Cost and Effectiveness of Legal Mandates for the Practice of Forestry on Private Land: Experiences with State Forest Practice Laws in the United States

Russell K. Henly & Paul V. Ellefon

Comprehensive state laws regulating the practice of forest management on private lands are in effect in seven of the United States. Established to protect a wide range of non-timber forest resources and to ensure reforestation after harvest, these laws may impose significant administrative costs on states and significant compliance costs on landowners and timber operators. Total state administration costs for 1984 are estimated at $10.1 and total private sector compliance costs are estimated at $120.5 million, for a total regulation cost of $130.6 million.

The resource protection effectiveness of state forest practice regulation is difficult to quantify. However, agreement is strong that regulation has led to significant improvements in forest resource conditions and has helped to increase reforestation.

Introduction

The modern generation of state forest practice laws, with us now since the early 1970’s, imposes significant restrictions on forestry operations over large areas of some of the nation’s most productive private forestland. Perhaps most simply characterized as comprehensive environmental forest practice laws for the conduct of forest management activities on private forestlands, modern forest practice laws are presently in effect in seven states: Massachusetts, Nevada, Alaska, Idaho, Oregon, Washington, and California. In order to comply with state forest practice regulations, timber operators and forest landowners must often expend significant effort and money to protect social interests in a range of public natural resources (e.g., water, fisheries, and wildlife). Likewise, states’ governments expend millions of dollars annually to administer their forest practice laws.

Now that the modern forest practice laws have been in effect for some time, there exists an opportunity to investigate public and private sector costs of administering such laws and to evaluate their effectiveness in protecting the resources they are designed to safeguard. In order to carry out such analysis, three steps were taken: A thorough literature review was conducted; an indepth questionnaire was sent to the state forester or forest practice program director in the seven states with comprehensive state forest practice laws; and personal interviews of state natural resource officials were made in Washington and California, states with the nation’s most stringent forest practice regulations.

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Table I. State agency forest practice regulation administration and enforcement expenditures, by State and agency, 1984.

<table>
<thead>
<tr>
<th>State and Agency</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massachusetts</td>
<td></td>
</tr>
<tr>
<td>Division of Forests and Parks</td>
<td>$ 500,000</td>
</tr>
<tr>
<td>Metropolitan District Commission</td>
<td>1,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>501,000</td>
</tr>
<tr>
<td>Nevada</td>
<td></td>
</tr>
<tr>
<td>Division of Forestry</td>
<td>$ 100,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100,000</td>
</tr>
<tr>
<td>Alaska</td>
<td></td>
</tr>
<tr>
<td>Division of Forestry</td>
<td>$ 317,000</td>
</tr>
<tr>
<td>Department of Fish and Game</td>
<td>450,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>767,000</td>
</tr>
<tr>
<td>Idaho</td>
<td></td>
</tr>
<tr>
<td>Bureau of Private Forestry</td>
<td>$ 33,000</td>
</tr>
<tr>
<td>Bureau of Water Quality</td>
<td>45,000</td>
</tr>
<tr>
<td>Department of Water Resources</td>
<td>15,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>93,000</td>
</tr>
<tr>
<td>Oregon</td>
<td></td>
</tr>
<tr>
<td>Department of Forestry</td>
<td>$ 600,000</td>
</tr>
<tr>
<td>Department of Fish and Wildlife</td>
<td>40,000</td>
</tr>
<tr>
<td>Department of Environmental Quality</td>
<td>6,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,646,000</td>
</tr>
<tr>
<td>Washington</td>
<td></td>
</tr>
<tr>
<td>Division of Private Forestry and Recreation*</td>
<td>$1,635,000</td>
</tr>
<tr>
<td>Department of Game</td>
<td>395,000</td>
</tr>
<tr>
<td>Department of Fisheries</td>
<td>305,000</td>
</tr>
<tr>
<td>Department of Ecology</td>
<td>30,000</td>
</tr>
<tr>
<td>Department of Agriculture</td>
<td>5,000</td>
</tr>
<tr>
<td>Department of Commerce and Economic Devel.</td>
<td>5,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2,375,000</td>
</tr>
<tr>
<td>California</td>
<td></td>
</tr>
<tr>
<td>Department of Forestry</td>
<td>$4,377,000</td>
</tr>
<tr>
<td>Department of Fish and Game</td>
<td>$120,000</td>
</tr>
<tr>
<td>Regional Water Quality Control Boards</td>
<td>120,000</td>
</tr>
<tr>
<td>Coastal Commission</td>
<td>12,000</td>
</tr>
<tr>
<td>Department of Parks and Recreation</td>
<td>6,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4,635,000</td>
</tr>
<tr>
<td>Total Expenditure by Above States</td>
<td>$10,117,000</td>
</tr>
</tbody>
</table>

* Now called the Division of Private Forestry and Natural Heritage.

Costs of regulation

Administrative costs

In most states regulating forest practices, several agencies participate in administering and enforcing forest practice regulations, though the bulk of the effort and expenditure is almost always borne by the state forestry agency. Table 1 summarizes estimated forest practice regulation expenditures, by state and agency, for 1984. The 1984 state government forest practice regulation expenditures by the seven states totaled over $10 million, with California spending the most ($4,635,000) and Idaho the least ($93,000).

Not all state forestry agencies are satisfied with the level of funding available to carry out their forest practice regulation responsibilities. The Massachusetts Division of Forests and Parks indicated that an annual funding level of $1 million—twice the 1984 level—would be necessary, while the Nevada Division of Forestry called for $200,000, twice the estimated 1984 level. Alaska’s Division of Forestry was of the opinion that it was $48,000 short of an adequate funding level. Worst off in terms of forest practice program funding was the Idaho Bureau of Private Forestry. That agency’s funding for forest practice regulation in 1984 was only $33,000 (down from a 1981 level of $170,000), far below the indicated annual need of $400—$500,000. Washington’s Division of Private Forestry and Natural Heritage indicated a need of an additional $300,000 annually.

The state forestry departments in Oregon and California were basically satisfied with funding levels for forest practice regulation programs, though concern was expressed that more monies might be needed to timber harvest levels to rise. Note that in both Idaho and Alaska, non-timber agencies had more funds in 1984 to devote to forest practice regulation efforts than did the state forestry agencies. This is due more to legislative priorities than to the two states somehow organizing themselves differently for forest practice regulation than other states examined.

While program administrators might always be interested in higher funding levels, the size of the funding shortfalls identified by forestry administrators in Massachusetts,
Nevada, and Idaho clearly indicates a concern beyond simple incremental expansion of their programs. In some cases, lack of funding has clearly reduced the potential effectiveness of state forest practice regulation programs.

Private sector costs

The private sector cost of compliance with state forest practice regulations is difficult to determine. Traditional "with and without" analysis techniques are difficult to apply since the environmental soundness of management practiced by timber operators and forest landowners varied widely before regulations were enacted. Further, the environmental ethic of both public officials and of timber operators and landowners has increased greatly since "modern" state forest practice laws were enacted in the early 1970's. Thus, were all the present forest practice laws suddenly erased, forest management practices would likely be maintained at a higher level, vis-a-vis environmental protection, than they were at the time the laws were first implemented.

In addition to simple operating costs, several difficult-to-value and difficult-to-quantify costs are imposed by forest practice regulations. Vaux (1980) and Taylor (1980) list several of these costs imposed by the frustration of complex paper work and oversight by state forestry officials. Duerd and Jones (1976) suggest political costs related to an enlarged bureaucracy and a loss of freedom. But regulation may also benefit landowners by improving the effectiveness of their forest management activities due to requirements for the preparation of harvesting or management plans (Schick 1977). Partly because of these problems, little has been done to estimate the private sector costs of state forest practice regulation in any thorough and systematic way.

The Nevada Division of Forestry estimated private compliance costs at about $10 per thousand board feet (MBF) of timber harvested. Based on a survey, the Alaska Division of Forestry estimates compliance costs at $5 per MBF, on average (Alaska Division of Forestry 1984). Looking at the data more closely, 87 percent of the forest industry respondents to the Alaska survey indicated that compliance costs were $10 or more per MBF or less, while the remaining 13 percent estimated added costs to be $30 or more per MBF. Surprisingly, 13 percent indicated that they have been saving money since the advent of regulation. A University of Idaho (1978) study estimated the cost of compliance with that state’s forest practice law to be $1.50 per MBF, or $2.22 per MBF in 1984 dollars. The Oregon Forest Industries Council has estimated forest practice compliance costs in Oregon to be $12 per MBF. The Washington Division of Private Forestry and Recreation in 1977 estimated forest practice compliance costs in that state to be in the neighborhood of $2 to 3 per MBF, or $3 to 5 per MBF in 1984 dollars (Hawley 1977). More recently, the California Forest Protection Association has estimated compliance costs in Washington to be in the range of $2–12 per MBF (Anderson 1985), while another source places the Washington compliance cost figure at $10 per MBF (NCASI 1983). Compliance costs in both Washington and Oregon are expected to rise significantly if proposed riparian zone protection standards are approved. The California Department of Forestry estimates the private sector cost of compliance with the California Forest Practice Act at an average of $25 per MBF. The California Forest Protection Association has estimated compliance costs to be in the range of $22–90 per MBF (Anderson 1985).

Applying private sector compliance cost estimates to the amount of timber harvested from private forestlands in the states with forest practice laws provides some indication of the substantial magnitude of regulatory costs to the private sector—an estimated $121 million in 1984 alone (Table 2). These direct private sector costs are over 10 times the state administration costs; combined, the total costs of state forest practice regulation in 1984 (except for the direct private sector costs in Massachusetts) were $131 million.

<table>
<thead>
<tr>
<th>State</th>
<th>Cost Factor ($/MBF)</th>
<th>Private Timber Removals (MBF)*</th>
<th>Compliance Cost ($ Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nevada</td>
<td>10.00</td>
<td>0.2</td>
<td>0.002</td>
</tr>
<tr>
<td>Alaska</td>
<td>5.00</td>
<td>202</td>
<td>1.010</td>
</tr>
<tr>
<td>Idaho</td>
<td>2.22</td>
<td>861</td>
<td>1.911</td>
</tr>
<tr>
<td>Oregon</td>
<td>12.00</td>
<td>3,078</td>
<td>36.936</td>
</tr>
<tr>
<td>Washington</td>
<td>8.00</td>
<td>3,545</td>
<td>28.360</td>
</tr>
<tr>
<td>California</td>
<td>23.00</td>
<td>2,093</td>
<td>52.323</td>
</tr>
</tbody>
</table>

TOTAL $120.544

* Source: Nevada estimated from Green and Vax: Houser 1983; all others from Warren 1986.

Effectiveness of regulation

As identified above, the protection of forest resources through forest practice regulation is a costly endeavor. With such a large investment being made, it is only reasonable to question the adequacy of the protection and the nature of the benefits it has accrued. Unfortunately, any sort of monetary estimate of benefits received simply cannot be made at this time. Not only are there few production functions which relate specific forest practices to benefits generated (added numbers of fish, increased wildlife, improved water quality, etc.), but there also exist serious problems in trying to value such outputs. Further, it is extremely difficult to separate the effects of regulation on forest practices and forest resource protection from the effects of (a) a general growth in public concern for a quality environment and (b) the rather large increase in stumpsage values which occurred after a number of the present state forest practice laws were enacted (Green and Gallez 1982). While increases in stumpage values will tend to increase harvest levels, they also serve as an incentive to invest in sound forest practices (e.g., reforestation, protection of residual timber, conservation of soil productivity) which can ultimately lead to larger future timber harvests.

Because of these problems, the best that can be hoped for is a subjective, qualitative indication of how well forest practice regulation is meeting intended resource protection goals (goals which are themselves expressed in subjective terms). Measures of effectiveness can be based on field studies; on the general observations of individuals involved in forest practice regulation and forest resource protection; and on factors such as the adequacy of forest practice program funding levels, frequency of inspection of operations for compliance with the laws, and the degree of noncompliance found.

A general conclusion that can be drawn from the handful of field studies that have been conducted is that state forest practice laws—when fully complied with—are reasonably effective at protecting forest resources; however, adverse resource impacts are common and often significant when compliance is not achieved (Brown et al. 1977; University of Idaho 1978; U.S. Environmental Protection Agency 1979; Sache et al. 1980, 1981). A number of studies, largely focused on various sectors of the forestry community, have found generally favorable responses vis-a-vis the accomplishments of forest practice regulation at improving the protection of the environment (Alaska Division of Forestry 1984, Green 1982, Green and Gallez 1982). Other testimonies to the positive accomplishments of regulation may be found as well (Vaux 1983, Green et al. 1981).

Responding to the 1985 stumpage values (Elleson 1986) were also largely positive as to the resource protection accomplishments of state forest practice regulation. Though agreement was universal that resource protection accomplishments have been made through regulation, not all (primarily those individuals in water quality, fisheries, and wildlife agencies) were satisfied that an adequate standard of resource protection had been achieved. In the case of Idaho, it was noted that although the state’s forest practice regulations as written are at least somewhat effective in protecting various forest resources, as applied—due to the severely limited enforcement and the low level of enforcement which that funding level will support—they are in some cases less than effective.

One area of accomplishment where some...
quantitative indicators are available is in reforestation. In most cases, all seven of the states with comprehensive forest practice laws require, in most cases, that a site be reforested or adequate regeneration provided for after harvest. State forestry agencies indicated that regulation had led to increased reforestation (Heney and Ellenof 1986). Massachusetts indicated that reforestation requirements are being met 98 percent of the time. The Alaska Division of Forestry has been somewhat hesitant to aggressively investigate and enforce reforestation requirements due to dependence on the political influence of the state's industrial timberland landowners (Peacock 1985). In Idaho, reforestation standards are not being met 20 percent of the time and are being exceeded 10 percent of the time. Only a trace more land is being reforested than would have been in the absence of regulation. The chief of the Idaho Bureau of Private Forestry has noted the inadequacy of the state's present reforestation requirements in assuring good commercial timber productivity. Quality residual trees and/or saplings are or may be left or [allowed to] seed-in to take care of the 'reforestation requirements . . . ' (Almas 1984b). Thus, although harvested trees may be replaced, the nonharvested trees may have the potential to adequately replace the productivity of the prior stand. In Oregon, the reforestation requirements of the Forest Practices Act are being met 95 percent of the time; because of the 5 percent more area is being reforested than otherwise would have been. Based on a state Department of Natural Resources study (Bigger et al. 1983), Washington estimates that reforestation goals are being met 80 percent of the time and that 10 percent more area is being reforested due to the requirements of forest practice regulation. In California, reforestation requirements are being met or exceeded 99 percent of the time and exceed 75 percent of the time; 25 percent more area is being reforested than otherwise would have been; and regulation has resulted in an estimated annual $2-3 million reforestation investment which would not have otherwise occurred (Vaux 1985).

As discussed previously, several state forest practice programs are severely underfunded, a condition which raises concerns about their effectiveness. All seven of the forest practice law states except Massachusetts have legal provisions authorizing the state forestry agency to repair adverse resource impacts caused by landowner violations of law when such landowners fail to repair such impacts themselves. Mechanisms are also provided (e.g., liens and foreclosure on property or performance bonding [Nevada]), for the state to collect the cost of repairs from the landowner and/or timber operator. However, Idaho and Washington have never had the funds necessary to make such repairs.

Inadequate funding also leaves state forest practice programs with too few staff to review forest practice notifications or applications, to inspect operations and help timber operators and landowners understand and apply the regulations, and to aggressively enforce the regulations when operations and landowners fail to willingly comply. Non-timber state resource agencies, sometimes given oversight responsibilities by forest practice laws, are generally too poorly funded to assume these responsibilities to the degree that they would like.

Looking at inspection rates as an indicator of the effectiveness of forest practice regulation—the assumption being that frequent forest practice inspection is a factor in compliance, which in turn leads to a high level of resource protection—data indicate that inspection rates range from quite low to quite satisfactory. Massachusetts examines all operations, 521 operations are inspected per 100 operations completed (McLean 1985). That level of inspection was viewed to be sufficient to assure a high level of compliance, though room for improvement was indicated. The Alaska Division of Forestry is to inspect every operation of which it is notified (Peacock 1985). The Division is of the opinion that current inspection frequencies are adequate to ensure a high level of compliance with the forest practice regulations. The Division has not been following through on conducting reforestation inspections.

In fiscal year 1984, the Idaho Department of Lands inspected only 168 (6 percent) of the 2,700 operations occurring on private forestlands within the state (Idaho Department of Lands 1985, Idaho Division of Environment 1985). In the southern part of the state, where about one-fifth of the operations occur, no inspections were made (Almas 1984a). Compared to fiscal year 1981, 70 percent fewer inspections were made in fiscal year 1984. In 1983, during which 10 124 forest practice notifications were made in Oregon, the state Department of Forestry conducted 14 268 inspections (Oregon State Department of Forestry 1984). On average, the Department inspects operations more than once each year. The Department considers the current inspection rate to be adequate to assure a high level of compliance with the state's forest practice regulations. This inspection rate was not readily available for the number of general compliance inspections made annually, though the state Division of Private Forestry and Natural Heritage indicated that the number of inspections being made was insufficient to assure a high level of compliance. The low number of reforestation inspections being made in the state (an average of 1346 per year for fiscal years 1983 through 1985, relative to a 'build-out' scenario— an average of 5 992 new operations per year for the same period) raises concerns as to how well the state's reforestation requirements are being met, as does the reforestation study cited earlier (Bigger et al. 1983). The state Department of Ecology seems comfortable with the current rate of forest practice inspections being made by the Division of Private Forestry and Natural Heritage (Sachet 1985).

On average, 80 percent of the timber harvest permit applications in California receive an inspection from the Department of Forestry before being approved or denied (California Department of Forestry 1985, 1984, 1983). In 1984, when 1187 new timber harvest permit applications were approved, the Department of Forestry made 6793 inspections. The total number of operations active during a given year is usually several times the number of applications approved during that year, since an approved harvesting plan is valid for 3 years and restocking need not be achieved for up to 5 years after an operation is completed. Each operation probably receives 2-5 inspections over its lifetime, in addition to the estimated 30 000 operations only once each year (Green and Galze 1982, Slack 1985). All operations are inspected for compliance with restocking standards. The Department of Forestry views the present inspection level as sufficient to assure a high level of compliance with the forest practice regulations; however concern was expressed that an improvement in the timber market, bringing an increase in harvesting, would perhaps result in such a rate of inspection. Green and Galze (1982) found that timber operators and registered professional foresters overwhelmingly agreed that inspection levels were "sufficient to assure compliance . . . " However, this high response may also indicate a distaste for state oversight on the part of the operators and foresters.

The inspection of operations is a critical step in enforcing forest practice regulations. However, this should not be taken to imply that forest practice regulations are enforced with an iron fist. Rather, state forestry agencies generally work closely and cooperatively with timber operators and landowners to resolve violations through improving practices or repairing damages. In many cases, the application of formal sanctions is used only as a last resort, i.e., when the responsible party refuses to cooperate to resolve a violation. Thus, in some sense, the number of formal forest practice law enforcement actions taken by states is to a degree representative of the success of their regulatory programs; i.e., if a state has a significant number of reported failures in the cooperative resolution of violations—violations which are likely to involve direct resource impacts. Enforcement actions, of course, also depend upon vigilant inspection of operations for violations; where few inspections are made, few violations are likely to be detected.

Applying the above, state forest practice regulation must be given high marks—very few formal enforcement sanctions (such as fines, jail sentences, or license revocations) are ever applied by states. As late as 1985, Massachusetts had imposed no fines, nor had any timber harvest licenses been revoked for forest practice violations (DiSabatino 1985). Alaska reports an average of 3 to 4 forest practice violations each year; full prosecution has been sought in only two cases (Peacock 1985). In fiscal years 1981 through 1984, when 30 000 inspections occurred, only 11 violations were found to be unsatisfactory (Idaho Department of Lands 1985). The Oregon State Department of Forestry (1981 esti-

8 Silva Francesa 20 (4)
mated overall compliance with its forest prac-
tice regulations from 1976 through 1980 to be
98.3 percent—clearly a very high level. Dur-
ing 1980 through 1983, 706 citations were issued
(Wilson 1985) on a total of 43,213 operations,
again indicating an excellent level of
compliance. Washington issued only 53
criminal citations for the 20,912 operations
during fiscal years 1983 through 1985 (Wal-
ters 1985). California, as well, has had a low
rate of application of formal enforcement
sanctions. Though an average of 117 viola-
tions per year were issued from 1980 through
1984, formal enforcement actions were initi-
ated on an average of only 82, with
the bulk of these being satisfactorily corrected
(Henly and Ellefson 1986).

Conclusions
Where has the regulation of forest practices
brought us? Though a totally clear answer is
not possible, there seems to be almost universal
agreement that the implementation of
state forest practice regulation has been re-
sponsible for significant improvements in the
management of timber and forest resources.
And there is some evidence, though mixed,
that the reforestation requirements of forest
practice laws will have a significant positive
impact on future timber supplies. Higher
levels of resource protection and timber pro-
duction could likely be gained, under current
forest practice regulations, were the adminis-
tering state agencies provided with more fi-
ancial and human resources to discharge their
regulatory responsibilities. The main
point of contention surrounding the effective-
ness of state forest practice regulation is not
whether any resource protection improvement
has been gained, but rather whether enough
(or too much) has been achieved.

Gains accomplished thus far through state
forest practice regulation have not come with-
out cost. The estimated $131 million annual
gross societal cost of forest practice regulation
is large. Unfortunately, adequate information
and methodology do not exist to calculate the
concomitant benefits to society. This lack makes
it very difficult to quantitatively evalu-
ate whether or not the costs of regulation
outweigh the benefits, or whether the margin-
al benefits of more-stringent regulation are
greater than the marginal costs.

In sum, it can be safely said that state
forest practice regulation has indeed led to
the improvement of both timber and non-
timber forest resources. Whether an economi-
cally or socially efficient degree of regulation
has been achieved cannot yet be said with
any certainty; however, a reasonable degree of
political efficiency—that quintessence of the
public policy arena—does indeed appear to
have been reached.

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