

**ORGANIZATIONS AND PROGRAMS
PROMOTING LAWFUL
HARVESTING AND MARKETING OF TIMBER
IN THE HARDWOOD FOREST REGION
OF THE UNITED STATES: AN ASSESSMENT**

by

Paul V. Ellefson

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**College of Food, Agricultural and Natural Resource Sciences
and the Agricultural Experiment Station
University of Minnesota
St. Paul, MN**

Department of Forest Resources
University of Minnesota
115 Green Hall
1530 N. Cleveland Avenue North
St. Paul, MN 55108-6112
Ph: 612-624-3400
Fax: 612-625-5212
Email: forest.resources@umn.edu
<http://www.cnr.umn.edu/FR/publications/staffpapers/>

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¹ Professor Emeritus, Department of Forest Resources, University of Minnesota. Research supported by the University of Minnesota's Department of Forest Resources and Minnesota Agricultural Experiment Station, St. Paul, MN; American Hardwood Export Council, Reston, VA; and Seneca Creek Associates, LLC, Poolesville, MD.

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INTRODUCTION

Hardwood forests in the United States are vast in area and are important to the economic and social well-being of citizens and wood-based processing facilities throughout the nation.² As the value of the timber from hardwood forests has increased, there is growing concern over unlawful activities regarding its harvest and sale and the effect of these activities on the future sustainability of the hardwood resource. The issue has become more prominent as a result of international concerns over the export of hardwood timber that may have been illegally obtained and marketed.

The U.S. hardwood producing industry is sensitive to hardwood timber that may have been obtained from unlawful sources and in unlawful manners. In 2007, the American Hardwood Export Council commissioned a major review of the issue—a portion of which is represented by this document (Goetzl and others 2008). Focused principally on the legal and programmatic aspects of the issue, the following were of major concern to this portion of the review:³

- What is the current programmatic framework for reducing the risk of illegal hardwood timber harvesting activities?
- What is the risk of illegal hardwood timber harvesting activities occurring given the current programmatic framework?
- What programmatic responses might be considered as means of addressing potential adverse consequences of illegal harvesting activities?

Illegal or unlawful acts (as defined here) are those involving the harvest and transport of timber without a lawful right to do so (lack of contract or permit, harvesting more than agreed to limits), buying or selling of timber in fraudulent or deceptive manners (failure to pay timber seller, nonpayment of taxes and related charges), and harvesting irrespective of established forestry and conservation standards (fostering pollutants and contaminants, destruction of forest diversity, infringement on high-value conservation areas) (American Forest and Paper Association 2004, Greenpeace International 2005, World Business Council on Sustainable Development 2005).

² Hardwood forest stands occur in all 50 United States, although commercially available hardwood forests are concentrated in 33 states (168 million hectares; 37 percent of total U.S. forestland area). Within the latter, ownership of hardwood forests is overwhelmingly private (approximately 80 percent of total timberland), most commonly owned by 9.1 million non-corporate entities – family forest owners. In 2007, hardwood inventory in the U.S. was about 11.4 billion cubic meters, 80 percent of which was privately owned. In 2006, timber removals from hardwood forests totaled 160 million cubic meters, 92 percent from private family forests. (Butler 2007, Forest Service 2007).

³ Focus was on the following states: *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, Wisconsin; *South*: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia; and *West*: Oregon, Washington.

ORGANIZATIONS AND PROGRAMS

State Governments

Agencies and Resource Programs

Agencies and Departments

State governments have a rich assortment of programs and agencies that have the ability to change, alter or modify the way in which hardwood forests are used, management and protected (Zumeta and Ellefson 2000). In 2001, the 33 states in the hardwood producing region had in total more than 1,000 government entities (variously identified as agencies, bureaus, offices, departments, commissions or councils) which were responsible for public programs focused on forest resources, including hardwood forests (Ellefson and others 2001, 2003) (Table 2). Sixty-two percent of these entities were affiliated with state government in the North, while 30 percent are part of state governments in the South. Averaging nearly 31 entities per state, the dominate focus of these state government agencies was on resource use and management (such as forests and forestry, fisheries and wildlife, and parks and recreation), assistance and enforcement (such as enforcement and legal action, budgeting and planning, and educational and fiscal assistance), promotion and development (such as economic development, tourism, taxation and revenue collection), and environmental protection (such as air and water pollutant management, waste management and recycling). As exercised by state agencies, each of these functions has and continues to have important and direct effects on the condition and the use of the region's hardwood forests.

Programs and Personnel

State governments make significant investments in forests within the hardwood producing region, both in terms of forestry staff and in financial investments (Tables 3 and 4). In 2007, state governments within the region employed more than 10 thousand persons, of which 44 percent were natural resource professionals (for example, foresters, wildlife managers, resource planners, watershed specialists). These professional, technical, and administrative personnel were responsible for guiding the investment of \$937 million (from all sources) into a wide variety of important forest resource programs implemented by state governments. In 2004, about half of these investments (54 percent) was focused on fire prevention and control. Although regionally modest, investments in cooperative forestry and landowner assistance—\$135 million—and in forest health— \$24 million—have increasingly become important sources of financial support for programs focused on hardwood forests. Examples are wildfire protection within the region (526 million acres), forest stewardship plans prepared (23 million acres through 2006), forest legacy projects completed (1.1 million acres through 2006), and technical assistance provided to forest landowners (144 thousand technical assists) (National Association of State Foresters 2007).

Table 1. Forest and Timberland Area in the U. S. Hardwood Producing Region, by State and Ownership. 2007.

State	Forestland Area (hectares, thousands)		Timberland Ownership (hectares, thousands)		
	Total Forestland Area	Hardwood Forestland Area	Federal, State & Local	Private Corporate	Private Non-Corporate
<i>North:</i>					
Connecticut	726	681	159	95	447
Delaware	155	135	10	43	99
Illinois	1,831	1,776	259	87	1,420
Indiana	1,884	1,827	263	119	1,452
Iowa	1,165	1,110	126	16	1,000
Maine	7,152	4,246	306	4,127	2,512
Maryland	1,038	896	171	200	590
Massachusetts	1,283	1,030	337	68	788
Michigan	7,909	5,928	2,833	1,065	3,801
Minnesota	6,633	4,596	3,292	471	2,353
Missouri	6,102	5,806	982	253	4,703
New Hampshire	1,963	1,512	439	325	1,127
New Jersey	863	659	238	201	320
New York	7,555	6,565	697	896	4,888
Ohio	3,195	3,058	280	365	2,448
Pennsylvania	6,709	6,373	1,767	853	3,862
Rhode Island	144	132	21	21	100
Vermont	1,869	1,513	256	306	1,252
West Virginia	4,859	4,674	567	1,307	2,900
Wisconsin	6,586	5,334	2,029	576	3,886
Total	69,622	57,850	15,035	11,395	39,947
<i>South:</i>					
Alabama	9,183	5,316	536	2,554	6,048
Arkansas	7,620	5,212	1,386	2,204	3,888
Florida	6,534	3,095	1,685	2,594	2,015
Georgia	10,030	5,515	737	3,221	5,855
Kentucky	4,844	4,558	417	596	3,701
Louisiana	5,755	3,214	658	2,621	2,434
Mississippi	7,941	5,165	912	1,907	5,087
North Carolina	7,465	4,921	1,004	1,564	4,682
South Carolina	5,158	2,763	590	1,444	3,082
Tennessee	5,860	5,232	649	894	4,088
Virginia	6,380	5,068	941	1,177	4,078
Total	76,771	50,057	9,513	20,776	44,957
<i>West:</i>					
Oregon	12,209	1,378	6,033	2,364	1,565
Washington	9,016	1,049	3,723	1,959	1,956
Total	21,225	2,428	9,756	4,323	3,521
TOTAL REGION	167,618	110,336	34,303	36,494	88,425
TOTAL U.S.	304,011	134,684	63,832	42,949	101,315

Source: Butler (2007) and Forest Service (2007a).

Table 2. State Government Executive Branch Units Exerting Influence over the Use, Management and Protection of Forests in the U. S. Hardwood Producing Region, by State and Unit Level. 2001.

State	Agency (cabinet) Units	Governing or Advisory Units	Total Units	State	Agency (cabinet) Units	Governing or Advisory Units	Total Units
<i>North</i>				<i>South</i>			
Connecticut	21	1	22	Alabama	17	2	19
Delaware	12	0	12	Arkansas	18	3	21
Illinois	40	6	46	Florida	16	1	17
Indiana	28	5	33	Georgia	20	1	21
Iowa	26	4	30	Kentucky	41	15	56
Maine	32	9	41	Louisiana	23	4	27
Maryland	32	13	45	Mississippi	20	2	22
Massachusetts	16	1	17	North Carolina	26	4	30
Michigan	37	9	46	South Carolina	22	1	23
Minnesota	35	4	39	Tennessee	18	1	19
Missouri	18	11	29	Virginia	36	8	44
New Hampshire	26	6	32	Total	257	42	299
New Jersey	22	7	29	<i>West</i>			
New York	24	3	27	Oregon	34	13	47
Ohio	25	3	28	Washington	33	7	40
Pennsylvania	26	6	32	Total	67	20	87
Rhode Island	18	2	20	TOTAL	837	174	1,011
Vermont	17	9	26				
West Virginia	30	6	36				
Wisconsin	28	7	35				
Total	513	112	625				

Source: Ellefson and others (2001) and various state agency documents and state government personnel responsible for state forestry programs.

Table 3. Forestry Personnel Employed by State Governments in the U. S. Hardwood Producing Region, by State and Major Personnel Category. 2007.

State	Professional and Managerial	Technical-Administrative Personnel	Total	State	Professional and Managerial	Technical-Administrative Personnel	Total
<i>North</i>				<i>South</i>			
Connecticut	20	310	330	Alabama	110	220	330
Delaware	14	11	25	Arkansas	80	272	352
Illinois	35	19	54	Florida	338	917	1,255
Indiana	84	53	137	Georgia	108	500	608
Iowa	28	24	52	Kentucky	103	135	238
Maine	46	112	158	Louisiana	94	211	305
Maryland	51	45	96	Mississippi	120	427	547
Massachusetts	36	71	107	North Carolina	115	593	708
Michigan	173	52	225	South Carolina	102	259	361
Minnesota	198	157	355	Tennessee	87	248	335
Missouri	90	138	228	Virginia	128	145	273
New Hampshire	44	5	49	Total	1,385	3,927	5,312
New Jersey	85	30	115	<i>West:</i>			
New York	138	24	162	Oregon	587	125	712
Ohio	70	76	146	Washington	754	166	920
Pennsylvania	235	280	515	Total	1,341	291	1,632
Rhode Island	15	14	29	TOTAL	4,533	5,838	10,371
Vermont	50	18	68				
West Virginia	79	36	115				
Wisconsin	316	145	461				
Total	1,807	1,620	3,427				

Source: National Association of State Foresters (2007) and various state agency documents and state government personnel responsible for state forestry programs.

Table 4. Forestry Program Expenditures (all sources) by State Governments in the U.S. Hardwood Producing Region, by State and Major Expenditure Category. 2004.

State	Forestry Program (thousand dollars US)					Total
	Fire Prevention and Control	Cooperative Forestry and Landowner Assistance	Forest Health	Watershed Management and Protection	Other Programs	
<i>North</i>						
Connecticut	1,352	480	8	4	799	2,643
Delaware	1,050	365	140	50	410	2,015
Illinois	148	1,877	220	161	3,577	5,983
Indiana	3,976	4,349	362	51	7,002	15,740
Iowa	2,170	2,857	180	*	212	5,419
Maine	9,198	3,373	3,777	64	4,902	21,314
Maryland	2,735	2,720	650	535	2,550	9,190
Massachusetts	1,023	469	331	372	519	2,714
Michigan	19,374	298	556	84	17,033	37,345
Minnesota	40,663	2,508	698	412	5,077	49,358
Missouri	1,580	555	99	16	1,299	3,549
New Hampshire	1,333	28,848	140	*	425	30,746
New Jersey	7,540	486	220	80	1,114	9,440
New York	9,018	1,791	149	600	8,162	19,720
Ohio	732	1,688	130	*	12,019	14,569
Pennsylvania	46,400	1,558	2,730	5,944	2,584	59,216
Rhode Island	775	995	85	5	852	2,712
Vermont	1,469	961	832	30	1,682	4,974
West Virginia	2,865	2,348	3	566	1,350	7,132
Wisconsin	10,975	7,433	2,236	207	21,243	42,094
Total	164,376	65,959	13,546	9,181	92,811	345,873
<i>South</i>						
Alabama	13,629	5,473	1,959	72	2,622	23,755
Arkansas	9,700	7,278	832	243	3,232	21,285
Florida	76,289	2,709	333	109	6,958	86,398
Georgia	30,411	986	162	*	2,437	33,996
Kentucky	5,356	4,934	496	2,978	4,676	18,440
Louisiana	10,602	7,633	519	*	2,812	21,566
Mississippi	17,363	8,794	503	*	2,056	28,716
North Carolina	40,315	7,223	1	255	15,827	63,621
South Carolina	14,964	1,871	798	334	3,231	21,198
Tennessee	13,385	8,254	871	291	2,289	25,090
Virginia	5,526	10,116	673	2,885	6,510	25,710
Total	237,376	65,271	7,147	7,167	52,650	369,775
<i>West</i>						
Oregon	29,612	3,055	2,367	*	89,276	124,310
Washington	77,737	1,123	398	*	17,624	96,882
Total	107,349	4,178	2,765	*	106,900	221,192
TOTAL REGION	509,265	135,408	23,458	16,348	252,361	936,840

Note: Asterisk indicates investment included in other expenditure category. Estimates (based on 2002-2004 information) for Illinois, Maine, New York, Ohio and Arkansas. Total state forestry program expenditures (all states) for 2004 is an estimated \$1.25 billion.

Source: National Association of State Foresters (2007) and various state agency documents and state government personnel responsible for state forestry programs.

Table 5. Outcomes of Forest Resource Programs Initiated by State Governments in the U. S. Hardwood Producing Region, by State and Major Program Area. 2004 - 2006.

State	Forest Land Area Subject to (thousand hectares) . . .		Forest Legacy Projects (through March 2006)	Landowner Technical Forestry Assists (2004)
	Wildfire Protection (2004)	Forest Stewardship Plans (through 2006)		
<i>North</i>				
Connecticut	753	24	10,127	147
Delaware	337	20	1,356	775
Illinois	4,318	309	493	8,800
Indiana	2,966	293	5,196	3,920
Iowa	1,093	158	1,124	1,682
Maine	7,217	263	606,208	4,000
Maryland	1,038	132	1,247	1,761
Massachusetts	1,267	127	4,264	2,304
Michigan	9,753	238	360	1,826
Minnesota	19,351	556	6,241	2,975
Missouri	16,070	202	0	3,000
New Hampshire	2,307	276	212,139	1,682
New Jersey	1,497	40	4,169	700
New York	7,420	709	44,669	2,700
Ohio	2,388	357	0	3,800
Pennsylvania	6,880	159	1,191	8,812
Rhode Island	182	7	1,690	420
Vermont	1,873	138	60,067	1,556
West Virginia	5,296	263	0	5,166
Wisconsin	14,002	1,038	36,009	12,179
Total	106,007	5,310	996,550	68,205
<i>South</i>				
Alabama	9,304	403	10,127	7,670
Arkansas	7,604	243	0	6,697
Florida	12,141	277	1,671	5,902
Georgia	11,007	510	13,790	5,831
Kentucky	6,417	696	1,536	1,803
Louisiana	8,053	80	0	3,455
Mississippi	7,527	129	0	16,834
North Carolina	6,489	230	6,515	8,991
South Carolina	5,527	378	30,711	1,452
Tennessee	10,387	199	30,356	1,901
Virginia	6,904	428	3,959	12,681
Total	9,1361	3,573	98,665	73,217
<i>West</i>				
Oregon	6,370	199	0	1,570
Washington	9,267	157	14,795	1,500
Total	15,637	356	14,795	3,070
TOTAL REGION	213,004	9,238	1,110,010	144,492

Note: Estimates of landowner technical assists (based on 1998 and 2002 information) for Illinois, Ohio, Maine, Arkansas and Mississippi.

Source: Forest Service (2007b), National Association of State Foresters (2007) and various state agency documents and state government personnel responsible for state forestry programs.

Unlawful Harvesting and Marketing Controls Unlawful Timber Harvesting

The taking of trees from the land of another without consent is regarded by state governments as timber trespass and theft. Timber trespass and theft can have serious consequences, including landowners suffering economic hardships, timber harvesters generally discredited by the few, sawmills risking the acceptance of stolen property, and forest resources suffering from unplanned harvest and management (Government Accountability Project n.d.). Some states have recently become especially concerned about timber trespass and theft and have given serious study to the matter, notably New York, Indiana, and Wisconsin (Canham and Pedersen 2007, McCoy 2007, Wisconsin Division of Forestry 2005). Timber trespass and theft is fostered by a number of circumstances such as the high value of certain tree species, difficulties in apprehending and convicting thieves, occurrence of absentee landowners, and improper specification of property boundaries. Not all wrongful cutting of trees is intentional. Extenuating circumstances may occur, such as the accidental cutting of trees on another's property when ownership boundaries are unknown or are poorly marked. In many such cases, a private settlement often occurs between the involved parties (Hicks 2005).

Extent of Unlawful Harvesting

The extent of unlawful timber harvesting across the hardwood producing region is not easily determined, and where information about the problem exists the magnitude of its occurrence varies considerably from state to state. For example, a state government forestry executive in Maryland states "we are aware theft-trespass occurs, it is an infrequent and minor event," while a New York forestry consultant interviewed as part of the State's assessment of timber theft suggests "an estimated 300 [timber theft] cases per year with a timber value of \$10,000 per case." A reasonable and more comprehensive understanding of the extent of timber trespass and theft in the hardwood producing region can be obtained from the informed judgements of state forestry agency executives. For purposes here, the latter for each state in the region were asked "do you consider illegal harvesting of timber to be a problem in your state?" In response, they indicated the occurrence of such unlawful activities to be as follows (Table 6): not considered a problem (infrequent, five or fewer cases per year)—11 states, modest problem (occasional, seven to 10 cases per year)—7 states, an important problem (big issue, 30 or more cases per year)—10 states, and magnitude of problem unknown or information not available—5 states. If a regionwide estimate of reported and unreported timber trespass cases were to be made (excluding federal lands), the number of cases per year is probably in the range of 800 to 1,000. The experiences of two states with more detailed records provide additional insight on the matter.

- Indiana*: Total wrongfully cut timber 1999—50 MBF, 2000—300 MBF, 2001—125 MBF, 2002—160 MBF, 2003—175 MBF, 2004—150 MBF, 2005—225 MBF, and 2006—60 MBF. Total wrongful cut timber 1999 through 2006—1,245 MBF or 156 MBF per year. Unlawful harvest 1999 through 2003 was 0.04 percent of total statewide harvest during this five-year period.

- Maine*: Total timber trespass and theft complaints in 2006 were 543, 202 of which resulted in legal actions. In same year, \$7,400 total fines and \$217,081 in restitution and settlements paid to landowners.

- New Hampshire*: Total reported timber trespass cases (fiscal years): 2005—36 cases; 2006—31 cases; 2007—17 cases.

- New York*: Estimates of timber stolen range from less than one MBF to more than 50 MBF with an average of 16.7 MBF. Market value of stolen timber ranges from \$1,000 to \$70,000, with an average value of \$19,650. Probably 300 cases of timber theft over a three-year period. One-third of the cases involved poorly defined property boundaries; two-thirds were clearly marked but ignored.

Centralized systems within a forestry agency for reporting the occurrence of timber trespass and theft are known to exist in some states (for example, Indiana, Louisiana, Maine, New Hampshire). More often than not, however, such information is spread across various jurisdictions, including the offices of state courts (for example, Maryland), county courts (for example, Kentucky [120 county courts]) or the offices of local law enforcement agencies (Missouri [local sheriffs' offices]). In some states, the private sector is assigned responsibility for keeping track of timber ownership records. Such occurs in Louisiana where ownership records involving harvested timber must be kept (as required by law) by processing mills, timber harvesters, and log buyers. Compounding the information problem is that many cases of timber theft go unreported for reasons such as inability to locate thieves, arduous burdens of proof resting with the landowner, high cost of legal prosecution, and enforcement priorities assigned by governments to other more threatening types of crimes (Canham and Pedersen 2007, Wisconsin Division of Forestry 2007).

Legal and Administrative Directives

All states within the hardwood producing region have laws that address in some fashion matters involving timber trespass and theft (Table 6). Of the region's 33 states, six (for example, Connecticut and Missouri) rely chiefly on general statutory directives addressing larceny generally and subsequent decisions regarding restitution (misdemeanor or criminal, or both), while three states make use of a combination of general statutory directives plus laws specifically focused on timber theft and closely related matters (for example, Iowa and Pennsylvania). All other states in the region have laws addressing larceny in general, however, they implement laws focused specifically on timber trespass—laws which they view as their primary means of dealing with unlawful matters involving the ownership of timber.

State laws seek to address timber trespass and timber theft in various ways. Most common is a direct focus on theft as attested to by lack of landowner permission to harvest timber. States also are proactive in addressing timber theft in that some states require property boundaries to be defined in advance of timber harvest (for example, Arkansas). Others place legal liability on timber harvesters for application of sound forestry practices (for example, Tennessee), while some state laws require that written documentation attesting to ownership of timber to be harvested be made

Table 6. Timber Trespass and Theft Addressed by State Governments in the U. S. Hardwood Producing Region, by State, Extent Violations, and Statutory Authority for Addressing the Issue. 2007.

State	Extent of Violations	Centralized Reporting System	Statutory Directives
<i>North</i>			
Connecticut	“Many complaints concerning illegal timber harvest . . . most involve cutting on neighbor’s land to facilitate views”	No	General statutory directives: larceny – CGS. Chap 950-952
Delaware	“Virtually never receive complaints about illegal timber harvesting (no court cases in 15 years) . . . occasional cutting beyond property boundary	No	Timber trespass statutes: wilful-negligent timber cutting on another’s property – DL CODE. Title 25. Chap 14-1401 through 14-1404; timber theft from state forests – DL CODE. Title 3. Chap 10-1045.
Illinois	“Not extensive problem . . . may occur on occasion.”	No	Timber trespass statutes: knowingly and intentionally cutting trees without legal right (Wrongful Tree Cutting Act) – IL CODE. Chap. 740.185; transport of forest products without proof of ownership – IL CODE. Chap. 225.740; confiscation and forfeiture of property used in timber theft – IL CODE. Chap. 225.735.16.
Indiana	“162 MBF per year over five year period”	Yes	General statutory directives: Theft, conversion and receiving stolen property --IC. Art. 35-43-4; Licensing and bonding of timber buyers – IC. Art. 36.5.
Iowa	“About five reported cases per year. . .”	No	General statutory directives: damage and trespass on property – IOWA CODE. Chap. 716; Timber trespass statutes: willful injury of timber on land of another – IOWA CODE. Chap. 658.4.
Maine	“Yes, a problem. In 2006, 543 theft-trespass violations . . . fines and settlements of \$224,481.”	Yes	Timber trespass statutes: proper location of boundaries (civil) – Title 14 MRSA. Chap 739.2.7552A; and timber trespass and marking of property lines (criminal) – Title 17 MRSA Chap 83.4.2511 and 2512.

Note: Information is primarily concerned with trespass and theft involving private forest land. Centralized reporting systems refers to existence of a reporting system within a state’s lead forestry agency. Louisiana law requires private parties to keep records of harvested timber ownership.

Source: State registries of state laws and codes, and state government personnel responsible for enforcement of timber trespass laws.

Table 6 (continued).

State	Extent of Violations	Centralized Reporting System	Statutory Directives
Maryland	“Although aware theft-trespass occurs it is an infrequent and minor event.”	No	Timber trespass statutes: cutting trees without legal right (civil) – MD CODE. NATURAL RESOURCES. Title 5. Chap.5-409.
Massachusetts	“Somewhat of a problem.”	No	Timber trespass statutes: wilful cutting of timber on land of another without legal right – MGL. Chap 266.113and MGL. Chap 242.7; damages to co-tenant without notice to other parties – MGL. Chap 242.4.
Michigan	Not available	Not known	Timber trespass statutes: timber cutting without legal right – MCL. Chap. 600.2919; wilful timber cutting without legal right (criminal) – MCL. Chap 750.546.
Minnesota	Not known	No	General statutory directives: assigned damages for timber cutting without legal right – MN STAT. Chap. 548.05 and MN STAT. Chap. 561.04, casual or involuntary trespass without legal right – MN STAT. Chap. 548.04.
Missouri	“Number of reported cases of timber theft are low . . . about 10 cases per year . . . few to none successfully prosecuted.”	No	General statutory directives: trespass damages recoverable - MO STAT. Chaps. 537.340, 537.360 and 537.370; timber trespass statutes: timber trespass enforcement intensified during high fire conditions – MO STAT. Chap 254.270.
New Hampshire	“Yes, it has been a big issue. In FY 2006, 31 trespass cases and 10 deceptive forestry cases.”	Yes	Timber trespass statutes: negligent trespass (civil) – NH REV STAT. Chap. 227-J-8, reckless trespass – NH REV STAT. Chap. 227-J-8a; transport of coniferous trees – NH REV STAT. Chap. 227J. Sec. 11.
New Jersey	“No, timber buyer deception more of a problem”	No	Timber trespass statutes: timber cutting without legal right – NJ STAT. Title 4. Chap.4:17-9 and 10.
New York	“Extent of timber theft is unknown. Estimated maybe 300 cases per year with timber value of \$10,000 per case”	No	Timber trespass statutes: timber cutting without legal right – NY [Real Property and Proceedings] LAW. Art. 8. Chap 861; removal of trees without legal right – NY [Environmental Conservation] LAW. Title 15. Chap 9-1501.
Ohio	Not available	Not known	Timber trespass statutes: tree removal without legal right – OHIO CODE. Chap. 901.51, and penalties (criminal) tree removal without legal right – OHIO CODE. Chap. 901.51.

Table 6 (continued).

State	Extent of Violations	Centralized Reporting System	Statutory Directives
Pennsylvania	Not available	Not known	General statutory directives: theft by unlawful taking – PA STAT. Title 18. Chap. 3921; timber trespass statutes: timber cutting without legal right: restitution for timber theft -- PA STAT. Title 18. Chap. 8311 and PA STAT. Title 18. Chap. 1107.
Rhode Island	“Very few, most concern arboriculture problems . . . “	No	Timber trespass statutes: unauthorized cutting of wood – RI STAT. Title 34. Chap. 20-1; transport of contraband plants. RI STAT. Title 2. Chap. 15-13 through 15-16.
Vermont	“No official determination that timber theft is a distinct problem.”	Some	General statutory directives: grand and petty larceny (criminal) – VT STAT. Title 13 Chaps. 57.2501 and 57.2502; timber theft statutes: timber cutting without legal right -- VT STAT. Title 13. Chap. 77.3606; transport of stolen trees – VT STAT. Title 13. Chap. 77. 3609; mill operator filing annual report on source of timber VT STAT. Title 10. Chap. 83.2623.
West Virginia	“Yes, a very real concern for WV landowners.”	No	Timber trespass statutes: timber cutting and transport without legal right – WV STAT. Chap. 61-3-48 and 61-3-48A; and timber cutting and removal without legal right (criminal) – WV STAT. Chap. 61-3-52.
Wisconsin	Yes, several complaints of timber theft . . . some involve inadvertent property line problems . . . some blatant involving criminal theft charges”	No	Timber trespass statutes: timber cutting and transport without legal right – WI STAT. Chap. 26.05; civil liability for unauthorized removal of timber – WI STAT. Chap. 26.09; transport of timber unlawfully harvested – WI STATE. Chap. 26.06.3; harvest prohibited on forest land for which taxes are delinquent – WI STATE. Chap. 26.03.
<i>South</i>			
Alabama	“Illegal harvesting of timber is a problem”	No	Timber trespass statutes: criminal statute – AL CODE. Chap 9-13-60 through 65; timber theft equipment condemnation – AL CODE 9-13-220 through 227.
Arkansas	“Average of about 103 cases per year.”	Yes	Timber trespass statutes: damages for negligence specified – AR CODE. Chap. 18-60-102 (considers intent),AR CODE. Chap. 15-32-301 (does not consider intent); boundaries not properly determined before cutting timber – AR CODE. Chap. 15-32-101 and AR CODE. Chap. 5-38-203 (criminal offense).

Table 6 (continued).

State	Extent of Violations	Centralized Reporting System	Statutory Directives
Florida	“No, outright theft of timber is a rarity in Florida . . . although unintentional cutting across property lines or improper accounting of timber loads from timber sale may occur.”	No	General statutory directives: unintentional trespass – FL CODE. Chap 772.104, intentional theft – Chapters 775, 812, 817.
Georgia	“About seven reported cases of timber theft per year”	Some	Timber trespass statutes: willful and unintentional trespass – GA CODE. Chap. 51-12-50; recovery of damages – GA CODE. Chap. 51-12-51.
Kentucky	“Receive many inquiries regarding cutting over boundaries and not paying for timber . . .”	No	Timber trespass statutes: intentional trespass – KY CODE. Chap. 364.130.
Louisiana	“Over 15 years, arrested 60 to 70 persons per year that steal about \$1.5 million worth of timber.”	Yes	General statutory directives: criminal trespass – LA RS. Chap. 14:67. Timber theft statutes – cutting trees without consent of owner – LA RS. Chap. 4278.1; sale of undivided interest in timber – LA RS. 4278.2; timber transport and record keeping – LA RS. Chap. 4278.3 [Rule Title 7, Chap. 15]; central registry of timber theft information – LA RS. Chap. 1467.12.
Mississippi	Not available	No	Timber theft statutes: civil and criminal – MS CODE. Chap. 95-5-10; MS CODE Chap. 97-17-59.
North Carolina	Civil damages for unlawful cutting – no cases; larceny of pine needles or pine straw – 97 cases (2001 through 2006); injury to trees of another – no cases; cutting or removing another’s timber – no cases.	Some	Timber theft statutes: unlawful cutting/removal of timber – NC CODE. Chap 1-539.1, larceny of pine needles, NC CODE. Chap. 14-79.1; criminal trespass: cutting another’s timber NC CODE. Chap 14-135; timber dealer timber trade marks, NC CODE. Chap 80-15 through Chap. 80-23; unlawful cutting/removal of timber from vacant and unappropriated lands, NC CODE Chap. 146-43.

Table 6 (continued).

State	Extent of Unlawfulness	Centralized Reporting System	Statutory Directives
South Carolina	“About 200 cases per year, 40 to 50 warrants issued per year.”	Some	General statutory directives: petit and grand larceny – SC CODE. Chap. 16-13-30; fraudulent intent and false pretenses – SC CODE. Chap. 16-13-230 and 240; Entry on another’s lands without permission – SC CODE. Chap. 11-610. Timber theft statutes: criminal penalties – SC CODE. Chap. 16-11-580; payment of treble damages – SC CODE. Chap 11-11-615; confiscation and forfeiture of property used in timber theft, SC CODE. Chap. 16-13-177; knowingly transport of timber harvested illegally – SC CODE. Chap. 16-11-580 (A-4); illegal timber cutting on state lands. SC CODE. Chap 48-23-70.
Tennessee	“Aware of 10 cases in last eight years”	No	Timber trespass statutes: negligence and malicious intent – TN CODE. Title 43 Chap. 28-312.
Virginia	“Not extensive, but enough of a problem that agency pursued a statutory amendment concerning timber theft”	No	Timber theft statutes: malicious intent-larceny: VA CODE. Chap. 55-334.1; recovery of damages – VA CODE. Chap. 55-331, 55-332, 55-334.
<i>West</i>			
Oregon	“Used to be a big issue . . . bigger issue is fraud and misrepresentations to small woodland owners.”	No	Timber theft statutes: Unlawful transport of timber without permit – ORS. Chap 164.813-855; treble damages for removal of trees without lawful authority – ORS. Chap. 105.810-815; branding of forest products – ORS. Chap. 532.01-532.990.
Washington	“Yes, but unsure of magnitude . . . maybe for high-value species . . . often operators take advantage of forest owners. . .”	No	Timber theft statutes: Removal of trees without lawful authority (damages assessed) – RCW. 64.12.030 and RCW. 64.12.40 (unintentional circumstances)

available to law enforcement officials (for example, Maryland). A better appreciation of the nature of and variety of such authorities can be gained from example states and example provisions with a state's timber theft and trespass law(s):

Arkansas: persons desiring to cut and remove timber shall have the land surveyed prior to harvest and shall acquire documents signed by the landowners (person selling the timber and adjacent landowners) indicating agreement on property boundaries. Violation is a misdemeanor with fine of \$25 to \$300 and possibly jail sentence of up to six months.

Delaware: wilful, negligent or malicious cutting of trees on the land of another without consent of owner shall be subject to payment of damages equal to triple the fair value of the harvested timber. If trespass is unintentional, plaintiff to be awarded damages equal to the fair value of the harvested timber.

Illinois: person found to have intentionally cut timber without full legal cutting right to do so shall pay owner of timber three times its stumpage value.

Kentucky: person guilty of cutting timber on the land of another without legal right shall pay rightful owner three times the value of cut stumpage, three times the value damage to property, and legal cost incurred by owner of timber.

Maine: landowner or harvester shall clearly mark established property lines that are within 200 feet of area to be harvested. Failure of person to do so commits a civil violation with a fine more than \$250 but less than \$1,000

Maryland: person who willfully, negligently or maliciously enters the land of another without written permission to cut timber is liable for damages in the amount of triple the value of harvested timber plus legal fees. At the request of a law enforcement office, person harvesting timber on the lands of another must display written permission of a timberland owner.

Massachusetts: whoever cuts timber on land in which the person has no interest and without license of the landowner shall be punished by imprisonment for no more than six months or by fine of not more than \$500.

Mississippi: persons cutting trees without consent of landowner shall pay owner twice the fair market value of the trees and the cost of reforestation (not to exceed \$250 per acre). If cutting is done willfully with disregard to landowner rights, payment shall be \$55 per tree seven inches or more in diameter and \$10 per tree less than seven inches in diameter.

New Hampshire: negligent cutting of trees without permission of landowner is a civil crime involving a penalty of no less than three or more than 10 times the value of the trees cut. Reckless acts of trespass are felonies if loss is greater than \$1,000, or are a misdemeanor for other loss amounts.

New Jersey: Persons cutting timber on land to which they have no legal right shall pay a sum of eight dollars per tree cut, half going to landowner and half to persons initiating prosecution.

Pennsylvania: person cutting timber on property of another without consent of property owner is liable for civil damages equal to cost of establishing value of stolen timber; cost of property surveys involving such timber; and three times value of timber if deliberately stolen, two times if negligence is involved, and market value of timber if defendant had a reasonable basis for thinking timber was rightfully to be harvested.

South Carolina: unlawful for person to remove forest products without consent of landowner. Doing so is a misdemeanor if forest products are valued at \$1,000 or less (\$500 or 30 days or less in prison), and a felony if valued at more than \$1,000. Felony fines: up to five years in prison if timber valued at \$1,000 but less than \$5,000, and up to 10 years in prison if valued at \$5,000 or more.

Confiscation of property used in timber theft activities.

Tennessee: civil liability in the amount of double the value of timber harvested without consent of landowner.

Virginia: person removing timber from land without legal right to do so, or person authorizing removal of timber without legal right, shall pay landowner three times value of timber, pay reforestation costs (up to \$450 per acre), and pay legal costs incurred by landowner.

West Virginia: illegal to wilfully and maliciously (with intent to do harm) to trespass on lands of another and subsequently cut, injure, remove, or destroy timber. Violators are guilty of a misdemeanor and subject to fines of three times the value of stolen or destroyed timber, or confined in jail for 30 days, or both.

Wisconsin: No person may cut, transport, or direct the cutting of timber on forest land without consent of landowner. Violation leads to a fine of not less than \$100 or more than \$1,000, and liability for costs incurred to establish value of wrongfully harvested timber.

The thief or trespasser is typically the focus of state timber trespass and theft laws, although the transporters of stolen timber may also be targeted. At least five states in the hardwood producing region have such laws or rules (Table 6). Louisiana requires transporters of harvested timber to keep records (four years) of the landowner from which timber was harvested and amount and type of timber product being transported from that landowner. Mills receiving transported timber cannot accept delivery unless such information is provided. Similarly in Maine, all timber transported to a processing facility must be accompanied by a “trip ticket” that contains much the same information. In South Carolina, Vermont and Wisconsin, it is a violation of law to knowingly transport timber that has been harvested without the permission of the landowner.

Enforcement and Remedies

States within the hardwood producing region all have penalties and/or remedies specified in laws addressing timber trespass and theft. However, the nature of these penalties and remedies varies considerably from state to state. Most state laws allow for both civil and criminal prosecution (for example, South Carolina), opportunity for recovery of damages due to loss (for example, triple damages in Maryland, Pennsylvania), payment by defendant of injured party’s legal fees (for example, Virginia), payment by defendant of the costs of reforestation (for example, Mississippi, Virginia), and confiscation of property used in timber theft activities (for example, Illinois, South Carolina). The assignment of penalties frequently makes a distinction between wilful and intentional theft and unintentional and accidental actions that result in inadvertent theft of timber (for example, Delaware). In some states, assessment of damages for wilful disregard for landowner right is based on the size of trees harvested (for example, Mississippi requires payment of \$55 per tree seven inches or more in diameter and \$10 per tree less than seven inches in diameter). For criminal violations, prison terms of up to 10 years can be assigned depending on the state and on the value of the timber stolen (for example, South Carolina). Some state governments have authority to impose injunctions on illegal timber harvest activities, most notably when title to timberland is contested by multiple parties (for example, North Carolina). Connecticut and Georgia law authorizes the state government to revoke, suspend or deny certification of timber harvesters or professional foresters that have been convicted of a felony involving the conduct of a regulated forestry practice (including timber theft).

Enforcement of state timber trespass laws in the hardwood producing region is important. However, the extent to which such occurs region-wide depends on the severity of the issue, the magnitude of resources a state is willing to invest in law enforcement, and the record keeping of various government jurisdictions responsible for enforcement activities (local and state enforcement officers [sheriff departments, conservation

officers], local and state court systems, federal courts for multi-state crimes). Unfortunately, there is no regionally centralized system for reporting the level of enforcement activities under these circumstances and across these many jurisdictions. Searching various literature sources, including on-line legal systems, state court cases involving timber theft occurs—but maybe not all that frequently for reason previously described. Although certainly not based on an exhaustive review, the number of state-level *court cases* occurring over the past 5-6 years is estimated to be: Connecticut—three cases, Indiana—one; Kentucky—one; Louisiana—18; Michigan—one; Maine—200; Mississippi—two; New Hampshire—17; New Jersey—one; New York—65; Ohio—two; Pennsylvania—one; South Carolina—40; Washington—two; West Virginia—one; and Wisconsin—one case. This modest number of state court cases may reflect a number of realities, including the need for more thorough analysis, the difficulty inherent in bringing cases to state courts (left unreported or settled out of court), or the reality that the number of instances of illegal timber harvesting is—in general—quite small across the region (Mortimer and others 2005).

An appreciation of enforcement actions regarding timber trespass and theft can be obtained by example. In Connecticut, the Division of Forestry has been involved in at least three high profile timber theft cases:

- Case one: Two persons charged with seven counts of larceny and conspiracy involving theft from seven landowners; penalty of four years in jail, six years probation, and \$267,000 restitution to landowners.
- Case two: One person charged with larceny; penalty of four years in jail and \$80,000 restitution to landowner.
- Case three: One person charged with larceny; repeat offender assigned jail sentence and \$25,000 restitution to landowner.

Other example enforcement actions by states in the hardwood producing region are: Delaware—no history of court action (15 year period); Louisiana—arrest and prosecute and average of 60 to 70 persons per year (over 15 year period); Maine—prosecuted 202 cases in 2006; New Hampshire—17 cases timber trespass in FY 2007 (two misdemeanors, two court summons violations, nine written warnings, four cease and desist orders); New York—22 percent of 2007 cases resulted in charges by district attorney; North Carolina—no prosecuting offense code for all timber trespass statutes (four major) except larceny of pine needles (16 cases per year from 2001 through 2006); and South Carolina—40 to 50 warrants per year.

Timber Buyer-Seller Fraud

State governments are sensitive to fraud and misrepresentation involving the buying and selling of timber. In at least 14 states in the hardwood producing region formalized legal approaches have been established to deal with such matters, most notably in the following areas (Table 7):

- Misrepresenting ownership or origin of timber, as addressed by Arkansas, Connecticut, Louisiana, Rhode Island and Tennessee.
- Bonding of timber buyers, as addressed by Iowa and Indiana.
- Deceptive business practices, including payment for timber, as addressed by Georgia, New Hampshire, Louisiana, Maine, South Carolina and West Virginia.
- Record-keeping of transported timber, as addressed by Ohio, Louisiana and Tennessee.
- Educational awareness of fraud and timber theft, addressed by New York.

Table 7. Timber Seller-Buyer Fraud Addressed by State Governments in the U.S. Hardwood Producing Region, by State and Statutory Authority for Addressing the Issue. 2007.

State	Program Focus and Statutory Authority
Arkansas	Misrepresenting ownership or origin of timber – AR CODE. Chap. 5-38-203.
Connecticut	Fraudulent sale-purchase of timber (unfair trade practices) – CGS. Chap 735a.
Georgia	Wood load ticket (amount and origin) to landowner – GA CODE. Title 12. Chap. 6. Sec. 23; certificate of pine straw harvest to landowner. GA CODE. Title 12. Chap. 6. Sec. 200-207.
Iowa	Bonded timber buyers program – Iowa Code, Chap. 456A.36 (Adm. Chap. 72).
Indiana	Licensing and bonding of timber buyers – IC. Art. 36.5.
Louisiana	Prompt payment for timber by buyer – LA RS. 14:211; false statements about timber removal and sale – LA RS 14:212; timber transport and record keeping – LA RS. 4278.3 [Rule Title 7, Chap. 15].
Maine	Unfair trade practices involving buyers and sellers of wood – MRSA. Title 5. Chap. 10; proper measurement of wood – MRSA. Title 10. Chap. 501; consumer solicitation of sales – MRSA. Title 32. Chap 69; and failure to pay for harvested trees – MRSA. Title 17. Chap. 83.4,2512
New Hampshire	Deceptive business practices involving buying and selling of wood – NH REV STAT. Chap. 227.J-15
New York	Education and training regarding enforcement of timber theft and trespass laws – NY [Environmental Conservation] LAW. Title 7. Chap 71-0712.
Ohio	Timber buyer trademark proof of timber ownership – OHIO CODE. Title 9. Chap 981.
Rhode Island	Unlawful sale or delivery of wood and timber – RI STAT. Title 2. Chap 20.
South Carolina	Failure to pay landowner for harvested wood – SC CODE. Chap.48-23-265; providing accurate load tickets to seller of timber – SC CODE. Chap. 48-23-97; acquire forest products under false or fraudulent pretenses – SC CODE. Chap. 16-11-580 (A-3); breach of trust with fraudulent intent – SC CODE. Chap. 16-13-230; signatures for property by false pretenses. SC CODE. Chap. 16-13-240...
Tennessee	Timber buyer to obtain bill of sale from seller as evidence of buyer ownership – TN CODE. Title 39. Chap. 14-410.
West Virginia	Violation of contracts (nonspecific to timber) involving buying and selling of timber – WV STAT. Chap. 55-2-8.

Source: Individual state registries of state laws and codes, and state government personnel responsible for enforcement of timber trespass laws.

New Hampshire law regarding deceptive business practices imposes a felony sentence if the loss to either a seller or buyer is more than \$1,000. Prohibited is falsification of timber measurements, delivery of less than agreed to timber quantities, taking of more timber than contractually agreed to, failure to pay forest land owner as specified in contract, and failure of a buyer to provide a seller with verification of the amount of timber removed from a forest landowner's property. South Carolina has similar prohibitions, and depending on the severity of the fraudulent activity, fines of up to \$500 and imprisonment of up to 10 years can be imposed. Louisiana and South Carolina have special concern for the financial position of landowners selling timber, in that both states require timber buyers to make prompt payment for purchased timber. In the case of Louisiana, payment to a seller must be made within 30 days after the buyer receives payment from a third party, while in South Carolina, payment must be received within 45 days.

Occupational Licensing and Certification

State governments have established a variety of programs focused on occupations that are in a position to curb unlawful activities involving the harvest and sale of timber. These programs typically take the form of registration, certification or licensing of persons engaged in timber harvesting, buying and selling of timber, and offering of professional forestry services. Although the definitions are not always uniform, registration involves voluntary placement on a list of persons offering similar services, certification involves recognition of persons that meet certain qualifications (education, experience), and licensing identifies persons that have state government authority to engage in an activity (licensing is exclusionary) (MacKay and others 1995, 1996). In most states, the granting of an occupational certificate or license is for a specified period of time, requires some form of initial examination, and requires participation in continuing education opportunities so as to maintain proficiency. Some states, notably Maryland, impose penalties for false representation as a licensed professional forester.

Timber Harvesters

Timber harvesters are registered or certified in nearly all states (31 of 33) within the hardwood producing region (Table 8). Their accreditation in this respect is granted primarily via educational programs often sponsored as Master Logger Programs (name varies among states, for example, Illinois Game Of Logging Program, Minnesota Logger Certification Program, Georgia Master Timber Harvester Program). Such programs are sponsored by both public (for example, state cooperative extension services) and private concerns (for example, Washington Contract Loggers Association). Some Master Logger Programs are regional in nature (for example, Southern New England Master Logger Program). In 2006, the Washington Master Logger Program certified 908 persons as Master Loggers, while in the same year in Tennessee 1,950 persons were granted recognition as Master Loggers. To become a Master Logger, timber harvesters must attend a comprehensive training course (subjects such as basic forest management, application of forestry practices, logging safety and first aid, basic business practices), and subsequently participate in at least one continuing education course each year thereafter. Other Master Loggers and administrators of a Master Logger Program may periodically visit sites being actively harvested by a Master Logger.

States within the hardwood producing region are often intent on using their occupational accreditation programs as a means of promoting the application of forestry practices that will ensure the sustainability of hardwood forests. For example, on sites where they are the responsible timber harvesters, Master Loggers in Tennessee are liable (for one year) for compliance with all applicable water quality laws of the state and for the installation and maintenance of recognized forestry best management practices. In Kentucky, every commercial logging operation must have a certified master logger on-site and in charge at all times. Loggers and logging companies that fail to comply with Kentucky state law (specifically, the Kentucky Forest Conservation Act) are added to a “bad actor” list which is available for viewing by the public (more than 120 designations in 2007). Kentucky has reciprocal master logger agreements with Indiana, Ohio, Virginia, West Virginia, Tennessee, Missouri, North Carolina, Mississippi, Alabama and Arkansas.

Timber harvesters are licensed in some states, for example Maryland, Massachusetts, and West Virginia. In Maryland, a license is required for “any person engaged in a forest products business” (including timber harvesting), although the definition of business and subsequent prerequisites for securing the license are rather obscure. Massachusetts has an extensive timber harvester licensing program which prohibits unlicensed persons from harvesting timber for hire or profit on any forest land, while West Virginia law requires timber harvest operations to be directed by persons licensed to do so (called for by Logging and Sediment Control Act). In 2007, West Virginia had more than 1,000 licensed timber operators and nearly 1,500 licensed certified harvesters. Although labeled as licensed (denoted as certified), Connecticut requires that forest practitioners be assigned the title of “certified” and be in possession of documents attesting to mandatory certification as a forest practitioner (“no person shall advertise, solicit, contract or engage in commercial forest practices within [Connecticut] at any time without a certificate”). The latter are broadly defined to include foresters, timber harvesters (supervisory or otherwise) and timber buyers. Among various legal stipulations, they are prohibited from engaging in any fraudulent or dishonest activities involving the harvesting, buying and selling of timber. In 2007, more than 110 practitioners were certified in Connecticut.

Timber Buyers and Sellers

Timber buyers and sellers are licensed in five states, and licensed and bonded in three of those five states as follows(Table 8):

- Connecticut: Certification of forest practitioners – CGS Title 23. Chap. 451a. Sec. 65h and 650.
- Indiana: Licensing and bonding of timber buyers – IOWA CODE. Art. 36.5.
- Illinois: Licensing and bonding of timber buyers – IL CODE. Chap. 225.735.
- Iowa: Licensing and bonding of timber buyers – IOWA CODE. Chap. 456A.36.
- Maryland: Licensing of forest product business – MD CODE. NAT. RES. Title 5-608.

Indiana’s timber buyer licensing program addresses problems such as failure of timber buyers to pay for purchased timber, harvest by timber buyers (or cause to be harvested) of timber not purchased, and sale or purchase by timber buyers of timber whose ownership is uncertain (McCoy 2007). As of 2006, Indiana had 646 licensed timber buyers all of whom had a security bond ranging

from \$2,000 to \$20,000 depending on the value of timber they purchased during the previous year. Failure of a licensed timber buyer to pay a timber grower (seller) can lead to forfeiture of a security bond. A similar licencing arrangement for timber buyers exists in Illinois, where in 2007 there were 458 licensed buyers (yearly average of about 490 for the period 1997 through 2007). Timber buyers in Illinois are required to retain (for three years) all records involving their purchase and sale of timber. Also implemented in a similar fashion is Iowa's Bonded Timber Buyer Program, where bonded timber buyers are required to have a security bond in an amount equal to 10 percent of their annual timber purchases. As of 2007, there were 343 bonded timber buyers in Iowa, the number of which has increased about 25 percent in the past 10 years.

Professional Foresters

The licensing or registration of professional foresters occurs in 14 states within the hardwood producing region (Table 8). In Maryland, false representation as a licensed professional forester can lead to the imposition of severe penalties. The intent of such licensing is primarily to protect the public from harm and to ensure economic value to the timber owner and the application of sound forestry practices (such as reforestation, stand structure, post-harvest site condition) (Society of American Foresters 2001). Being so credentialed, signifies that an individual is qualified in some specialty and has the knowledge and skills necessary to perform at some minimum level. These qualifications involve requirements for training, education, apprentice or internship, formal examination, or any combination thereof. Separate from state registration and licensing programs are certification programs sponsored by professional societies. An example is the Society of American Forester's Certified Forester® Program (CF), which is a voluntary program developed to recognize excellence in professional forestry and assure the public of an individual's commitment to provide quality resource stewardship. Currently, a person becomes a Certified Forester based on an accredited degree or equivalent, five years of professional experience, and a commitment to remaining current in the profession.

Although not always professional foresters, some states require certification of persons engaged in the management of prescribed fires. For example, the Georgia Forestry Commission is authorized to "promulgate . . . a program whereby practitioners become qualified and registered as certified prescribed fire managers." Similarly in Florida, to become a certified prescribed burn manager a person must successfully complete a Florida Division of Forestry educational program and possess a valid certification number. A certified person who violates the provisions of Florida's prescribed burning laws commits a misdemeanor of second degree. Louisiana also has a certification program for managers of prescribed burns.

Table 8. Registration, Certification and Licensing of Professional Foresters, Timber Harvesters, and Timber Buyers-Sellers in the U.S. Hardwood Producing Region, by State and Occupational Category. 2007.

State	Professional Foresters			Timber Harvesters	Timber Buyers-Sellers
	Voluntary Registration	Mandatory Registration	Licensed	Registered, Certified or Licensed	Registered, Certified, or Licensed
<i>North</i>					
Connecticut	--	--	YES	YES	YES
Delaware	--	--	--	YES	--
Illinois	--	--	--	YES	YES*
Indiana	--	--	--	YES	YES*
Iowa	--	--	--	YES	YES*
Maine	--	--	YES	YES	--
Maryland	--	--	YES	YES	YES*
Massachusetts	--	--	YES	YES*	--
Michigan	YES	--	--	YES	--
Minnesota	--	--	--	YES	--
Missouri	--	--	--	YES	YES*
New Hampshire	--	--	YES	YES	--
New Jersey	YES	--	--	--	--
New York	--	--	--	--	--
Ohio	--	--	--	YES	--
Pennsylvania	--	--	--	YES	--
Rhode Island	--	--	--	YES	--
Vermont	--	--	--	YES	--
West Virginia	YES	--	--	YES*	YES*
Wisconsin	--	--	--	YES	-
<i>South</i>					
Alabama	--	--	YES	YES	--
Arkansas	--	YES	--	YES	--
Florida	--	--	--	YES	--
Georgia	--	YES	--	YES	--
Kentucky	--	--	--	YES	--
Louisiana	--	--	--	YES	--
Mississippi	--	YES	--	YES	--
North Carolina	--	YES	--	YES	--
South Carolina	--	YES	--	YES	--
Tennessee	--	--	--	YES	--
Virginia	--	--	--	YES	--
<i>West</i>					
Oregon	--	--	--	YES	--
Washington	--	--	--	YES	--
TOTAL REGION	3	5	6	31	7

Note: An asterisk indicates a licensing requirement. In Missouri, only producers-dealers of treated timber are required to have licenses. Prescribed fire managers are certified in Georgia, Florida and Louisiana. Timber harvester registration-certification typically occurs within the auspicious of a Master Logger Program.

Source: Society of American Foresters (2001), National Association of State Foresters (2004), MacKay and others (1995) and various state agency documents and state government personnel responsible for state forestry programs.

Forestry Practice Guides and Requisites

State Program Initiatives Generally

Range of Program Types

State governments implement a wide variety of programs to promote the application of sound forestry practices across a range of forest land ownerships (Kilgore and Blinn 2004). In 2006-2007, the 33 states in the hardwood producing region reportedly implemented more than 800 programs whose purpose ranged from protecting water quality to improving timber harvest methods and from protecting wildlife and endangered species to promoting reforestation (Table 9). These programs can be usefully grouped into six major categories, namely extension-education programs (for example, state Project Learning Tree programs, state Master Logger Program), technical assistance programs (for example, Arkansas Landowner Assistance Program), tax incentive programs (for example, Minnesota Sustainable Forestry Incentives Act), fiscal incentive programs (for example, Maine Best Management Practices Low Interest Loan Program), land trust and easement programs (for example, Washington Forest Legacy Program) and regulatory programs (for example, West Virginia Logging Sediment Control Act). As denoted by the following, extension-education programs are most common among states in the hardwood producing region followed by fiscal incentive programs:

- Extension-education programs—30 percent of programs, average of seven programs per state.
- Fiscal incentive programs—27 percent of programs, average of seven programs per state.
- Regulatory programs—19 percent of programs, average of five programs per state.
- Technical assistance programs—10 percent of programs, average of three programs per state.
- Tax incentive programs—7 percent of programs, average of two programs per state.
- Land trust and easement programs—6 percent of programs, average of two programs per state.

State government programs can be selected and designed to promote forestry practices that have various purposes. In the early 1990s, technical assistance programs dominated in that a sizeable portion of state programs focused technical assistance on five of six major resource objectives (Table 10). For these five objectives, more than four of ten states chose technical assistance as the preferred approach. Even for protecting water quality, one third of the states chose technical assistance. Although less common among states than technical assistance and extension-education, fiscal and tax incentive programs appear as an important means of promoting reforestation, especially in the South, while regulatory programs (when chosen) are regionally the programs of choice for protecting forests from wildfire, insects and diseases, and for protecting water quality. Judging program preferences by the portion of states using them, the preference ranking (descending order) for nearly all purposes would be technical assistance, extension-education, fiscal and tax incentives and regulatory programs.

Table 9. State Government Programs Available for Promoting Appropriate Use and Management of Private Forests in the U. S. Hardwood Producing Region, by State and by Number and Type of Program. 2006-2007.

State	Major Type of Program (primary focus on forests) (number of programs)					
	Extension-Educational Programs	Technical Assistance Programs	Tax Incentive Programs	Fiscal Incentive Programs	Land Trust & Easement Programs	Regulatory Programs
<i>North</i>						
Connecticut	7	2	1*	5	2	2
Delaware	7	1	2*	7	1	4
Illinois	5	2	2*	7	2	4
Indiana	5	2	5	8	2	2
Iowa	7	1	2	6	1	2
Maine	9	3	2*	6	4	5
Maryland	9	2	2*	6	2	11
Massachusetts	6	3	3*	5	2	3
Michigan	7	2	2*	6	1	1
Minnesota	8	2	2*	6	2	6
Missouri	6	2	1*	7	1	1
New Hampshire	8	3	2*	6	3	11
New Jersey	6	2	1*	6	2	5
New York	6	1	2*	5	1	5
Ohio	7	3	2*	6	1	1
Pennsylvania	8	2	1	6	1	5
Rhode Island	5	1	1*	4	1	4
Vermont	7	3	1*	5	3	4
West Virginia	7	3	1*	6	1	7
Wisconsin	8	2	2*	7	1	3
<i>South</i>						
Alabama	7	3	1	7	1	3
Arkansas	7	3	2	8	1	2
Florida	8	3	1	7	1	2
Georgia	9	3	2	7	1	2
Kentucky	7	2	1	6	1	8
Louisiana	6	3	1	8	1	3
Mississippi	7	2	1	6	2	6
North Carolina	8	3	1	9	1	7
South Carolina	7	3	1	6	1	8
Tennessee	9	3	1*	9	1	5
Virginia	9	3	2*	8	1	6
<i>West</i>						
Oregon	9	4	5	7	3	9
Washington	10	2	3*	9	2	8
TOTAL REGION	241	79	59	217	51	155

Note: Attention directed to major programs focused primarily on forests and administered primarily by state government organizations, although in some cases private programs may be included. Asterisk indicates a forest management plan is a prerequisite to participation in certain tax relief programs. Education programs include USDA-Extension Service programs, USDA-Forest Service Conservation Education Programs; Project Learning Tree; Master Logger Program; Project Wild and Project Wet; Arbor Day and Tree City USA Programs; American Tree Farm System; Smokey the Bear forest protection program; and National Firewise Communities.

Source: Ellefson and others (2004 and 2005), Forest Service (2007d), Greene and others (2007) and various state agency documents and state government personnel responsible for state forestry programs,.

Table 10. State Government Programs Available for Promoting Major Forest Management Objectives on Private Forests in the U. S. Hardwood Producing Region, by Region, and Type and Intent of Program. 1992.

Intent of Program and Region	Percent of States with Program Type			
	Extension- Education Programs	Technical Assistance Programs	Fiscal and Tax Incentive Programs	Regulatory Programs
Protect Water Quality				
NORTH	30	33	17	20
SOUTH	36	36	10	18
Promote Reforestation				
NORTH	26	37	24	13
SOUTH	26	48	26	0
Improve Timber Harvesting				
NORTH	35	37	14	14
SOUTH	36	50	5	9
Protect from Wildfire, Insects, and Diseases				
NORTH	27	38	14	21
SOUTH	32	44	4	20
Protect Wildlife and Endangered Species				
NORTH	35	35	15	15
SOUTH	25	46	12	17
Enhance Recreation and Aesthetic Qualities				
NORTH	25	48	20	7
SOUTH	30	50	20	0

Note: Oregon and Washington have at least one of each type of program focused on each forestry activity. States may have more than one program in a single type of program.

Source: Ellefson and others 2005.

Forestry Practices Promoted or Required

A major purpose of a great many state forest resource programs is to make sure landowner and timber harvesters apply ecologically, technically and economically sound forestry practices. The latter have been variously grouped, although commonly so as practices involving streamside management, stream crossings, forest roads, waste disposal, chemicals and fertilizers, and harvesting and reforestation. Within each of these categories there may exist a myriad of different forestry practices, each with a different purpose and each frequently delivered by different type of programs (including technical assistance as well as regulatory). Example practices are:

- Streamside management zone: *Arkansas* – for slopes less than 7 percent, minimum streamside management zone should be 35 feet on each side of stream.
- Stream crossings: *North Carolina* – use temporary bridging as opposed to culverts and fords to minimize sediment release into streams.
- Forest roads: *Mississippi* – road grades should be limited to between 2 percent and 10 percent, with grades above 10 percent used only for short distances.
- Waste disposal: *Indiana* – establish designated area for fueling, material storage and

maintenance. Such areas should be away from waterways, areas prone to runoff or sensitive areas like caves, sinkholes, springs, seeps and riparian management zones.

- Chemical and fertilizers: *Wisconsin* – Calibrate spray equipment to apply chemicals uniformly and in the correct quantities, and apply chemicals only under favorable weather conditions.

- Harvesting and reforestation: *Oregon* – minimum tree stocking standards are: (a) 200 free to grow seedlings per acre; or (b) 120 free to grow saplings and poles per acre; or (c) . . .

The 33 states in the hardwood producing region have a laudable record of promoting – via education, technical assistance, fiscal incentives, or regulatory actions – the application of reputable forestry practices in each of the above six categories (Table 11). The frequency with which states have adopted and subsequently promoted these practices is as follows: Streamside management practices: 33 of 33 states, stream crossing practices: 33 of 33 states, forest road practices: 33 of 33 states, waste disposal practices: 25 of 33 states, chemical and fertilizer practices: 25 of 33 states, and harvesting and reforestation practices: 33 of 33 states. As for the frequency with which states have adopted practices in these six categories: 22 states have practices in all categories, six states have practices in five categories, and five states have practices in four categories.

Rate of Forestry Practices Application

Forestry practices judged worthy of application are useful to the extent that they are actually applied. State governments are sensitive to this reality and most have initiated compliance monitoring programs (National Association of State Foresters 2005, National Council for Air and Stream Improvement 2007, Phillips and Blinn 2007) (Table 11). In 2007, 25 of the 33 states in the hardwood producing region reported a formal monitoring program for evaluating the extent to which landowners and timber harvesters apply recommended or required forestry practices. The rate of compliance with forestry practices ranges from lows of 25 to 40 percent and highs from 95 to 100 percent. For states which have initiated monitoring programs, the average range of compliance for all practices is 70 to 90 percent. To promote higher levels of compliance, 30 states sponsor special education and training sessions for landowners and timber harvesters.

Requirements for establishing monitoring programs, their level of sophistication and frequency of application varies from state to state. For example, in Minnesota, state law requires “a program for monitoring silvicultural practices and the application of timber harvest and forest management guidelines,” while in Washington, state law requires “annual assessment of how regulations and voluntary processes are working.” In Washington, forestry operations are incomplete until approved by an inspector, the pre and post-harvest inspections are considered compliance monitoring. Many states in the northeastern portion of the hardwood producing region look to standardized regional protocols for monitoring the application of forestry practices that have potential to impact water resources (Forest Service 2007c). As use of compliance monitoring results, states in 2000 reported compliance information was used to modify existing training and education programs, target technical assistance programs, modify existing recommended forest practices, or develop new recommended forestry practices (National Association of State Foresters 2001).

Table 11. Forestry Practices Required or Promoted by State Government Programs in the U. S. Hardwood Producing Region, by State, Major Forestry Practice Category and Compliance Rate. 2007.

State	Major Category Forestry Practice Category						BMP Training- Education Program	Formal BMP Monitoring Program	BMP Compliance Rates
	Streamside Management	Stream Crossings	Forest Roads	Waste Disposal	Chemicals and Fertilizers	Harvesting and Reforestation			
<i>North:</i>									
Connecticut	YES	YES	YES	YES	NO	YES	YES	NO	NA
Delaware	YES	YES	YES	YES	YES	YES	YES	YES	95% to 99%
Illinois	YES	YES	YES	NO	YES	YES	NA	NO	NA
Indiana	YES	YES	YES	YES	YES	YES	YES	YES	85% to 97%
Iowa	YES	YES	YES	YES	YES	YES	YES	NO	25% to 50%
Maine	YES	YES	YES	YES	YES	YES	YES	YES	72% to 90%
Maryland	YES	YES	YES	NO	NO	YES	YES	YES	75% to 90%
Massachusetts	YES	YES	YES	YES	YES	YES	YES	YES	75% to 90%
Michigan	YES	YES	YES	YES	YES	YES	NA	NO	NA
Minnesota	YES	YES	YES	YES	YES	YES	YES	YES	40% to 85%
Missouri	YES	YES	YES	NO	YES	YES	YES	YES	NA
New Hampshire	YES	YES	YES	NO	NO	YES	YES	NO	NA
New Jersey	YES	YES	YES	NO	YES	YES	NO	NO	NA
New York	YES	YES	YES	YES	NO	YES	YES	YES	59% to 88%
Ohio	YES	YES	YES	YES	NO	YES	YES	NO	70% to 90%
Pennsylvania	YES	YES	YES	NO	NO	YES	YES	NO	NA
Rhode Island	YES	YES	YES	YES	YES	YES	YES	YES	NA
Vermont	YES	YES	YES	NO	NO	YES	YES	YES	70% to 90%
West Virginia	YES	YES	YES	NO	NO	YES	YES	YES	61% to 100%
Wisconsin	YES	YES	YES	YES	YES	YES	YES	YES	86% to 98%

Note: NA indicates not available. New Hampshire and Pennsylvania do not provide recommendations for managing streamside management zones, although they do recommend limiting soil disturbance in such zones. In some cases, a formal monitoring program is not in place and compliance rates are estimates prepared by agency staff. Also, although a monitoring program may be in place, its design and implementation is sufficiently flawed so as to prevent judgement about compliance rates.

Source: National Association of State Foresters (2005), National Council for Air and Stream Improvement (2007), Wear and Greis (2002), and state government personnel responsible for state forestry programs, and state best management practice monitoring (audit) reports.

Table 11 (continued).

State	Major Category of Best Management Practice						BMP Training- Education Program	Formal BMP Monitoring Program	BMP Compliance Rates
	Streamside Management	Stream Crossings	Forest Roads	Waste Disposal	Chemicals and Fertilizers	Harvesting and Reforestation			
<i>South:</i>									
Alabama	YES	YES	YES	YES	YES	YES	YES	YES	93% to 97%
Arkansas	YES	YES	YES	YES	YES	YES	YES	YES	84% to 96%
Florida	YES	YES	YES	YES	YES	YES	YES	YES	94% to 100%
Georgia	YES	YES	YES	YES	YES	YES	YES	YES	81% to 100%
Kentucky	YES	YES	YES	YES	YES	YES	YES	YES	50% to 60%
Louisiana	YES	YES	YES	YES	YES	YES	YES	YES	70% to 96%
Mississippi	YES	YES	YES	YES	YES	YES	YES	YES	77% to 93%
North Carolina	YES	YES	YES	YES	YES	YES	YES	YES	40% to 85%
South Carolina	YES	YES	YES	YES	YES	YES	YES	YES	78% to 96%
Tennessee	YES	YES	YES	YES	YES	YES		YES	80% to 90%
Virginia	YES	YES	YES	YES	YES	YES	YES	YES	35% to 90%
<i>West:</i>									
Oregon	YES	YES	YES	YES	YES	YES	YES	YES	79% to 100%
Washington	YES	YES	YES	YES	YES	YES	YES	YES	70% to 90%

Regulatory Program Initiatives

State governments actively make use of regulatory programs as a means of securing the public interest in forests within the hardwood producing region. These programs are composed of laws and rules that limit or confine behavior and that rely on coercion (penalties), rather than voluntary behavior, as a way of securing compliance with established standards (Davies and Mazurek 1998). State regulatory programs focused on the application of forestry practices within the region are extremely diverse in their intentions and in the structures they use to accomplish such intentions. For example, a 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, streamside management zones). The enforcement tools available to state regulatory programs are numerous and similarly diverse. 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. To assume that state regulatory programs are uniform in their intent and application is inappropriate. Washington's regulatory program is a far cry for those that exist in Kentucky or Connecticut, and the regulatory program implemented by Maine is simply not the same as programs being implemented in Virginia and West Virginia (Ellefson and others 2004).

Authority for the regulation of forestry practices in the hardwood producing region can emanate from a number of statutory sources, most notably environmentally centered authorities and forest centered authorities. The former authorize state agencies (such as departments of environmental protection) to deal with pollutants that affect broad sets of resources (air, water, soil, wildlife, wetlands), while authorities of the latter type focus exclusively and directly on forest resources and are usually administered by a state's lead forestry agency or an independent forestry board or commission. State agencies responsible for implementing environmental center authorities usually have similar agency counterparts at the federal government level.

Regulatory Legal Authorities

Environmental Centered Authorities

The extent to which state environmental law serves as a basis for regulating forestry practices in the hardwood producing region depends on the exactness of statutory directive. Where statutory statements 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 intent that requires 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], and “. . . establish regulations concerning disposal of hazardous wastes . . . as deemed necessary to protect public health, safety

and welfare and the environment” [Massachuset]. If these broad statements of intent are construed to include concerns over activities involving forests and forestry within the hardwood producing region, 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 (Appendix Table 1). 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 2004, 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 (Environmental Law Institute 1997, 1998; and Ellefson and others 2005).

The range of state environmental laws that have potential to serve as the foundation for the regulation of forestry practices in the U. S. Hardwood producing region can best be appreciated by examples. Consider the following:

- *Timber Harvesting in Scenic River Areas* (South Carolina): Limited harvesting in scenic river areas provided landowners follow best management practices for forested wetlands as approved by the South Carolina Forestry Commission (*SC CODE. Chap. 29. Sec 29-160*).
- *Agricultural and Silvicultural Pollution Abatement* (Ohio): Ohio Division of Soil and Water Conservation to establish enforceable standards to prevent erosion from agricultural or silvicultural activities leading to degradation of waters (*OHIO CODE. Title 15. Chap. 1511*).
- *Coal Mine Reclamation* (Indiana, Pennsylvania): Persons in Indiana must obtain a permit specifying plans for meeting surface standards for coal mined areas (*IC CODE. Chap. 10. Art. 14-34-10*); persons in Pennsylvania conducting or proposing to conduct an earth disturbance activity shall design, implement and maintain BMPs to minimize the potential for accelerated erosion and sedimentation in order to protect water quality (*PA STAT. Title 25. Chap. 102.11*), and vegetative standards for post-mining conditions are established (*PA STAT. Title 25. Chap. 87*).

- *Chemicals and Pesticides* (Delaware, Minnesota): Delaware Department of Agriculture shall regulate the sale and application of pesticides (*DL CODE. Title 3. Chap. 12*); in Minnesota, persons 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*).
- *Sediment Reduction* (South Carolina): Department of Health and Environmental Control 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. Title 48. Chap. 18. Sec. 70*).
- *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. Sec. 480A-480BB*).
- *Timber Harvesting in Scenic Areas* (Connecticut, Tennessee): Connecticut Department of Environmental Protection authorized to establish regulations to preserve scenic landscapes in designated Greenways (*CGS Title 23. Chap 454. Sec 100 through 102*); harvesting in Class I scenic rivers in Tennessee is allowed pursuant to reasonable regulations issued by the commissioner of environment and conservation . . . In Class II and III areas, no timber harvesting within and conservation easement (*TN CODE. Title 11. Chap. 11-13-111*).
- *Endangered Plant and Animal Species* (Maryland, Pennsylvania): Maryland Secretary Department of Natural Resources shall establish rules and regulations to ensure conservation of land or aquatic habitats, necessary for the conservation of nongame, threatened, or endangered species of wildlife or plants (*MD CODE Title 10. Sec. 10-2A-06*); Pennsylvania Department of Environmental Protection establish rules conserving and protecting native wild plants (*PA STAT. Title 17. Chap. 45*).
- *Alteration of Watercourses* (New York, Vermont): New York Department of Environmental Conservation permit required for crossing of certain classified watercourses (*NY[Environ. Conserv.] LAW. Art. 17. Title 3*), Vermont Department of Environmental Conservation permit required for alteration or modification of watercourse with drainage area greater than 10 square miles (*VT STAT. Title 10. Chap. 41*).
- *Mined Land Reclamation* (Arkansas, Missouri): Upon issuance of permit Arkansas Department of Environmental Quality, operators shall condition site for reforestation subsequent and maintenance of forest conditions (*AR CODE Title 15. Chap 57. Sec 315*); with the approval of the

commission (Missouri Department of Conservation), operators shall set out or plant on affected land, plants, trees, shrubs . . . such shall be of an appropriate type based on sound . . . forestry principles . . . seeding or planting shall be completed within 24 months after completion of operations (*MO STAT Chap. 444. Sec. 77*).

- *Shoreland Protection Regulation* (Maine, Minnesota): Maine Board of Environmental Protection shall set forth land use guidelines for shorelands (*MRSA Title 38. Sec. - 435-465*); Minnesota Commissioner of Natural Resources may adopt rules in counties failing to adopt ordinances for the conservation of shoreland generally (*MN STAT. Chaps. 103F.215 and 103F.211*), and adopt rules for the protection of shorelands within wild and scenic rivers (*MN STAT. Chap. 103F.321*).

- *High-priority Water Resources* (Florida): Department of Environmental Protection to establish special rule provisions (such as buffers) to protect water bodies worthy of special protection (Outstanding Florida Waters) because of their outstanding natural attributes (*FL CODE. Title 29. Chap. 403. Sec. 27*).

- *Land Use* (Florida, Maine, Oregon, Vermont): Florida Environmental Land and Water Management Act of 1972 (*FL CODE Title 28. Chap380*); Maine Land Use Regulatory Commission (*MRSA. Title 12 Chap. 207A. Sec 681-689*); Oregon State Land Use Act of 1973 (*ORS Chap.197*); Vermont State Land Use and Development Act of 1970 (*VT STAT. Title 10. Chap. 151*).

- *Water Quality* (Tennessee): . . . activities (stream bank disturbance and alteration, gravel removal, bank stabilization) involving working in a stream require an aquatic resource alteration permit (Tennessee Water Quality Control Act) (*TN CODE. Title 69. Chap. 3*).

- *Wetlands* (Vermont): Secretary of Department of Environmental Conservation authorized to regulate any persons action or activity that causes discharges into wetlands (waterways) in violation of established policy. Secretary may order proper procedures for control of that action or activity (*VT STAT. Title 10. Chap. 47. Sec. 1272*).

Forest-Centered Authorities

Diversity of Authorities

Regulatory authority over the application of forestry practices on private land in the hardwood producing region is extensive and can emanate from state law whose primary focus is forests and the interest of state government in their use, management and protection (Ellefson and others 2004 and 2007, Siegel 1997) (Table 12). This legal authority 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 Oregon (Oregon Forest Practices Act) and Washington (Washington Forest Practices 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 10 or more different statutes that may require notices of intent to harvest, conditioned

Table 12. State Forest-Centered Statutory Authorities Regulating the Application of Forestry Practices in the U.S. Hardwood Producing Region, by State. 2007.

State	Forest-Centered Authorities
<i>East</i>	
Connecticut	Connecticut Forest Practices Act (practices, regulations, penalties, municipal actions). <i>CGS. Title 23. Chap. 451a.</i>
Delaware	Pine and Yellow-Popular Tree Conservation and Reforestation. <i>DL CODE. Title 3. Chap. 10-5.</i> Silvicultural Systems and Sedimentation and Erosion Control. <i>DL CODE. Title 3. Chap. 10-6.</i>
Illinois	Stream Debris Adverse to Fish. <i>IL CODE. Chap. 515.5.</i> Ginseng Regulation. <i>IL CODE. Chap. 525.20.</i> Prescribed burning regulations. <i>IL CODE. Chap. 525.37.</i>
Indiana	Local government requirement to comply with accepted forestry practices. <i>IC. Chap. 2. Art. 36-7-2-10.</i> Forestry Operation Declared not to be Public Nuisance. <i>IC. Chap. 6. Art. 32-30-11.</i>
Iowa	Forestry Practices Meeting NRCS Soil and Water Conservation Standards. <i>IOWA CODE. Title 5. Chap. 161A (Administrative Code 27-12.84).</i>
Maine	Forest Practices Act. <i>MRSA. Title 12. Chap. 805. Sec. 8866-9970.</i> Slash Disposal. <i>MRSA. Title 12. Chap. 807. Sec. 9331 - 9338.</i> Timber Harvesting in Shoreland Areas <i>MRSA Title 38. Chap. 3. Sec. 438B;</i> LURC Use Regulation. <i>MRSA. Title 12. Chap. 206A. Sec. 681 - 689.</i> Wood Processing Reporting Requirements. <i>MRSA. Title 12. Chap. 805. Sec. 8881-8888.</i>
Maryland	Forest Conservation Act. <i>MD CODE. Title 5. Sec. 1601-1613.</i> Reforestation. <i>MD CODE. Title 5. Sec. 103.</i> Pine Tree Reforestation. <i>MD CODE. Title 5. Sec. 501-508.</i> Reforestation after Highway Construction. <i>MD CODE Title 5. Sec. 103.</i> Chesapeake Bay Critical Areas Commercial Harvests. <i>MD CODE. Title 8. Sec. 1808.7.</i> Fire Hazard Reduction. <i>MD CODE. Title 5. Sec. 710.</i> Timber Harvest in Nontidal Wetlands. <i>MD CODE. Title 5. Sec. 901 - 911.</i> Roadside Tree Protection. <i>MD CODE Title 5. Sec. 401- 406.</i>
Massachusetts	Massachusetts Forest Cutting Practices Act (harvest guidelines, notice of intent). <i>MGL. Title 15. Chap. 132. Sec. 40-45.</i> Slash Management. <i>MGL. Title 7. Chap. 48. Sec. 16 and 16A.</i>
Michigan	Slash and Debris Removal. <i>MCL. Chap. 324. Sec. 51901-51905.</i> Forestry operations exempt as nuisances. <i>Chap 320. Sec. 2031 through 2036.</i>
Minnesota	Removal and Transport of Decorative Materials. <i>MN STAT. Chap. 88.642.</i> Control and Management of Forest Pests. <i>MN STAT. Chap. 89.53-57.</i> Disposal of Slash and Debris. <i>MN STAT. Chap. 88.14.</i> Forest Management Practices in Litigation. <i>MN STAT. Chap. 88.81.</i>
Missouri	Designated Cropland Forestry Practices. <i>MO STAT. Chap. 254.</i>
New Hampshire	Notice of Intent to Harvest Timber. <i>NH REV STAT. Chap. 227J. Sec. 5.</i> Operations in Wetlands. <i>NH REV STAT. Chap. 227J. Sec. 6.</i> Alteration of Terrain. <i>NH REV STAT. Chap. 227J. Sec. 7,</i> and <i>NH REV STAT. Chap. 485A. Sec. 17.</i> Cutting Near Certain Waters and Roads. <i>NH REV STAT. Chap. 227J. Sec. 9.</i> Slash and Mill Disposal near Waters. <i>NH REV STAT. Chap. 227J. Sec. 10.</i> Transport of Coniferous Trees. <i>NH REV STAT. Chap. 227J. Sec. 11.</i> Insect and Disease Management Control Areas. <i>NH REV STAT. Chap. 227K. Sec. 3.</i> Shoreland Protection Standards (woodland buffer) and Penalties. <i>NH REV STAT. Chap. 483B. Sec. 1, 9 and 18.</i> Floating of Timber. <i>NH REV STAT. Chap. 485B. Sec. 1.</i>
New Jersey	New Jersey Freshwater Wetlands Act. <i>NJ STAT. Title 13. Chap. 9B-4.</i> [also woodlands assessment/plan approval requirements]. Permissible Forestry Activities-Practices. <i>NJ. STAT. Title 4. Chap. 1C-9.</i>

Note: 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 as are administrative rules generally.
 Source: State registries of state laws and codes, and state government personnel responsible for state forestry programs.

Table 12 (continued).

State	Forest-Centered Authorities
New York	Reforestation. <i>NY [Environ. Conserv.] LAW. Art. 9. Title 5.</i> Removal of Evergreens and Protected Plants. <i>NY [Environ. Conserv.] LAW. Art. 9. Title 5.</i> Forest Insect and Disease Control. <i>NY [Environ. Conserv.] LAW. Art. 9. Title 13.</i> Freshwater Wetland Permits. <i>NY [Environ. Conserv.] Law. Art. 24. Title 1-13.</i>
Ohio	Forest Fire Hazard as a Nuisance. <i>OHIO CODE. Title 15.Chap. 1503.07.</i>
Pennsylvania	Fire Protection Nuisance Declarations. <i>PA STAT. Chap. 3. Sec 302(d).</i> Erosion and Sediment Control. <i>PA STAT. Title 25. Chap. 102. Sec. 1-7.</i> Oak Wilt Disease Protection. <i>PA STAT. Title 7. Chap. 125. Sec. 46.</i>
Rhode Island	Registration of Wood Cutting Operations. <i>RI STAT. Title 2. Chap 5-1 through 4.</i> Permits for Cutting of Trees. <i>RI STAT. Title 2. Chap. 15-8.</i> Forest Fires and Fire Prevention. <i>RI STAT. Title 2. Chap 2-12. Sec. 5-13.</i>
Vermont	Regulation of Heavy Cutting Practices. <i>VT STAT. Title 10. Chap. 83.Sec. 2625.</i> Treatment of Slash. <i>VT STAT. Title 10. Chap. 83.Sec. 2648.</i> Commissioner Authority to Regulate Forestry Practices. <i>VT STAT. Title 10. Chap.85. Sec. 2622.</i>
West Virginia	Logging Sediment Control Act (notification, supervision, harvester licensing). <i>WV STAT. Chap. 19. Art. 1B.</i> Debris Burning. <i>WV. Rules. Title 45. Sec. 6.</i> Forest Insect and Disease Control. <i>WV STAT. Chap. 20. Sec. 19.</i> Ginseng Regulation. <i>WV STAT. Chap. 19. Sec. 1A-3a.</i>
Wisconsin	Statewide County Notification of Timber Harvest. <i>WI STAT. Chap. 26.03.</i> Fire Prevention and Suppression. <i>WI STAT. Chap. 26.11.</i> Forest Insect and Disease Control. <i>WI STAT. Chap. 26.30.</i> Forestry Operations Conforming to Generally Acceptable Practices are not Nuisances. <i>WI STAT. Chap. 823.075 (1,2,3).</i>
<i>South</i>	
Alabama	Watershed Management Authorities (require use of AL Forestry Commission Developed BMPs) <i>AL CODE. Title 9. Chap 9-10A-4.</i> Prescribed Burning Notification. <i>AL CODE. Chap. 9-13-270 through 274.</i> Insect and Disease Protection <i>AL CODE. Title 9. 9-13-120 through 142.</i> Ginseng Regulation. <i>AL CODE. Chap. 9-13-240 through 250.</i>
Arkansas	Notice of Intent to Control Burn. <i>AR CODE. Title 20. Chap. 22. Sec. 302.</i>
Florida	Notification for Prescribed Burning. <i>FL CODE. Title 35. Chap. 590.02</i> Permit for Sale of Cypress Products. <i>FL CODE. Title 35. Chap. 590.50.</i> Certification of Prescribed Burn Managers. <i>FL CODE Title 35. Chap. 590.125.</i>
Georgia	Vegetative Management in Road Right-of-Ways. <i>GA CODE. Title 32. Chap. 6. Sec. 75.</i> Uniform Local Government Procedures for Harvesting Notification Permits. <i>GA CODE. Title 12. Chap. 6. Sec. 24.</i> Permit for Controlled Burns. <i>GA CODE. Title 12. Chap. 6. Sec. 90.</i> Unlawful Harvest of Ginseng. <i>GA CODE. Title 12. Chap. 6. Sec. 150-157.</i> Prescribed Burning Permits. <i>GA CODE. Title 12. Chap 6. Sec. 145-149.</i> Certification of Prescribed Burn Managers. <i>GA CODE. Title 12. Chap 6. Sec. 149.</i>
Kentucky	KY Forest Conservation Act (logger designation, appropriate practices, penalties). <i>KY CODE. Title 12. Chap. 149. Sec. 342 -350, and 355.</i> Prescribed Fire Authority. <i>KY CODE. Title 12. Chap 149. Sec. 400.</i>
Louisiana	Terpentine Leave Trees. <i>LA RS. Chap. 3:4293.</i> Reforestation of Public Land or Right-of-Way Land. <i>LA RS. 3:4271.</i>
Mississippi	Forest Harvesting. <i>MS CODE. Title 49. Chap. 19. Sec. 53.</i> Leave Trees Involving Harvest of Naval Stores. <i>MS CODE. Title 49. Chap. 19. Sec. 55.</i> Pine Tree Stocking After Harvest. <i>MS CODE. Title 49. Chap. 19. Sec. 57.</i> Hardwood Tree Stocking After Harvest. <i>MS CODE. Title 49. Chap. 19. Sec. 59.</i> Seed Tree Requirements after Harvest. <i>MS CODE. Title 49. Chap. 19. Sec. 61.</i> Felling brush or trees in waterways. <i>MS CODE. Title 97. Chap. 15. Sec. 39 and 41.</i>

Table 12 (continued).

State	Forest-Centered Authorities
North Carolina	Forest Practice Guideline Enforcement (Sedimentation Control Act). <i>NC CODE.</i> Chap. 113A-52.1. Insect and Disease Protection. <i>NC CODE.</i> Chap. 113-60.4 through Chap. 11360.8. Prescribed Fire Permits. <i>NC CODE.</i> Chap. 113-60.40 through Chap. 113-60.45. Obstruction of Streams and Drainage Ditches. <i>NC CODE.</i> Chap. 77-13 and Chap. 77-14. Restriction on Local Government Regulation. <i>NC CODE.</i> Chap. 153A.452. Forestry Professional Registration. <i>NC CODE.</i> Chap. 89B. [Certain] Riparian Zone Buffer Management. <i>NC Environmental Mgt. Commission Rules [NCAC 2B]</i> . Corporate timberland harvesting in accord with established forestry rules. <i>NC CODE.</i> Chap. 113-72, Adoption and compliance with Department of Environment and Natural Resource established forest practice guidelines. <i>NC CODE.</i> Chap 113A-52.1
South Carolina	Forest Pest Outbreak Management. <i>SC CODE.</i> Chap. 48-29-10 through 60. Emergency Fire Protection Powers. <i>SC CODE.</i> Chap. 48-31-10 through 40. Prescribed Fire Management. <i>SC CODE.</i> 48-34-10 through 60. Regulation of Certain Fires. <i>SC CODE.</i> Chap. 48-35-10 through 60. State precedence over local forest practice ordinances. <i>SC CODE.</i> Chap. 50-2-10 through 50.
Tennessee	Stop Work Order Silvicultural Activities. <i>TN CODE.</i> Title 69. Chap 3. Sec. 133. Master Logger Liability for Forestry Practices. <i>TN CODE.</i> Title 69. Chap. 3. Sec. 138. Ginseng Harvest Regulations. <i>TN CODE.</i> Title 70. Chap. 8. Sec 201-205.
Virginia	Conduct of Silvicultural Activities. <i>VA CODE.</i> Title 10.1. Chap. 11. Sec. 81.1 - 81.7. Regulation of Prescribed Burning. <i>VA CODE.</i> Title 10.1. Chap. 11. Sec. 42. Pine Trees Left for Reforestation. <i>VA CODE.</i> Title 10.1. Chap. 11. Sec. 64 and 71. Logging Debris in Streams. <i>VA CODE.</i> Title 62.1. Chap. 20. Sec. 194.2.
West	
Oregon	Oregon Forest Practices Act (notification, reforestation, penalties). <i>ORS.</i> Chap. 527.610-992. Seeding of Prescribed Burn. <i>ORS.</i> Chap. 526. 360 and 370. Integrated Pest Management. <i>ORS.</i> Chap. 527. 310 through 370. Permit for Extraction of Tree Pitch. <i>ORS.</i> Chap. 527.260. Permits for Fires on Forestlands. <i>ORS.</i> Chap 477.515. Burning within Limits of Smoke Management Plan. <i>ORS.</i> Chap. 477.013. Fire Hazard Abatement. <i>ORS.</i> Chap. 477.062. Export of Unprocessed State Timber. <i>ADM RULE.</i> 629.031.
Washington	Washington Forest Practices Act (harvest permits, reforestation, penalties). <i>RCW.</i> Chap. 76.09.010 through 935. Fire Protection (burning permits, hazard reduction, road closures). <i>RCW.</i> Chap. 76.04.205 through 76.04.495, and 76.04.700 through 900. Forest Insect and Disease Control. <i>RCW.</i> Chap. 76.06.010 through 130. Wood Debris in Navigable Waters. <i>RCW.</i> Chap. 76.42.010 through 070. Specialized Products (cedar, evergreen foliage, Christmas trees). <i>RCW.</i> Chap. 76.48.010 through 910. Forest Practice Rule Authority re Water Quality. <i>RCW.</i> Chap. 48.420 and 425. Selective Cutting in Shorelands. <i>RCW.</i> Chap.90.58.150. Hydraulics Project Approval. <i>RCW.</i> Chap. 77.55.010 through 370.

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 non tidal 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 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 occur under comprehensive regulatory laws. Examples of states in the U.S. hardwood producing region that have such laws are 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); 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, 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.” Other states with similar statutory provisions are Florida, Maine, Maryland, Mississippi, Ohio, Pennsylvania, 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.

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 perquisite 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.

Content of Statutory Authority

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, while statutes in other states specify in great detail the entire structure of a regulatory program, including statutory specification of exacting standards for forestry practices. Examples of the latter in the U.S. hardwood producing region are:

- 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*).
- . . . 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 reseeded . . . shall not be cut until at least three years have elapsed (Virginia) (*VA Code Title 10.1. Chap. 11. Sec. 64 and 65*).

Forestry Practices Regulated

The forestry practices subject to state to regulatory programs in the U. S. hardwood producing region range from reforestation practices to construction of roads and trails and from management of slash and debris to the disposal of hazardous material. Although a great variety of forestry practices can exist within anyone category, these practices can usefully be grouped as follows:

- *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).

Based on the informed judgement of state government executives responsible for state regulatory or related programs involving forestry practices, all state governments in the U. S. hardwood producing region regulate at least one forestry practice in one or more of the above categories (Ellefson and others 2004) (Table 13). The extent and breadth of these regulatory programs are focused more sharply by the reality that in only 58 cases (out of 231 possible) do the 33 states report not regulating some practice within any one of the above seven major forest practice categories. Though all states engage in some form of forest practices regulation, variation among states is substantial. Some states stress only one category of forestry practices (for example, Illinois—chemical application practices, Mississippi—timber harvesting practices), while in certain other states one or more forestry practice in all of the aforementioned categories is state regulated (for example, Kentucky, Massachusetts, Oregon). In a more exacting sense, state regulation of forestry practices within anyone category occurs as follows:

Road and trail practices: all practices—18 percent (6) of states; some practices—46 percent (15) of states; no forestry practices—12 percent (4) of states; and conditionally regulated—24 (8) percent of states.

Timber harvest practices: all practices—18 percent (6) of states; some practices—33 percent (11) of states; no forestry practices—12 percent (4) of states; and conditionally regulated—37 percent (12) of states.

Table 13. Extent to Which Forestry Practices Applied on Private Forest Land Are Regulated by State Government Agencies in the U.S. Hardwood Producing Region, by State and Major Forest Practice Category. 2004-2005.

State	Road and Trail Practices	Timber Harvesting Practices	Reforestation Practices	Cultural Practices	Chemical Application Practices	Forest Protection Practices	Administrative Practices
<i>East</i>							
Connecticut	CONDITIONAL	CONDITIONAL	NONE	NONE	ALL	NONE	NONE
Delaware	SOME	SOME	SOME	NONE	SOME	NONE	SOME
Illinois	NONE	SOME	NONE	NONE	ALL	NONE	NONE
Indiana	SOME	SOME	NONE	NONE	ALL	SOME	SOME
Iowa	NONE	NONE	NONE	NONE	SOME	NONE	SOME
Maine	SOME	SOME	SOME	NONE	ALL	SOME	SOME
Maryland	ALL	ALL	ALL	NONE	ALL	SOME	SOME
Massachusetts	ALL	ALL	ALL	SOME	SOME	SOME	SOME
Michigan	SOME	SOME	NONE	NONE	SOME	SOME	CONDITIONAL
Minnesota	SOME	SOME	NONE	NONE	ALL	SOME	SOME
Missouri	CONDITIONAL	CONDITIONAL	CONDITIONAL	CONDITIONAL	CONDITIONAL	CONDITIONAL	CONDITIONAL
New Hampshire	SOME	CONDITIONAL	CONDITIONAL	SOME	SOME	SOME	SOME
New Jersey	SOME	SOME	SOME	SOME	SOME	SOME	SOME
New York	SOME	CONDITIONAL	CONDITIONAL	CONDITIONAL	ALL	SOME	CONDITIONAL
Ohio	CONDITIONAL	NONE	NONE	CONDITIONAL	NONE	NONE	NONE
Pennsylvania	SOME	NONE	NONE	SOME	ALL	SOME	SOME
Rhode Island	SOME	SOME	NONE	NONE	NONE	NONE	SOME
Vermont	SOME	SOME	NONE	SOME	ALL	NONE	SOME
West Virginia	ALL	ALL	NONE	NONE	SOME	SOME	SOME
Wisconsin	SOME	CONDITIONAL	CONDITIONAL	CONDITIONAL	SOME	SOME	CONDITIONAL
<i>South</i>							
Alabama	CONDITIONAL	CONDITIONAL	CONDITIONAL	CONDITIONAL	CONDITIONAL	CONDITIONAL	CONDITIONAL
Arkansas	NONE	CONDITIONAL	NONE	NONE	SOME	CONDITIONAL	NONE
Florida	SOME	NONE	NONE	SOME	ALL	NONE	NONE
Georgia	SOME	CONDITIONAL	CONDITIONAL	CONDITIONAL	CONDITIONAL	CONDITIONAL	SOME
Kentucky	ALL	ALL	ALL	ALL	SOME	ALL	SOME
Louisiana	CONDITIONAL	CONDITIONAL	SOME	CONDITIONAL	ALL	CONDITIONAL	CONDITIONAL
Mississippi	NONE	CONDITIONAL	SOME	NONE	NONE	NONE	NONE
North Carolina	SOME	SOME	SOME	NONE	ALL	SOME	NONE
South Carolina	CONDITIONAL	CONDITIONAL	CONDITIONAL	CONDITIONAL	CONDITIONAL	SOME	SOME
Tennessee	CONDITIONAL	CONDITIONAL	NONE	NONE	ALL	SOME	NONE
Virginia	CONDITIONAL	SOME	SOME	NONE	ALL	SOME	SOME
<i>West</i>							
Oregon	ALL	ALL	ALL	SOME	ALL	ALL	ALL
Washington	ALL	ALL	SOME	SOME	ALL	SOME	ALL

Source: Ellefson and others (2004), National Association of State Foresters (2001), and various state agency documents and state government personnel responsible for forest practice regulatory programs,

Reforestation practices: all practices—12 percent (4) of states; some practices—24 percent (8) of states; no forestry practices—43 percent (14) of states; and conditionally regulated—21 percent (7) of states.

Cultural practices: all practices—9 percent (1) of states; some practices—18 percent (6) of states; no forestry practices—49 percent (16) of states; and conditionally regulated—24 percent (8) of states.

Chemical application practices: all practices—49 percent (16) of states; some practices—30 percent (10) of states; no forestry practices—9 percent (3) of states; and conditionally regulated—12 percent (4) of states.

Forest protection practices: all practices—6 percent (2) of states; some practices—52 percent (17) of states; no forestry practices—27 percent (9) of states; and conditionally regulated—15 percent (5) of states.

Administrative practices: all practices—6 percent (2) of states; some practices—52 percent (17) of states; no forestry practices—24 percent (8) of states; and conditionally regulated—18 percent (6) of states.

For purposes of clarity, within a single grouping of forestry practices there may occur a number of different forestry practices, not all of which are subject to regulation. For example, Michigan regulates the removal of slash and debris that may occur after timber harvest, but does not regulate most other harvesting practices. Similarly, Pennsylvania regulates cultural practices to prevent oak wilt disease, but it does not regulate other cultural practices.

Regulation of forestry practices in some states is conditional (i.e., “it depends”), in that regulation of a practice occurs only when certain conditions or thresholds occur (Table 13). For example, in Washington special consideration must be given to the type and application of forestry practices when critical habitats of some species of wildlife (for example, Gray Wolf, Silver-spot Butterfly) are encountered, or when forest land to be harvested contains cultural, historic or archeological resources. Similar provisions have been made for certain conditions in New Hampshire (harvest operations in wetlands) and Vermont (harvesting above 2,500 feet elevation). In the hardwood producing region, 15 states report conditional circumstances for regulation, most of which involve timber harvesting practices (12 states), cultural practices (eight states), and reforestation practices (seven states). States with conditional circumstances applying most often to categories of forestry practices are Missouri and Alabama (all categories), while 18 states report no conditional circumstances. Five of the latter account for over one-quarter (26 percent) of the forest area in the U. S. hardwood producing region (Maine, North Carolina, Oregon, Pennsylvania, and Washington).

The states most likely to regulate all or some of the practices in the above seven forest practice categories are Kentucky, Massachusetts, New Jersey, Oregon and Washington (account for 17 percent of the forest area in hardwood producing region), while the states least likely to regulate to the same extent (all or some) are Arkansas, Connecticut, Mississippi (10 percent of forest

area) (Table 13). The 10 most forested states in the region, accounting for 211.6 million acres of the region's 412.5 million acres, regulate all or some of the practices occurring in an average of four of the categories (Maine, Michigan, New York, Alabama, Arkansas, Georgia, Mississippi, North Carolina, Oregon, Washington). For the entire hardwood producing region, the probability of all or some of the forest practices in anyone forest practice category being regulated is: 64 percent for roads and trails, 51 percent for timber harvest practices, 36 percent for reforestation practices, 27 percent for cultural practices, 79 percent for chemical application practices, 58 percent for forest protection practices, and 58 percent administrative practices associated with regulatory initiatives. If conditional regulation of practices is included, the percentage's chances rise to 88, 88, 57, 51, 91, 73 and 76, respectively.

Agencies Responsible for Regulation

Number and Type of Agencies

The number and type of state government agencies influencing the use and management of private forests in the hardwood producing region is extensive. In 2001, an average of 26 state government entities per state (departments, commissions, divisions, bureaus) were responsibly for policies and programs that could change, alter or modify the way hardwood forests are used, managed, or protected (Ellefson and others 2001, 2002). Of these entities, an average of nearly six per state (region-wide total of 189) were 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. The most frequent focus of these state government regulatory entities was the quality of air and water resources, namely 23 percent (44 agencies). Including the latter, other focal points for agency regulation of forestry practices in 2001 were:

- Air and water pollution control—23 percent of agencies
- Forest resource management—19 percent
- Fish and wildlife management—12 percent
- Soil and resource conservation—8 percent
- Land use planning and direction—2 percent
- Park and natural area preservation—4 percent
- Insect, disease and invasive species—4 percent
- Economic development and transportation—1 percent
- Other regulatory focal points—27 percent

The category “other regulatory focus” (27 percent of total) highlights the diversity of regulatory functions implemented by state government agencies. The regulatory focus of agencies in this category 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.

A state-by-state accounting can further highlight the diverse landscape of state agency regulatory interests (Table 14). In states with relatively few agencies engaged in regulatory activities (for example, Illinois, Florida, Mississippi), regulatory interests are quite narrow and often carefully focused (fish and wildlife, forest management, and air and water quality, respectively). Louisiana is another good example, in that only two subjects (terpentine leave trees, right-of-way reforestation) are the regulatory concerns of the state's Division of Forestry (reportedly the only agency regulating forest practices in the state). However, in states where the number of regulating agencies is high (for example, exceeds six), the combined interests of such agencies can also be high. Such occurs, for example, in Michigan, New York and Kentucky, which each have a regulatory landscape involving five different subjects, and in Oregon, Virginia, New Hampshire, and Indiana where each state has six different subjects of interest to state regulatory agencies.

State government agencies actually involved in the regulation of forestry practices occurring within the hardwood producing region can best be illustrated with the following example agencies, most of which report extensive or moderate regulatory involvement with forestry practices.

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: 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: Indiana Department of Natural Resource's Division of Nature Preserves, and the Tennessee Department of Environment and Conservation's Division of Natural Heritage.

Air and Water Management and Pollution Control Agencies: 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: Missouri Commission on Land Reclamation, and New York Department of Environmental Conservation's Division of Solid and Hazardous Materials.

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.

Table 14. State Government Agency Involvement in the Regulation of Forestry Practices Applied to Nonfederal Forests in the U. S. Hardwood Producing Region, by State and by Regulatory Focus and Magnitude. 2004-2005.

State	Number of Agencies Regulating Forestry Practices	Major Focus of Agencies Regulating Forestry Practices	Extent of Agency Involvement in Regulating Forestry Practices (number of agencies)			Magnitude of Agency Staff Involved in Regulating Forestry Practices (number of agencies)		
			Extensive	Moderate	Minimal	< 3 FTEs	3 to 7 FTEs	> 7 FTEs
<i>East</i>								
Connecticut	1	a	0	0	1	0	0	1
Delaware	4	a, b, d	1	2	1	2	2	0
Illinois	1	c	0	0	1	1	0	0
Indiana	9	a, b, c, f, g, i	0	8	1	8	1	0
Iowa	2	b, e	0	0	2	2	0	0
Maine	4	a, b, e	0	1	3	3	0	1
Maryland	7	a, b, c, i	4	3	0	1	4	2
Massachusetts	6	a, b, c, g, i	1	2	3	4	0	2
Michigan	9	a, b, c, g, i	0	4	5	3	2	4
Minnesota	12	a, b, c, g, i	3	7	2	0	8	4
Missouri	2	a, i	0	0	2	2	0	0
New Hampshire	6	a, b, c, g, h, i	1	1	4	4	0	2
New Jersey	10	a, b, c, d, i	5	0	5	7	1	2
New York	7	a, b, c, g, i	0	6	1	2	3	2
Ohio	2	d, f	0	0	2	2	0	0
Pennsylvania	0	--	0	0	0	0	0	0
Rhode Island	9	a, b, c, i	1	5	3	9	0	0
Vermont	4	b, c, i	1	1	2	3	0	1
West Virginia	4	a, b, i	1	0	3	2	0	2
Wisconsin	3	a, b, i	0	2	1	1	1	1
<i>South</i>								
Alabama	3	a, b	0	2	1	0	0	3
Arkansas	9	a, b, c, d, i	0	1	8	9	0	0
Florida	1	b	0	0	1	1	0	0
Georgia	1	b	0	0	1	0	0	1
Kentucky	9	a, b, c, g, i	3	1	5	4	1	4
Louisiana	1	b	0	0	1	1	0	0
Mississippi	1	a	0	1	0	1	0	0
North Carolina	8	a, b, c, d, i	0	1	7	4	3	1
South Carolina	7	a, b, c, i	1	3	3	7	0	0
Tennessee	8	a, b, c, f, i	2	6	0	2	1	5
Virginia	17	a, b, c, d, f, i	1	3	13	14	0	3
<i>West</i>								
Oregon	13	a, b, c, d, e, i	4	4	5	7	4	2
Washington	9	a, b, c, f, i	3	5	1	3	4	2
TOTAL REGION	189	--	32	69	88	109	35	45

Note: Primary regulatory agency functions: a = air and water management and pollution control; b = forest resource management; c = fish and wildlife management; d = soil and resource conservation; e = land use planning and management; f = parks and natural area management; g = insects, diseases and invasive species; h = economic development and transportation; and I = other functions (for example, mined land reclamation, historic and archeological preservation, law enforcement, waste management).

Source: Ellefson and others (2004) and various state agency documents and state government personal responsible for state forest practices regulatory programs.

Extent of Agency Involvement

State government agencies involved in the regulation of forestry practices in the hardwood producing region are not always uniform in the intensity of their regulatory activities (Ellefson 2001, 2004). For purposes here, the extent of agency involvement in regulatory matters focused on forestry practices is grouped as follows:

- *Extensive involvement*: 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*: 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*: Statute or agency policy requires application of poorly defined forest practice standards (“generous reforestation,” “appropriate slash minimally,” “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).

State government executives responsible for state regulatory or related programs involving forestry practices in the U. S. Hardwood producing region report that 101 (54 percent) of the 189 agencies are either extensively (17 percent) or moderately (37 percent) involved in the regulation of forestry practices (Table 14). States with a large number of agencies (eight or more) so involved (moderately plus extensively) are Indiana, Minnesota, Tennessee, Oregon and Washington. About one-third (46 percent or 88 agencies) of the 189 total state agencies are regarded as having only minimal regulatory involvement. Examples of the latter group are agencies whose primary function involves land use planning (Maine Land Use Regulation Commission), soil and conservation (Arkansas Soil and Water Commission), insect and disease protection (Division of Entomology and Pathology, Indiana Department of Natural Resources), and management of parks and natural areas (Division of Natural Areas and Preserves, Ohio Department of Natural Resources). Virginia has the largest number of agencies that are minimally involved in regulating forestry practices, namely 13 (out of 17 agencies); followed by Arkansas where eight of nine agencies total are minimally involved.

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 2004, state government forestry executives in the 33 hardwood producing states reported the state’s lead forestry agency was responsible for some degree of regulatory program implementation (Ellefson and others 2004). In 12 of these states, regulatory activities by the lead forestry agency were considered extensive (for example, Delaware Forest Service) while in 10 states and in 11 states it was judged to be moderate (for example, Arkansas Forestry Commission) or minimal (for example,

Florida Division of Forestry), respectively. In the hardwood producing region, examples of lead state forestry agencies involved (moderate to extensive) in the regulation of forestry practices are:

- Delaware: Section of Forest Service, Department of Agriculture
- 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
- New Hampshire: Division of Forests and Lands, Department of Resources and Economic Development
- New Jersey: Division of Parks and Forestry, Department of Environmental Protection
- 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

Magnitude of Regulatory Investments

State regulatory programs focused on forestry practices in the hardwood producing region require substantial public investment in the form of finances, rule-making, issuance of permits, on-site inspections, enforcement actions, and addressing legal challenges made by the regulated public. In 2004, states in the region engaged the talents of an estimated 715 full-time equivalent (FTE) staff for regulatory program implementation (Ellefson and others 2001). Thirty-one percent (about 220 FTEs) of the staff employed by these agencies are part of an agency whose primary function is forest resource management, while slightly more than 190 of the FTE staff are affiliated with air and water pollution control agencies.

The size of staff employed by the 189 state agencies that have regulatory responsibilities involving forestry practices ranges from those that engage three or fewer FTE regulatory program staffs (58 percent of the agencies) to those that employ seven or more FTE staff (24 percent of the agencies). Eighteen percent of the agencies require three to seven FTE staffs to implement their forest practices regulatory programs. On average, economic development and transportation agencies employ fewer than one FTE per agency, while forest resource management agencies engage an average of five FTE staffs to implement forest practice regulatory programs. In 2003, for example, the Division of Forest Practices, Washington Department of Natural Resources reported a staff greater than seven FTEs, as did the Division of Parks and Forestry, New Jersey Department of Environmental Protection, while fewer than three FTEs each were reported by the Division of Forest Environment, Rhode Island Department of Environmental Management and the Division of Forests and Prairies, Iowa Department of Natural Resources (Ellefson and others 2004).

State regulatory programs in the hardwood producing region in 2004 required a state investment of approximately \$US 40 million, assuming a full-time equivalent requires an investment of \$55,000 annually. Although highly variable between states, the average investment per state is about \$US 1.2 million. Examples of 2003 public investments (US dollars) by especially prominent state regulatory programs in the region are (Appendix Tables 2 and 3):

Connecticut Forest Practices Act: \$ 165,000, 3.0 FTE Program Staff
Maine Timber Harvest Reporting Law: \$1,115,000, 16.5 FTEs
Massachusetts Forest Cutting Practices Act: \$460,000, 16.0 FTEs
Oregon Forest Practices Act: \$7,800,000, 94.0 FTEs
Vermont Heavy Cutting and Water Pollution Acts: \$330,000, 6.0 FTEs
Virginia Forest Practices Notification Act: \$4,000,000, 50.0 FTEs
Washington Forest Practices Act: \$9,656,000, 176.0 FTEs
West Virginia Logging Sediment Control Act: \$761,000, 66.0 FTEs

Regulatory Effectiveness

The ability of regulatory programs to satisfactorily influence the application of forestry practices within the hardwood producing region is often disputed by various segments of the regulated public and by many government officials. Adding uncertainty to the matter is the reality that past reviews and analyses of their effectiveness have provided mixed results. In large measure this uncertainty occurs because of differences in the conceptual approaches used to carry-out evaluations, unevenness in the structure and implementation of regulatory programs being compared, poorly defined objectives of some regulatory programs, difficulties in identifying and specifying regulatory program benefits and costs, and deficiencies in the type, amount and precision of data needed to conduct with-and-without analyses. Are regulatory programs the most effective and efficient approach for ensuring the proper application of science-based forestry practices to private forests in the hardwoods producing region? According to a recent review of nearly 50 past evaluations of regulatory initiatives, the answer is the ubiquitous “it depends,” wherein for some situations the answer is “yes” and in other cases “no.” Most likely it’s a combination of different types of programs—including regulatory programs—that is the most effective approach for ensuring the sustainability of hardwood forests (Ellefson and others 2004).

Regulatory versus Non-Regulatory Programs

Judgements about the effectiveness of regulatory programs presume they are being compared other approaches seeking to attain the same desired ends. In 2004, state government executives responsible for state regulatory and related programs focused on forestry practices in the hardwood producing region considered the ability (effectiveness) of five different types of state government programs, including regulatory programs, to promote the application of forestry practices considered to be well-grounded both technically and administratively. The programs considered were extension education, technical assistance, tax incentive, financial incentive, and regulatory programs, while the forestry practices of interest were grouped into seven categories (roads and trails, timber harvesting,

reforestation, cultural practices, chemical applications, forest protection, and administrative practices). Measures of effectiveness (five categories) ranged from least effective to most effective.

Regulatory programs were considered effective, but only marginally so when compared with four other types of programs (Table 15). More likely ways of promoting landowner application of sound forestry practices were technical assistance programs, extension education programs, and fiscal incentive programs. Least effective were tax incentive programs. For the 33 states in the hardwood producing region, average ratings of program effectiveness for the entire region were as follows: technical assistance programs—somewhat effective (4.0); extension education programs—somewhat less than somewhat effective (3.7); regulatory programs—slightly less than average effectiveness (2.9); financial incentive programs—average to marginally effective (2.6); and tax incentive programs—somewhat less than marginally effective (1.8).

Across the hardwood producing region, regulatory initiatives appear to be the preferred choice of program for dealing with the application of herbicides and pesticides, and for the application of certain timber harvesting practices (Table 15). Cultural practices and forest protection practices appear to benefit somewhat less from regulatory initiatives. For influencing other major categories of forest practices, regulation is used but is considered only average to marginally effective. Masked by these generalizations are important regional differences. Regulatory programs are considered to be a very respectable approach for influencing forestry practices in Western hardwood producing states (especially for timber harvesting, reforestation, and the use of chemicals), while in the South they are viewed as a marginally effective type of program (except maybe for chemical applications and certain timber harvesting practices). States in the North are generally midway between in judgements about regulatory program effectiveness.

Compliance with Regulated Practices

Compliance with state regulated forestry practices can also provide insight to regulatory program performance. By directly linking forest practice standards that have been legally established by a state (either in statute or in rule) to the rate at which landowners and timber harvesters comply with such standards, judgements about regulatory program effectiveness can be made. For nine example states known to have prominent forest practice regulatory programs, overall compliance rates with such programs is quite respectable, namely: Maine—72 to 90 percent, Massachusetts—75 to 90, Kentucky—50 to 60, Maryland—75 to 90, Oregon—79 to 100, Vermont—70 to 90, Virginia—35 to 90, Washington—70 to 90, and West Virginia—61 to 100 (Table 11). For more detail, consider compliance with regulatory programs in the following states (Ellefson and others 2004, National Council for Air and Stream Improvement 2007, Wear and Greis 2002).

The Oregon Forest Practices Act establishes forest practice standards in both law and rule. During the 1999 to 2000 field season, the level of compliance with such standards was 96.3 percent for 13,506 forest practice applications. From most perspectives, such compliance rates would support the view that Oregon's forest practices regulatory program was quite effective. In more detail, the compliance rates for certain forest practices (specified by rule) were as follows.

Table 15. Effectiveness of Major State Government Programs in Promoting the Application of Forestry Best Management Practices on Private Forests in the U. S. Hardwood Producing Region of the U.S., by Program Type and Major Forest Practice Category. 2004.

Major Category of Forestry Practice	Extension Education Programs			Technical Assistance Programs			Tax Incentive Programs			Financial Incentive Programs			Regulatory Programs		
	North	South	West	North	South	West	North	South	West	North	South	West	North	South	West
Road and Trail Practices (e.g., water crossings, erosion control, material disposal, blasting standards, winter use and closures).	3.6	4.3	3.5	3.8	4.0	3.5	1.6	1.8	1.0	2.7	3.0	3.0	3.2	1.9	4.0
Timber Harvesting Practices (e.g., landings; skid trails; slash management; equipment; felling, bucking and yarding; residual stand damage; safety).	3.8	4.2	3.5	4.3	3.8	3.5	1.8	2.0	2.0	2.4	2.8	1.0	2.7	2.2	5.0
Reforestation Practices (e.g., site preparation, timing, species selection, artificial or natural, regeneration levels, supplemental planting).	3.2	3.5	3.5	4.2	4.0	3.5	2.5	2.6	2.0	3.3	3.8	1.0	1.8	1.2	5.0
Cultural Practices (e.g., early release treatments, thinning, pruning, stand improvement cuttings, stand health).	3.6	3.7	3.5	4.2	4.2	4.0	2.1	2.2	1.5	3.4	3.5	2.5	1.8	1.2	3.5
Chemical Application Practices (e.g., methods of application, intensity, timing, mixing, spill management).	3.6	4.1	3.5	4.0	4.0	3.5	1.8	1.5	1.5	2.3	3.2	1.5	3.6	2.1	5.0
Forest Protection Practices (e.g., fuel loads, fire prevention; disease and insect prevention; animal damage prevention, salvage and sanitation cuttings).	4.0	4.4	3.5	4.0	3.9	4.5	1.7	1.9	1.5	2.3	2.8	3.5	3.0	1.8	2.0
Administrative Practices (planning, notifying, reporting, monitoring, evaluating, enforcing).	3.8	3.8	3.5	4.0	3.8	4.5	2.0	2.0	1.0	2.2	2.8	2.0	3.2	1.9	4.0
All Major Categories	3.7	4.0	3.5	4.1	4.0	3.9	1.9	2.0	1.5	2.7	3.1	2.1	2.8	1.8	4.1

Note: 5= most effective, 4=somewhat effective, 3=average effectiveness, 2= marginally effective, 1=least effective. North Region: 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 Region: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia. West Region: Oregon and Washington.

Source: Ellefson and others (2004) and state government personal responsible for state forest practices regulatory programs.

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

In 1995, the Maine forest practice regulatory program focused on timber harvesting near rivers, ponds, streams, and wetlands. Sites harvested during 1993 and 1994 were surveyed in 1995 to determine rates of compliance with these required practices. For streamside management zones, 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 practices required for stream crossings, 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.

West Virginia's Logging Sediment Control Act of 1992 requires, among other provisions, licensing and certification of loggers, harvest operation notification (and posting), and logging sites to be reclaimed within seven days of an operation's completion. Pursuant to the Act, the state has adopted required management practices for controlling erosion and water siltation from logging operations. The overall 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 forest practice guidelines). Average compliance for seven practices required for log landings was 76 percent; seven practices for skid roads, 62 percent; and six practices for haul roads, 52 percent. A compliance review in 2007 determined overall compliance with regulated forestry practices to be 85 percent. Forest practices categories having relatively high compliance rates (greater than 80 percent) were standards for skid trails, construction outside of streamside management zones, crossing at right angles to streams, avoiding equipment in streams, and skid trail spacing and stabilization.

Kentucky's Forest Conservation Act requires that timber harvesters implement all state-determined forestry best management practices (major categories: access roads, skid trails and landings, vegetative on disturbed soils, streamside management, sinkholes, logging debris, fertilizers, and wetlands). In 2005, field surveys found an average of 56 percent of sites to be in compliance with all major categories of regulated forestry practices. Rates of compliance for example categories are: skid trail, roads and landings—56 percent compliance, streamside management zones—69 percent, timber harvesting in wetland areas—35 percent, and vegetation established on distributed soils—15 percent.

North Carolina's Division of Forest Resources established mandatory forestry practices related to water quality so as to be in compliance with provisions of the state's Sediment Pollution Control Act (1973). In 2005, compliance with the mandated practices averaged 82 percent. Compliance with practices involving water quality (streamside management zones, stream temperature management, debris entering streams, waste entering streams, and access roads) were consistently above 85 percent. However, compliance rates with the regulated practices were consistently lower for practices such as stream crossings (65 percent), skid trails (72 percent), and site rehabilitation (41 percent).

Virginia requires forest landowners to notify the state's Department of Forestry at least three days prior to conducting a timber harvest and encourages use of forestry practices specified by the Department. Compliance monitoring is conducted for the following categories of forest practices: stream crossings, water control structures, seeded areas, streamside management zones, skid trails and roads (rutting), gravel applications, and trash and oil spills. In 2006, forestry practice categories that scored well for compliance were: streamside management zones (83 percent), trash and oil spills (90 percent), road and trail grades (91 percent), and gravel mats (91 percent). In contrast, compliance for use of water control structures was low (35 percent) as was compliance with practices involving streamside crossings (68 percent).

The Maryland Forest Service evaluated compliance with required forestry practices in 1995. Across all categories, compliance for the state averaged 82 percent with compliance rates for specific categories as follows: haul roads and skid trails (82 percent), stream crossings (75 percent), streamside management zones (83 percent), landings and log decks (90 percent), and soil stabilization (68 percent). At the regional level, the state's lower Coastal Plain and Eastern Shore had the highest implementation rates (89 percent), followed by the Piedmont (86 percent), Mountain Region (78 percent), and the upper Coastal Plain region (75 percent).

Non-Regulatory Program Initiatives

In addition to regulatory programs, state governments implement a wide variety of other types of programs that are focused on ensuring the sustainability of forests within the hardwood producing region. As previously discussed, these programs range from tax incentive initiatives to technical assistance programs and from educational programs to land trust programs (Table 9). Of the nearly 650 non-regulatory programs reportedly implemented by state government within the region, extension-education programs are most common as denoted by the following:

- Extension-education programs—37 percent of non-regulatory programs, average of seven programs per state.
- Fiscal incentive programs—34 percent of non-regulatory programs, average of seven programs per state.
- Technical assistance programs—12 percent of non-regulatory programs, average of three programs per state.
- Tax incentive programs—9 percent of non-regulatory programs, average of two programs per state.

- Land trust and easement programs—8 percent of non-regulatory programs, average of two programs per state.

Tax policy can be an important means of encouraging (or discouraging) behavior that leads to the subsequent production of goods and services provided by the region's hardwood forests. As an approach that can significantly impact the profitability of forest investments, taxation has been applied in the region for at least three basic public purposes, namely to: encourage private forest landowners to invest in activities that result in increased timber supply and encourage the flow of capital from outside sources into the forestry sector; compensate private forest landowners for the many nontimber values provided by forests from which society as a whole benefit; and provide an equitable basis for investment due to the long-term nature of forest investments (Bailey and others 1999). While a number of types of taxation exist, the most common forms impacting forest investment and management decisions in the hardwood producing region are taxes on (Table 16):

- Income tax: all but seven states in the U.S. impose income taxes on individuals and corporations. The provisions of these tax programs vary considerably from states to state. In 14 southern states within the region, treatment of income by these provisions (for example, standard deductions, exemptions, long-term gains exclusions) can affect tax liabilities associated with forest land investments and management (Bailey and others 1999).
- Estate tax provisions: 29 states in the U.S. impose inheritance taxes, 16 of which impose an inheritance tax on heirs receiving property while five states tax the right of the decedent's estate to transfer property. These provisions can have a significant effect on investment in forests and forest management (Peters and others 1998).
- Property tax provisions: all states in the hardwood producing region have property tax programs which are often adjusted to discourage conversion of forest land to other uses and to encourage investment in forest management activities (Table 16). Major program types are current-use programs, ad valorem tax programs, flat tax programs, tax exemption programs, and severance tax programs (Purdue University 2007).

Fiscal incentives can also be used as a policy tool to address certain characteristics of forests and forestry that tend to discourage forest investments (Table 17). In 2006, 523,000 owners of family forests (48 million acres) participated in cost-share programs (Butler 2007). Their motives for doing so varied widely. Tree planting, for example, requires significant capital expenditure without financial return for very long periods of time, often 60-80 years or beyond. Fiscal incentives can be used by government to encourage landowners to make these long-term investments, investments they might not otherwise consider (Sampson and DeCoster 1997). By providing financial payments to offset or reduce these large initial capital outlays, landowners can increase their return on investment and at the same time provide a variety of important goods and services desired by the public in general. Fiscal incentive programs initially were developed to focus on the production of timber, namely cost share payments to landowners for tree planting, site preparation,

and other cultural practices that tend to increase productivity (for example, timber stand improvement). More recently, fiscal incentive programs have been developed and implemented to address a wide range of forest resource benefits (for example, wildlife habitat improvement, riparian habitat and productivity) (Natural Resources Conservation Service 2007, Wear and Greis 2002).

Table 16. State Government Forest Property Tax and Severance (Yield) Programs in the U.S. Hardwood Producing Region. 2000.

State	Eligibility Requirements					
	Minimum-maximum acreage required	Management plan required	Minimum forest income required	Minimum forest land stocking required	Penalty for early withdrawal	Yield or severance tax applicable
North						
Connecticut	YES	YES	NO	NO	NO	YES
Delaware	YES	YES	NO	NO	YES	NO
Illinois	YES	YES	NO	NO	NO	YES
Indiana	YES	NO	NO	YES	NO	NO
Iowa	YES	NO	NO	YES	NO	NO
Maine	YES	YES	NO	NO	NO	NO
Maryland	NO	YES	NO	NO	YES	NO
Massachusetts	YES	YES	YES	YES	YES	YES
Michigan	YES	YES	NO	YES	YES	YES
Minnesota	YES	YES	NO	NO	YES	NO
Missouri	YES	YES	NO	NO	YES	YES
New Hampshire	YES	YES	NO	NO	YES	YES
New Jersey	YES	YES	NO	NO	YES	NO
New York	YES	YES	NO	NO	YES	YES
Ohio	YES	YES	YES	NO	YES	NO
Pennsylvania	YES	NO	NO	NO	YES	NO
Rhode Island	NO	YES	NO	NO	NO	NO
Vermont	YES	YES	NO	NO	YES	NO
West Virginia	YES	YES	NO	YES	YES	YES
Wisconsin	YES	YES	NO	NO	YES	YES
South						
Alabama	NO	NO	NO	NO	YES	YES
Arkansas	NO	NO	NO	NO	NO	YES
Florida	NO	NO	NO	NO	NO	NO
Georgia	YES	NO	NO	NO	NO	YES
Kentucky	YES	NO	NO	NO	NO	NO
Louisiana	YES	NO	YES	NO	YES	YES
Mississippi	NO	NO	NO	NO	NO	YES
North Carolina	YES	NO	NO	NO	YES	YES
South Carolina	YES	NO	NO	NO	YES	YES
Tennessee	NO	YES	NO	NO	NO	NO
Virginia	YES	YES	NO	YES	YES	YES
West						
Oregon	NO	NO	NO	NO	NO	YES
Washington	YES	YES	NO	NO	YES	YES

Source: Ellefson and others (2005), Wear and Greis (2002), and state government personnel responsible for state forestry programs.

Land trusts and conservation easements are another example of non-regulatory programs that are used by state governments and private concerns in the hardwood producing region. Among the more widely known that have a direct focus on forest resources is the federal Forest Legacy Program. As discussed above, through 2006 the Forest Legacy Program has promoted the protection of more 1.1 million acres of forests within the hardwood producing region (Table 9). Ninety percent of this protected forest is in the North, the remainder is in the South and West (9 percent and 1 percent, respectively). Land trusts and conservation easements are also sponsored by private concerns (for example, American Land Conservancy, The Nature Conservancy, American Land Conservancy). As of 1996, private land trusts had acquired some 5,600 conservation easements on forest land, encumbering almost 1.6 million acres nationwide with an additional 900,000 acres of forest land projected for purchase by 2001 (total of 2.5 million acres). About one-fifth of this total area was located in the South, especially in Florida, Mississippi, North Carolina, and Virginia (Bick and others 1998, Wear and Greis 2002). All 11 states in the South have established some form of land trust.

The renewable resources extension program is also an example of a state-federal educational initiative that has a significant presence in promoting the sustainability of hardwood forests (Table 18). Implemented by states in partnership with the federal government, the program sponsored more than 225 staff years of effort within the region in 1999, distributed as follows: timber productions—37 percent, environmental quality—16 percent, timber utilization—20 percent, and continuing education of natural resource professionals—13 percent (14 percent other areas). The 2007 federal financial involvement in the program was nearly \$2.5 million.

Table 17. Forestry Cost-share Programs Implemented by State Governments in the U.S. Hardwood Producing Region. 2001.

Program Title and Description
<ul style="list-style-type: none"> • <i>Alabama Agricultural and Conservation Development Program</i> (1985): 60 percent for tree planting, site preparation, and timber stand improvement; funding level – \$750,000 per year; funding source—general state revenue. • <i>Illinois Forest Development Programs</i> (1983): 80 percent for tree planting, site preparation and timber stand improvement; funding level – NA; funding source – 4 percent timber harvest fee. • <i>Iowa Woodland Fencing Program</i> (1985): 50 percent for fencing of forest land subject to soil loss from grazing; funding level—NA; funding source—general state revenue. • <i>Louisiana Forest Productivity Program</i> (1998): 50 percent for reforestation and timber stand improvement; funding level—\$4.1 million per year; funding source—timber severance tax. • <i>Maine Forestry Direct Link Loan Program</i>: financial incentive (low interest loan) to encourage increase application of forestry best management practices and use of environmentally friendly logging equipment. • <i>Maryland Woodland Incentives Program</i> (1986): 50 percent for reforestation and timber stand improvement; funding level—NA; funding source—4 to 5 percent tax on wooded lands transferred to nonagricultural use valuations for property taxes. • <i>Minnesota Forestry Improvement Program</i> (1985): 65 percent for fencing and firebreaks and 50 percent for road construction; funding level—NA; funding source—general state revenue. • <i>Mississippi Forest Resources Development Program</i> (1974): 50 to 75 percent for reforestation and timber stand improvement; funding level—\$3 million; funding source—timber harvest tax. • <i>Missouri Soil and Water Conservation Program</i> (1985): 75 percent for tree planting and fencing; funding level—NA, funding source—one-tenth percent sales tax fee. • <i>New Jersey Farmland Preservation Program</i> (1986): 50 percent for plantation establishment, site preparation and stand improvement; funding level—NA; funding source—state bond fund. • <i>North Carolina Forest Development Program</i> (1978): 40 to 60 percent for tree planting, site preparation and stand improvement; funding level—\$2.2 million per year; funding source—timber harvest tax and general state revenue. • <i>Ohio Silvicultural Direct Link Loan Program</i>: financial incentive (low interest loan) to encourage increase application of forestry best management practices and use of environmentally friendly logging equipment. • <i>South Carolina Forest Renewal Program</i> (1981): 40 percent for reforestation, stand improvement and prescribed burning; funding level—\$660,000 per year; funding source—timber harvest tax and general state revenue. • <i>Tennessee Reforestation Incentives Program</i> (1997): 50 percent for reforestation and timber stand improvement; funding level—\$160,000 per year; funding source—real estate transfer receipts. • <i>Virginia Reforestation Timberlands Act</i> (1970): 40 percent for site preparation, tree planting and stand improvement; funding level—\$2.2 million per year; funding source—harvest tax and general state revenue. • <i>Wisconsin Forest Landowner Grant Program</i> (1980s): 65 percent for land management plans, tree planting, stand improvement; funding level—NA; funding source—NA.

Source: Bullard and Straka (1998), Meeks (1982), and Wear and Greis (2002).

Table 18. Renewable Resources Extension Program Funding and Staffing in the U. S. Hardwood Producing Region, by State and Major Extension Program Area. 1999, 2007.

State	Federal Funding (\$ thousands) (2007)	Staff Years by Renewable Resources Extension Program Area (1999)					Total
		Timber Production	Environmental Quality	Timber Utilization	Continuing Education	Other Areas	
<i>North</i>							
Connecticut	46.5	0.0	0.0	0.0	0.0	0.0	0.0
Delaware	57.7	0.0	0.0	0.0	0.1	0.0	0.1
Illinois	55.8	0.3	0.4	0.1	0.8	1.0	2.6
Indiana	52.7	1.6	0.4	0.8	2.3	0.0	5.1
Iowa	46.5	1.0	0.0	0.0	0.0	0.9	1.9
Maine	66.5	1.0	0.5	1.0	1.0	1.0	4.5
Maryland	57.7	0.8	0.8	0.5	0.5	0.1	2.7
Massachusetts	46.5	0.1	0.3	0.1	0.3	0.1	0.9
Michigan	80.3	2.0	1.5	1.5	2.5	0.0	7.5
Minnesota	60.4	0.3	1.3	1.0	0.6	0.7	3.9
Missouri	82.2	5.0	3.2	3.2	0.9	3.0	15.3
New Hampshire	46.5	3.4	2.3	0.8	1.0	2.0	9.5
New Jersey	46.5	1.7	0.1	0.0	0.2	0.0	2.0
New York	92.6	3.0	0.8	1.7	0.7	0.8	7.0
Ohio	66.0	3.3	0.5	2.7	0.0	0.0	6.5
Pennsylvania	88.0	1.8	1.8	1.1	0.7	1.0	6.4
Rhode Island	46.5	0.2	2.0	0.2	0.3	1.5	4.2
Vermont	46.5	1.0	0.0	0.8	0.2	1.0	3.0
West Virginia	70.0	1.5	0.6	2.0	0.3	1.0	5.4
Wisconsin	77.2	1.5	0.6	2.0	1.0	0.3	5.4
Total	1,232.6	29.5	17.1	19.5	13.4	14.4	93.9
<i>South</i>							
Alabama	119.5	2.5	2.0	1.0	1.3	3.0	9.8
Arkansas	96.1	1.5	0.5	0.8	0.8	0.5	4.1
Florida	97.6	1.0	1.0	0.4	0.0	1.0	3.4
Georgia	110.0	5.0	5.5	7.0	2.0	1.0	20.5
Kentucky	80.7	2.7	0.2	2.8	1.5	1.0	8.2
Louisiana	93.0	5.0	0.0	2.0	2.3	0.0	9.3
Mississippi	105.3	16.0	3.0	1.0	1.0	1.0	22.0
North Carolina	106.8	5.0	3.0	4.0	2.0	5.6	19.6
South Carolina	85.3	5.0	0.5	0.5	0.2	0.5	6.7
Tennessee	86.8	1.0	0.1	0.5	0.5	1.0	3.1
Virginia	100.7	2.6	0.4	1.7	1.0	1.5	7.2
Total	1,081.8	47.3	16.2	21.7	12.6	16.1	113.9
<i>West</i>							
Oregon	91.1	4.6	1.0	3.9	2.0	1.0	12.5
Washington	78.8	1.6	1.1	1.0	1.6	1.0	6.3
Total	169.9	6.2	2.1	4.9	3.6	2.0	18.8
TOTAL REGION	2,484.3	83.0	35.3	46.1	29.6	32.5	226.6

Source: Cooperative State Research, Education and Extension Service (2007) and Ellefson and others (2005).

Federal Government

Resource Management Agencies

Federal agencies are very active in the implementation of programs focused on hardwood forests. These programs are the responsibility of many federal agencies, bureaus, divisions and commissions that are represented within nearly all of the federal government's 14 executive agency departments and in many of its more than 60 independent federal agencies and federal corporations. As for federal agencies that have a more focused responsibility for influencing the use, management and protection of nonfederal forests, including hardwood forests, the following example agencies have been suggested (Ellefson and others 2001, National Research Council 1998): U.S. Department of Agriculture (Cooperative Extension Service, Forest Service, Natural Resources and Conservation Service), U. S. Department of Commerce (National Oceanic and Atmospheric Administration), U. S. Department of Defense (Department of the Army, Corps of Engineers), U. S. Department of the Interior (Bureau of Indian Affairs, Fish and Wildlife Service, U.S. Geological Survey), U. S. Department of Labor (Occupational Safety and Health Administration), U. S. Department of the Treasury (Internal Revenue Service), U. S. Environmental Protection Agency, and the Tennessee Valley Authority. The magnitude of investments in forests made by these agencies is uncertain, although some have suggested they are annually responsibly for guiding expenditure of more than one billion dollars (National Research Council 1998). Yet to be determined is how much of that investment is focused specifically hardwood forests.

Programs and Statutory Authority

A number of federal laws and associated federal rules and administrative directives represent significant capacity to influence forestry practices applied on public and private forest land within the hardwood producing region. Of the 16 federal laws listed in the Table 19, all but three rely indirectly on state governments to develop and implement standards for forestry practices (for example, Clean Water Act, requires programs for controlling nonpoint forest sources of pollution; Coastal Zone Management Act, requires adoption of enforceable forestry practices). In nine of the federal statutes identified, federal law directly promotes the application of sound practices across all hardwood producing forest ownerships (for example, Occupational Safety and Health Act, conditions for felling and skidding; Federal Insecticide, Fungicide, and Rodenticide Act, conditions for pesticide application in wetlands). Only three of the federal statutes identified call for the development and application of sound forest practice standards on hardwood producing forests within federal lands (for example, National Forest Management Act, conditions for growing and harvesting timber on National Forests).

A more focused understanding of the federal presence in the management of nonfederal forests in the hardwood producing region can be attained by examining the U.S. Department of Agriculture's Forest Service involvement in cooperative forestry programs involving state government (Schuster and Krebs 2003) (Table 20). Such programs are a federal responsibility but are largely carried out by state forestry agencies. In 2007, federal investment in these programs approached \$130 million, distributed programmatically as follows: cooperative fire protection – 32

Table 19. Federal Statutes Requiring Development and Application of Sound Forestry Practices in the U.S. Hardwood Producing Region, by Resource Focus and Landowner Application. 2007.

Federal Statute	Major Forest (or Related) Resource of Concern	Federal Statutory Requirements for Application of Sound Forestry Practices		
		Direct Federal Application Only to Federal Land	Direct Federal Application to All Forest Land	Indirect State Action for Practice Development
Clean Air Act of 1990	Air		X	X
Clean Water Act of 1987	Water		X	X
Coastal Zone Management Act of 1972	Comprehensive			X
Endangered Species Act of 1973	Fish and Wildlife		X	X
Federal Insecticide, Fungicide and Rodenticide Act	Comprehensive		X	X
Federal Land Policy and Management Act of 1976	Comprehensive	X		
Fish and Wildlife Conservation Act of 1980	Fish and Wildlife			X
National Trails System Act of 1968	Recreation		X	X
National Wildlife Refuge System Act of 1966	Fish and Wildlife	X		
National Forest Management Act of 1972	Comprehensive	X		
Occupational Safety and Health Act of 1970	Comprehensive		X	X
Rivers and Harbors Act of 1890	Water		X	X
Soil and Water Conservation Act of 1977	Comprehensive			X
Superfund Act of 1980	Comprehensive		X	X
Surface Mining Control and Reclamation Act of 1977	Comprehensive			X
Wild and Scenic Rivers Act of 1968	Recreation		X	X

Source: Forest Service (1993) and West Publishing (1997).

percent, forest legacy program—28 percent, cooperative forestry programs—22 percent, and forest health programs—18 percent. About 22 percent of state forestry budgets are supported by these federal programs, although this percentage varies widely from state to state. At the higher end, they represent 58 percent of forestry budgets in Connecticut and New York, while at the lower end they account for only 4 percent of budgets in Florida, Oregon and Washington (National Association of State Foresters 2007).

Enforcement and Compliance

Federal agencies have substantial authority and institutional capacity to enforce laws, regulations, and guidelines that contain standards important to the sustainability of hardwood producing forests (Tables 21 and 22). For example, in administering the National Forest System “all persons employed in the Forest Service of the United States shall have authority to make arrests for the violation of the laws and regulations relating to the National Forests” (Public Law 58-138; Agricultural Appropriations Act of March 3, 1905). Focusing on timber theft and fraud, three major federal laws are especially important, namely illegal destruction, removal and transport of timber (18USC:19:1852), destruction of timber on public land and Indian reservations (18USC:91:1853), and general theft of public money, property or records (18USC:31:641). In furtherance of these authorities, the agency is also authorized to cooperate with any state or political subdivision thereof in the enforcement of laws involving National Forests (16USC:3:551a).

Table. 20. Forest Service, U.S. Department of Agriculture Investment in State Cooperative Forestry Programs in the U. S. Hardwood Producing Region, by State and Program Area. 2007.

State	Total Forest Land Area (thousand hectares)	Federal Investment in State Cooperative Forestry Programs (thousand dollars)					Total	Percent of State Forestry Budget (2006)
		Cooperative Fire Protection	Cooperative Forestry Programs	Forest Health Management	Forest Legacy Program			
<i>East</i>								
Connecticut	726	232	374	299	38	943	58	
Delaware	155	202	319	126	2,030	2,677	41	
Illinois	1,831	643	1,073	148	38	1,902	31	
Indiana	1,884	515	553	123	1,040	2,231	14	
Iowa	1,165	678	438	184	39	1,339	44	
Maine	7,152	1,082	637	316	4,242	6,277	16	
Maryland	1,038	584	1,036	728	19	2,367	25	
Massachusetts	1,283	943	624	206	2,537	4,310	40	
Michigan	7,909	1,692	948	1,917	3,505	8,062	12	
Minnesota	6,633	1,668	1,171	529	790	4,158	6	
Missouri	6,102	1,082	876	158	27	2,143	13	
New Hampshire	1,963	299	500	220	3,040	4,059	36	
New Jersey	863	1,184	578	1,891	40	3,693	58	
New York	7,555	1,419	1,849	351	30	3,649	20	
Ohio	3,195	836	808	398	40	2,082	18	
Pennsylvania	6,709	1,329	1,173	1,267	37	3,806	12	
Rhode Island	144	194	310	77	3,185	3,766	34	
Vermont	1,869	232	525	541	28	1,326	35	
West Virginia	4,859	637	859	776	30	2,302	29	
Wisconsin	6,586	1,659	1,255	389	40	3,343	12	
Total	69,622	17,110	15,906	10,644	20,775	64,435	20	
<i>South</i>								
Alabama	9,183	1,508	971	980	1,210	4,669	12	
Arkansas	7,620	1,378	838	954	25	3,195	17	
Florida	6,534	1,838	1,133	1,398	2,275	6,644	4	
Georgia	10,030	1,744	1,272	1,790	2,275	7,081	12	
Kentucky	4,844	1,265	853	289	25	2,432	29	
Louisiana	5,755	1,601	832	360	0	2,793	13	
Mississippi	7,941	1,553	820	810	25	3,208	10	
North Carolina	7,465	1,726	1,065	1,681	25	4,497	10	
South Carolina	5,158	1,535	807	928	5,025	8,295	17	
Tennessee	5,860	1,452	901	313	0	2,666	16	
Virginia	6,380	1,542	1,122	552	254	3,470	15	
Total	76,771	17,142	10,614	10,055	11,139	48,950	14	
<i>West</i>								
Oregon	12,209							
Oregon	9,016	3,755	783	1,340	15	5,893	4	
Washington	21,225	3,370	1,452	926	3,606	9,354	4	
Total		7,125	2,235	2,266	3,621	15,247	4	
TOTAL REGION	167,618	41,377	28,755	22,965	35,535	128,632	22	
TOTAL U.S.	304,011	-	-	-	-	-	-	

Note: For some states, Forest Legacy Program allocations adjusted downward to more appropriately depict federal share (percent) of total state forestry budget (in 2006) (Delaware, Indiana, Maine, Massachusetts, Michigan, New Hampshire, Rhode island, Alabama, Florida, Georgia, South Carolina, Virginia, Washington, and total percent).

Source: National Association of State Foresters (2007) and federal government personnel responsible for state cooperative forestry programs.

Table 21. Enforcement Actions Authorized by Selected Federal Statutes Relevant to Forests within the U. S. Hardwood Producing Region, by Statute and Type of Action. 2001.

Federal Statute	Type of Actions Authorized to Compel Action or Enforcement			
	Specifies Fines and Prison Sentences To Be Imposed	Authorizes Development of Rules To Be Followed	Specifies Standards, Action or Process To Be Followed	Authorizes Funds Required To Compel Action
Focus Directly and Exclusively on Forests and Forestry				
Forest Conservation & Shortage Relief Act of 1990 (timber exports)	X	X	X	X
Forest & Rangeland Renewable Resources Planning Act of 1974		X	X	X
National Forest Management Act of 1978			X	
Renewable Resource Extension Act of 1978		X	X	
Focus Broadly on Environment, but Encompasses Forests and Forestry				
Administrative Procedures Act of 1946		X	X	
Archeological Resources Protection Act of 1979	X		X	
Clean Air Act of 1990	X	X	X	X
Clean Water Act of 1987	X	X	X	X
Coastal Zone Management Act of 1972		X	X	X
Endangered Species Act of 1973	X	X	X	X
Federal Insecticide, Fungicide, and Rodenticide Act	X	X	X	X
Federal Land Policy and Management Act of 1976	X	X	X	X
Federal Noxious Weed Act of 1974	X	X	X	X
Fish and Wildlife Conservation Act of 1980			X	
National Environmental Policy Act of 1969		X	X	X
National Trails System Act of 1968			X	X
National Wildlife Refuge System Administration Act of 1966	X	X	X	X
Occupational Safety and Health Act of 1970	X	X	X	X
Public Lands U. S. Criminal Code of 1948	X		X	
Soil and Water Conservation Act of 1977			X	X
Solid Waste Disposal Act of 1986	X	X	X	X
Surface Mining Control and Reclamation Act of 1977		X	X	
Wilderness Act of 1964			X	
Wild and Scenic Rivers Act of 1968			X	X

Sources: Coggins and others (2001), Forest Service (1993) and West Publishing Company (1997).

The USDI-Bureau of Land Management is also authorized to “institute a civil action for an injunction to prevent any person from utilizing public lands in violation of regulations” (Federal Land Policy and Management Act of 1976). The agency has the authority to develop regulations for public land use, management, and protection; to initiate civil actions for violation of regulations, including nature of relief expected; to enter into contracts with law enforcement officials as necessary to enforce regulations; and to cooperate with regulatory and law enforcement officials of any state or political subdivision thereof. Similar authorities are granted to other federal agencies (for example, the USDI-National Park Service and the U.S. Fish and Wildlife Service enforce the laws and regulations for which they are responsible) (Coggins and others 2001, Forest Service 1993, West Publishing Company 1997).

Table 22. Penalties and Punishment Authorized by Federal Statutes Relevant to Forestry Activities within the U.S. Hardwood Producing Region. 2001.

Federal Statute	Penalties for Violations and Provision for Related Enforcement
Preservation of American Antiquities Act of 1906	<ul style="list-style-type: none"> • Persons appropriating any object of antiquity on federal government lands subject to penalties of up to \$500 or up to 90 days (or both).
Migratory Bird Treaty Act of 1918	<ul style="list-style-type: none"> • Persons failing to comply with regulations regarding taking, killing, or possessing migratory birds subject to penalties up to \$500 or imprisoned up to six months (or both) (\$2,000 or two years [or both] for sale of birds)
Bald & Golden Eagle Protection Act of 1940	<ul style="list-style-type: none"> • Persons possessing or selling eagles subject to penalties of up to \$5,000 or imprisonment up to one year (or both) (second violation, \$10,000 and two years)
Federal Insecticide, Fungicide & Rodenticide Act	<ul style="list-style-type: none"> • Persons failing to properly register or use pesticides subject to various penalties ranging from maximums of \$1,000 to \$25,000 and from maximums of 30 days to three years imprisonment
Public Lands U. S. Criminal Code of 1948	<ul style="list-style-type: none"> • Persons engaged (on federal public lands) in timber trespass, tree injury, setting of wildfires, destruction of livestock fences, destruction of survey markers, or deception at land and timber sales subject to various penalties ranging from maximums of \$500 to \$3,000 and from maximums of six months to three years imprisonment.
Occupational Safety & Health Act of 1970	<ul style="list-style-type: none"> • Person violating safety and health rules subject to civil and criminal penalties ranging from maximum of \$7,000 to \$70,000 and six months imprisonment.
Endangered Species Act of 1973	<ul style="list-style-type: none"> • Persons knowingly (civil crime) or willfully (criminal crime) engaged in violations of endangered species law subject to various penalties ranging from maximums of \$500 to \$50,000 and from maximums of six months to one year imprisonment. Criminal violations also result in loss of any permits or leases authorizing use of federal land.
Federal Noxious Weed Act of 1974	<ul style="list-style-type: none"> • Persons violating quarantine of noxious weeds or promoting their dissemination subject to penalties of up to \$5,000 or up to one year imprisonment (or both)
Federal Land Policy & Management Act of 1976	<ul style="list-style-type: none"> • Persons violating provision of Act regarding use and protection of public lands subject to penalties up to \$1,000 or up to 12 months imprisonment (or both)
Archeological Resources Protection Act of 1979	<ul style="list-style-type: none"> • Persons damaging, removing, or defacing archeological resource on federal public lands subject to criminal penalties ranging from maximum of \$10,000 to \$100,000 and from maximum of one year to five years imprisonment. Civil penalties assigned by land manager.
Lacey Act Amendments of 1981 (wildlife)	<ul style="list-style-type: none"> • Persons importing, exporting, selling, or purchasing wildlife in violation of federal laws subject to civil and criminal penalties ranging from maximum of \$250 to \$20,000 and up to five years imprisonment.
Solid Waste Disposal Act of 1986	<ul style="list-style-type: none"> • Persons or organizations violating compliance orders for management of hazardous wastes subject to civil and criminal penalties ranging from maximums of \$25,000 to \$1,000,000 and from two to 15 years imprisonment.
Forest Resource Conservation and Shortage Relief Act of 1990 (timber exports)	<ul style="list-style-type: none"> • Persons illegally exporting unprocessed federal timber subject to penalties ranging from maximum of \$75,000 to \$500,000. Violators may be barred from purchasing federal timber for up to five years.
National Wildlife Refuge Administration Act of 1966	<ul style="list-style-type: none"> • Persons violating Act's provisions subject to fines prescribed by Title 18 U.S.C. or up to one year imprisonment (or both).

Sources: Coggins and others (2001), Forest Service (1993) and West Publishing Company (1997).

Comprehensive information describing the extent of federal agency capacity for enforcement of forestry activities within the hardwood producing region is not generally available (Ellefson and others 2005). However, the enforcement activities of the Forest Service, U. S. Department of Agriculture provides some insight on the matter. The agency's enforcement program focuses on curbing a variety of illegal activities (for example, arson, theft, vandalism, and use of controlled substances) that occur primarily in the National Forest System. To facilitate this work, the agency has established the Law Enforcement Management Reporting System (LEMARS), a data retrieval system that provides management with a means of identifying and following law enforcement activities. The system is designed to consistently and accurately document information on violations occurring within the National Forest System by type, location, resources damaged, and estimated property loss.

The number of law enforcement incidents and violations on the National Forests have risen substantially in recent years, nationwide going from about 144,000 in 1996 to more than 285,000 in 2000 (U. S Department of Agriculture, Forest Service 2000). Timber trespass incidents on the National Forests in 1994 totaled 143,232 (1992, 114,328; 1993, 111,512), with closely related incidents numbering 8,209 in the same year (1992, 5,414; 1993, 6,168). For National Forests in the Eastern portion of the nation (Forest Service Regions Eight and Nine), 417 cases for the period 2004 through 2007 were reported for illegal activities involving timber removal and transport, trees cut or injured, and theft of government property. As for violations of the Code of Federal Regulations which actually implement federal law applicable to theft of or injury to timber on National Forests, 3,484 incidents were recorded for the same period and were distributed as follows (Law Enforcement and Investigations staff of Forest Service, U.S. Department of Agriculture):

- 64 percent—Cutting or otherwise damaging any timber, tree or other forest product (36CFR:261.6a)
 - 5 percent—Cutting any standing tree under contract, before it was marked to cut (36CFR:261.6b)
 - 2 percent—Removing any timber cut under permit, except to a designated location (36CFR:261.6c)
 - * percent—Stamping, marking with paint any tree in a similar manner as authorized to cut (36CFR:261.6d)
 - 4 percent—Loading, removing or hauling timber acquired under permit, except as authorized (36CFR:261.6e)
 - * percent—Selling or exchanging any timber obtained under free use (36CFR:261.6f)
 - * percent—Violating any timber export or substitution restriction (36CFR:261.6g)
 - 25 percent—Removing any timber, except as authorized by permit, contract or regulation (36CFR:261.6h)
- (* indicates less than one percent)

The agency's law enforcement budget in 1998 was \$64.0 million, as compared to \$8.3 million in 1992. The agency conducts law enforcement investigations with a staff of about 450 professionals, who are assigned to the agency's regional administrative centers and to the National Headquarters in Washington, D.C. (Forest Service 2000).

Private Programs and Systems

Resource Assessment and Planning

Private landowners within the hardwood producing region are sensitive to the need for assessment of forest conditions and for forest plans that will enable them to take responsible actions regarding the use, management and protection of their forests. For example, forest industry and forest management firms within the region characteristically develop landownership and management plans and subsequently implement corporate strategies based on such plans. Similarly responsive to the need for plans and planning are the approximately 10 million owners of family forests in the hardwood producing region. In 1994, approximately 5 percent of the nearly 10 million family forest owners nationwide were known to have a written plan guiding the management of their forest property (covering 154 million acres nationwide), while in 2006 more than 7 percent of nearly 11 million family forests had such plans (covering 42 million acres nationwide) (Birch 1996, Butler 2007). In the latter year, more than 40 percent of these owners used a state forestry agency or a private forestry consultant as advisors in the preparation of their plans. The importance of these planning activities is highlighted by a late 1990s national assessment that found that 84 percent of landowners with such plans had implemented them (applying at least one recommended activity, such as thinning of trees) (Esseks and Moulton 2000).

The importance of land use and management plans by private concerns is also suggested by compliance with regulatory programs implemented by some state governments within the hardwood producing region. In Oregon and Washington, private landowners who want to conduct timber harvests prepare for state agencies timber harvest plans (or notifications) that prescribe forestry practices considered critical to the sustainability of forest resources. Between 2001 and 2003, the Oregon Department of Forestry processed an average of 20,000 plans or notifications per year, while Washington's Division of Forest Practices processed 5,400 harvest plans in 2003 (Ellefson and others 2004).

Forest Certification and Accreditation

Private organizations representing a variety of interests in forests in general have developed and implemented various forest certification programs. The motives for their development and implementation are many, including improving the performance of forest management activities and the strengthening of the credibility and public acceptance of forestry in general. A significant aspect of all private certification efforts is that they represent voluntary, nonregulatory approaches to the promotion of improved forest practices and forest management systems. Certification of a forest, including hardwood forests, implies that the management practices being applied meet approved standards of a designated authority (Society of American Foresters 1999).

There are more than 25 nongovernmental forest certification programs worldwide plus a number of governmental efforts to develop criteria and indicators of sustainable forest management (Confederation of European Paper Industries 2000, Ellefson and others 2005, Society of American Foresters 1999). (Examples of international certification programs and activities are the International

Standards Organization (ISO) 14001 Environmental Management System (especially ISO TR 14061), Pan-European Forest Certification, Alliance of World Wide Fund for Nature and World Bank, World Business Council for Sustainable Development, Center for International Forestry Research, and programs in various countries, including Austria, Bolivia, Brazil, Canada, Czech Republic, Denmark, Finland, France, Ghana, Indonesia, Latvia, Malaysia, Mexico, Norway, Sweden, Switzerland, and the United Kingdom).

Five major nongovernmental certification programs recommending sound forestry practices have gained considerable attention in the United States (Table 23). Although the practices recommended by these programs can differ substantially in content, all programs have standards that in some way address such subjects as planning, management, reforestation, forest operations, special places, pesticides, product utilization, fish and wildlife, and soil and water resources. Programs typically set forth sets of forest practice principles or objectives within which participants are given substantial flexibility to develop more exacting practices considered appropriate to specific resource, economic, and political settings.

The forestry practices promoted by programs certifying hardwood forests in the United States are useful to the extent they are actually applied in a forest setting. As of 1999, the Sustainable Forestry Initiative Program certified 56.5 million acres (93.7 in 2001); American Tree Farm Program, 85 million acres; Forest Stewardship Council Program, 4.6 million acres; and Green Tag Forestry Program, 2,100 acres (Society of American Foresters 1999). In 2006, more than 1.2 million owners of family forests had heard of green certification (representing 56.7 million acres), 84,000 owners had their forest land enrolled in a certification program (representing 10.5 million acres), and 310,000 owners plan to or are likely to enroll their forest property in the future (66.4 million acres). Potential total enrollment in a forest certification program may well exceed 390,000 owners that are responsible for nearly 77 million acres of forest. These are significant amounts given that the preponderance of family forests in the United States are within the U. S. Hardwood producing region.

Table 23. Nongovernmental Forest Certification Programs Promoting the Application of Sound Forestry Practices within the U.S. Hardwood Producing Region, by Program and Program Characteristics. 1999.

Program Characteristic	Forest Certification Program				
	Sustainable Forestry Initiative Program	Forest Stewardship Council Program	Environmental Management Systems: Forestry ISO 14000: TC 201	Tree Farm Program	Green Tag Forestry Program
Sponsor	American Forest & Paper Association (AF&PA)	Forest Stewardship Council (FSC)	International Standards Organization	American Forest Foundation	National Forestry Association (NFA) & National Woodland Owners Association
Mission	Promote commitment to sustainable forestry and the measures by which the public can measure this commitment	Improve forest practices through market-based mechanisms	Provide standardized means by which companies can address environmental impacts of their activities	Ensure sustainable forests by providing landowners with information & voluntary verification of sustainable forest practices	Promote landowner recognition of responsibility for sustainable woodland management
Eligible Parties	AF&PA members	Interested forest landowners	Organizations involved in environmental management	Owners of 10 or more acres of forestland	NFA members
Forest Practice Standard Key Principles	Principles: use responsible forest practices, protect forest health and productivity, protect special forest sites, continuously improve practice of forest management	Principles: comply with laws, establish clear tenure to land, respect indigenous peoples' rights, enhance well-being of workers and communities, ensure wide range of environmental & social benefits, conserve biological diversity, develop forest management plans, monitor forestry activities, conserve natural forests, and plan environmentally for plantations	Principles: give environmental management high priority, communicate externally, comply with laws and rules, assign responsibility for environmental management, promote environmental planning, establish performance discipline, evaluate performance, establish audit systems, encourage vendors to establish environmental management systems	Principles: broaden practice of sustainable forestry; communicate to and involve public; prudently use chemicals; reforest harvested lands; manage for quality water, wildlife, aesthetics, special sites, and biodiversity	Principles: promote forest sustainability by sound management involving planning, tree harvesting, road construction, skidding, post harvest evaluations, product utilization, chemical applications, community and employee relations, economic viability, and record keeping
Forest Practice Standard Audits	Voluntary verification or second and third party audits	Third party audits	First, second, or third party audits	Third party audits	Third party audits

Source: Adapted from Society of American Foresters (1999).

RISK OF UNLAWFUL CONDITIONS

Conditions of Unlawfulness

Timber harvested or marketed without the consent of an owner or without due regard for laws that promote the sustainability of hardwood forests can jeopardize the integrity of hardwood processing industries and the governments and communities that depend on such resources. As defined here, unlawful acts are those involving the harvest and transport of timber without a lawful right to do so (lack of contract or permit, harvesting more than agreed to limits), buying or selling of timber in fraudulent or deceptive manners (failure to pay timber seller, nonpayment of taxes and related charges), and harvesting irrespective of established forestry and conservation standards (fostering pollutants and contaminants, destruction of forest diversity, infringement on high-value conservation areas).

The occurrence of unlawful acts involving timber harvesting and marketing depends on the occurrence of various conditions, including the extent to which there exists a culture of lawfulness (or unlawfulness) within various segments of society; existence of government or privately sponsored standards defining lawful conduct; awareness and capacity of the private sector to comply with established rules regarding lawful conduct; ability of government to effectively and fairly implement standards embodied in rules defining lawful conduct; and the value of timber and timber related products to be exchanged in domestic and international markets. Depending on the likelihood of their occurrence, these conditions—and many more—can pose significant uncertainty (or risk) over whether or not hardwood timber has or will be bought or harvested in unlawful manners. As used here, risk means the likelihood or probability of the latter occurring (low risk, moderate risk, high risk). Desirous of avoiding unlawful acts involving forests in the hardwood producing region, assessment of risk is very important to landowners, timber buyers, timber harvesters, and wood processors.

Assignment of Risk and Exposure **Principles and Standards**

Assigning various levels of risk to certain acts requires specification of some standards. For example, landowner access to information about the preparation and execution of contracts probably reduces the risk of fraud being imposed on a landowner by a timber buyer. Similarly, if a state government is known for rigorous enforcement of water quality laws, the risk of water pollutants from timber harvesting may be low. And if state law requires clear documentation of forest ownership boundaries prior to harvest, the risk is inadvertent illegal harvesting on another's property is lowered. In these three examples, the standards against which levels of risk can be assigned are access to contract information, rigorous enforcement of water laws, and property identification procedures. As might be expected, number and variety of such standards can be enormous and are usually reflective of the interest of the organizations that advocate them. Consider the following examples:

- *World Wildlife Fund International* identifies the following as verification of legal timber sources: purchasers know where timber was grown and can identify the harvesting entity, harvesting entity has the legal right to harvest (harvest permit), timber was legally harvested and charges were paid, regulatory authorities have capacity to secure proof of ownership, regulatory system is focused such that timber buyers know what is expected of them, and timber sellers and buyers have competent management systems for supplying evidence of timber ownership (Miller and others 2006).
- *Environmental Resources Management* (2003) identifies the following as timber harvest standards: trees selected for felling are in permitted area and are of a volume specified by contract, harvested timber can be traced to specific area of forest covered by harvest permit, timber in processing yard can be identified as originating from legal sources, and wood products processed by manufacturers are documented as having come from legal sources.
- *Forest Stewardship Council* (1996) identifies 10 principles of forest stewardship, namely respect for all country's applicable laws, treaties and agreements; clearly defined, documented and legally established long-term tenure and use rights to the land and forest resources; respect for legal and customary rights of indigenous peoples to own, use and manage their lands, territories, and resources; maintain or enhance the long-term social and economic well-being of forest workers and local communities; encourage the efficient use of the forest's multiple products and services to ensure economic viability and a wide range of environmental and social benefits; conserve biological diversity, water resources, soils, and unique and fragile ecosystems and landscapes; prepare a written, current and implemented long-term management plan; conduct monitoring resource and social conditions appropriate to the scale and intensity of forest management; maintain or enhance the attributes which define high conservation value forests; and plantations that provide an array of social and economic benefits and promote the restoration and conservation of natural forests.
- *Montreal Process Criteria and Indicators* establish seven major criteria for judging sustainable forest management, within which indicators involving legal and institutional frameworks set forth standards directed at property rights and land tenure arrangements; forest resource assessment, planning, and policy review; public participation in policy making and review; implementation and enforcement of best management practice codes; management of special environmental values; and development and maintenance of human skills across disciplines (Ellefson and others 2005).
- *Forest Stewardship Council* (2006a and b) controlled wood standards specify a variety of standards within the context of the Council's 10 principles of forest stewardship, for example evidence regarding the legality of harvested wood includes evidence of authority to harvest, harvest occurring from authorized areas, and payment of royalties and related fees. District in which harvesting occurs may be considered of low risk for illegally harvested wood when there is evidence that laws regarding logging are enforced, systems for granting licenses and harvest permits are

robust and effective, little or no evidence or reporting of illegal harvesting, and a low perception of corruption involving the granting of harvest permits or enforcement of harvesting laws.

- *Sustainable Forestry Initiative* (2007) sets forth nine standards, namely practice sustainable forestry, promote responsible forestry practices, provide for reforestation and maintenance of forest productive capacity, improve long-term forest health, maintain forest and soil productivity, protect water resources, protect special sites and biological diversity, comply with relevant laws and regulations, and improve the practice of forest management.

- *Program for Promoting the Endorsement of Certification* (PEFC) establishes standards for identifying high and low risk sources of timber and wood products, namely high risk occurs when timber exports from a country are banned by the UN Security Council, known to have a low level of forest law enforcement, decrease in forest area, while low risk occurs when timber is declared as certified, reliable verification of legality is made by government, and verifiable documentation of timber's legality in the supply chain.

- *World Bank* governance indicators provide six standards of governance, namely voice and accountability (extent to which citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media), political stability and absence of violence (likelihood that government will be destabilized or overthrown by unconstitutional means), government effectiveness (quality of public services, civil service independence from political pressures, quality of policy formulation and implementation), regulatory quality (ability to formulate and implement sound policies and regulations), rule of law (extent of confidence in rules of society and contract enforcement), and control of corruption (extent to which public power is exercised for private gain) (Kaufmann and others 2007).

- *Global Accountability Framework* suggests four standards for judging accountability to stakeholders, namely transparency (ready access to information), participation (processes facilitating involvement), evaluation (reviews of goal-oriented progress), and complaint response mechanisms (stakeholder opportunity to challenge decisions) (Blagescu and others 2005).

The aforementioned standards are a resource from which to draw inferences about the chances (risk) of unlawful acts occurring in hardwood producing region. Summarized and grouped into major categories, these standards of acceptable conduct become as follows:

- *Ownership and rights*—processes for defining the legal right to harvest and transport timber are well established.

- *Fraud and deception*—processes for conducting transactions between sellers and buyers of timber are legal and accomplished without deceit or misrepresentation.

- *Forest practice standards*—timber harvesting and forest management generally are consistent with and in compliance with standards currently accepted for forestry and related practices.

- Protected areas*—timber does not originate from locations that are protected because of their unique ecological or cultural value.
- Information systems*—timber transactions and forest management generally are very often monitored and the information resulting therefrom is current, reliable and easily accessible.
- Institutional capacity*—government has resources available to enforce lawful standards, while the private sector has the capacity and the sentiment to apply them.
- Certification systems*—independent certification systems made available by reputable organizations are available and are considered an effective means promoting lawful conduct.
- Regulatory systems*—processes for granting of occupational licenses and harvest permits are robust and effective. Such systems complement various types of non-regulatory programs.
- Culture of law abidance*—citizens have respect for the legal and communal rights of others. Citizens have appropriate avenues for seeking redress of unlawful conditions.
- Government integrity*—governments are stable, effective and accountable, and citizens have confidence in their ability to address unlawful acts.
- Enforcement*—government has the capacity to enforce standards that forbid unlawful conduct.

The standards set forth above represent acceptable behavior that—when complied with—prevents unlawful actions involving the harvest and transport of timber without a lawful right to do so, buying or selling of timber in fraudulent or deceptive manners, and harvesting irrespective of established forestry and conservation standards. For the hardwood producing region, it is obvious that the institutions, laws and rules, and inclinations of citizens as previously described in this assessment would appear to be very consistent with these standards and that the risk of any one of the standards being seriously violated is very, very low.

Scoring of Parameters

The risk of hardwood timber being bought or harvested in unlawful manners can be further appraised by a state-by-state evaluation of various risk parameters, including extent of forest area certified, resource agencies' investments in forests, registration or licensing of occupational groups (timber harvesters, timber buyers), unlawful timber harvesting activity and the legal restrictions imposed on such activities, and the extent and intensity of regulatory and nonregulatory forestry programs directed at forests within the hardwood region. For each state in the hardwood producing region, the parameters used for the scoring the risk assessment are as follows (a rank of "3" was assigned [namely 71 percent to 80 percent] where state information is not available for compliance with forestry best management practices):

CERTIFIED TIMBERLAND AREA

- A. FSC, SFI and ATFS Certified Lands
1 – Represent more than 25 percent
2 – Represent 20 – 25 percent
3 – Represent 15 – 19 percent
4 – Represent 10 – 14 percent
5 – Represent Less than 10 percent

RESOURCES AGENCIES AND INVESTMENTS

- B. Forestry Personnel per 500,000 forested acres
1 - More than 20
2 - 16 to 20
3 - 11 to 15
4 - 6 to 10
5 - Less than 6
- C. Forestry Program Expenditures per 500,000 forested acres
1 - More \$1,400,000
2 - \$1,100,001 to \$1,400,000
3 - \$800,001 to \$1,100,000
4 - \$500,000 to \$800,000
5 - Less than \$500,000
- D. Number of Forestry Programs per 500,000 forested acres
1 - Five
2 - Four
3 - Three
4 - Two
5 - One or less
- E. Landowner Technical Assists per 500,000 forested acres
1 - More than 250
2 - 201 to 250
3 - 151 to 200
4 - 100 to 150
5 - Less than 100

OCCUPATIONAL REGISTRATION AND LICENSING

- F. Registration-Licensing of Timber Harvesters
1 - Yes
2 - No
- G. Registration-Licensing of Timber Buyers/Sellers
1 - Yes
2 - No
- H. Registration-Licensing Professional Foresters
1 - Yes
2 - No

TIMBER THEFT CONDITIONS

- I. Unlawful Timber Harvesting Considered
1 - Very Unimportant
2 - Somewhat Unimportant
3 - Somewhat Important
4 - Very important
- J. Statutes Focused Directly on Unlawful Timber Harvesting
1 – More than Four
2 - Three to Four

TIMBER THEFT CONDITIONS (continued)

- K. Statutes Focused Directly on Timber Seller-Buyer Fraud
1 – Two or More
2 - One
3 - None

APPLICATION OF SOUND FOREST PRACTICES

- L. Major Forest Practice Categories Addressed by State Government Programs Generally
1 – Five or Six
2 - Three to Four
3 – One or Two
4 - None
- M. Compliance with Forestry Best Management Practices
1 - More than 90 percent
2 - 81 percent to 90 percent
3 - 71 percent to 80 percent
4 - 61 percent to 70 percent
5 - Less than 60 percent

REGULATORY AUTHORITIES AND PROGRAMS

- N. Forest-centered Regulatory Statutory Authorities
1 - More than Four
2 - Three to Four
3 - One to two
4 - None
- O. Major Forest Practice Categories Addressed by State Government Regulatory Programs
1 - Five or Six
2 - Three or Four
3 - One or Two
4 - None
- P. Forest Practice Regulatory Program Staffing
1 - More than 40 FTEs
2 – 31 to 40 FTEs
3 – 21 to 30 FTEs
4 - 10 to 20 FTEs
5 - Less than 10 FTEs
- Q. Notification or Permit Required for Timber Harvesting
1 - Yes
2 - No

NONREGULATORY PROGRAMS

- R. Special Forest Property Tax Incentives
1 - Yes
2 - No
- S. Renewable Forest Resources Extension Staff
1 – More than eight staff years
2 – Seven to eight staff years
3 – Five to six staff years
4 – Three to four staff years
5 - Less than three staff years

Using the aforementioned state-by-state scoring system, where high scores indicate greater risk while low scores indicate the opposite, an appraisal summarizing these conditions for each of the 33 states in the hardwood producing region was undertaken (Table 24). The lower a state’s total score, the less likely that unlawful timber harvesting and marketing activities will occur (lowest possible score is 19, highest possible score is 73). The scores for each state are distributed as follows:

	State Scores	Number of States
Little Risk	18 to 20	0
	21 to 23	0
	24 to 26	0
	27 to 29	0
	30 to 32	0
	33 to 35	1
	36 to 38	2
	39 to 41	4
	42 to 44	7
	Some Risk	45 to 47
48 to 50		4
51 to 53		7
54 to 56		0
57 to 59		0
60 to 62		0
63 to 65		0
High Risk	66 to 68	0
	69 to 71	0
	72 to 74	0

None of the states are at either extreme (low score versus high score) of riskiness for unlawful timber harvesting activities. If words depicting informed (but biased) judgment about risk are added to the analysis, none of the states should be considered to be of “little risk” while none should be considered “high risk”—all are in the middle range of “some risk.”

In summary, both approaches to appraising risk strongly suggest that the likelihood of unlawful timber harvesting and marketing in the hardwood producing region is very, very low. This conclusion becomes even more forceful if viewed in a global context, where it is highly doubtful that any appreciable amount of unlawfully harvested or marketed hardwood timber enters international markets. When compared to many global situations, unlawful harvesting of hardwood forests is probably of such a small magnitude and frequency in the United States that it simply cannot be considered a systemic problem.

Table 24. Risk Parameters and Risk Scores for State Government Programs Addressing Unlawful timber Harvesting in the U.S. Hardwood Producing Region, by State and Parameter. 2007.

State	Certified Forest Acres	Resource Agencies & Investments				Occupational Registration & Licensing			Timber Theft & Fraud Conditions			Application of Sound Forestry Practices		Regulatory Authorities & Programs				Non-regulatory Programs		Total Score
		Forestry Personnel per 500,000 Acres	Forestry Program Expenditures per 500,000 Acres	Number of Forestry Programs per 500,000 Acres	Landowner Technical Assists Per 500,000 Acres	Registration Required of Timber Harvesters	Licensing of Timber Buyers/Sellers	Licensing or Registration of Professional Foresters	Perceived Extent of Timber Theft	Specific Statutes on Unlawful Timber Harvesting	Statutes Specific to Timber/Seller Fraud	Major Practices Addressed by State Programs	Compliance to BMPs	Forest-Centered Reg Statutory Authorities	Categories of Forest Practices Addressed	Regulatory Program Staffing	Harvest Notifications or Permit Required	Forest Property Tax Provisions	Renewable Forest Resources Extension Staff	
NORTH																				
CT	5	1	4	1	5	1	1	1	4	4	2	1	3	3	2	5	1	1	5	50
DL	5	1	1	1	1	1	2	2	1	3	3	1	1	3	2	4	2	1	5	40
IL	5	4	4	4	1	1	1	2	1	2	3	2	3	2	3	5	2	1	5	51
IN	3	3	1	3	1	1	1	2	4	3	3	1	1	3	2	4	2	1	3	42
IA	5	4	3	3	1	1	1	2	2	3	2	1	5	3	3	5	2	1	5	52
ME	1	5	4	5	4	1	2	1	4	3	1	1	2	1	1	4	1	1	4	46
MD	4	2	1	1	1	1	1	1	1	3	3	2	2	1	1	2	2	1	4	34
MA	2	2	5	3	1	1	2	1	3	3	2	1	2	3	1	3	1	1	5	42
MI	1	4	3	5	5	1	2	1	1	3	3	1	3	3	2	1	2	1	1	43
MN	1	3	1	5	5	1	2	2	1	4	3	1	4	2	2	1	2	1	4	45
MO	5	4	5	5	4	1	1	2	2	3	3	1	3	3	1	5	2	1	1	52
NH	2	5	1	3	3	1	2	1	4	2	2	2	3	1	1	3	1	1	1	39
NJ	5	1	1	1	3	2	2	1	1	3	3	1	3	3	1	2	2	1	5	41
NY	5	5	4	5	5	2	2	2	3	3	2	1	3	2	1	2	2	1	2	52
OH	5	4	3	5	2	1	2	2	2	3	2	1	3	3	3	5	2	1	3	52
PA	3	2	1	5	1	1	2	2	2	3	3	2	3	2	2	5	2	1	3	45
RI	4	1	1	1	1	1	2	2	1	3	2	1	3	2	3	4	1	1	4	38
VT	5	4	4	3	3	1	1	2	1	2	3	2	3	2	2	4	1	1	4	48
WV	5	5	5	5	2	1	1	1	4	3	2	2	2	2	2	4	1	1	3	51
WI	1	3	2	5	1	1	2	2	3	2	3	1	1	2	1	4	1	1	3	39
Average	4	3	3	3	3	1	2	2	2	3	3	1	3	2	2	4	2	1	4	45

Note: Timber theft and seller-buyer fraud conditions estimated for MI, MN, OH, PA and MS. Forestry best management practices compliance rates estimated for CT, IL, MI, MO, NH, NJ, PA and RI. See text for parameter descriptions and rankings.

Table 24 (continued).

State	Certified Forest Acres	Resource Agencies & Investments				Occupational Registration & Licensing			Timber Theft & Fraud Conditions			Application of Sound Forestry Practices		Regulatory Authorities & Programs				Non-regulatory Programs		Total Score
		Forestry Personnel per 500,000 Acres	Forestry Program Expenditures per 500,000 Acres	Number of Forestry Programs per 500,000 Acres	Landowner Technical Assists Per 500,000 Acres	Registration Required of Timber Harvesters	Licensing of Timber Buyers/Sellers	Licensing or Registration of Professional Foresters	Perceived Extent of Timber Theft	Specific Statutes on Unlawful Timber Harvesting	Statutes Specific to Timber/Seller Fraud	Major Practices Addressed by State Programs	Compliance to BMPs	Forest-Centered Reg Statutory Authorities	Categories of Forest Practices Addressed	Regulatory Program Staffing	Harvest Notifications or Permit Required	Forest Property Tax Provisions	Renewable Forest Resources Extension Staff	
SOUTH																				
AL	2	4	4	5	3	1	2	1	3	3	3	2	1	2	1	3	2	1	1	44
AR	3	4	4	5	3	1	2	1	3	3	2	1	2	3	2	4	1	2	4	50
FL	3	1	1	5	3	1	2	2	2	4	3	2	1	2	2	5	2	2	4	47
GA	3	3	4	5	4	1	2	1	3	3	1	2	1	1	1	5	2	1	1	44
KY	5	4	4	5	5	1	2	2	3	3	3	2	5	3	1	1	1	1	1	52
LA	1	3	4	5	4	1	2	2	3	2	1	2	2	3	1	5	2	1	1	45
MS	3	3	4	5	1	1	2	1	3	3	3	2	2	1	3	5	2	1	1	46
NC	3	2	1	5	2	1	2	1	2	2	3	2	4	1	1	2	1	1	1	37
SC	3	3	3	5	5	1	2	1	4	2	2	2	2	1	1	4	2	1	2	46
TN	5	3	3	5	5	1	2	2	2	3	2	2	2	2	2	1	1	1	4	48
VA	5	4	3	5	1	1	2	2	3	3	3	2	4	2	1	1	1	1	2	46
Average	3	3	3	5	3	1	2	2	2	3	2	2	2	2	1	3	2	1	2	46
PACIFIC NORTHWEST																				
OR	3	3	1	5	5	1	2	2	3	2	3	2	2	1	4	1	1	1	1	43
WA	1	1	1	5	5	1	2	2	3	3	3	2	3	1	4	1	1	1	3	43
Average	2	2	1	5	5	1	2	2	3	3	3	2	3	1	4	1	1	1	2	43
HARDWOOD STATES AVERAGE																				
All States	3	3	3	4	2	1	2	2	2	3	3	2	4	2	2	3	2	1	3	45

SUMMARY AND OBSERVATIONS

Unlawful activities involving the harvest and sale of hardwood timber in the U.S. has been expressed by a number of organizations. In large measure, the latter are concerned over the extent to which such activities occur and whether they adversely affect the future sustainability of the nation's hardwood forests. A proactive interest in the issue has been expressed by various organizations, most notably the American Hardwood Export Council. In 2007, the Council commissioned a major review of the issue (Goetzl and others 2008) which drew in part on this report. The latter focused principally on the legal and programmatic aspects of the issue, a summary of which follows.

Summary and Major Findings

State Governments

Agencies and Resources: Hardwood forests in the U.S. are extensive in area and contain a substantial portion of the nation's timber volume. State governments have acknowledged the importance of this resource by directing a large number of state agencies toward its management and protection. These agencies, and the large number of staff associated with them, are responsible for directing substantial public investments in hardwood forest management. The outcomes of these investments are sizeable; they represent important consequences for the continued sustainability of forests within the region.

Timber Theft and Fraud: State governments in the hardwood producing region are keenly aware of the potential for unlawful timber harvesting and for buyer-seller fraud involving the exchange of timber. Although reliable information regarding the extent of such activities is uneven and often contradictory, their region-wide magnitude in terms of number of incidents and value of timber involved appears to be somewhat modest. Nearly all state governments have had the foresight to establish laws and administrative rules for dealing with such problems. Enforcement of such laws is significant, although dependent on state perceptions regarding the magnitude of the problem and the resources available to control it.

Occupational Licensing: State governments and many private organizations in the hardwood producing region have recognized the importance of having capable persons engaged in the sale and harvesting of timber and in the application of sound forestry practices. To this end, nearly all states in the region have certification or licensing programs for timber harvesters, and many have such programs for timber buyers and sellers and for professional foresters.

Diverse Programs: State governments in the hardwood producing region make use of a large number of many different types of programs for promoting the application of various forestry practices considered essential to the protection and sustainability of hardwood forests. Compliance monitoring programs implemented by state governments clearly indicate that landowners and timber harvesters are applying these forestry practices at rates that are very respectable.

Regulatory Authorities: State governments have enacted a myriad of environmental and land use laws that indirectly lead to the regulation of forestry practices applied to public and private forest in the hardwood producing region. They are important sources of regulatory authority within the region and eminent from broad state interests in matters such as land use (growth and development, critical natural areas, wild and scenic rivers), wildlife (nongame species, endangered species), toxic materials (pesticides, hazardous waste), wetlands (resource diversity), water quality (shoreland, sediments, flood control), air quality (pollutants), and minerals (surface mining, mined-land reclamation). State governments have also enacted a great many laws that directly authorize the regulation of forestry practices. Every state in the region has some form of law that directly controls the way in which forest land is used and the type and manner of forestry practices that can be applied. These laws are not modest in their statements of intent nor are they shy in specifying authority for enforcement.

Regulated Practices: Even though there exists wide variation across the region, forestry practices applied within the hardwood producing region are very likely to be covered by some form of regulatory program implemented by state government. In nearly every state, all or at least some of the forestry practices included within seven major categories of forestry practices are subject to state regulatory initiatives. The chances of all, or at least some, forestry practices being regulated is about 50 percent.

Regulatory Agencies and Investments: State agencies engaged in the regulation of forestry practices are numerous in number and make sizeable investments in regulatory programs. Diverse in their responsibilities, these agencies focus on a wide range of concerns over the condition of forest environments and make investments in regulatory programs that are often commensurate with the importance of such resources. From a forestry practices perspective, the most prominent regulatory focus of state agencies are air and water quality, use and management of forests, and use and management of wildlife. The lead forestry agency of nearly all states assumes important roles in the regulation of certain forestry practices.

Regulatory Effectiveness: Regulatory programs of state governments positively influence the condition of forests within the hardwood producing region and have a respectable record in ensuring that landowners and timber harvesters comply with legally prescribed forest practice standards. Such is especially so when they are properly focused and when used in concert with certain other types of programs, notably technical assistance and extension-education programs. Although regulatory program effectiveness varies considerably across the region, certain practices uniformly benefit from their attention.

Federal Government

The federal government has significant involvement in promoting the sustainability of hardwood forests and ensuring their availability to persons and organizations that depend on them. This presence is very apparent in terms of the number of federal agencies that have responsibility for programs focused on such resources, the extensive statutory authority assigned to such agencies, and the well developed set of programs that are financially supported and actively implemented and

enforced. Federal programs also focus regulatory actions on certain forest conditions within the hardwood producing region (for example, wetlands, endangered species), and are reliable sources expertise and scientific knowhow required for the sustainable management of hardwood forests.

Private Organizations

Private owners of hardwood forests are especially sensitive about their forest's current and future condition. Such is attested to by a willingness to assess the condition of their forest and to adopt and subsequently implement a forest management plan. Moreover, many owners in the U. S. Hardwood producing region are willing to seek out and subsequently abide by forestry standards that have been set forth by various forest certification programs.

Risk of Unlawful Conditions and Activities

The likelihood of unlawful timber harvesting and marketing in the hardwood producing region is very, very low. This conclusion becomes even more forceful if viewed in a global context, where it is highly doubtful that any appreciable amount of unlawfully harvested or marketed hardwood timber enters international markets. When compared to many global situations, unlawful harvesting of hardwood forests is probably of such a small magnitude and frequency in the United States that it simple cannot be considered a systemic problem.

Potential Program Responses

The incidence of unlawful activities involving the harvest and marketing of hardwood timber in the U.S. hardwood timber producing region appears to be very limited. The modesty of the problem is even more pronounced when considered in the global context of international trade. However, if illegal timber harvesting activities are widely perceived as a problem by parties having an interest in hardwood forests, they deserve some sort of programmatic response. To be most effective, the response should be proactive in nature and should be initiated by an organizations that are most closely involved with and understanding of the export of hardwood timber and wood products. In this case, the industry's trade organization would seem most appropriate, namely the American Hardwood Export Council. Although acknowledged as not being presented in detail nor in priority order, consider the following:

- Promote industry-wide educational programs that alert companies to national and global concerns over illegal timber harvesting and how such concerns might be addressed.
- Establish responsibility for developing and implementing an information system for nationally tracking the extent and type of illegal activities involving the illegal harvest of hardwood timber (for example, American Hardwood Export Council; State and Private Forestry, USDA-Forest Service)
- Encourage state governments to adopt progressive programs directed at illegal timber harvesting, including occupational licensing of timber harvesters and timber buyers as appropriate.

- Promote credible legal standards for state laws and programs focused on illegal timber harvesting activities. As suitable, establish laws that focus specifically on illegal timber harvesting. Prevent widespread inconsistencies between state enforcement programs.
- Promote adoption of company and industry-wide policies that set forth proficient standards regarding the legality of timber sources and timber harvest methods. Communicate such policies to suppliers and stakeholders.
- Periodically review the extent of illegal timber harvesting activities occurring nationally and assess the effectiveness of programs used to respond to such activities (every five to seven years).
- Foster cooperative relationships with enforcement agencies at the state and national levels, and promote the capacity (financial, employees) of progressive programs currently being implemented.
- Develop and promote adoption by individual timber processors (companies, timber buyers) of effective procedures that can be used to determine the legality of timber sources and timber harvest methods. Especially focus on systems for rating in an orderly manner the risk of working with timber suppliers most likely to illegally harvest and trade timber.
- Promote conformity with established state and national laws and programs that govern the application of forestry practices on forest land in both public and private ownership.
- Promote research to better enable the design of more effective institutions and programs focused on unlawful timber harvesting and marketing activities. Especially conduct comparative studies of experiences with programs being implemented by various countries throughout the world.
- Adopt on an industry-wide basis one of the many private certification schemes that promote point of origin documentation and certification by independent third parties.

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APPENDICES

Appendix Table 1. Major State Laws Regulating Nonpoint Sources of Water Pollution with Special Reference to Forestry Practices in the U.S. Hardwood Producing Region, by State. 2007.

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.

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).

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.

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.

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.

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 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.

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.

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.

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.

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 (2004), Environmental Law Institute (1997 and 1998), National Conference of State Legislatures (2007), Wear and Greis (2002), and various directories of state statutes.

Appendix Table 2. State Agency Expenditures and Staffing for Prominent Forest Practice Regulatory Programs in the U.S. Hardwood Producing Region, by State. 2000 through 2003.

State	2000		2001		2002		2003	
	Expend- itures	Staff	Expend- itures	Staff	Expend- itures	Staff	Expend- itures	Staff
Connecticut	198	3.0	187	3.0	176	3.0	165	3.0
Maine	952	14.1	1,020	15.0	1,088	15.9	1,155	16.5
Massachusetts	570	18.0	570	18.0	570	16.0	460	16.0
Oregon	7,000	103.0	7,000	103.0	7,600	110.0	330	94.0
Vermont	300	6.0	310	6.0	320	6.0	7,800	6.0
Virginia	4,500	57.0	4,500	57.0	4,000	54.0	4,000	50.0
Washington	7,560	137.0	10,802	196.0	9,313	169.0	9,656	176.0
West Virginia	466	61.0	447	61.0	492	66.0	761	66.0

Note: Expenditures thousands of current \$US and full-time equivalent staff.

Source: Ellefson and others (2004), and various state agency documents and state government personnel responsible for state forest practices regulatory programs.

Appendix Table 3. Characteristics of Prominent Forest Practices Regulatory Programs Implemented by State Governments in the U. S. Hardwood Producing Region, by State and Program. 2004.

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.

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. Clearcuts 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). 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 be 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. 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, 1 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). 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).

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) through 1991 (\$3,300) and in 1991 accounted for about 6 percent of the budget assigned to the state’s Department of Forestry. During the period since 1999, the program’s budget was as follows: 2000—\$7,000 (7 percent of Department budget), 2001—\$7,000 (7 percent), 2002—\$7,600 (6 percent), and 2003—\$7,800 (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). 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.

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	--	--

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, 1 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 Reforestation. 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 each year (18 percent of the Department of Forestry’s annual budget), 2002—\$4,000 (17 percent), and 2003—\$4,000 (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 per year (current dollars) for the period 1985 (\$2,200) through 1991 (\$6,600) and in 1991 accounted for about 7 percent of the budget assigned to forestry units of WA Department of Natural Resources. During the period since 1998, the program's fiscal year budget was as follows: 1999—\$6,951 (5.6 percent of WA Department of Natural Resources operating expenditures), 2000—\$7,560 (6.4 percent), 2001—\$10,802 (7.8 percent), 2002—\$9,313 (6.3 percent), and 2003—\$9,656 (6.8 percent). 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. 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.

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: Ellefson and others 2004, and various state agency documents and state government personnel responsible for state forest practices regulatory programs.