck and Farrow 2001, National Association of State Foresters 2001, Potoski and Prakash 2004).

Balancing of Public Versus Private Responsibility. Through regulation, government makes itself responsible for the regulated activity; in the case of forestry, it has imposed regulations on landowners and harvesters because they failed to practice sound forestry. The anti regulatory fervor of recent years reflects a growing awareness of the consequences of that shift from the individual to society. Concepts like certification, sustainable forestry, forest stewardship, and ecosystem management reflect new ethical standards toward forests and forest practices that will result in a better balance between personal responsibility for practicing good forestry and compliance with rigid standards imposed by government. In fact, third party certification of forestry practices may well moderate interest in the regulatory role of government.

Empathy for Private-sector Operating Environments. The culture of regulation has often assumed that private entities have the financial resources and technical sophistication needed to comply with regulatory programs. This assumption may be unrealistic. For the landowner, harvest-free riparian zones are costly; preparation of preharvest plans is expensive; installation of specialized safety equipment is costly; and legal requirements for public hearings and the like are often an affront to individual rights. With increasing frequency, regulatory agencies are acknowledging the burdens of regulatory programs. In response, they have begun to consider a broader array of forestry practice standards, to analyze the benefits and costs of standards before they become rules, to consider incentives to mitigate adverse impacts on owners of small forest properties, and to create programs that reduce the risk of unexpected and costly management responses in the future. There is also discussion of regulatory reform that would increase landowners' discretion in choosing the forest practices that will meet society's goals for water quality, wildlife habitat, and scenic beauty.

Focus on Prevention Rather than Misdeeds. Regulatory agencies are by law required to enforce the rules they establish. But identifying violations and punishing perpetrators are but a narrow slice of the potential represented by regulatory programs. An agency can also mobilize a variety of resources to solve on-the-ground problems: it can

serve as an information broker and draw on its cumulative experiences – and those of forest landowners and harvesters – to improve forest management practices. The agency’s mission can be to change the culture of forestland ownership and timber harvesting so that people are sensitive to harmful forest practices and aware of how they might be avoided.

Improved Program Effectiveness. Forest practices regulatory programs often embody rigid legal structures that can make them prone to inefficiencies. Among the ways that program operations might be improved are the following.

- Reduce the institutional fragmentation of regulatory programs and agencies.
- Embrace more convincing procedures for anticipating, reviewing, and adopting new forest practice technologies.
- Engage regulated entities in more collaborative rule making and rule-implementing activities.
- Privatize certain elements of regulatory programs, such as contracting for inspection and monitoring services.
- Mobilize information resources (in addition to regulatory resources) to address a forest practice problem (agency acts as a consultant).
- Issue long-term permits for forest management plans rather than permits for individual harvests.
- Seek less repressive regulatory approaches, such as contingent regulation where focus is really on those that repeatedly apply substandard forestry practices.

Additional and More Professionally Diverse Regulators. Emerging in forestry agencies are a growing number of professionals who have specialized knowledge not only about forests and forestry but about regulation in general – rules, inspections, penalties. They offer potential to bring their unique expertise to rule development, enforcement procedures, and legal considerations important to implementation of regulatory programs. Like wise, there are an ever-increasing and more diverse group of professionals – ecologists, hydrologists, geologists, wildlife biologists – that have become involved in forest practices regulatory programs. As the concern over the effects of forestry practices on a broader array of conditions increases, so also is the disciplinary landscape of regulatory professionals broadened. This interdisciplinary richness is commendable; however, care must be taken not to further fragment the broader importance of sustaining healthy forests in general.

Demands for and Management of Information. Forest practices regulatory programs require an enormous amount of information if they are to be effectively applied. Required is data about regulated forest practices, especially their effectiveness and the extent to

which landowners and harvesters comply with them. Information on which rules are based must be accurate and reliable, relevant at various scales, and gathered appropriately for consistency and subsequent analysis. Administrators of regulatory programs must have access to current program operations (for example, Oregon's Forest Activity Computerized Tracking System [FACTS], and Washington's Forest Practices Application System [FPARS]). Information on state regulatory conditions merged to provide an accurate national picture of regulatory trends would be most helpfully (for example, a nation website for state regulatory programs). The future level of confidence associated with regulatory programs can erode if the information on which they are based is not solid.

Emerging Contemporary Concerns. Regulatory programs operate in technical and political environments that are continually changing. At least two major emerging topics pose future challenges to such programs, namely the growing interest in certification programs and the reality of effluent load limits assigned to certain waters in forested areas. The former involves voluntary adherence (and periodic re-inspection) to forest practice standards set forth by groups such as the Forest Stewardship Council and the Sustainable Forestry Initiative. The approach can be viewed as a self-regularity measure, although how such relates to existing forest practices regulatory programs is unclear. As for the second emerging topic, concern is with water quality and federal requirement to establish total maximum daily loads (TMDLs) of pollutants for waters considered to be impaired. States must identify and report waters for which effluent standards are not stringent enough and must propose programs that will lead to taking corrective actions, which could include regulatory initiatives. The initiative is authorized by Amendments to the Federal Water Pollution Control Act (Birkeland 2001).

Research and Evaluation

Unmet needs for information regarding the performance of regulatory programs is of considerable concern. The importance is highlighted by the reality that substantial political energy is devoted to debate about the need for such programs, and that respectable sums of public and private resources are invested in their implementation. This setting strongly suggests that regulatory programs and alternatives to them require greater attention by the research community, and that such attention needs to be more than simply supplying information that promotes the often limited interests of those that advocate or loathe regulatory approaches. Examples of areas in need of research and policy analyses are as follow (Seitz 1979, Wagner 2000, Ellefson and others 2002 and 2004).

Sectors Requiring Regulatory Attention. Ownership of forests is diverse as is the variety of benefits that forests are capable of providing. Within this diverse setting, are there certain landowner categories and kinds of forest benefits that need regulatory attention? Do certain categories of private landowners require the intense reality of regulatory approaches in order to ensure the sustainability of the forests for which they are responsible? Similarly, are there certain types of benefits provided by forests that are of such high value that the impact of certain forestry practices challenges their very existence and, consequently, need to be protected by regulation?

Creative and Imaginative Alternatives. Regulatory programs are one among a broad array of programs that can be used to secure the public interest in private forests. Are there program alternatives (including regulatory programs of which there are many styles) that might be considered as ways of coping with problem externalities that may be occurring as a result of certain forestry practices? Are there programmatic approaches (for example, product or practice certification, permits and licenses, environmental covenants, voluntary self-regulation, environmental reporting, tradeable resource rights, liability instruments, performance bonds, ownership trusts, long-term leases) used by other sectors (for example, agriculture, mining, transportation, law enforcement) that should be considered for possible application in the forest resource sector?

Performance of Regulatory Programs. Regulatory programs (and alternatives to them) deserve comprehensive analysis of their potential or current performance (commonly known as Regulatory Impact Analysis). What are the relative costs and benefits attributable to regulatory programs, and by what standards should these costs and benefits be judged? How might the accuracy of benefits and costs attributable to regulatory programs be improved? What can be said of the efficiencies that might result from synergies occurring when regulatory and nonregulatory programs are merged in various combinations? What can be said about regulatory program performance when difficult with-and-without analyses are applied? What are the broader sector-wide and economic structural implications of regulatory programs?

Equity Consequences of Regulatory Programs. Regulatory programs seek to internalize the adverse consequences of applying forestry practices in manners considered unsatisfactory. By so doing, the presumption is that such costs can be transferred to broader markets where all benefits and costs of a forestry operation might be more appropriately allocated. Such may not be the case. What are the distributional consequences of regulatory programs, and how do they compare with alternative programs

attempting to achieve the same public interest in private forests? Are some forest sectors more likely to bear greater regulatory costs, while some beneficiaries reap rewards for which they have not been charged? How might regulation-inspired inequitable conditions be remedied, by markets or by government actions (for example, taxation, fiscal incentives)?

Institutional Structures for Regulation. Regulatory programs are implemented by various levels of government (for example, federal, state, county), are operated in various fashions (for example, notification schemes, permit-inspection systems), and are judged by information flowing from a plethora of monitoring activities (for example, compliance, effectiveness, administrative). How should regulatory responsibility for forestry practices applied on private forests be allocated between levels of government and within a given level of government? Within any single level of government, are competing regulatory responsibilities a problem, and, if so, how might they be addressed? Is there a role for the private sector in implementing certain parts of a regulatory program (for example, compliance monitoring, on-site inspections)? Are rule-development procedures effective and, if not, are there better ways of engaging the regulated public in rule making processes. What conditions merit statutory prescription of forest practice standards and what conditions imply the placement of standards in administrative rules? Performance-based standards (for example, specified level of water quality) provide for creativity by the regulated public, while prescriptive forest practices (for example, culverts installed every 100 meters) limit such creativity. What is the proper blend of standards versus prescriptive practices, and under what circumstances should emphasis be given one or the other? What approaches might be used to ensure that science-based forest practices standards and well-designed administrative processes are continually being incorporated into regulatory initiatives?

Information and Information Management Systems. Efficiently operating regulatory programs depend on access to sizable quantities of information that is current and presented in user-friendly manners. There is need for systems that can quickly and effectively process information required from the regulated public (for example, notifications, permit requests). Also needed are systems that can digest and report current conditions and trends in regulatory programs generally (for example, responsible agencies, types of programs, investment levels, effectiveness and efficiency). Information systems should also promote consistency in the gathering of information about regulatory programs and consistency in the manner in which regulatory impact analyses are conducted.

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APPENDIX A: Forestry Source Nonpoint Water Pollutant Regulatory Authorities

Table A-1. Provisions of Major State Laws Regulating Forestry Practices with Special Reference to Nonpoint Sources of Water Pollution, by State. 2001.

Alabama

Water pollution control law requires a permit for discharge of water pollutants, although excluded are certain nonpoint source discharges from agriculture and silviculture from the permit requirement. State may directly enforce against nonpoint sources, if they cause violation of water quality standards or to deal with any type of water pollution resulting from negligence or that produces a health hazard. Attorney general may commence a civil enforcement action for damages for pollution of the waters of the state. Enforcement may include includes orders, injunctions, civil actions for damages for pollution (recover reasonable costs to prevent, minimize, or clean up any damage), costs for restocking of fish killed, civil penalties of \$100 to \$25,000 per day, and criminal penalties for willful violation or grossly negligent violations.

Forestry Focused: Forestry Commission has power to adopt and promulgate rules and regulations pertaining to all phases of forestry. However, for enforcement the Commission relies on voluntary BMPs, licensing requirements for foresters, and the state's water pollution control act. State law authorizes soil and water conservation districts to "formulate regulations governing the use of lands within the district in the interest of conserving soil and soil resources and preventing and controlling soil erosion." "Any management guidelines developed by watershed management authorities [a special form of authority within some soil and water conservation districts] to protect forested watersheds shall follow the best management practices established by the Forestry Commission." Enforcement of district land use regulations is by injunction ordered by circuit courts or by districts performing need corrections and subsequent recovery of expenses.

Alaska

Water pollution control law prohibits persons from "pollut[ing] or add[ing] to the pollution of the air, land, subsurface land, or water of the state." The Alaska Department of Environmental Conservation (DEC) has broad authority to adopt pollution standards and "to determine what qualities and properties of water indicate a polluted condition . . ." "If an activity presents "an imminent or present danger" to the people of the state or would result in or be likely to result in "irreversible or irreparable damage" to the environment, the DEC may issue an emergency abatement order without a hearing. Superior court may also enjoin violations of statute, regulations, orders or permits and impose sanctions including civil penalties of between \$500 and \$10,000 for the initial violation and not more than \$5000 for each subsequent day of the violation. If a violation occurs with criminal negligence, it is considered a misdemeanor.

Forestry Focused: Commissioner of Natural Resources may issue nonpoint source pollution regulations subject to Department of Environmental Conservation approval. On state, municipal, and private forest land, state law provides that "environmentally sensitive areas" shall be recognized "in the development of regulations and best management practices that are designed to implement nonpoint source pollution control measures. Before beginning forestry operations on private or state public forest land, the operator must submit to the Director of the state Division of Forestry a "detailed plan of operations." Unless a stop-work order is issued or the agency extends the review period, the operator may commence work, at the latest, thirty days after submission of the plan. The plan must be renewed annually. Director may issue orders to cease violations of plan or to repair any resulting damage. Violation of statute, regulation, directive or stop-work order can result in a maximum civil fine of \$10,000, or, if criminal negligence is found, charges of a misdemeanor. Repairs may proceed with the violator liable for their cost.

Arizona

Water pollution law authorizes development of programs for nonpoint source discharges, which may include, but does not require, development of enforceable mechanisms. However, the Department of Environmental

Quality (DEQ) is required to adopt a "program to control nonpoint source discharges of any pollutant or combination of pollutants into navigable waters." Thus, enforceable mechanisms could be created by regulation.

Arkansas

Water pollution control law establishes a general discharge prohibition that may be used to take enforcement against nonpoint source discharges, namely unlawful to "cause pollution . . . of any of the waters of this state," or to "place or cause to be placed any sewage, industrial waste, or other wastes in a location where it is likely to cause pollution of any waters of this state." Pollution and Ecology Commission is the responsible enforcement agency and is authorized to conduct investigations, administrative proceedings, and institute civil enforcement actions in the proper court. Administrative penalties may be no greater than \$10,000 per day of violation; civil actions may result in penalties not over \$10,000 per day of violation, an order to enjoin violations and/or compel compliance, an order for remedial measures, and recovery of all costs, expenses, and damages. Violations may also be a criminal misdemeanors punishable by imprisonment for not more than one year, a fine of not more than \$25,000, or both. Purposeful, knowing, or reckless violations adversely affecting human health or the environment is a felony, punishable by imprisonment.

Forestry Focused: Restriction on tree-cutting near river beds, namely "it is unlawful to remove any trees growing below the normal high watermark on any river or stream which has been designated as a navigable river or stream." Violators are subject to a fine of not less than ten dollars (\$10.00) nor more than one thousand dollars (\$1,000).

California

Water pollution control law (Porter-Cologne Act) establishes enforceable permitting provisions and empowers regional water quality control boards to order the abatement of nonpoint source discharges. Timber harvesting operations conducted under the state's forest practice's act are exempt from the waste discharge requirements if the law's requirements are certified as best management practices by the U.S. Environmental Protection Agency. Enforcement of pollution control law is by order, injunction, or remedial action with cost recovery. Other sections of the law provide for civil penalties, injunctions, misdemeanor prosecutions, and administrative orders.

Forestry Focused: State's forest practices law addresses nonpoint source pollution in the operating context of forestry practices and timber harvesting activities. Law divides the state into three districts (coast forest, northern forest, southern forest) with distinct rules established by the state Board of Forestry. Rules must "protect the soil, air, fish, and wildlife, and water resources, including, but not limited to, streams, lakes, and estuaries," and must include measures for "soil erosion control, for site preparation that involves disturbance of soil or burning of vegetation following timber harvesting activities . . . , for water quality and watershed control, for flood control . . . [etc.]." Rules are implemented through requirements for licensing of foresters and for filing and approval of timber harvest plans, "... no person shall conduct timber operations unless a timber harvesting plan prepared by a registered professional forester has been submitted for such operations to the Department of Forestry." Law provides for public comments and review of proposed plans by other agencies. Reports of completion of work must be filed within one month after completion of the activity described in the plan, and operations must be inspected within six months Enforcement measures include license actions, misdemeanor prosecutions (with fines of not more than \$1000 per day nor imprisonment for more than six months), civil injunction actions, and departmental corrective actions with cost recoveries. Although local government regulation of forestry is largely preempted, the California Tahoe Regional Planning Agency may adopt rules that are stricter than those promulgated by the Board of Forestry.

Colorado

Water pollution control law establishes a general policy declaration favoring the prevention of discharge of untreated pollutants. However, the law does not have a general enforceable prohibition that directly applies to nonpoint sources. Instead, the law confers authority on the Water Quality Control Commission to adopt

regulations which may include nonpoint source regulations. The law specifically requires the use of non-regulatory mechanisms before regulatory approaches may be used.

Forestry Focused: Board of Agriculture has the power and duty "to foster and promote the control of soil erosion on . . . forest lands." State law does not appear to specify operational enforcement requirements related to nonpoint source water pollution from forestry activities.

Connecticut

Water pollution control law makes it a violation to discharge any substance to the waters of the state without a permit, namely ". . . no person or municipality shall initiate, create, originate, or maintain any discharge of water, substance or material into the waters of the state without a permit for such discharge issued by the Commissioner of Environmental Protection." "Discharge" means "the emission of any water, substance or material into the waters of the state, whether or not such substance causes pollution." In such a context, discharge is not limited to point sources. In setting standards for permits, the Commissioner must consider "best management practices," namely practices which reduce the discharge of waste into the waters of the state and which have been determined to be acceptable based on technical, economic and institutional feasibility. Enforcement authorities include orders prohibiting or abating pollution and orders to correct potential sources of pollution. Civil penalties are available up to \$25,000 per day. Criminal actions may be brought for willful violations with a sanction of up to \$25,000 per day and/or one year.

Forestry Focused: State forestry law requires any person engaged in commercial forest practices to obtain and maintain a state certificate in one of three categories, namely forester, supervising forest products harvester, and forest products harvester. Certified foresters, supervisors, and harvesters are required to file annual reports of their activities and continuing education. The certification process provides a basis for assuring that forest practices are conducted in accordance with forest practice rules addressing nonpoint source water pollution. State law authorizes the Commissioner of Environmental Protection to adopt regulations "governing the conduct of forest practices including, but not limited to, the harvest of commercial forest products . . . such regulations shall provide for a comprehensive statewide system of forest practices regulations which will . . . afford protection to and improvement of air and water quality . . ." The law also authorizes municipalities to regulate forest practices in a manner consistent with the state law; they must be approved by the Commissioner. Enforcement tools include civil penalties of up to \$5,000 per day per offense, compliance orders, injunctions, and denial, suspension, or revocation of a certificate.

Delaware

Water pollution control law requires ". . . no person shall, without first having obtained a permit from the Department of Natural Resources and Environmental Control, undertake any activity that may cause or contribute to discharge of a pollutant into any surface or groundwater . . ." The adopted permitting regulations are aimed at point sources, but the state also can use this statutory authority to deal with nonpoint source pollution events. Numerous nonpoint activities do not require a permit (for example, activities involving drainage ditches; uncontaminated stormwater discharges; application of fertilizer; plowing or cultivating for agricultural or horticultural purposes; irrigation; movement of earth for building excavations). Enforcement includes civil penalties, orders, and injunctions.

Forestry Focused: State's forestry administrator "shall provide for the protection of the waters of the State from pollution by sediment deposits resulting from silvicultural activities." A special order may be issued by the administrator determines that an owner or operator is conducting any silvicultural activity in a manner which is causing or is likely to cause alteration of physical, chemical or biological properties of any state water, resulting from sediment deposition presenting an imminent and substantial danger to public health, safety or welfare, or recreational, commercial, industrial, agricultural or other reasonable uses. The order may direct the owner or operator "to cease immediately all or part of the silvicultural activities on the site and to implement specified corrective measures within a stated period of time." Special orders are issued after notice and hearing and are effective not less than five days after service, except for emergency special orders which may be issued immediately. Failure to comply can lead to civil penalties of \$200 to \$2,000 per

violation per day, although intentional and knowing violations of orders are subject to fines of \$500 to \$10,000 per violation per day.

Florida

Water pollution control law administered by the Department of Environmental Protection (DEP) prohibits any person “. . . to cause water pollution so as to harm or injure human health or welfare, animal, plant, or aquatic life or property.” Also a violation of state law is failure to obtain a permit required by law, rule or regulation adopted to prevent such pollution. Additional and separate state law provides water pollution prevention enforcement authority for Florida’s five water management districts (WMDs). DEP enforcement powers include civil actions for damages; actions for civil penalties up to \$10,000 per day; administrative actions for damages; and administrative orders for abatement or other corrective action, subject to administrative hearings. The law also provides for injunctions and for criminal prosecution for violations committed with intent.

Forestry Focused: Where applicable, persons engaging in forest harvest operations must file a "notice of a general permit" with a Water Management District.

Georgia

Water pollution control law authorizes a permit program to control nonpoint sources that may impair water quality, namely law requires a permit for anyone seeking to "erect or modify facilities or commence or alter an operation of any type which will result in the discharge of pollutants from a nonpoint source into the waters of the state, which will render or is likely to render such waters harmful to the public . . . " Regulations limit this in that permits are required only if the state’s Environmental Protection Division (EPD) "has issued one to the same person for a point source discharge." Injunctive relief and civil penalties of up to \$50,000 per day are provided for, as are criminal penalties of \$2,500 to \$25,000 and/or imprisonment.

Forestry Focus: State requires registration of professional foresters, with continuing education and re licensing. Forest practices for hire must be conducted by a professional forester. Enforcement of licensing requirements includes injunction, license revocation, and misdemeanor prosecution.

Hawaii

Water pollution control law includes some provisions that may be used to take enforcement action against nonpoint source discharges that are not permitted or that result in water quality violations. Administrative and civil (up to \$10,000 for each offense) penalties are authorized. Criminal sanctions are more stringent if the violation was "knowing" rather than "negligent."

Idaho

Water pollution control law provides that "no person shall conduct a new or substantially modify an existing nonpoint source activity that can reasonably be expected to lower the water quality of an outstanding resource, except where the nonpoint source activities are temporary or short-term and do not alter the essential character of a stream segment." Prior agency approval is required to conduct any new nonpoint source activities affecting such waters. Where total maximum daily loads (TMDLs) are required, the state must develop "pollution control strategies for both point sources and nonpoint sources for reducing those sources of pollution."If a person fails to obtain new nonpoint source approval in those few instances where it is required (outstanding resource waters), or fails to implement BMPs and violations of water quality result,

the state may institute a civil action. Nonpoint source activities not conducted according to BMPs may be subject to compliance schedules, administrative and civil relief including injunctive relief.

Forestry Focused: State forestry law requires the Forest Board to "develop methods for controlling watershed impacts resulting from cumulative effects" of forest practices. Under the Idaho Forestry Act

("Act"), a BMP is defined as practices that the Forest Board determines to be the "most effective and practicable means of preventing or reducing the amount of nonpoint pollution generated by forest practices," and the rules under the Act establish site-specific BMPs for stream segments of concern. If implementation of BMPs is insufficient to protect beneficial uses, the forest activity may be deemed "an imminent or substantial threat." Operators are required to post a notice of intent to engage in forestry practices; a bond is required where an operator has failed to apply BMPs or willfully caused degradation of water resources. Rules are enforced through issuance of notice of violation and cease and repair orders. Relevant sanctions include suits for reparations, attachment of liens, bond forfeiture and injunctive relief. The Right to Conduct Forest Practices Act limits the circumstances under which forest practices may be deemed a nuisance.

Illinois

Water pollution control law provides that "No person shall cause or threaten or allow the discharge of any contaminants that would cause or tend to cause water pollution, or that would violate regulations or standards . . . " Enforcement occurs by injunction, mandamus, or other appropriate remedy and/or civil penalties. Civil penalties of a maximum of \$50,000 for the violation and \$10,000 for each continuing day may be assessed.

Indiana

Water pollution control law provides that "A person may not: (1) throw, run, drain, or otherwise dispose into any of the streams or waters of Indiana; or (2) cause, permit, or suffer to be thrown, run, drained, allowed to seep, or otherwise disposed into any waters; any organic or inorganic matter that causes or contributes to a polluted condition of any waters, as determined by rule . . . " Water Pollution Control Board can establish requirements for permits "to control or limit the discharge of contaminants into state waters"; while this is not limited to point sources, the current regulations cover permitting for point sources and do not require permits for "any introduction of pollutants from nonpoint source agricultural and silvicultural activities." Laws are enforced by administrative order, civil penalties of up to \$25,000 per day, and injunctions. Failure to comply with an order or is a misdemeanor.

Iowa

Water pollution control law contains a general prohibition against unpermitted discharges of pollutants (defined as "wastes") into waters, which may be used to reach some types of nonpoint source discharges. Enforcement is through cease and desist orders, civil penalties up to \$5,000 per day, injunctions, and criminal (serious or aggravated misdemeanor) prosecution. Cities and counties are authorized to assess a civil penalty equal in an amount to the penalty assessed by the state.

Kansas

Water pollution control law provides for enforceable permitting provisions that may be applied to nonpoint source discharges, namely "No person shall place or permit to be placed or discharge or permit to flow into any of the waters of the state any pollutants, except pursuant to a permit." Enforcement of these provisions is by corrective action orders, civil penalties of up to \$10,000 and criminal prosecutions.

Kentucky

Water pollution control law may be enforced against nonpoint source discharges that pollute state waters in violation of applicable standards or regulations, namely "No person shall, directly or indirectly, throw, drain, run or otherwise discharge into any of the waters of the Commonwealth . . . any pollutant in contravention of the standards adopted by . . . rule, regulation, permit or order or any provision of the statute." The Natural Resources and Environmental Protection Office or the Attorney General may institute an action to recover penalties or bring an action seeking an injunction. Violators are subject to a civil penalty not to exceed \$25,000 per day for each violation. Knowing violations are a felony punishable by a fine not to exceed \$25,000, imprisonment of one to five years, or both.

Forestry Focused: State Forest Conservation Act (1998) establishes enforceable mechanisms applicable to commercial timber harvesting, including no person shall conduct commercial timber harvesting operations unless a certified "master logger" is on site who has completed certain educational requirements (including continuing education every three years). Timber harvesting operations must use appropriate best management practices (BMPs) which are defined by the state's Division of Forestry, approved by the Agriculture Water Quality Authority, and reviewed by the Forestry Best Management Practices Board. If a logger or operator fails to use appropriate BMPs or is causing water pollution, a written warning is issued and/or a conference with district foresters. Continued failure to comply can result in issuances of a special order mandating immediate implementation of the corrective measures or cessation of all or a portion of the timber harvesting operation. Subsequent failure to continue noncompliance may result in logger or operator being deemed a "bad actor" and subject to civil penalties of up to \$1,000. Agriculture Water Quality Act also establishes enforceable best management practices (BMPs) that apply to farm operations of ten or more acres, including silviculture conducted on such operations.

Louisiana

Water pollution control law prohibits any person from conducting an activity "which results in the discharge of any substance into the waters of the state without the appropriate permit, variance, or license." Such is not applicable to "unintentional nonpoint source discharge resulting from agricultural, horticultural, or aquacultural products." Regulations also exclude from the permitting requirements "introduction of pollutants from nonpoint sources resulting from normal agricultural and silvicultural activities."

Forestry Focused: State forestry law provides that any person who cuts standing cypress trees on water bottoms owned by the state of Louisiana is subject to a fine (up to \$5000) and/or imprisonment (up to six months). Furthermore, the state's Natural and Scenic Rivers Act prohibits commercial harvesting of timber within 100 feet of low water marks, with exceptions including selective harvesting of trees, cutting to control disease or insects, and harvesting timber for personal use by the person by person owning property. Civil penalties of up to \$1000 per day for each violation can be imposed.

Maine

Water pollution control law provides that "No person may directly or indirectly discharge or cause to be discharged any pollutant without first obtaining a license" from the appropriate state agency, a prohibition that includes nonpoint source discharges. If discharge, emission or deposit of any materials into any waters, air or land constitutes a substantial and immediate danger to the health, safety or general welfare, the governing state agency shall request the Attorney General to initiate immediate injunction proceedings to prevent such discharge. Additional enforcement mechanisms include administrative consent orders, civil injunctive remedies, and civil penalties of up to \$10,000 per day. Criminal violations can result in a fine of not less than \$100 nor more than \$25,000 per day of violation.

Forestry Focused: State forestry law authorizes rules to protect water quality. Management plans are required for clearcuts in excess of 50 acres. Landowners are required to notify the state's forestry agency prior to harvesting timber and to file reports on timber sales. Enforcement includes civil forfeitures of \$1,000 per violation of performance standards. Violation of notice requirements results in a civil forfeiture of \$50 for harvests of 50 cords or less and \$1000 for larger harvests or for failure to submit other reports. For unorganized portions of the state, the Land Use Regulation Commission establishes forest practice regulations, including timber harvesting standards for slash disposal, clearcut size/location, retention of buffer strips, and a general requirement to "reasonably avoid sedimentation of surface waters." The state's shoreland zoning law protects areas within 250 feet of the normal highwater line of any great pond, river or saltwater body, within 250 feet of a coastal wetland or the upland edge of a freshwater wetland, and within 75 feet of the highwater line of a stream. Statute limits timber harvesting in the protected areas to selective cutting of no more than 40 percent of trees 4 inches or more in diameter in any ten-year period, prohibits timber harvests within 75 foot areas abutting great pond shoreland zoned for resource protection, and requires reforestation within 2 growing seasons of any harvest beyond the 75-foot buffer.

Maryland

Water pollution control law provides that "a person may not discharge any pollutant into the waters of this State"; to accomplish such a requirement the Department of the Environment may require nonpoint source dischargers to obtain permits under certain circumstances. Enforcement of permits is by corrective action orders, injunctions, civil penalties not exceeding \$10,000 per day (judicially) or \$1,000 per day (administratively), or criminal prosecution. Furthermore, on land managed under an agricultural soil conservation and water quality plan approved by the local soil conservation district, "it is unlawful for any person to add, introduce, leak, spill, or otherwise emit soil or sediment into waters of the state or to place soil or sediment in a condition or location where it is likely to be washed into waters of the state by runoff of precipitation." Enforcement by injunctive relief or corrective action orders. Civil penalties are available up to \$25,000 per day or criminal penalties of up to \$50,000 and/or one year imprisonment.

Forestry Focused: State forestry law requires the Department of Natural Resources "to administer forest conservation practices on privately owned forest land and manage publicly owned forest lands," and authorizes the promulgation and enforcement of rules and regulations specifying forest practice standards which are to be enforced by district forestry boards. State law also provides for licensing of professional foresters. Under the state's Nontidal Wetlands program, forestry activities are required to have an erosion and sediment control plan, except that various forestry practices are exempted from the planning requirement. Under the Chesapeake Bay Critical Area Protection Program, "all harvesting of timber in the Chesapeake Bay Critical Area shall be in accordance with plans approved by the district forestry board."

Massachusetts

Water pollution control law prohibits any person from ". . . discharging any pollutant into waters of the commonwealth, except in conformity with a permit . . . or shall be punished by a fine . . . or by imprisonment . . . or shall be subject to a civil penalty not to exceed \$25,000 per day of such violation." However, regulations issued pursuant to the law exempt from permit requirements "any introduction of pollutants from non-point source agricultural and silvicultural activities, including runoff from orchards, cultivated crops, pastures, range lands, and forest lands." Enforcement mechanisms, in addition to civil penalties, include orders and injunctive relief.

Forestry Focused: State forestry law (Forest Cutting Practices Act) requires preparation of minimum forest cutting practices and guidelines (best management practices). Landowners must give prior notice to the appropriate agency and to neighboring property owners of intent to harvest. The notice must include a proposed cutting plan. Not covered by the law is cutting for the owner's own use, cutting less than 25,000 board feet or 50 cords, or land clearing activities. Enforcement is by stop work order and fine of up to \$100 per acre. Harvesting timber for hire or profit requires a license and requires licensees to demonstrate familiarity with the state's laws on forestry and timber harvesting; enforcement is by fine and injunction. State law also prohibits the placement of slash within 25 feet of any continuously flowing stream, any pond, river, or water supply. Forestry operations in wetlands are subject to additional regulations and to best management practice requirements.

Michigan

Water pollution control laws prohibit persons from ". . . directly or indirectly discharging into the waters of the state any substance that is or may become injurious to . . . public health, safety or welfare . . . domestic, commercial, industrial, agricultural, recreational uses . . . value or utility of riparian lands . . . or livestock, wild animals, birds, fish, aquatic life, or plants. In response to said laws, the Department of Environmental Quality "may promulgate rules and issue orders restricting the polluting content of any waste material or polluting substance discharged or sought to be discharged into any . . . waters of the state." State may bring civil actions or criminal prosecutions in court, revoke a permit, issue an order of abatement, or refer a case to the attorney general. Sanctions include civil fines of not less than \$2,500 nor more than \$25,000 per day, and criminal penalties and terms of imprisonment for knowing violations.

Forestry Focused: State forestry law authorizes forest improvement districts whereon minimum forest practice standards are to be applied. Members of a district must submit a forest management plan notifying the district board of intent to comply with the forest practice standards. The board can issue a notice of violation if a forest practice rule is violated and may order the member to make "reasonable efforts to repair the damage or correct the unsatisfactory condition." If the member fails to comply, the board may take action and then file a lien to recover the costs of the action. State's Inland Lakes and Streams law requires permits for projects that affect lakes and streams (for example, stream crossings). Enforcement is by civil action with fines up to \$10,000 per day.

Minnesota

Water pollution control law generally obligates every person to "notify" the state of the discharge of any substance or material that may cause pollution of the waters and the discharger to take all reasonable actions to minimize or abate the pollution caused. Pursuant to said law, rules state "No sewage, industrial waste or other wastes shall be discharged from either a point or nonpoint source into the waters of the state in such quantity or in such a manner . . . as to cause water pollution" Enforcement accomplished by criminal prosecution, civil penalties, injunction, and other actions to compel performance.

Forestry Focused: State forestry laws have few provisions regulating private forestry operations with respect to nonpoint source water pollution, although the Sustainable Forest Resources Act of 1995 provides for voluntary forest practice guidelines. Department of Natural Resources is prohibited from selling state forest land that "borders on or are adjacent to meandered lakes or public waters and water courses," and if the Department harvests these state lands, it must "reserve the timber and impose other conditions deem(ed) necessary to protect watersheds, wildlife habitat, shorelines and scenic features." Clear cutting is prohibited where "soil, slope or other watershed conditions are fragile" and where it occurs within certain distances within a "wild, scenic and recreation river."

Mississippi

Water pollution control law prohibits any person ". . . to cause pollution of any waters of the state or to place or cause to be placed any wastes in a location where they are likely to cause pollution; and to discharge any wastes into any waters of the state which reduces the quality of such waters below established water quality standards." Violations are enforceable by administrative orders, civil penalties of up to \$25,000 per day, injunction, or misdemeanor prosecution. Regulations provide that no permit may be required for nonpoint agriculture and silviculture pollution.

Forestry Focused: Forest Harvesting Law requires that certain numbers of trees be left on each acre for growing stock and/or seed trees after harvest. Law does not apply to land clearing for crop production or pasture, building sites or roads, nor to noncommercial cutting by owners for their own use. Enforceable by injunction or by misdemeanor prosecution with a fine of \$25-\$50 per working unit of 40 acres or less.

Missouri

Water pollution law provides it to be ". . . unlawful for any person to cause pollution of any waters of the state . . . or to discharge any water contaminants into any waters of the state which reduce the quality of such waters below established water quality standards." Enforcement is through administrative penalties up to \$10,000 per day, civil penalties up to \$10,000 per day, and criminal prosecution.

Montana

Water pollution control law makes it unlawful to "cause pollution . . . of any state waters or to place or cause to be placed any wastes where they will cause pollution of any state waters." However, exempt from the prohibition is "any placement of materials that is authorized by a permit issued by any state or federal agency . . . if the agency's permitting authority includes provisions for review of the placement of materials to ensure that it will not cause pollution of state waters." Statute also makes it unlawful to "cause degradation

of state waters without authorization" and establishes a detailed nondegradation policy for state waters. Department of Environmental Quality has general inspection and penalty authority for violations of the water quality code, including issuance of specific compliance orders, cleanup orders, and administrative penalties of up to \$10,000 per violation per day. Civil actions include temporary and permanent injunctions, while judicial remedies include civil penalties of up to \$25,000 per day and, for willful or negligent violations of the discharge prohibition, criminal fines of up to \$25,000 per day, imprisonment of up to one year, or both. Criminal penalties may be doubled for repeat violations.

Forestry Focused: State forestry law requires creation of "streamside management zones" for forest streams (strip at least 50 feet wide) within which certain activities are prohibited, including: broadcast burning; off-road vehicle operation; clearcutting; road construction (unless necessary for stream crossing); handling, storage, application or disposal of hazardous substances; and deposit of slash in water bodies. Department of Natural Resources and Conservation has inspection authority on federal, state and private land to ensure compliance with the rules for streamside management zones and may issue civil penalties of up to \$1,000 per day, as well as rehabilitation orders. State's forest practice law requires use of best management practices and requires that notice be given prior to commencement of any forestry practices. Consultation with landowner or operator may result, the intent of which is to provide information and advice.

Nebraska

Water pollution law makes it unlawful to "cause pollution of any . . . waters . . . of the state or to place or cause to be placed any wastes in a location where they are likely to cause pollution" of state waters. Enforcement is through corrective action orders, injunctions, civil penalties up to \$10,000 per day, and criminal (felony and misdemeanor) prosecution. State may recover damages for restocking the waters with fish or replenishing wildlife.

Forestry Focused: Erosion and Sediment Control Act may be applicable to forestry activities to control soil loss.

Nevada

Water pollution control law authorizes prescriptions for "diffuse sources" (equivalent to nonpoint sources) of water pollutants that are "significantly causing or adding to water pollution in violation of a water quality standard." Special regulations exist to protect the Lake Tahoe watershed, namely it is illegal to discharge waste within 100 feet of the lake or a stream or other water supply in the watershed.

Forestry Focused: State forestry law requires a permit for logging operations and conversion of timberland "to any use other than the growing of timber." All logging permits require the use of best management practices to prevent, eliminate or reduce water pollution from diffuse sources. Violation of permit conditions can result in administrative revocation of permit and/or charge of a misdemeanor violation punishable with a fine (up to \$1000) and/or imprisonment (six months or less). Statute prohibits "felling of trees, skidding, rigging or construction of roads within 200 feet of a waterbody" or tractor logging on slopes of 30 percent. Variances may be granted for both prohibitions. Tractor skid trails, landings, logging truck roads and firebreaks to be located, constructed, used and left so as to not "appreciably diminish water quality."

New Hampshire

Water pollution control law does not expressly focus on nonpoint sources yet requires that ". . . after adoption of a given classification for a stream, lake, pond, tidal water, or section of such water, it shall be unlawful for any person or persons to dispose of any sewage, industrial, or other wastes, in such a manner as will lower the quality of these waters . . ." The Department may issue cease and desist orders, seek injunctive relief in courts, request civil penalties of up to \$10,000 per day, or impose administrative penalties of not more than \$2,000 per offense. Willful or negligent violations, or knowing failure to obey a lawful order subjects the violator to a fine of up to \$25,000 per day and/or imprisonment for up to six months.

Forestry Focused: State forestry law authorizes the Department of Resources and Economic Development, to develop and implement enforceable provisions regarding timber harvesting on private and public lands. Law requires filing of a notice of intent to cut, cross-compliance with the state's wetlands permitting program, and compliance with the state's Alteration of Terrain Program. Prohibited is harvesting within specified distances of great ponds, standing bodies of water and within 50 feet of any perennial stream. Law also prohibits disposal of slash and mill residue in any perennial stream or standing body of water. Cease and desist orders can be issued against any timber operation in violation of the law; violations may be enjoined by superior court. Administrative fines may be also assessed for any offense, not to exceed \$2,000 per violation. The Alteration of Terrain program requires loggers to notify of intent to cut and obligates them ". . . to abide by appropriate best management practices to include all state laws pertaining to logging operations." State's Comprehensive Shoreland Protection law is also partly applicable to forestry activities as it requires natural woodland buffers near shorelands.

New Jersey

Water pollution control law prohibits the discharge of any pollutant except as authorized by statute or under a permit. Enforcement provisions include compliance orders, injunctive relief, and civil penalties of not more than \$50,000 for each violation, and criminal sanctions if there is a knowing or reckless violation which causes a significant adverse environmental effect.

New Mexico

Water Quality Control Commission authorized "promulgate and publish regulations to prevent or abate water pollution in the state" and to require permits. Law provides for administrative orders with penalties up to \$25,000 per day.

Forestry Focused: State's forest practices law requires permits and inspections for timber harvesting beyond specified minimum timber volumes and harvest areas. New Mexico counties may also enact enforceable ordinances addressing harvest practices (Rio Arriba County has a timber harvest permit process that incorporates as mandatory conditions the state's voluntary forest practice guidelines).

New York

Water pollution law declares state policy to maintain reasonable standards of water purity "and to that end require the use of all known available and reasonable methods to prevent and control the pollution of the waters of the state." Enforcement is by administrative order, injunction, a civil penalty of up to \$25,000 per day, or for willful violations by criminal prosecution.

North Carolina

Water pollution law specifies (absent a permit or special order) no person shall "cause or permit any waste, directly or indirectly, to be discharged to or in any manner intermixed with the waters of the State in violation of the water quality standards applicable to the assigned classifications." Violators of the law may be assessed civil penalties of up to \$10,000 per violation per day, misdemeanor criminal fines of up to \$15,000 per violation per day, or felony criminal fines of up to \$250,000 per violation per day; they also are subject to injunctive relief.

Forestry Focused: Sedimentation Pollution Control Act (regulates certain kinds of land-disturbing activity) that causes erosion and sedimentation requires the Department of Environment, Health and Natural Resources to adopt "Forest Practice Guidelines Related to Water Quality" (best management practices for forest activity). The Guidelines are presented in the North Carolina Administrative Code as well as in a Forestry Practices Manual issued by the Division of Forest Resources. Forest activities conducted in accordance with these Guidelines are exempt from the other provisions of the Act.

North Dakota

Water pollution law makes it unlawful "to cause pollution of any waters of the state or to place or cause to be placed any wastes in a location where they are likely to cause pollution of the waters of the state." This provision is not restricted to point sources. State law also requires a permit for a range of activities that would cause a "discharge" or "would otherwise alter the physical, chemical, or biological properties of any waters of the state in any manner not already lawfully authorized." Enforcement actions include emergency orders, judicial injunctions, fines of up to \$50,000, and, for willful violations, jail terms of one or two years. Civil penalties of up to \$10,000 per day are also available for violations without willful intent.

Ohio

Water pollution law declares "No person shall cause pollution or place or cause to be placed any [pollutants] that cause pollution of any waters of the state . . . " However, exempted are ". . . pollution . . . resulting from farming, silvicultural, or earthmoving activities." Local units of government (such as Soil and Water Conservation Districts) have inherent powers to abate such nuisances if so determined.

Forestry Focus: Law specifically provides for control of sediment and related runoff from agricultural and silvicultural activities by directing the Division of Soil and Water Conservation, Department of Natural Resources (with the approval of the Soil and Water Conservation Commission) to adopt rules establishing "technically feasible and economically reasonable standards to achieve a level of management and conservation practices in farming or silvicultural operations that will abate wind or water erosion of the soil or abate the degradation of the waters of the state by animal waste or by soil sediment including substances attached thereto." The law further empowers the Division to "establish procedures for . . . enforcement of rules for agricultural and silviculture pollution abatement." The law is implemented at the farm and forest level by local soil and water conservation districts.

Oklahoma

Water pollution law makes it "unlawful for any person to cause pollution of any waters of the state or to place or cause to be placed any wastes in a location where they are likely to cause pollution of any air, land or waters" and declares any such action to be a public nuisance. Regulations expressly construe the law to include nonpoint sources. For violations, the Department of Environmental Quality may seek an injunction, a civil penalty of up to \$10,000 per violation, and/or misdemeanor criminal penalties of \$200 to \$10,000, imprisonment for up to six months, or both. However, the law divests the Department's of jurisdiction over agricultural and silvicultural nonpoint sources, instead assigning jurisdiction to the Department of Agriculture for agricultural discharges and to the Conservation Commission for erosion control. Neither of these entities appears to have enforcement authorities applicable to nonpoint source discharges.

Forestry Focused: State Board of Agriculture "shall administer silviculture best management practices in cooperation with forestry land users under the provisions of state and federal water pollution laws, which include the process to identify silviculturally-related nonpoint sources of pollution as defined by the Oklahoma Environmental Quality Code and setting forth procedures and methods to control to the extent feasible such sources." The statute does not expressly set out enforcement authority for best management practices.

Oregon

Water pollution control law prohibits persons from polluting "any waters of the state," from placing waste where it is "likely to escape or be carried into the waters of the state by any means," and from discharging wastes into water if the discharge reduces water quality "below the standards established by rule for such waters." The general prohibition is not expressly limited to point sources; it is interpreted to address nonpoint source discharges. Violations of the general prohibition provision are deemed a public nuisance.

Forestry Focused: State's Forest Practices Act requires that forest operations be conducted in accordance with rules and standards "relating to air and water pollution control." State Forestry Board establishes best management practices (BMPs) "to insure that nonpoint source discharge of pollutants resulting from forest operations do not impair the achievement and maintenance of water quality standards." Operators are required to comply with BMPs, unless they can demonstrate that alternative practices yield better results. Forestry Board is authorized to require a written plan for forestry operations if operations are within one hundred feet of a stream used by fish or for domestic use. Also, operators must give written notice of chemical applications to Forestry Board which in turn must notify persons that are within 10 miles of the application and hold downstream surface water rights. Where forest operators are in compliance with the Board's BMPs, then the operations are not considered in violation of any water quality standards. Also, forestry operations are immune from private nuisance actions if they are in compliance with the Act and with BMPs. Enforcement is through inspection, notice of violation, issuance of administrative orders (cease and desist or reparation orders) and general criminal and civil penalties, including potential civil sanctions of up to \$5000 per violation.

Pennsylvania

Water pollution law authorizes state to "enforce reasonable orders and regulations for the protection of any source of water for present or future supply to the public, and prohibiting the pollution of any such source of water rendering the same inimical or injurious to the public health or objectionable for public water supply purposes." Violation of law is a summary offense punishable by a fine of not less than \$100 nor more than \$10,000 for each offense. Willful or negligent violations are misdemeanors punishable by a fine of not less than \$2,500 nor more than \$25,000 for each separate offense and/or imprisonment in the county jail for a period of not more than one year. Civil penalties may be assessed not to exceed \$10,000 per day per violation. State may also issue orders or seek injunctive relief.

Forestry Focused: Forest harvesting activities involving earthmoving must comply with the regulatory program authorized by the Clean Streams Law.

Rhode Island

Water pollution law makes it ". . . unlawful for any person to place any pollutant in a location where it is likely to enter the waters . . ." of the state. Enforcement is by notices of violation, compliance orders, injunctive relief, criminal liability, and civil penalties of up to \$25,000 per day.

Forestry Focused: State forestry law requires, for the cutting of trees for commercial forest products, registration with the Department of Environmental Management as a "woods operator." Cutting without such registration is a misdemeanor punishable by a fine of \$100 to \$500.

South Carolina

Water pollution law makes it ". . . unlawful for any person to place any pollutant in a location where it is likely to enter the waters . . ." of the state. Enforcement is by notices of violation, compliance orders, injunctive relief, criminal liability, and civil penalties of up to \$25,000 per day.

Forestry Focused: State forestry law does not specifically address (regulate) nonpoint sources of water pollutants on private lands, although state-owned forest land is addressed. The Erosion and Sediment Reduction Act requires the DHEC to promulgate regulations for erosion and sediment reduction and stormwater management on land owned by the State, a State agency, a quasi-state agency or land under the management or control of such an entity. For forest land controlled by the State Forestry Commission, the Commission must develop and implement a sediment reduction plan, doing so in consultation with the DHEC.

South Dakota

Water pollution law prohibits discharges of waste that result in water quality violations, and the placement of wastes in locations where they are likely to cause water pollution. The state's Water Management Board is required to promulgate water quality standards and to classify water according to its beneficial uses. The standards must protect public health, use of waters for public water supplies, propagation of fish and aquatic life and wildlife, recreational purposes and agricultural, industrial, and other legitimate uses. Persons violating rules are liable for a civil penalty not to exceed \$10,000 or for damages to the environment, or both. Criminal violations are misdemeanors subject to a fine not to exceed \$10,000 and/or a sentence of up to one year imprisonment.

Tennessee

Water pollution law (Water Quality Control Act of 1977) prohibits "the discharge of sewage, industrial wastes or other wastes into waters, or a location from which it is likely that the discharged substance will move into waters . . ." However, the law does not apply to "any agricultural or forestry activity or the activities necessary to the conduct and operations thereof or to any lands devoted to the production of any agricultural or forestry products, unless there is a point source discharge from a discernible, confined, and discrete water conveyance." Enforcement of the law is through corrective action orders, civil penalties up to \$10,000 per day, criminal misdemeanor prosecution, and injunctions. Violators are also subject to a cause of action for damages.

Texas

Water pollution law provides that ". . . no person may discharge sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state." Exempted from this prohibition are discharges authorized by permit, discharges in compliance with a certified water quality management plan as provided under the state agriculture code, and activities under the jurisdiction of the Department of Parks and Wildlife, General Land Office (coastal management) or the Railroad Commission of Texas. Enforcement is through administrative penalties up to \$10,000 per day, civil penalties of between \$50 and \$10,000, and injunctions.

Forestry Focused: State Soil and Water Conservation Board and soil and water conservation districts are empowered to plan, implement and manage programs for abating agricultural and silvicultural nonpoint source pollution. Where silvicultural nonpoint sources are identified as important water quality problems, the Board can certify a program for addressing the problem, using local soil and water conservation districts as the key implementers of the plan. The Board adopts rules for the plans in compliance with state water quality standards.

Utah

Water pollution law makes it unlawful for any person to discharge a pollutant into waters of the state or to cause pollution which constitutes a menace to public health and welfare, is harmful to wildlife, fish or aquatic life, or impairs domestic, agricultural, industrial, recreational or other beneficial uses of water. Violations of these prohibitions are treated as a public nuisance. If violations occur, the state's Water Quality Board may give written notice, may seek injunctive relief in a civil action, pursue civil penalties not to exceed \$10,000, or, in the case of willful or gross negligence, seek fines not to exceed \$25,000.

Forestry Focused: Utah Forest Practices Act requires registration of timber operators and 30 day advance notification of intent to commence harvesting practices. Utah Division of Forestry has 10 days in which to acknowledge receipt of notification and to provide information about guidelines to improve water quality. Division (in cooperation with Extension Service) is to promote use of guidelines and related technical information.

Vermont

Water pollution control law prohibits "discharge [of] any waste, substance or material into the waters of the state" without a permit. For certain classes of waters, the state "shall not regulate accepted agricultural or silvicultural practices, as are defined by the commissioners of agriculture, food and markets and forests, parks and recreation . . ." Law is enforceable by administrative orders, emergency orders, administrative penalties of up to \$25,000 for a single violation \$10,000 per day (but not more than \$100,000 total) for a continuing violation, civil enforcement, and criminal enforcement.

Forestry Focused: State forestry law requires notice of intent to harvest when harvest involves more than forty acres. State forestry agency must review the proposed harvest to determine compliance with silvicultural guidelines and forestry standards and requirements with respect to water quality, wetlands, and riparian zones. Exemptions from notice are properties under a state approved forest management plan. Violation of law or rules may result in a penalty of up to \$50,000 and up to \$25,000 per day for a continuing violation. Municipal bylaws may not restrict "accepted silvicultural practices."

Virginia

Water pollution law provides that ". . . except as otherwise permitted by law, it shall be unlawful for any person to [place pollutants] into state waters which can substantially impair the lawful use or enjoyment of such waters and their environs by others." Violations are misdemeanors and punishable by "a fine of not less than \$100 nor more than \$500 or by confinement in jail not more than twelve months or both such fine and imprisonment." Any person whose property is damaged or whose property is threatened with damage may seek from the court ". . . an injunction enjoining any violation of this law . . ."

Forestry Focused: State forestry law declares that if silvicultural activities are being conducted in a manner that causes or is likely to cause pollution, the state forester ". . . may advise the owner or operator of corrective measures needed to prevent or cease the pollution." The state forester is also granted authority ". . . to issue special orders to any owner or operator . . . to cease immediately all or part of silvicultural activities on a site and to implement specified corrective measures within a stated period of time." Also authorized is the issuance of emergency orders (without advance notice or hearing) if an ". . . owner or operator is conducting any silvicultural activity in a manner which is causing or is likely to cause an alteration of the physical, chemical or biological properties of any state waters resulting from sediment deposition . . ." A civil penalty of up to \$5,000 per violation per day may be assessed after the owner or operator has been given an opportunity for a hearing. Orders may be enforced by injunction.

Washington

Water pollution law prohibits the discharge of "any organic or inorganic matter that shall cause or tend to cause" water pollution and requires a permit for the disposal of solid or liquid waste material into waters of the state. The state Department of Ecology ("DOE") enforces the law by bringing an action, issuing orders or directives, or imposing penalties. Willful violations are crimes punishable by a fine of up to \$10,000 and/or imprisonment for not more than one year. Civil violations incur penalties of up to \$10,000 per day per violation.

Forestry Focused: State forestry law (forest practices act) requires the state forest practices board to promulgate regulations that establish minimum forest practices standards. Regulations determine which forest practices fall within which of four classes of practices, ranging from Class I, requiring no notification, through Classes II-IV requiring notification and submission of an application for approval. Class IV forest practices are considered to have "a potential for substantial impact on the environment and therefore require an evaluation." The state departments of Ecology and Natural Resources enforce the law. The attorney general also may engage in enforcement actions, and a county may bring actions in superior court against the state departments, landowners, timber owners, and operators. Sanctions include civil penalties, collect costs, or disapproval, for up to one year, of a forest practices application.

West Virginia

Water pollution law has minimal regulation or prohibition of nonpoint source discharges.

Forestry Focus: State forestry law also requires a license for commercial timber harvest and purchase of timber or logs for resale, and certification of supervisors of logging sources. If the Division of Forestry notifies the Office of Water Resources (Division of Environmental Protection) that failure to use a particular best management practice is causing or contributing, or has the potential to contribute, to soil erosion or water pollution, the Division of Environmental Protection may issue a written compliance order, issue immediate suspension of work orders, suspend licenses or certificates for 30 to 90 days for the second violation within two years, or revoke licenses or certificates for third violations within two years. The Division may seek civil penalties of up to \$2,500 for the first offense and \$5,000 for subsequent offenses.

Wisconsin

Water pollution law authorizes the Department of Natural Resources (DNR) to issue general orders and adopt rules applicable for "preventing and abating pollution of the waters of the state." The DNR may issue orders for the abatement of nonpoint source pollution which the Department has determined to be significant on a case-by-case basis. Violators of agency orders are subject to administrative penalties of up to \$5,000 per day.

Forestry Focus: State forestry law provides for a tax incentive program that requires submission of a forest management plan. Failure to file notice of intent to harvest can result in fines up to \$1,000. Persons intentionally harvesting merchantable timber in violation of the law are subject to forfeiture equal to 20 percent of the current value of the timber harvested. Furthermore, "All slash which falls into or is deposited in any lake or stream or on the land of an adjoining owner, shall be immediately removed . . ." Violators are subject to fines of not more than \$50, however repeat offenders are subject to higher fines and imprisonment.

Wyoming

Water pollution law (Wyoming Environmental Quality Act) prohibits "causing, threatening or allowing the discharge of any pollution or waste into the waters of the state" or "altering the physical, chemical, radiological, biological or bacteriological properties of any waters of the state" unless authorized by permit. Enforcement measures include cease-and-desist orders, temporary and permanent injunctive relief, reparations for damages, civil penalties of up to \$10,000 per violation per day, and criminal penalties of up to \$25,000 per violation per day and/or imprisonment of up to one year.

Source: Adapted from Ellefson and others 1995 and 2002, Environmental Law Institute 1997 and 1998, National Conference of State Legislatures 2001, Wear and Greis 2002, and various state statute directories and related documents.

APPENDIX B: Regional State Forest Practices Regulatory Conditions

Table B-1. Extent to Which Forestry Practices Are Correctly Applied on Private Forest Land in the North, by Major Forestry Practice Categories. 2003.

Major Categories of Forestry Practices	Degree to which Forestry Practices are Judged to be Correctly Applied on Private Forest Land (percent of states)				
	Always	Often	Some-times	Never	Total
Road and Trail Practices (e.g., water crossings, erosion control, material disposal sites, blasting standards, winter use and closures)	15	55	30	0	100 [20]
Timber Harvesting Practices (e.g., landings; skid trails; slash management; equipment; felling, bucking and yarding; residual stand damage; safety)	15	55	30	0	100 [20]
Reforestation Practices (e.g., site preparation, timing, species selection, artificial or natural, regeneration levels, supplemental planting)	10	55	35	0	100 [20]
Cultural Practices (e.g., early release treatments, thinning, pruning, stand improvement cuttings, stand health)	0	45	55	0	100 [20]
Chemical Application Practices (e.g., methods of application, intensity, timing, mixing, spill management)	20	50	30	0	100 [20]
Forest Protection Practices (e.g., fuel loads, fire prevention; disease and insect prevention; animal damage prevention, salvage and sanitation cuttings)	5	50	45	0	100 [20]
Administrative Practices (e.g., planning, notifying, reporting, monitoring, evaluating, enforcing)	5	50	40	5	100 [20]
All Major Categories	10	51	38	1	100 [20]

Note: Number in brackets [] is number of states.

Table B-2. Extent to Which Forestry Practices Are Correctly Applied on Private Forest Land in the South, by Major Forestry Practice Categories. 2003.

Major Categories of Forestry Practices	Degree to which Forestry Practices are Judged to be Correctly Applied on Private Forest Land (percent of states)				
	Always	Often	Sometimes	Never	Total
Road and Trail Practices (e.g., water crossings, erosion control, material disposal sites, blasting standards, winter use and closures)	0	92	8	0	100 [13]
Timber Harvesting Practices (e.g., landings; skid trails; slash management; equipment; felling, bucking and yarding; residual stand damage; safety)	0	92	8	0	100 [13]
Reforestation Practices (e.g., site preparation, timing, species selection, artificial or natural, regeneration levels, supplemental planting)	0	92	8	0	100 [13]
Cultural Practices (e.g., early release treatments, thinning, pruning, stand improvement cuttings, stand health)	0	69	31	0	100 [13]
Chemical Application Practices (e.g., methods of application, intensity, timing, mixing, spill management)	23	62	15	0	100 [13]
Forest Protection Practices (e.g., fuel loads, fire prevention; disease and insect prevention; animal damage prevention, salvage and sanitation cuttings)	8	31	61	0	100 [13]
Administrative Practices (e.g., planning, notifying, reporting, monitoring, evaluating, enforcing)	0	54	46	0	100 [13]
All Major Categories	5	70	25	0	100 [13]

Note: Number in brackets [] is number of states.

Table B-3. Extent to Which Forestry Practices Are Correctly Applied on Private Forest Land in the West, by Major Forestry Practice Categories. 2003.

Major Categories of Forestry Practices	Degree to which Forestry Practices are Judged to be Correctly Applied on Private Forest Land (percent of states)				
	Always	Often	Sometimes	Never	Total
Road and Trail Practices (e.g., water crossings, erosion control, material disposal sites, blasting standards, winter use and closures)	12	70	18	0	100 [17]
Timber Harvesting Practices (e.g., landings; skid trails; slash management; equipment; felling, bucking and yarding; residual stand damage; safety)	18	70	12	0	100 [17]
Reforestation Practices (e.g., site preparation, timing, species selection, artificial or natural, regeneration levels, supplemental planting)	18	59	17	6	100 [17]
Cultural Practices (e.g., early release treatments, thinning, pruning, stand improvement cuttings, stand health)	6	35	59	0	100 [17]
Chemical Application Practices (e.g., methods of application, intensity, timing, mixing, spill management)	12	70	18	0	100 [17]
Forest Protection Practices (e.g., fuel loads, fire prevention; disease and insect prevention; animal damage prevention, salvage and sanitation cuttings)	6	59	35	0	100 [17]
Administrative Practices (e.g., planning, notifying, reporting, monitoring, evaluating, enforcing)	18	41	41	0	100 [17]
All Major Categories	13	58	28	1	100 [17]

Note: Number in brackets [] is number of states.

Table B-4. Extent to Which Forestry Practices Applied to Private Forest Land in the North Are Regulated by State Government Agencies, by Major Forestry Practice Categories. 2003.

Major Categories of Forestry Practices	Degree to which Forestry Practices Applied to Private Forest Land are Regulated (percent of states)				
	All Practices Regulated	Some Practices Regulated	Only If Certain Conditions Exist	No Practices Regulated	Total
Road and Trail Practices (e.g., water crossings, erosion control, material disposal sites, blasting standards, winter use and closures)	15	60	10	15	100 [20]
Timber Harvesting Practices (e.g., landings; skid trails; slash management; equipment; felling, bucking and yarding; residual stand damage; safety)	10	25	20	45	100 [20]
Reforestation Practices (e.g., site preparation, timing, species selection, artificial or natural, regeneration levels, supplemental planting)	15	10	15	60	100 [20]
Cultural Practices (e.g., early release treatments, thinning, pruning, stand improvement cuttings, stand health)	0	15	15	70	100 [20]
Chemical Application Practices (e.g., methods of application, intensity, timing, mixing, spill management)	40	45	0	15	100 [20]
Forest Protection Practices (e.g., fuel loads, fire prevention; disease and insect prevention; animal damage prevention, salvage and sanitation cuttings)	0	55	5	40	100 [20]
Administrative Practices (planning, notifying, reporting, monitoring, evaluating, enforcing)	0	65	15	20	100 [20]
All Major Categories	11	39	12	38	100 [20]

Note: Certain conditions (thresholds) calling for imposition of regulations could include sedimentary pollutants exceeding a water quality standard or tree planting occurring below acceptable levels of reforestation. Note: Number in brackets [] is number of states.

Table B-5. Extent to Which Forestry Practices Applied to Private Forest Land in the South Are Regulated by State Government Agencies, by Major Forestry Practice Categories. 2003.

Major Categories of Forestry Practices	Degree to which Forestry Practices Applied to Private Forest Land are Regulated (percent of states)				
	All Practices Regulated	Some Practices Regulated	Only If Certain Conditions Exist	No Practices Regulated	Total
Road and Trail Practices (e.g., water crossings, erosion control, material disposal sites, blasting standards, winter use and closures)	8	31	46	15	100 [13]
Timber Harvesting Practices (e.g., landings; skid trails; slash management; equipment; felling, bucking and yarding; residual stand damage; safety)	8	23	54	15	100 [13]
Reforestation Practices (e.g., site preparation, timing, species selection, artificial or natural, regeneration levels, supplemental planting)	8	15	31	46	100 [13]
Cultural Practices (e.g., early release treatments, thinning, pruning, stand improvement cuttings, stand health)	8	0	31	61	100 [13]
Chemical Application Practices (e.g., methods of application, intensity, timing, mixing, spill management)	31	23	23	23	100 [13]
Forest Protection Practices (e.g., fuel loads, fire prevention; disease and insect prevention; animal damage prevention, salvage and sanitation cuttings)	8	8	30	54	100 [13]
Administrative Practices (planning, notifying, reporting, monitoring, evaluating, enforcing)	0	31	8	61	100 [13]
All Major Categories	10	19	32	39	100 [13]

Note: Certain conditions (thresholds) calling for imposition of regulations could include sedimentary pollutants exceeding a water quality standard or tree planting occurring below acceptable levels of reforestation. Note: Number in brackets [] is number of states.

Table B-6. Extent to Which Forestry Practices Applied to Private Forest Land in the West Are Regulated by State Government Agencies, by Major Forestry Practice Categories. 2003.

Major Categories of Forestry Practices	Degree to which Forestry Practices Applied to Private Forest Land are Regulated (percent of states)				
	All Practices Regulated	Some Practices Regulated	Only If Certain Conditions Exist	No Practices Regulated	Total
Road and Trail Practices (e.g., water crossings, erosion control, material disposal sites, blasting standards, winter use and closures)	41	24	29	6	100 [17]
Timber Harvesting Practices (e.g., landings; skid trails; slash management; equipment; felling, bucking and yarding; residual stand damage; safety)	41	12	24	23	100 [17]
Reforestation Practices (e.g., site preparation, timing, species selection, artificial or natural, regeneration levels, supplemental planting)	18	17	12	53	100 [17]
Cultural Practices (e.g., early release treatments, thinning, pruning, stand improvement cuttings, stand health)	0	41	12	47	100 [17]
Chemical Application Practices (e.g., methods of application, intensity, timing, mixing, spill management)	29	41	6	24	100 [17]
Forest Protection Practices (e.g., fuel loads, fire prevention; disease and insect prevention; animal damage prevention, salvage and sanitation cuttings)	0	53	18	29	100 [17]
Administrative Practices (planning, notifying, reporting, monitoring, evaluating, enforcing)	35	24	12	29	100 [17]
All Major Categories	24	30	16	30	100 [17]

Note: Certain conditions (thresholds) calling for imposition of regulations could include sedimentary pollutants exceeding a water quality standard or tree planting occurring below acceptable levels of reforestation. Note: Number in brackets [] is number of states.

Table B-7. State Agency Involvement in the Regulation of Forestry Practices on Private Forest Land in the North, by Agency Primary Function, Extent of Agency Involvement and Magnitude of Staff Involved with Regulatory Programs. 2003.

Agency Primary Function	Total (percent)	Extent of Agency Involvement in Regulation of Forestry Practices (percent of agencies)			Magnitude of Agency Staff Involved in Regulation of Forestry Practices (percent of agencies)		
		Extensive	Moderate	Minimal	< 3 FTEs	3 to 7 FTEs	> 7 FTEs
Air and Water Management and Pollution Control Agencies	100 [30]	7	53	40	63	14	23
Forest Resource Management Agencies	100 [23]	52	39	9	26	26	48
Fish and Wildlife Management Agencies	100 [12]	17	33	50	58	25	17
Parks and Natural Area Management Agencies	100 [6]	0	50	50	50	33	17
Land Use Planning and Management Agencies	100 [5]	0	0	100	100	0	0
Soil & Resource Conservation Agencies	100 [5]	20	20	60	60	40	0
Economic Development and Transportation Agencies	100 [3]	0	0	100	100	0	0
Insect, Disease and Invasive Species Agencies	100 [3]	0	33	67	67	0	33
Other Agencies	100 [23]	9	52	39	65	22	13
TOTAL	100 [110]	17	42	41	57	21	22

Note: Other agency primary functions include reclamation and restoration, law and rule enforcement, taxation and revenue collection, professional licensing and certification, human health and safety, trails and roads, archeology and historic preservation, coastal zone management, solid and hazardous materials, agriculture and food provisions, and environmental quality generally. Number in brackets [] is number of agencies engaged in regulation.

Table B-8. State Agency Involvement in the Regulation of Forestry Practices on Private Forest Land in the South, by Agency Primary Function, Extent of Agency Involvement and Magnitude of Staff Involved with Regulatory Programs. 2003.

Agency Primary Function	Total (percent)	Extent of Agency Involvement in Regulation of Forestry Practices (percent of agencies)			Magnitude of Agency Staff Involved in Regulation of Forestry Practices (percent of agencies)		
		Extensive	Moderate	Minimal	< 3 FTEs	3 to 7 FTEs	> 7 FTEs
Air and Water Management and Pollution Control Agencies	100 [24]	8	38	54	75	4	21
Forest Resource Management Agencies	100 [15]	13	47	40	47	0	53
Soil & Resource Conservation Agencies	100 [11]	9	0	91	73	18	9
Fish and Wildlife Management Agencies	100 [8]	24	38	38	38	12	50
Insect, Disease and Invasive Species Agencies	100 [3]	34	0	66	100	0	0
Parks and Natural Area Management Agencies	100 [2]	0	50	50	50	0	50
Economic Development and Transportation Agencies	100 [0]	0	0	0	0	0	0
Land Use Planning and Management Agencies	100 [0]	0	0	0	0	0	0
Other Agencies	100 [19]	0	16	84	63	37	0
TOTAL	100 [82]	10	28	62	63	14	23

Note: Other agency primary functions include reclamation and restoration, law and rule enforcement, taxation and revenue collection, professional licensing and certification, human health and safety, trails and roads, archeology and historic preservation, coastal zone management, solid and hazardous materials, agriculture and food provisions, and environmental quality generally. Number in brackets [] is number of agencies engaged in regulation.

Table B-9. State Agency Involvement in the Regulation of Forestry Practices on Private Forest Land in the West, by Agency Primary Function, Extent of Agency Involvement and Magnitude of Staff Involved with Regulatory Programs. 2003.

Agency Primary Function	Total (percent)	Extent of Agency Involvement in Regulation of Forestry Practices (percent of agencies)			Magnitude of Agency Staff Involved in Regulation of Forestry Practices (percent of agencies)		
		Extensive	Moderate	Minimal	< 3 FTEs	3 to 7 FTEs	> 7 FTEs
Air and Water Management and Pollution Control Agencies	100 [27]	18	41	41	63	26	11
Forest Resource Management Agencies	100 [19]	74	26	0	16	31	53
Fish and Wildlife Management Agencies	100 [10]	20	60	20	50	10	40
Land Use Planning and Management Agencies	100 [6]	0	17	83	83	17	0
Soil & Resource Conservation Agencies	100 [5]	0	40	60	60	0	40
Insect, Disease and Invasive Species Agencies	100 [2]	0	0	100	0	100	0
Parks and Natural Area Management Agencies	100 [2]	0	50	50	50	50	0
Economic Development and Transportation Agencies	100 [0]	0	0	0	0	0	0
Other Agencies	100 [13]	15	31	54	69	31	0
TOTAL	100 [84]	27	36	37	52	25	23

Note: Other agency primary functions include reclamation and restoration, law and rule enforcement, taxation and revenue collection, professional licensing and certification, human health and safety, trails and roads, archeology and historic preservation, coastal zone management, solid and hazardous materials, agriculture and food provisions, and environmental quality generally. Number in brackets [] is number of agencies engaged in regulation.

Table B-10. State Agency Involvement in the Regulation of Forestry Practices on Private Forest in the North, by Agency Primary Function and Degree of Coordination with Lead State Forestry Agency. 2003.

Agency Primary Function	Portion of Regulating Agencies Coordinating with State's Lead Forestry Agency on Regulatory Activities (percent of agencies)				Total (percent)
	Extensive	Moderate	Minimal	None	
Air and Water Management and Pollution Control Agencies	17	43	40	0	100 [30]
Forest Resource Management Agencies	83	13	4	0	100 [23]
Fish and Wildlife Management Agencies	25	33	33	9	100 [12]
Parks and Natural Area Management Agencies	17	0	66	17	100 [6]
Land Use Planning and Management Agencies	0	40	60	0	100 [5]
Soil and Resource Conservation Agencies	40	40	20	0	100 [5]
Economic Development and Transportation Agencies	0	100	0	0	100 [3]
Insect, Disease and Invasive Species Agencies	34	33	33	0	100 [3]
Other Agencies	35	39	13	13	100 [23]
TOTAL	35	34	26	5	100 [110]

Note: Other agency primary functions include reclamation and restoration, law and rule enforcement, taxation and revenue collection, professional licensing and certification, human health and safety, trails and roads, archeology and historic preservation, coastal zone management, solid and hazardous materials, agriculture and food provisions, and environmental quality generally. Number in brackets [] is number of agencies engaged in regulation.

Table B-11. State Agency Involvement in the Regulation of Forestry Practices on Private Forest Land in the South, by Agency Primary Function and Degree of Coordination with Lead State Forestry Agency. 2003.

Agency Primary Function	Portion of Regulating Agencies Coordinating with State's Lead Forestry Agency on Regulatory Activities (percent of agencies)				Total (percent)
	Extensive	Moderate	Minimal	None	
Air and Water Management and Pollution Control Agencies	21	46	33	0	100 [24]
Forest Resource Management Agencies	80	20	0	0	100 [15]
Soil and Resource Conservation Agencies	18	9	46	27	100 [11]
Fish and Wildlife Management Agencies	63	12	25	0	100 [8]
Insect, Disease and Invasive Species Agencies	34	66	0	0	100 [3]
Parks and Natural Area Management Agencies	0	50	50	0	100 [2]
Economic Development and Transportation Agencies	0	0	0	0	100 [0]
Land Use Planning and Management Agencies	0	0	0	0	100 [0]
Other Agencies	5	16	63	16	100 [19]
TOTAL	33	26	34	7	100 [82]

Note: Other agency primary functions include reclamation and restoration, law and rule enforcement, taxation and revenue collection, professional licensing and certification, human health and safety, trails and roads, archeology and historic preservation, coastal zone management, solid and hazardous materials, agriculture and food provisions, and environmental quality generally. Number in brackets [] is number of agencies engaged in regulation.

Table B-12. State Agency Involvement in the Regulation of Forestry Practices on Private Forest Land in the West, by Agency Primary Function and Degree of Coordination with Lead State Forestry Agency. 2003.

Agency Primary Function	Portion of Regulating Agencies Coordinating with State's Lead Forestry Agency on Regulatory Activities (percent of agencies)				Total (percent)
	Extensive	Moderate	Minimal	None	
Air and Water Management and Pollution Control Agencies	41	26	26	7	100 [27]
Forest Resource Management Agencies	100	0	0	0	100 [19]
Fish and Wildlife Management Agencies	40	60	0	0	100 [10]
Land Use Planning and Management Agencies	0	50	50	0	100 [6]
Soil and Resource Conservation Agencies	40	40	20	0	100 [5]
Insect, Disease and Invasive Species Agencies	0	0	0	100	100 [2]
Parks and Natural Area Management Agencies	0	50	50	0	100 [2]
Economic Development and Transportation Agencies	0	0	0	0	100 [0]
Other Agencies	15	54	23	8	100 [13]
TOTAL	45	31	20	4	100 [84]

Note: Other agency primary functions include reclamation and restoration, law and rule enforcement, taxation and revenue collection, professional licensing and certification, human health and safety, trails and roads, archeology and historic preservation, coastal zone management, solid and hazardous materials, agriculture and food provisions, and environmental quality generally. Number in brackets [] is number of agencies engaged in regulation.

Table B-13. Effectiveness of Major State Government Programs in Promoting Correct Application of Forestry Practices on Private Forests in the North, by Major Forestry Practice Category. 2003.

Major Categories of Forestry Practices	Effectiveness of Program in Promoting Correct Application of Each Major Category of Forestry Practices				
	Extension Education Programs	Technical Assistance Programs	Tax Incentive Programs	Financial Incentive Programs	Regulatory Programs
Road and Trail Practices (e.g., water crossings, erosion control, material disposal sites, blasting standards, winter use and closures).	3.60	3.85	1.55	2.70	3.15
Timber Harvesting Practices (e.g., landings; skid trails; slash management; equipment; felling, bucking and yarding; residual stand damage; safety).	3.80	4.30	1.75	2.45	2.70
Reforestation Practices (e.g., site preparation, timing, species selection, artificial or natural, regeneration levels, supplemental planting).	3.25	4.15	2.45	3.30	1.85
Cultural Practices (e.g., early release treatments, thinning, pruning, stand improvement cuttings, stand health).	3.55	4.25	2.10	3.40	1.80
Chemical Application Practices (e.g., methods of application, intensity, timing, mixing, spill management).	3.55	3.95	1.80	2.30	3.55
Forest Protection Practices (e.g., fuel loads, fire prevention; disease and insect prevention; animal damage prevention, salvage and sanitation cuttings).	4.00	4.05	1.65	2.30	3.00
Administrative Practices (planning, notifying, reporting, monitoring, evaluating, enforcing).	3.75	4.00	2.05	2.15	3.25
All Major Categories	3.64	4.08	1.91	2.66	2.76

Note: 5= most effective, 4=somewhat effective, 3=average effectiveness, 2= marginally effective, 1=least effective.

Table B-14. Effectiveness of Major State Government Programs in Promoting Correct Application of Forestry Practices on Private Forests in the South, by Major Forestry Practice Category. 2003.

Major Categories of Forestry Practices	Effectiveness of Program in Promoting Correct Application of Each Major Category of Forestry Practices				
	Extension Education Programs	Technical Assistance Programs	Tax Incentive Programs	Financial Incentive Programs	Regulatory Programs
Road and Trail Practices (e.g., water crossings, erosion control, material disposal sites, blasting standards, winter use and closures).	4.31	4.00	1.77	3.00	1.92
Timber Harvesting Practices (e.g., landings; skid trails; slash management; equipment; felling, bucking and yarding; residual stand damage; safety).	4.15	3.85	2.00	2.77	2.23
Reforestation Practices (e.g., site preparation, timing, species selection, artificial or natural, regeneration levels, supplemental planting).	3.46	4.00	2.62	3.77	1.15
Cultural Practices (e.g., early release treatments, thinning, pruning, stand improvement cuttings, stand health).	3.69	4.23	2.23	3.46	1.23
Chemical Application Practices (e.g., methods of application, intensity, timing, mixing, spill management).	4.07	4.00	1.54	3.23	2.07
Forest Protection Practices (e.g., fuel loads, fire prevention; disease and insect prevention; animal damage prevention, salvage and sanitation cuttings).	4.38	3.92	1.93	2.77	1.85
Administrative Practices (planning, notifying, reporting, monitoring, evaluating, enforcing).	3.85	3.77	2.00	2.77	1.92
All Major Categories	3.99	4.00	2.01	3.11	1.77

Note: 5= most effective, 4=somewhat effective, 3=average effectiveness, 2= marginally effective, 1=least effective.

Table B-15. Effectiveness of Major State Government Programs in Promoting Correct Application of Forestry Practices on Private Forests in the West, by Major Forestry Practice Category. 2003.

Major Categories of Forestry Practices	Effectiveness of Program in Promoting Correct Application of Each Major Category of Forestry Practices				
	Extension Education Programs	Technical Assistance Programs	Tax Incentive Programs	Financial Incentive Programs	Regulatory Programs
Road and Trail Practices (e.g., water crossings, erosion control, material disposal sites, blasting standards, winter use and closures).	3.53	3.59	1.73	2.82	3.41
Timber Harvesting Practices (e.g., landings; skid trails; slash management; equipment; felling, bucking and yarding; residual stand damage; safety).	3.82	3.65	1.80	2.41	3.35
Reforestation Practices (e.g., site preparation, timing, species selection, artificial or natural, regeneration levels, supplemental planting).	3.24	3.35	2.33	3.12	2.94
Cultural Practices (e.g., early release treatments, thinning, pruning, stand improvement cuttings, stand health).	3.59	4.00	2.20	3.18	2.06
Chemical Application Practices (e.g., methods of application, intensity, timing, mixing, spill management).	3.75	3.56	1.86	2.12	3.62
Forest Protection Practices (e.g., fuel loads, fire prevention; disease and insect prevention; animal damage prevention, salvage and sanitation cuttings).	3.47	3.65	1.80	3.67	2.71
Administrative Practices (planning, notifying, reporting, monitoring, evaluating, enforcing).	3.59	3.94	1.80	2.35	3.41
All Major Categories	3.57	3.68	1.91	2.75	3.07

Note: 5= most effective, 4=somewhat effective, 3=average effectiveness, 2= marginally effective, 1=least effective.

APPENDIX C: Prominent State Forest Practices Regulatory Programs

Table C-1. Prominent State Forest Practices Regulatory Programs, by State. 2004.

ALASKA FOREST RESOURCES AND PROTECTION ACT

Authority and Program Governance

Statute Citation: Alaska Forest Resources and Practices Act. *AK Stat. Title 41. Sec. 41.17.010-41 - 41.17.950.* Policy and Intent: Balance protection of state's forest resources with the economic benefits and activities derived from forest resources and ensure sustainable management of forest resources. Achieved through a combination of professional management delivery and regulatory measures. Administration: Commissioner of Department of Natural Resources has authority to adopt and promulgate regulations to further intent of the act, and with the approval of the Department of Environmental Conservation, to adopt regulations to control nonpoint source pollution. Consults with departments of Environmental Conservation and Office of Habitat Management and Permitting. Technical assistance from Division of Forestry. State Board of Forestry reviews and comments on adopted regulations. Board promotes coordination and cooperation between agencies. Reports to legislature on effectiveness of regulations and act generally. Applicability: All state, municipal, and private forest land is subject to provisions of act. Federal land management must be compatible with Alaska Coastal Zone Management Act. The Forest Resources and Practices Act establishes the forest management standards for compliance with the coastal management program. Act contains standards for administration of state, municipal, and private lands, and for public lands only. Act provides for interagency cooperation and review and comment. Minor forestry activities (e.g. personal use) are exempt. Regulated Practices: Road construction and maintenance; timber harvesting activities; log transfer, sort yards, and storage facilities; reforestation; prevention and suppression of insects and disease; salvage logging; vegetative management; and fire and flood control management. Act also specifically provides regulation for site preparation; deployment of broadcast chemicals; forest land conversion; riparian management; and wildlife habitat on private land. Procedures: Land or timber owner or operator must submit plan before beginning operation. Operation may begin upon notice of state forester or expiration of 30-day period, whichever occurs first. State forester reviews all plans, distributes to affected state agencies, coastal districts, and to members of the public who request notification; approves plans within 30 days. Forester may conduct inspections and issue stop work order for operation's components in violation of act or rules. Recommendations from the Office of Habitat Management and Permitting, and Department of Environmental Conservation are solicited. Enforcement and Penalties: If, upon inspection, a violation has been determined, the state forester may issue directive (in writing) notifying person of violation and ordering said person to cease violating activity. Respondent may appeal with state forester, then superior court, if directive is sustained. If violation poses significant harm to public or to environment, state forester may issue stop work order. Respondent may appeal to hearing officer named by state forester, and, if sustained, may appeal to superior court. Each violation is subject to civil fine not to exceed \$10,000. Fine imposed after directive and/or stop work order is issued and final appeals hearings. Costs of repairing damage imposed on landowner, timber-owner, or operator.

Program Administration and Investments

The budget required for administration of the Alaska program averaged about \$240,000 per year (current dollars) for the period 1985 (\$364,000) through 1991 (\$224,000) and in 1991 accounted for about two percent of the budget assigned to the state's Division of Forestry (Ellefson and others 1995). During the period since 1999, the program's budget was as follows: 2000 – \$526,900 (3.1 percent of Division budget), 2001 – \$678,300 (3.9 percent), 2002 – \$700,900 (3.9 percent), and 2003 - \$718,000 (3.5 percent). Approximately 58 percent of the 2003 budget was from state government general funds and 42 percent from special program funds of the federal government. The 2003 budget was distributed over the following expenditure categories: 40 percent – review of plans and notifications, 6 percent – enforcement actions, 4 percent – employee continuing education and training, 8 percent – landowner & timber operator continuing education, 4 percent – equipment and supplies, 16 percent – monitoring and evaluation, and 17 percent –

general administrative actions. The staff assigned to the program averaged 4.1 full-time equivalents (FTEs) during the period 1985 (6.5) through 1991 (3.0) (Ellefson and others 1995). Since 1999, the staff assigned the program was: 2000 – 5.1 FTEs, 2001 – 7.9 FTEs, 2002 – 7.9 FTEs, and in 2003 – 7.9 FTEs. The most recent major updating of the program’s administrative rules occurred in 1999 (for Region I) and 2003 (for Region III).

During the period 1994 through 2003, the Division of Forestry annually received an average of 148 new notifications of intent to harvest. In addition, 57 notification renewals were annually granted during the same period. In total, about 200 total operations were annually active under required notification provisions. In 2003, the average harvest area per notification was 298 acres. An average of about 155 inspections are annually made by the Division of Forestry (1.3 inspections per operation). The Department of Environmental Conservation (14 inspection in 2003) and the Division of Habitat and Restoration (70 inspections in 2003) also conduct inspections. An average of 2.7 violation notices are issued by the Division each year. A more detail description of notifications, inspections and violations follows (Alaska Division of Forestry 2004).

Year	New Notifications	Inspections of Private Forestry Operations*	Violation Notices Issued
1994	204	217	9
1995	216	243	4
1996	209	195	4
1997	186	167	5
1998	120	125	1
1999	114	108	0
2000	137	187	1
2001	83	152	2
2002	112	133	1
2003	94	125	0

*Inspections by the Division of Forestry. Inspections also conducted by the Department of Environmental Conservation.

CALIFORNIA Z’BERG-NEJEDLY FOREST PRACTICES ACT

Authority and Program Governance

Statute Citation: Calif. Public Resources Code. Sec.4511-4628. Policy and Intent: Create and maintain an effective and comprehensive system of regulation and use of all timberlands to achieve goal of sustained yield of timber products while considering recreation, watershed, wildlife range and forage, fisheries, regional economic vitality, and aesthetics. Administration: State Board of Forestry has primary authority to adopt and promulgate regulations. Establishes and consults with district forest practices committees to adopt district regulations. Solicits recommendations from Department of Fish and Game, State Water Resources Control Board, State Air Resources Control Board, and California Coastal Commission. Department of Forestry and Fire Protection (CDF) administers and enforces regulations adopted by board. Director of Department approves plans and brings action to correct violations. Applicability: All land available for, and capable of growing a crop of trees of commercial species used to produce lumber and other forest products is subject to provisions of act. Federal land and designated experimental forests are exempt. Board may exempt additional nonsignificant forest activities. Act does not limit rights of local governments. Provides for county government input for specific regulations. Regulated Practices: Cutting and removal of timber for commercial purposes; road construction and maintenance; fuel and fire beaks; stream crossings; landings; skid trails; fire hazard abatement; site preparation; erosion control; and natural and scenic quality protection. Act mandates conformance to specific resource

conservation standards (e.g., minimum stocking requirements), timberland conversion procedures, fire protection, soil erosion control, and stream protection. Act governs any activity which alters the physical or vegetative characteristics of any forest land and any activity involving or associated with the cutting of trees or harvesting forest products. All forest practices are subject to minimum standards. Procedures: All timber operators require a license issued by board. Timber harvesting operations require a timber harvest plan (THP) prepared by a registered professional forester (RPF). Plan includes detailed description of proposed harvest and silvicultural methods, erosion control methods, and road layout. Department receives plan and distributes for public and interagency review. After review period, department decides if plan is suitable. If plan is rejected, submitter may request appeal hearing. Department of Fish and Game and State Water Resources Control Board may also request hearing. Operator must submit completion report after operations. Department inspects for suitability. Within 5 years, owner must submit stocking report. Department inspects for suitability. Landowners with less than 2,500 of timberland may opt for nonindustrial timber management (NTMP) which mandates long-term use of uneven-aged management to achieve sustained yield of forest products. Long-term NTMPs eliminate need for individual THPs, prior approval of harvest operations, and are sheltered from subsequent rule changes. Enforcement and Penalties: Department may issue, upon inspection, a stop order as preliminary action to cease violation. Revocation of order may entail agreement for owner or operator to repair damages or otherwise correct violation. Respondent may appeal to State Board of Control. Department may bring action in court to enjoin violating operations. May seek temporary restraining order, court ordered remedy of damages and violation, or other actions directing the defendant or department to correct the violations. All costs of repair or corrective action may be in form of bond or a lien on property. Department must notify owner and operator of all corrective actions taken by the Department. Each violation constitutes a misdemeanor punishable by fine not exceeding \$1,000 or 6 months imprisonment in county jail, or both.

Program Administration and Investments

The budget required for administration of the California program averaged about \$6,235 thousand per year (current dollars) for the period 1985 (\$4,833 thousand) through 1991 (\$8,690 thousand) and in 1991 accounted for about two percent of the budget assigned to the state's Department of Forestry and Fire Protection (Ellefson and others 1995). During the period since 1999, the program's budget was as follows: 2000 – \$12,972 thousand (2.4 percent of Department budget), 2001 – \$12,651 thousand (1.8 percent), 2002 – \$13,828 thousand (2.1 percent), and 2003 - \$13,748 thousand (2.3 percent). Approximately 96 percent of the 2003 budget was from state government general funds and 4 percent from dedicated funds (for example, special taxes). The 2003 budget was distributed over the following expenditure categories: 55 percent – review of plans and notifications, 25 percent – enforcement actions, 3 percent – employee continuing education and training, 5 percent – equipment and supplies, 3 percent – monitoring and evaluation, and 9 percent – general administrative actions. The staff assigned to the program averaged 70.4 full-time equivalents (FTEs) during the period 1985 (68.0) through 1991 (94.0) (Ellefson and others 1995). Since 1999, the staff assigned the program for each of the five years 2000 through 2003 was 124.5 FTEs.

During the period 1999 through 2003, about 3,900 timber harvest plans were submitted per year to the CA Division of Forestry and Fire Protection (CDF). Each operation authorized by a plan was inspected an average of 1.8 times (average of 2.4 times per 1,000 acres harvested). An average of 832 violations per approved operation occurs each, or about 0.21 per plan (average of 0.28 per 1,000 acres harvested). In 2003, \$340,260 in fines were imposed and 6.0 years of probation were assessed. The former was a three year high, with fines in 2001 only \$60,855. The number of timber harvest plans, inspections and penalty actions taken for the period 1999 through 2003 is as follows.

Year	Harvest Plans Submitted*	Number of Inspections	Number of Violations	Misdemeanor Actions	Civil Actions Initiated**	Administrative Civil Complaints Initiated***
1999	4,259	6,825	628	33	4	0
2000	4,182	8,050	894	40	12	1
2001	3,571	7,190	687	12	0	16
2002	3,877	6,747	519	12	3	8
2003	3,671	6,488	502	11	2	3

*Included are timber harvest plans, programmatic harvest plans, exemption notices, emergency notices, nonindustrial timber management plans (466 NTHPs 1991 through 2001), and illegal (non-permitted) operations. ** Action by District attorney. *** Action by CA Division of Forestry and Fire Protection.

Year*	Fines Assessed	Fines Paid	Years of Probation Assessed
2001	\$60,855	\$48,955	10.0
2002	\$109,850	\$104,850	9.0
2003	\$340,260	\$333,650	6.0

* May include cases initiated in prior years.

CONNECTICUT FOREST PRACTICES ACT

Authority and Program Governance

Statute Citation: CT Stat. Title 24. Chap. 451a. Policy and Intent: Provide a comprehensive state-wide system of laws and forest practices to protect and enhance natural resource and environmental values with consideration to ownership goals and public interest. Focus of law is on competency of timber harvesters, not on forest practice standards per se. *Administration:* Commissioner of Department of Environmental Protection develops and adopts standards against which judgements are made for approval or denial status as a certified forest practitioner. Standards are adopted consultation with Forest Practices Advisory Board. *Applicability:* Harvest of commercial forest products on all lands, including state-owned lands, is subject to the Act. Home-rule authority is respected by the act, provided some conditioning by the commissioner. *Regulated Practices:* Act governs any activity which alters the physical or vegetative characteristics of any forest land and any activity involving or associated with the cutting of trees or harvesting forest products. There are no specified forest practice standards. *Procedures:* Three classes of forest practitioners are established: forester, supervising forest products harvester, and forest products harvester. Each is authorized to conduct certain commercial forestry operations, but in order to do certified status must be granted (up to five years) by the Commissioner (using information from application for certification). Commissioner has power to deny or revoke certification for noncompliance with environmental law (primarily wetland statutes) or demonstration of incompetence as attested to by prior poorly conducted harvesting activities. Practitioners must annually submit a report of activities specified by the Commissioner, and each practitioner is required to participate in a biennial professional education program sanctioned by the Commissioner. *Enforcement and Penalties:* Commissioner may suspend or revoke any violating practitioner's certification as a means of enforcement. Commissioner may issue in writing an order to comply, detailing nature of violation and ordering person to comply with provisions of act or rules. Respondent may request hearing with Commissioner. If person fails to comply with order, Commissioner may request Attorney General to bring action in superior court to enjoin person to comply with the act. Civil penalty up to \$5,000 per day for each day a violation occurs.

Program Administration and Investments

The Connecticut Forest Practices Act was established in 1991 at which time the estimated cost of administration was \$210,00 annually (Ellefson and others 1995). Since 1999, the staff assigned the program for the five years 2000 through 2003 was 3.0 FTEs. Assuming an investment of \$55,000 per FTE, the estimated 2003 investment in the Connecticut program is \$165,000. The program's administrative rules were last revised in 1998.

IDAHO FOREST PRACTICES ACT

Authority and Program Governance

Statute Citation: ID Stat. Title 38. Chap. 13. Sec. 1301-1313. Policy and Intent: Encourage forest practices on public and private lands to maintain and enhance benefits and resources resulting from forest lands. Assure continuous growing and harvesting of forests and protection and maintenance of soil, air, water, wildlife, and aquatic habitat. Provide a mechanism for harmonizing, implementing, and enforcing forest practice laws and rules. Administration: Board of Land Commissioners adopt rules for forest regions, including forest practice standards. Consults with 8-member Forest Practices Advisory Committee. Committee members represent interests from northern and southern regions of state; give technical advice to board; coordinate agencies, landowners interests. Department of Lands administers and enforces act and adopted rules. Applicability: All private, state and federal land growing forest tree species that are capable of furnishing raw material used in forest products manufacture. Regulated Practices: Harvesting activities, road construction, reforestation, chemical and fertilizer use, and slash management. Conversion of forest land requires notification. Procedures: Operator must notify department of intent. Woodland management plan may suffice. If operation borders stream segment of concern, notice must be given 10 days prior. Site-specific best management practices (BMPs) are given for segment of concern in written agreement. Nonresident operators must submit performance bond of \$200 per acre, minimum of \$5,000, max. of \$15,000. Enforcement and Penalties: Department first issues notice of violation, then may issue cease-and-repair order. If cease-and-repair order is not complied with, department may issue stop work order. Operator may challenge stop order in court or request hearing with board. Department may initiate remedies. All costs of repair and administration are responsibility of operator. Department may act to recover costs or may place a lien on property. Bond of nonresident is forfeited in this case. Violation of notification and bonding requirements may be enjoined with court-ordered temporary restraining order or preliminary injunction. All violations are misdemeanors subject to fine. At the discretion of the Board of Land Commissioners, habitual or repeat violators must post an operating bond. Department of Lands will not accept new notifications from operators with current Notice of Violations.

Program Administration and Investments

The budget required for administration of the Idaho program averaged about \$ 386,000 per year (current dollars) for the period 1985 (\$108,000)through 1991 (\$685,000) and in 1991 accounted for about 4 percent of the budget assigned to the state's Department of Lands (Ellefson and others 1995). During the period since 1999, the program's budget was as follows: 2000 – \$1,171 thousand (5.9 percent of Department budget), 2001 – \$1,462 thousand (7.2 percent), 2002 – \$1,505 (6.6 percent), and 2003 - \$1,457thousand (6.0 percent). Approximately 67 percent of the 2003 budget was from state government general funds, 28 percent from dedicated funds (for example, special taxes), and 5 percent from federal government special programs. The 2003 budget was distributed over the following expenditure categories: 5 percent – review of plans and notifications, 5 percent – enforcement actions, 5 percent – landowner and timber operator continuing education and training, 20 percent – equipment and supplies, 40 percent – monitoring and evaluation (routine inspections), landowner education and assistance – 20 percent, and 5 percent – general administrative actions. The staff assigned to the program averaged 7.9 full-time equivalents (FTEs)during the period 1985 (4.5) through 1991 (13.7) (Ellefson and others 1995). Since 1999, the staff assigned the program was 19.0 FTEs in 2000, and 20.0 FTEs in each year 2001 through 2003. The most recent major updating of the program's administrative rules occurred in 1995, 1996 and 2000.

The number of notifications, inspections, violations and enforcement activities by the Department of Lands for the period 2001 through 2003 is as follows.

Year	Notifications Received	On-site Inspections	Noncompliance with Best Management Practice	Issuance of Notice of Violation
2001	3,679	2,532	246	11
2002	3,911	2,478	273	18
2003	3,591	2,709	219	10

Noncompliance denotes the number of operations where at least one best management practice is not in compliance (about 90 percent of operations are in full compliance). The Department takes no further action if corrective action is taken. However, if a violation(s) continues the Department may issue a formal Notice of Violation after which it can pursue administrative or legal action considered necessary.

MAINE HARVEST REPORTING LAW

Authority and Program Governance

Statute Citation: Harvest Reporting Requirements. *ME Law Title 12. Chap. 805. Sec. 8881-8883, 8883B, 8885, 8887, 8888.* *Policy and Intent:* State role is as catalyst to encourage and promote sustainable management and use of forests and related resources. State must manifest a consistent and comprehensive perspective, with regard to private ownership. *Administration:* Commissioner of Conservation develops and promulgates rules and regulations. Consults with technical working and stakeholder groups, Citizens' Forestry Advisory Council, and commissioners of Environmental Protection, and Inland Fisheries and Wildlife. Reviews municipal comprehensive plans to ensure compatibility with state goals. Bureau of Forestry administers field forestry and regulatory programs. Bureau of Forestry administers, enforces daily activities of act. *Applicability:* All forest lands within state including state and municipal ownership. Experimental forests, precommercial operations, and personal use are exempt. Municipalities may adopt regulations in consultation with department. *Regulated Practices:* Clearcutting, regeneration, harvesting in shoreland areas (effective 2006), and harvesting on lands owned for five years or less (effective 2005) are subject to forest practice standards. Also calls for minimum stocking, water quality protection, soil erosion control, wildlife habitat management. Goal of balanced-age, sustainable forest. *Procedures:* Landowner must notify bureau of harvest. Notice is effective for 2 years. Clear-cuts over 50 acres must have management plan (certified by a licensed forester) on file subject to inspection. Forest landowner must submit confidential report detailing information on species, volume and stumpage of trees cut, location of stumpage, acreage of harvest, methods used, and extent of whole-tree harvesting. Owners must submit confidential precommercial silvicultural practice report for practices on lands of 10 acres or more. Wood processors must submit annual reports on products exported or imported. Director publishes report on harvest methods and practices employed throughout state. *Enforcement and Penalties:* Civil penalty for failure to notify (harvest of less than 50 cords -- up to \$50, more than 50 cords -- up to \$1,000 each occurrence), continued operation after cessation order up to \$1,000 per day. Failure to comply with cease order is punishable with fine of not more than \$1,000 per day of violation. Failure to submit appropriate reports is punishable by fine of not more than \$1,000.

Program Administration and Investments

The budget required for administration of the Maine program was \$170,000 in 1990 and \$340,000 in 1991 and in the latter year accounted for about 4 percent of the budget assigned to the state's Bureau of Forestry (Maine Forest Service) (Ellefson and others 1995). The 2003 budget is estimated to be \$1,155,000 (\$70,000 per FTE), all of which is from state government general funds. In 2003, the budget was estimated to distributed over the following expenditure categories: 40 percent – review of harvest notifications, 5 percent – enforcement of forest practice standards, 15 percent – continuing education of

agency employees, 5 percent – equipment and supplies and 35 percent – general administrative actions. The staff assigned to the program in 1990 and 1991 was 6.0 FTEs, while the staff in 2003 was 16.5 FTEs (58 forest rangers at 20 percent time; 14 foresters at 35 percent time). A staff FTE required \$70,000 annually.

The Maine Bureau of Forestry experienced the following in terms of notification inspections, notification violations (Maine Forest Service 2003) and civil penalties during the period 2000 through 2003.

Year	Notifications	Notification Inspections	Notification Violations	Civil Penalties
2000	6,352	2,829	177	\$ 0
2001	5,591	3,348	236	1,251
2002	5,121	1,458	35	977
2003	4,827(est)	4,492	12	762

The notifications received in 2002 were distributed by ownership type as follows: nonindustrial – 89 percent, industrial – 7 percent, other woodlands (for example, government), and institutional investor timberlands – 1 percent (Maine Forest Service 2003). During the period 2000 through 2003, the Bureau negotiated settlement agreements for nine violations of forest practices standards with \$53,250 in assigned penalties. The Bureau also prevailed in a court-ordered decree for a monetary penalty of \$19,500. And lastly, the Bureau issued four letters of warning for minor violations during the period 2000 through 2003.

MASSACHUSETTS FOREST CUTTING PRACTICES ACT

Authority and Program Governance

Statute Citation: Massachusetts Forest Cutting Practices Act. *MA Gen. Laws. Title 15. Chap. 132. Sec. 40-51. Policy and Intent:* Public welfare requires rehabilitation, maintenance, and protection of forest lands for a variety of outputs. All lands devoted to forest growth to be kept in good condition to protect and maintain public interest. Foster cooperation between landowners and state agencies. *Administration:* Director of Division of State Parks and Recreation (Bureau of Forestry) seeks recommendations for rules from an 8-member State Forestry Committee representing a diversity of forestry sector interests. Public hearings are held to discuss the proposed rules. The Director then adopts the rules, with approval of Commissioner of Environmental Management, and proceeds with their implementation via staff assigned the Bureau of Forestry. *Applicability:* Every owner of land proposing to cut forest products on land devoted to forest purposes (with certain exceptions). Does not specify ownerships. Forest practices are subject to Wetlands Act and Slash Law and are subject to review and recommendation by the MA Natural Heritage and Endangered Species Program. *Regulated Practices:* Act does not specify practices (specified in rules). Practice of forestry is defined as including activities involving inventories, planning, appraisal and silvicultural activities. Exempt cuttings involve noncommercial use, maintenance of rights of ways and pastures, clearing for buildings or cultivation purposes, and cutting less than 25,000 board feet or 50 cords. *Procedures:* All parties engaged in the business of timber harvest must obtain license from director. Must notify adjacent landowners that are within 200 feet of harvest area of intent to cut. Owner must also submit notice and a cutting plan to regional office of the Division, the director, and the municipal conservation commission. All cutting plans receive an initial inspection (except when agency has prior knowledge that wetlands or streams are not involved), an interim inspection especially sensitive resources are involved, and a final inspection (which is mandatory). Landowners cutting on classified land must submit stumpage estimate and mark boundaries of cutting area. Cutting may begin after 10-day waiting period on lands not a wetland or rare species habitat, or when director issues final work order. Aggrieved landowner may appeal decision to deny cutting within 10 days after denial. Landowner may further appeal aggrieved decision to superior court. Director may inspect any time. Director's agent must prepare report specifying nature of operation, extent of operation, amount cut, and other information following cutting. *Enforcement and Penalties:* Failure to

submit notice of intent, written plan, or comply with written plan is punishable by a civil penalty not to exceed \$100 per acre. Director may issue stop work orders. Director may suspend or revoke license of timber harvester until corrective actions are taken. Any person in violation of act is subject to a fine of not more than \$500 per violation. Superior court may enjoin operations and order remedies.

Program Administration and Investments

The budget required for administration of the Massachusetts cutting practices program averaged about \$500,000 per year (current dollars) for the period 1985 (\$480,000) through 1991 (\$560,000) (Ellefson and others 1995). During the period since 1999, the program's budget for 2000 through 2002 averaged \$570,000 per year (14 percent of budget of Division of Forests and Parks) and in 2003 was \$460,000 (12 percent of Division budget). All funds for the 2003 program funds came from state government general funds, and was distributed as follows: over the following expenditure categories: 55 percent – review of plans and notifications, 5 percent – enforcement actions, 2 percent – employee continuing education, 10 percent – landowner and timber operator continuing education and training, one percent – equipment and supplies, 17 percent – monitoring and evaluation (routine inspections), and 10 percent – general administrative actions. The staff assigned to the program averaged 15.7 full-time equivalents (FTEs) during the period 1985 (16.0) through 1991 (15.0) (Ellefson and others 1995). Since 1999, the staff assigned the program was 18.0 FTEs in 2000 and 2001, and 16.0 FTEs in each year 2002 through 2003. Most recent major updating of the program's administrative rules occurred in 1996.

The Bureau of Forestry received about 650 plans (notifications) per year during the period 2002 through 2003 (fiscal year 2002 – 686 plans, fiscal year 2003 – 618 plans, and fiscal year 2004 – 654 plans). During this three year period, 55 plans were not approved (2.8 percent of total received). In 2003, the Bureau initiated enforcement actions against licensed foresters (one license suspension and several warnings) and timber harvesters (one license suspension). About 30 stop-work orders were issued in 2003 and more than 10 informal enforcement meetings were held with timber harvesters. Enforcement actions have not involved court action (consequently, no fines issued have been assigned).

MONTANA NOTIFICATION AND STREAMSIDE MANAGEMENT ACTS

Authority and Program Governance

Statute Citation: Prior Notification of Forest Practice Application. *MT Stat. Title 76. Chap. 13. Part 1.* Administered by the Division of Forestry, MT Department of Natural Resources and Conservation, the law requires landowners to inform the Department of their intent to harvest timber. Having made known their intent, the law requires the Department to provide (within five working days) operators and landowners with information about best management practices, and, if necessary, carry-out an on-site consultation with the operator or landowner. Owners may also submit for approval a notice providing an annual, semiannual, or quarterly operating plan that indicates the estimated starting date of forest practices for each timber sale planned by the owner during the operating period.

Statute Citation: Streamside Management Zones. *MT Stat. Title 77. Chap. 5. Sec. 3-1-307.* Intent on maintaining the integrity of forest streams and the quality and quantity of water available for domestic, agricultural, industrial, and recreational use, the law is also administered by the Division of Forestry, MT Department of Natural Resources and Conservation, The law defines a streamside zone (50 feet each side of stream, lake or other body of water) and prohibits certain activities in such zones, including broadcast burning, operation of wheeled or tracked equipment, clearcutting, handling of hazardous materials, sidelaying of road material, and deposit of slash in streams or other waterbodies. Civil penalty up to \$1,000 per violation.

Program Administration and Investments

The 1991 budget required for administration of Montana's notification program and streamside program was \$83,000 thousand (current dollars) or about one percent of the Division of Forestry's total budget (Ellefson and others 1995). During the period since 1999, the budget for administering the programs was as follows: 2000 – \$518,000 (5.4 percent of Division budget), 2001 – \$529,000 (5.5 percent), 2002 -- \$603,000 (5.7 percent), and 2003 – \$614,000 (6.1 percent). Approximately 80 percent of the 2003 budget was from state government general funds and 20 percent from state special revenues. The 2003 budget was distributed over the following expenditure categories: 20 percent – review of plans and notifications, 5 percent – enforcement actions, 5 percent – employee continuing education and training, 30 percent – landowner & timber operator continuing education, 20 percent – equipment and supplies, 19 percent – monitoring and evaluation, and one percent – general administrative actions. In 1991, 2.0 FTE staff was assigned to the programs' administration (Ellefson and others 1995). Since 1999, the staff assigned the programs was: 2000 – 16.3 FTEs, 2001 – 16.8 FTEs, 2002 – 17.8 FTEs, and in 2003 – 18.4 FTEs. The most recent major updating of the program's administrative rules occurred in 2000.

In 1991, the Division of Forestry processed 1,100 notifications and made 110 on-site visits (950 and 95, respectively in 1990) (Ellefson and others 1995). In fiscal year 2004, 1,223 pre-harvest notifications were received by the Division, resulting in like number of BMP information packets mailed to landowners. During the same period, 237 on-site consultations occurred, six post-harvest evaluations were made, 24 alternative practices were issued, and 11 streamside zone warnings were issued (Montana Department of Natural Resources and Conservation 2004).

NEVADA FOREST PRACTICE ACT

Authority and Program Governance

Statute Citation: Nev. Rev. Stat. Chap. 528. Sec. 10 - 120. *Policy and Intent:* Establish minimum forest practices standards and require compliance to promote sustained productivity and preserve water supply. *Administration:* Lead authority rests with state forester-firewarden. Adopts rules regarding minimum forest practices and protection of uncut trees. Processes permits and conversion certificates. Ensures compliance to erosion control measures. Committee composed of state forester, director of Department of Wildlife, and state engineer grants variances for operations in watershed and water body buffer areas. *Applicability:* Cutting practices of all timber owners or operators conducting logging operations must conform to Act. Land ownerships subject to act not specified. Operations removing trees for conversion are exempted. *Regulated Practices:* Act specifically defines allowances, restrictions, and limitations on cutting, operations on slopes, activities near water bodies, erosion control measures, seeding, fire prevention, and timberland conversion. Under cutting practice standards, trees of certain age and diameter must be left. *Procedures:* All operations require logging permit obtained from Division of Forestry. Variances must be submitted to state forester with specific information. State forester sets performance bond based on contract price of timber cut, conditioned on compliance with provisions of the logging permit. State forester has 45 days to act. Applicant can request hearing within 10 days. Timber land conversion certificate is required for conversion Must submit plan and affidavit. Performance bond of \$75 per acre is required to insure soil stabilization and rehabilitation costs. *Enforcement and Penalties:* Violation of any provision of the act constitutes a misdemeanor. State forester may adopt rules regarding enforcement procedures. State forester may suspend or revoke logging permit as means of enforcement.

Program Administration and Investments

The budget required for administration of the Nevada program averaged about \$1,062 thousand per year (current dollars) for the period 1985 (\$875,000) through 1991 (\$1,250 thousand) and in 1991 accounted for about 12 percent of the budget assigned to the state's Division of Forestry (Ellefson and others 1995). During the period since 1999, the program's budget was as follows: 2000 – \$884,000 (estimated), 2001 – \$549,227 (20 percent of Division budget), 2002 – \$616,747 (22 percent), and 2003 - \$704,513 (23 percent). Approximately 98 percent of the 2003 budget was from state government general

funds and 2 percent from special dedicated funds related to the regulatory program (for example, permit fees). The 2003 budget was distributed over the following expenditure categories: 15 percent – review of plans and notifications, 5 percent – enforcement actions, 5 percent – employee continuing education and training, 20 percent – landowner & timber operator continuing education, 10 percent – equipment and supplies, 5 percent – monitoring and evaluation, and 40 percent – general administrative actions. The staff assigned to the program averaged 5.0 full-time equivalents (FTEs) during the period 1985 (5.0) through 1991 (5.0) (Ellefson and others 1995). Since 1999, the staff assigned the program was: 2000 – 5.0 FTEs, 2001 – 6.0 FTEs, 2002 – 6.0 FTEs, and in 2003 – 7.0 FTEs. The most recent major updating of the program's administrative rules occurred in 2002.

The number of harvest permit applications received in 2002 is estimated to be about 215. Such presumes an average of \$490 to review and approve a permit and \$105,700 of the Division's 2003 forest practice program budget allocated to such reviews (15 percent of \$704,513).

NEW MEXICO FOREST CONSERVATION ACT

Authority and Program Governance

Statute Citation: NM Stat. Chap. 68. Sec. 2-1 to 2-23. *Policy and Intent:* Assist in prevention and suppression of forest fires, control of forest pests, maintain and enhance economic benefits of forest resources to New Mexico, and provide guidance toward good forest resource management (stated in rules). *Administration:* Under authority of NM Conservation Act, rules adopted and implemented by the Division of Forestry, Department of Energy, Minerals and Natural Resources. *Applicability:* Applies to all person, associations, corporations, and other legal government entities engaged in harvest activities on non-municipal or non-federal lands. *Regulated Practices:* Harvesting activities, treatment of slash, erosion prevention (water bars and reseeded), tree utilization, and reforestation. At a minimum, 300 healthy trees must exist within 5 years after harvest. Special requirements for prevention of erosion when converting forest to non-forest land. Operators may propose alternatives to the forest practice standards set forth in rules. *Procedures:* When harvesting more than 25 acres (or combination of areas totaling more than 25 acres in one calendar year on same or adjacent property), operator must apply to Division for a harvesting permit 30 days prior to commencing harvest operations. Application must contain plans for regeneration, roads and skid trails, and time schedule for harvesting. Operator not allowed to fell timber in more than 2 harvest units at one time. For proposed harvest less than 25 acres, a harvest permit must be obtained if owner or contractor has been convicted of harvesting violations within previous three years. *Enforcement and Penalties:* Notices issued for discovery of deficiencies. Violation of regulations punishable by misdemeanor fine up to \$1,000 or imprisonment not to exceed one year or both. New permits not granted if deficient conditions in previous sites.

Program Administration and Investments

The budget required for administration of the New Mexico program averaged about \$205,000 per year (current dollars) for the period 1985 (\$190,000) through 1991 (\$217,000 thousand) and in 1991 accounted for about 7 percent of the budget assigned to the state's Division of Forestry (Ellefson and others 1995). During the period 2000 through 2003, the program's budget has remained at \$500,000 annually, with its portion of the Division's total budget distributed as follows: 2000 – 8 percent, 2001 – 7 percent, 2002 – 7 percent, and 2003 – 6 percent. Approximately 85 percent of the program's 2003 budget was from state government general funds and 15 percent from federal government special programs. The 2003 budget was distributed over the following expenditure categories: 25 percent – review of plans and notifications, 10 percent – enforcement actions, 10 percent – employee continuing education and training, 5 percent – landowner & timber operator continuing education, 5 percent – equipment and supplies, 30 percent – monitoring and evaluation, and 35 percent – general administrative actions. The staff assigned to the program averaged 7.0 full-time equivalents (FTEs) during the period 1985 (7.0) through 1991 (7.0) (Ellefson and others 1995). Since 1999, the staff assigned the program in 2000, 2001 and 2002 was 2002 – 8.0 FTEs,

and in 2003 – 9.0 FTEs. The most recent major updating of the program’s administrative rules occurred in 2001.

The number of harvest permit applications received in 2002 is estimated to be about 255. Such presumes an average of \$490 to review and approve a permit and \$125,000 of the Division's 2002 forest practice program budget allocated to such reviews (25 percent of \$500,000)

OREGON FOREST PRACTICES ACT

Authority and Program Governance

Statute Citation: OR Rev. Stat. Title. 44. Chap. 527. Sec. 610-992. Policy and Intent: Encourage economically efficient forest practices. Assure continuous growing and harvest of forest products. Maintain forest land as primary use on private land consistent with sound management of other natural resources. Avoid uncertainty and confusion with other laws and agency regulations. Administration: Forestry Board adopts regulations to carry out intent of act and to establish forest practice standards. Regional forest practices committees assist board in promulgating regulations, but only advisory. Board decides by rule which operations require notices and/or written plans. Board develops inventory and regulations regarding endangered species. Board consults with departments of Environmental Quality, Fish and Wildlife, Parks and Recreation, State Lands, and others when developing regulations. Submits report to legislature and governor. Department of Forestry implements and enforces act. Applicability: Land used for growing and harvesting forest tree species, regardless of zoning or tax classification or how state or local statutes, regulations or ordinances apply. Christmas tree farms and short rotation crops are exempt. Federal lands not mentioned. No local government may adopt regulations or ordinances to limit or regulate forest practices. Regulated Practices: Operations on forest land including reforestation, road construction and maintenance, harvesting trees, application of chemicals, and slash disposal are subject to regulation under the act. Procedures: Board determines by rule which operations require a notice and which require a written plan. Notice must be given for all operations. Written plans are required of all operations within 100 feet of Type “F” (fish-bearing) and Type “D” (domestic use) streams or 300 feet of the site of a protected resource. Notification plan is transmitted to Department of Revenue, local county assessor, and person requesting a copy. Comments on written plans may be submitted within 14 days after plan is submitted. State Forester may comment between 14 and 21 days after plan is submitted. The operation may commence on the date the State Forester provides comments, or at any time after 21 calendar days, providing a notification has also been submitted. Written plans may be required for other actions, but no comment period is provided. Persons aggrieved by approved operations (and made timely comments) may request hearing with the board. Enforcement and Penalties: State forester may issue citation of violation, order to cease operations, and an order to repair damages. State forester may take further action through a temporary order. Person being served with orders may request hearing with the board. Civil penalties up to \$5,000 and criminal penalties may be assessed for all forest practice violations. Lesser forms of enforcement may be utilized through the written statement of unsatisfactory conditions when damage is on-existent or so limited as to be easily correctable. State forester may consider past history and degree of violation. Penalty must be served in writing. Penalty must be paid in 10 days after becoming final and may become a lien on the property thereafter. Person served the penalty may request a hearing. If state forester repairs damage, the person in violation is responsible for costs and lien may be placed on property.

Program Administration and Investments

The budget required for administration of the Oregon program averaged about \$2,445 thousand per year (current dollars) for the period 1985 (\$1,600 thousand) through 1991 (\$3,300 thousand) and in 1991 accounted for about 6 percent of the budget assigned to the state’s Department of Forestry (Ellefson and others 1995). During the period since 1999, the program’s budget was as follows: 2000 – \$7,000 thousand (7 percent of Department budget), 2001 – \$7,000 thousand (7 percent), 2002 – \$7,600 thousand (6 percent), and 2003 - \$7,800 thousand (7 percent). Approximately 59 percent of the 2003 budget was from state government general funds, 40 percent from special dedicated funds related to the regulatory program (for

example, special taxes), and 1 percent from federal government special program funds. The 2003 budget was distributed over the following expenditure categories: 2 percent – review of plans and notifications, 3 percent – enforcement actions, 5 percent – employee continuing education and training, 7 percent – landowner & timber operator continuing education, 16 percent – equipment and supplies, 6 percent – monitoring and evaluation, and 38 percent – general administrative actions, and 2 percent research through cooperative agreements. The staff assigned to the program averaged 55 full-time equivalents (FTEs) during the period 1985 (44.1) through 1991 (64.3) (Ellefson and others 1995). Since 1999, the staff assigned the program was: 2000 – 103.0 FTEs, 2001 – 103.0 FTEs, 2002 – 110.0 FTEs, and in 2003 – 94.0 FTEs. The most recent major updating of the program’s administrative rules occurred in 1995, 1996 and 2002.

Department of Forestry notifications, on-site inspections and enforcement actions for the period 2000 through 2003 is as follows:

Year	Notifications Submitted	Reported On-Site Inspections	Citations Issued	Civil Penalties Issued	Corrective Action Ordered
2001	19,122	5,028	118	106	74
2002	21,014	6,736	66	60	45
2003	19,375	2,292	57	48	30

For the period 1990 through 1997, the Department issued an average of 270 citations per year, of which about 28 percent were for violations of rules involving reforestation (Rose and Coate 2000). In 1994 and 1995, an unusually large number of reforestation rule valuations occurred because of a significant rule change, namely reforestation to begin within 12 months of harvest. The average penalty issued for violation of reforestation rules during the period 1990 through 1997 was \$1,529. However, penalties were most commonly at either the maximum (105 of 388 penalties assessed, or 27 percent, were at least \$3,750) or the minimum (150 of 388 penalties assessed, or 39 percent, were for \$0). Maximum penalties are assessed when planting is not completed to rule standards (\$3,750 for less than five acres, and \$5,000 for five or more acres). Reforestation compliance and citations issued for the period 1990 through 1999 are as follows (Oregon Department of Forestry 2002b, Rose and Coate 2000).

Year	Acres in Reforestation Compliance	Percent of Acres in Reforestation Compliance	Reforestation Citations Issued	Total Citations Issued
1990	--	--	39	184
1991	--	--	36	178
1992	--	--	43	197
1993	--	--	32	288
1994	145,291	97.3	145	306
1995	153,808	98.8	187	436
1996	112,902	98.9	67	280
1997	130,748	99.5	67	297
1998	127,227	98.4	--	--
1999	158,182	99.6	--	--

UTAH FOREST PRACTICES ACT

Authority and Program Governance

Statute Citation: UT Stat. Title 65A. Chap. 8A. Sec 101-106. *Policy and Intent:* Promote the sustainable harvest of the state’s forests and ensure the application of forest practice guidelines that will preserve water quality and soil stability, prevent hazard of fire and insect infestation, minimize waste of

timber resources, and protect the regenerative and productive capacity of forest land. *Administration:* Lead authority for the Act rests with the UT Division of Forestry, Fire and State Lands, although the Division is to cooperate with the UT State University Extension Services in promoting water quality guidelines and providing technical assistance to landowners and operators. Administrative rules may be promulgated by the Division. *Applicability:* Persons responsible for conducting forest practices and persons having contractual harvesting agreements with landowners. *Regulated Practices:* Act specifies forest practices to be harvesting of trees, road construction, site preparation, reforestation, and management of logging slash. Nor considered forest practices are nurseries, harvest of Christmas trees, harvest of trees for noncommercial personal use, and harvests involving fewer than 10 contiguous acres of forest land. *Procedures:* Persons intent on conducting forest practices (except on own land) must be registered (two year period) with the Division and must subsequently notify the Division 30 days prior to commencing forest practices. Within 10 days, Division must acknowledge the notification and provide information (including water quality guidelines) that would assist the landowner or operator when conducting forest practices. Division is to provide a list of registered operators to interested landowners. *Enforcement and Penalties:* Practices are periodically inspected by the Division. Penalties for noncompliance are not authorized.

Program Administration and Investments

The Utah Forest Practices Act was enacted in 2001 and rules regarding the registration of operators were subsequently established in 2004. Employing four FTEs, the program's 2003 budget is estimated to be \$220,000 (\$55,000 per FTE) of which 60 percent originates from grants provided by a federal water quality program. The program's budget is about 2 percent of the Division's total 2003 budget and is allocated among the following expenditure categories: 10 percent – review of harvest notifications, 5 percent – employee continuing education, 10 percent – landowner and operator education and training, 65 percent – monitoring and evaluation, and 10 percent – general administrative activities.

In 2002, the Division of Forestry received 45 notifications of intent to harvest, while in 2003 it received 16 notifications (6 notifications for 2004 partial year). As of 2004, 46 timber harvesters were registered with the Division, of which 76 percent would provide landowner with a performance bond and 93 percent would provide insurance for operations occurring on private land.

VERMONT HEAVY CUTTING AND WATER POLLUTION ACTS

Authority and Program Governance

Vermont's forest practices regulatory system encompasses a number of laws and programs. It includes a tax incentive programs (Use Value Appraisal Program) which is voluntary but requires a management plan, application of practices to standards, periodic inspections, annual activity reports and significant penalties for failure to comply with the voluntarily agreed to management plan. Other state laws that regulate forestry practices include the following:

Statute Citation: Water Pollution Prohibition. *VT Stat. Title 10. Chap. 47. Sec. 1259, 1274 and 1275.* Administered by multiple departments in the VT Agency of Natural Resources, broadly prohibits discharge of pollutants into the waters of the state and authorizes the Agency to establish acceptable management practices which are to be implemented as though administrative rules. Enforcement occurs via issuance of permits, legal orders, and judgements of superior courts (enjoin future actions, order restorations, punitive damages). Failure to obey law (neglect, refusal) implies penalties up to \$25,000 or six months imprisonment (or both) with each violation a separate offense. Knowingly making false statements in permit application leads to similar penalties (up to \$10,000).

Statute Citation: Regulation of Heavy Cutting Practices. *VT Stat. Title 10. Chap. 83. Sec. 2621-2625.* Administered primarily by the Department of Forests, Parks and Recreation, special conditions are imposed on harvests above 2,500 feet elevation. Department is authorized to adopt rules specifying silvicultural standards and stipulating standards for (examples) soil productivity, water quality, riparian zones, unique

or fragile areas, and areas having special scenic qualities. Fifteen days before commencing a harvest of 40 or more acres (or a previously harvested area within a specified distance of a proposed harvest), landowner must file with the Department a notice of intent to cut (seek an A-250 permit). Exemptions include existence of an approved agricultural conversion plan, approved forest management or chip harvesting plan, and land conversion subject to regulation by another district or board. Department has 15 days in which to respond to a completed notice of intent (appeals can be made to Department's Commissioner). Violation of law's provisions implies a civil penalty of not more than \$50,000 for each violation, and, in the case of a continuing violation, a penalty of not more than \$25,000 for each day a violation continues.

Statute Citation: Treatment of Slash. *VT Stat. Title 10. Chap. 83. Sec. 2648.* Administered primarily by the Department of Forests, Parks and Recreation, law limits the way forest cutting may manage slash near the right-of-way of any public highway and near adjoining property owners (remove slash for a distance of 50 feet from the highway right-of-way and from the boundary lines of woodlots owned by adjoining property owners). Remove slash for a distance of 100 feet from standing buildings on adjoining property, and leave main logging roads through cut-over areas free from slash.

Program Administration and Investments

The administration of Vermont's regulatory programs required a staff of six FTEs for each year 2000 through 2003. Given the level of staffing, the cost of the program in 2003 is estimated to be \$330,000 (\$55,000 per FTE). These costs were distributed over the following expenditure categories: 80 percent – review of plans and notifications, 10 percent – enforcement actions, 2 percent – employee continuing education and training, 2 percent – landowner & timber operator continuing education, one percent – equipment and supplies, 3 percent – monitoring and evaluation, and 3 percent – general administrative actions. Funds have never been specifically designated for administration of the heavy cutting law. The most recent major updating of the programs' administrative rules occurred in 1998.

Since enactment of the heavy cutting law in 1997, an average of 71 notices of intent to harvest have been filed annually with the Department of Forests, Parks and Recreation (total of 499 notices). For the same period, the average annual harvest per notification was 170 acres (total of 84,956 acres; 0.2 percent of Vermont's forest area). In 2004 (fiscal year), 32 applications were filed in response to the heavy cutting law, of which 82 percent were filed under one of the law's exempt categories (such as agricultural clearing, ice-wind related, existence of a forest management plan). Most operations are inspected on-site. In 2004, no penalties were levied (Vermont Forestry Division 2004). For the period 1998 through 2004 (fiscal years), notifications and area involved are as follows.

Year (fiscal year)	Notification of Intent to Cut	Average Area per Notification (acres)
1998	148	161
1999	87	175
2000	81	128
2001	70	153
2002	50	209
2003	20	227
2004	32	306

VIRGINIA FOREST PRACTICES NOTIFICATION ACT

Authority and Program Governance

Statute Citation: Conduct of Silvicultural Activities Affecting Water Quality. *VA Code Title 10.1. Chap. 11. Sec. 81.1 - 81.7. 71.* Administered by the VA Department of Forestry, law requires harvesters and

landowners to notify the Department (prior to completion, but not later than three days after commencement) of harvesting activities. Notification may be verbal or written and must specify location and anticipated date of activity. If harvester or landowner fails to notify, the Department may assess a civil penalty of \$250 for initial violation and not more than \$1,000 for subsequent violations in a 24 month period. Law also authorizes Department (state forester) to notify harvesters or landowners of silvicultural activities causing (or likely to cause) pollution of state waters and inform them of corrective measures to prevent or eliminate such pollution. If harvester or landowners fail to take preventive or corrective action, Department may issue special or emergency orders (with or without advance notice or hearing) requiring immediate ceasing of silvicultural activities and subsequent implementation of corrective measures. Injunctions may be sought by Department against persons refusing to obey special or emergency orders. Refusal to obey such orders can lead to civil penalties not to exceed \$5,000 for each violation. Money acquired by penalty shall be deposited in the Virginia Forest Water Quality Fund and shall be used for research, monitoring, and promotion of activities that prevent erosion and sedimentation. For operations commenced after notification, agency policy is to inspect 85 percent of such operations within 15 days of receiving a notification.

Statute Citation: Pine Trees Left for Reseeding. *VA Code Title 10.1. Chap. 11. Sec. 64 and 71.* Administered by the VA Department of Forestry, law specifies that persons owning and harvesting loblolly or white pine which constitute 25 percent or more of live trees on each acre to be harvested shall leave uncut not less than 8 cone-bearing pines 14 inches or larger in diameter on each acre cut. Seed trees may not be cut until three or more years after harvest. Persons violating law guilty of misdemeanor and may be fined \$30 for each seed tree cut, but not to exceed \$240 for any one acre. If convicted, procedures are specified for ensuring proper planting of harvested area. Provisions of law do not apply to sole land ownerships in excess of 500 acres or landowners receiving federal financial assistance for timber growing.

Statute Citation: Logging Debris in Streams. *VA Code Title 62.1. Chap. 20. Sec. 194.2.* Unlawful to obstruct any stream, river, creek or swamp by disposal of trash, debris, tree laps, logs, or felled timber. Enforced by state or local laws enforcement officials, and forest and game wardens with general police power. Violations punished as a misdemeanor.

Program Administration and Investments

The budget required for administration Virginia's regulatory programs was as follows: 2000 and 2001 – \$4,500 thousand each year (18 percent of the Department of Forestry's annual budget), 2002 – \$4,000 thousand (17 percent), and 2003 – \$4,000 thousand (17 percent). Approximately 79 percent of the 2003 budget was from state general funds, 11 percent from special dedicated funds related to the regulatory programs, 10 percent from federal government special programs. The 2003 budget was distributed over the following expenditure categories: 10 percent – review of plans and notifications, 25 percent – enforcement actions, 5 percent – employee continuing education and training, 20 percent – landowner & timber operator continuing education, 35 percent – monitoring and evaluation, and 5 percent – general administrative actions. The staff assigned to the programs was: 2000 and 2001 – 57.0 FTEs each year, 2002 – 54.0 FTEs and in 2003 – 50.0 FTEs. The most recent major updating of the program's administrative rules occurred in 1997 and 2002.

In 2003, the Department of Forestry received 5,197 notifications of intent to conduct commercial timber harvesting operations. For the period 1998 through 2003, an average of 2,780 operations were inspected each year. In 2002, 87 percent of harvest operations were inspected within 15 days of notification (exceeding Department standard of 85 percent). As for enforcement, an estimated 564 compliance actions (special orders, fines) were initiated in 2003, a number that has steadily risen since the law's enactment in 1993. Nearly all compliance actions involved failure to notify; few involve best management practice violations. In 2003, 58 special and 25 emergency special orders were issued, and \$199,856 in civil penalties were levied (\$170,191 in 2002). Only \$48,323 of the levied fines have been collected. Notifications, inspections and compliance actions for the period 1998 through 2003 are as follows.

Year	Harvest Notifications	Harvest Operations Inspected	Compliance Actions Initiated*
1998	2,037	3,180	199
1999	2,234	2,941	272
2000	2,564	3,350	622
2001	2,925	3,550	436
2002	2,896	3,326	457
2003	5,197	3,870 (est)	564 (est)

*Special orders and fines.

WASHINGTON FOREST PRACTICES ACT

Authority and Program Governance

Statute Citation: Rev. Code of WA. Title 76. Chap. 9. Sec. 10-935. Policy and Intent: Adopt comprehensive state-wide system of laws and regulations to protect public resources. Encourage profitable use of timber resources. Avoid duplication of forest practice regulations. Promote interagency cooperation. Mitigate effects of mass earth movements and fluvial process. Administration: Forest Practices Board develops and adopts regulations, including standards for forest practices and administrative standards. Water quality protection rules developed with Department of Ecology. Must submit proposed rules to Department of Fish and Game and counties for review and comment. Hearings held in counties for public comments. Department of Natural Resources implements and enforces act and rules of board. Appeals Board hears all appeals hearings and requests. Overall system coordinated via the Forest Practices Application Review System (FPARS). Applicability: Ownership details are not mentioned in the act. All but Class IV practices are exempt from statement required by State Environmental Policy Act (SEPA). No local or regional government may adopt or enforce and rules or ordinances regarding forest practices. Local governments may adopt stricter rules in conformance to Shoreline Management Act programs. Regulated Practices: General practices include: road and trail construction, intermediate and final harvest, precommercial thinning, reforestation, fertilization, disease and insect control, salvage logging, riparian management, and brush control. Board has authority to specify which practices fall under which of four forest practice classes. Procedures: Department of Natural Resources receives applications. Class II practices: submit notice, commence 5 days later. Class III practices: submit notice, Department must act within 30 days. Class IV practices: similar to class III plus detailed statement pursuant to state environmental policy act. Applications transmitted to departments of Game, Fisheries, and Ecology, and to the county in which operations are to take place; county may formally object. Operator must file a reforestation report; department inspects for compliance. Intent to convert forest land must be stated in application. Enforcement and Penalties: Department may conduct site inspections to ensure compliance, and may issue stop order or, if stop order is not needed, a notice of failure to comply. Such an order or notice is final, unless person appeals. Each notice and order includes directives for corrective actions. If remedial or corrective actions are not taken, the Department of Natural Resources may act to make the person liable for all costs, which becomes a lien if not paid in 60 days. Dept. of Ecology may take enforcement actions if water quality protection regulations are violated. Civil penalty of \$10,000 each violation (each violation a separate offense), and gross misdemeanor fine of not less than \$100 nor more than \$1,000, or imprisonment for not more than one year or both fine and imprisonment for each separate violation (each day of violation occurs constitutes a separate violation)

Program Administration and Investments

The Washington forest practices program administers forest practice rules applied on 12 million forested acres. The budget required for administration of the Washington program averaged \$3,914 thousand per year (current dollars) for the period 1985 (\$2,200 thousand) through 1991 (\$6,600 thousand)

and in 1991 accounted for about 7 percent of the budget assigned to forestry units of WA Department of Natural Resources (Ellefson and others 1995). During the period since 1998, the program's fiscal year budget was as follows: 1999 – \$6,951 thousand (5.6 percent of WA Department of Natural Resources operating expenditures), 2000 – \$7,560 (6.4 percent), 2001 – \$10,802 thousand (7.8 percent), 2002 -- \$9,313 (6.3 percent), and 2003 – \$9,656 thousand (6.8 percent) (Washington Department of Natural Resources 2004). Based on information from the mid-1990s, an estimated two-thirds of the 2003 budget was from state government general funds, with the remaining portion from special dedicated funds related to the regulatory program (Ellefson and others 1995). As for the distribution of the 2003 program budget, such is estimated to be as follows: 33percent – review of plans and notifications, 20 percent – enforcement actions, 5 percent – employee continuing education and training, 2 percent – landowner & timber operator continuing education, 10 percent – equipment and supplies, 20 percent – monitoring and evaluation, and 10 percent – general administrative actions. The staff assigned to the program averaged 75.7 full-time equivalents (FTEs) during the period 1985 (58.1) through 1991 (112.8) (Ellefson and others 1995). In 2003, the staff assigned to the program is estimated to be 176 FTEs (\$55,000 per FTE). Between 1974 and December 2003, the Division has been engaged in the promulgation of at least 27 rule changes.

In 1990, the Division of Forest Practices received 11,267 applications to harvest timber; in 1992 it was 13,455 (Ellefson and others 1995). In FY 1998-1999, the program processed 7,410 forest practices applications that affected 653,441 acres, including applications for 6,648 timber harvests, 657 chemical applications, and 3,077 road construction projects (totaling 4,748 miles) (Washington Department of Natural Resources 2004). In 2003, the Division received 5,379 harvest applications, issued 194 violation documents (does not include secondary documents issued after initial issuance of Notice to Comply or Stop Work Order), and assessed civil penalties totaling \$42,500. The Division does not keep records of on-site inspections, although preference for inspection is given to high-risk forest practice applications (generally Class III and IV).

WEST VIRGINIA LOGGING SEDIMENT CONTROL ACT

Authority and Program Governance

Statute Citation: WV Code Art. 1B. Chap. 19. Sec. 1B. *Policy and Intent:* Control commercial timber harvesting activities that expose soil and subsequently result in sediment deposition in streams. Intent is to strengthen and extend sediment control activities by establishing requirements for licensing, certification and harvest notification. *Administration:* Director of Division of Forestry has primary authority to adopt rules and procedures to implement the act, although the Chief of the Office of Water Resources, Division of Environmental Protection may initiate action if the Director fails to appropriately act on forestry practices contributing to sedimentation. *Applicability:* All timber operations, except when trees are harvested for personal use, harvested for purposes of rights-of-ways for public roads and utilities, and harvested for purposes of holiday decorations. Exempt from timber harvesting license requirement are persons harvesting trees for personal use that have an aggregate stumpage value not exceeding \$15,500. *Regulated Practices:* Forestry practices that cause or have potential to contribute to soil erosion or water pollution. Director is responsible for a licensing and certification program, to include opportunity for education and examination on matters involving safety and appropriate best management practices. *Procedures:* Persons conducting timber harvest operations must notify the Director of the Division of Forestry at least three days prior to harvest and must do so in specified manners (such as name and address, harvest location, area to be harvested, time period of harvest, sediment control practices to be used). Harvest site must be posted with operators name and license number. Such persons (Including harvesting supervisors) must have a license to conduct harvesting operations. The harvest areas is to be reclaimed within seven days of completion. If best management practices are not properly applied, Director may issue a written order requiring corrective action. The order must be complied with within 10 or fewer days or may be appealed within 48 hours to a district conference panel. Aggrieved parties may subsequently appeal to the county circuit court. *Enforcement and Penalties:* Director has authority to issue stop-work orders, suspend timber harvesting licenses, take remedial on-site action, and enter private property for purposes of making inspections. Civil penalties may be assessed, not to exceed \$2,500 for first offense and up to \$5,999 for subsequent offenses. Criminal misdemeanor penalties may also be assessed in an amount not less than \$250 and not more than

\$500. Civil penalties deposited in a timber operations enforcement fund to be used for administration and enforcement of the Act.

Program Administration and Investments

The budget required for administration of West Virginia’s sediment control program was as follows: 2000 -- estimated \$466,000, 2001 – 447,000, 2002 – \$491,800 (5.4 percent of Division of Forestry’s annual budget) and 2003 – \$760,558 (7.6 percent). Twenty-five percent of the 2003 budget was from state general funds, 25 percent from dedicated sources (special taxes), and 50 percent from federal government special programs. The 2003 budget was distributed over the following expenditure categories: 5 percent – review of plans and notifications, 50 percent – enforcement actions, 5 percent – employee continuing education and training, 20 percent – landowner and timber operator continuing education, 5 percent – equipment and supplies, 10 percent – monitoring and evaluation, and 5 percent – general administrative actions. The staff assigned to the program was: 2000 and 2001 – 61 FTEs each year, 2002 and 2003 – 66 FTEs each year. The most recent major updating of the program’s administrative rules occurred in 2002.

Since the 1992 inception of the Logging Sediment Control Act, the Division of Forestry has – through 2001 – received more than 28,664 notifications of logging operations and has issued a total of 2,340 suspension orders. For the period 1998 through 2001, an average of 3,300 notifications were received annually, 81 percent of which were investigated – 34 percent were out of compliance with recommended best management practices. In 2001, noncompliance operations involved failure to notify – 18 percent, no license – 13 percent, operation not reclaimed – 12 percent, no sign posting – 9 percent, and logger not certified – 8 percent. Of the 1,100 Division actions taken in 2001, 19 percent lead to corrective action, 51 percent involved issuance of a compliance order, and 40 percent of the operations were suspended. Notifications, inspections and corrective actions for the period 1998 through 2001 are as follows (Wang and others 2004).

Year	Harvest Notifications Received	Harvest Operations Inspected	Harvest Operations in Compliance	Agency Corrective Action Required*
1998	3,454	2,734	62 percent	1,315
1999	3,298	2,406	63 percent	1,261
2000	3,204	2,368	65 percent	1,208
2001	3,237	3,237	72 percent	1,100

* Action taken involved suspension of operation, issuance of compliance order, or corrective action taken by operator.

Source: State laws, administrative rules, and information provided by administrators of forest practices regulatory programs.