An Economic Evaluation of the 1979 Forestry Incentives Program

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University of Minnesota
Station Bulletin 550—1983
Agricultural Experiment Station

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Acknowledgments

A study of this magnitude would not have been possible without the support and involvement of many people. James Space, Deputy Regional Forester in the Forest Service's Region 6, was the overall study coordinator. The Forest Service's Billy Page was the liaison between the State Foresters, the Agricultural Stabilization and Conservation Service (ASCS), and the Forest Service's Northeastern and Southeastern Areas. Mark Goforth, of the Forest Service, handled the data management and the field procedures design.

Christopher Holmes and George Brooks, Area Forestry Incentives Program coordinators, supervised field sampling. Actual sampling was done by R. Kerry Witt and Andrew M. Wheatcraft, research specialists at the University of Minnesota; Kerry Price and Leslie Homan, Michigan state foresters; Randall Oste, Kentucky state forester; Dale Higdon and Will Royal, Georgia state foresters; and Carlton Cobb, Louisiana state forester. Witt and Wheatcraft also assisted with data analysis. Dan E. Wingerd, research specialist at the University of Minnesota, did much of the programming for the study's analysis.

Lavell (Pete) Stanger, Region 6 Forest Service silviculturist, sampled all field cases in Washington, Oregon, California and analyzed most of the data.

Many people reviewed the study's work plan, including John Fedkiw, USDA; Steven Satterfield, OMB; Thomas Browning, ASCS; Rexford Resler and Henry DeBruin, American Forestry Association; George Ryan and Fred Kaiser, USDA-Forest Service; and Hans Gregersen, University of Minnesota.

Marilyn S. Harper, Forest Service Economist, Atlanta, GA., assisted in developing the stumpage prices.

The complex silvicultural data of the management regimes were reviewed and evaluated by Lawrence O. Safford, Robert M. Frank, Burl Ashley, Kenneth F. Lancaster, William E. Balmer, Daniel H. Sims, John W. Benzie, Gary J. Brand and Martin E. Dale, all Forest Service employees.

Toni Stewart and Clara Schreiber typed the manuscript.

We express our appreciation to these and others involved in the study for their valuable advice and assistance.

Table of Contents

List of Tables

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and
Paul V. Ellefson

Introduction

Fifty-eight percent of the commercial forest land in the United States (Forest Service, 1980) belongs to nonindustrial private owners. Concern over the level of investments made on these forest lands, and about the resulting effect on the nation's future timber supply, led Congress to create the Forestry Incentives Program (FIP) in 1973, under Public Law 93-86, Section 4. Under the FIP, public funds are used to share the costs of noncommercial forest operations such as site preparation and planting, cull tree removal, and precommercial thinning on nonindustrial private lands.

Increased timber production is the primary objective of the program and that goal has remained paramount in the program's administration. The legislative history (Sikes, 1973) and the legislation list several other goals, however, including the enhancement of other forest resources, such as soil and water conservation, wildlife habitat, recreation, and aesthetics, and these goals are also considered in program application.

The program is jointly administered by two USDA agencies, the Forest Service and the Agricultural Stabilization and Conservation Service (ASCS). The Forest Service, through cooperation with State Foresters, provides technical assistance for practice installation, determines suitability of practices and develops practice specifications. It also develops and maintains the procedure for allocating cost-share funds to the states. County Agricultural Stabilization and Conservation (ASC) committees determine applicant eligibility, approve applications, administer agreements and issue cost-share payments to landowners.

State forestry agencies provide landowners with technical assistance, including needs determinations, forest management plans, supervision of practice installation, and certification of completion according to practice specifications. State Foresters may also use private forestry consultants to provide technical assistance.

Program participation is restricted to owners of less than 1,000 acres of forest land, although the Secretary of Agriculture may grant a waiver of this maximum for up to 5,000 acres. In 1978, minimum tract size was set at ten acres. Because the program emphasizes cost-effective timber production, participation is also limited to land capable of producing more than 50 cubic feet of commercial timber per acre annually. More productive tracts may receive higher priority for cost-sharing, depending on local committee direction. The government's portion of the cost-shares has varied between 50 and 75 percent, depending on state guidelines, but in 1982 the USDA reduced the upper limit to 65 percent. Almost 2.2 million acres had been treated through the program by 1981, with reforestation carried out on approximately 57 percent of the acres. In recent years, there has been an increasing trend toward reforestation rather than timber stand improvement (TSI). In the first eight years of FIP, $88.6 million (table 1) in cost-shares were paid to landowners. The amount of cost-shares allocated in a year may differ from the total paid because funds can be carried over into another fiscal year. This occurs due to the time lag between approval of a practice and payment after it is completed.

Landowners must complete their approved projects in a timely manner. Work is completed on most site preparation and planting cases within 12 months, while TSI projects may take longer.

The average federal cost-per-acre of reforestation has fallen in real dollars (table 2) since 1974. Several factors may have contributed to this reduction: the administration of the program has improved; there is a trend among some states to lower the portion of the cost-share paid by federal funds; and, the average tract size is increasing, which captures some economies of scale. In eight years, the average reforestation tract size increased 118 percent.

Per acre costs and average tract size for TSI have not improved as greatly. Although the average TSI tract size has increased by 40 percent in the eight years of the program, the opportunities for increasing the average tract size may not be as great as in reforestation, since the practice is dependent on the size of existing stands.

This is the second FIP evaluation. The first, an evaluation of the 1974 program year, consisted of an effectiveness study, based on administrative records (Mills, 1976), and an efficiency study, based on field sampling (Mills and Cain, 1978). This study uses essentially the same methods, with several modifications. In most instances, the same type of data are presented, allowing ready comparison between the two program years evaluated.

Study Objectives

Study objectives were to estimate the additional timber production and financial returns likely to result from the 1979 Forestry Incentives Program. The study compares the expected timber yield and value increases with federal and private investment costs to determine the program's cost-effectiveness. It is assumed that most of the land in the program would be growing a forest if it were not in the FIP; consequently, the program is credited only with the expected difference in timber quantity and quality attributable to the federal and concomitant private investment.

The study was done in accordance with the Congressional requirement for periodic evaluation of the FIP and the Presidential directive, issued when the bill was signed, that the program be cost-effective.

Study Design

This study consists of: 1) a cost-effectiveness evaluation, drawn from administrative records and based on treatment cost per acre, site productivity, tract size, and region, and, 2) an efficiency analysis, based on a sample of 676 cost-shared cases, combining field measurements, stumpage prices, harvest yields, and initial and future treatment costs to estimate internal rates of return, benefit-cost ratios, net present worths, and additional timber yields.

Period Evaluated

Field sampling included only FIP cases cost-shared in fiscal 1979 (October 1, 1978, through September 30, 1979). As that was the sixth year of FIP administration, procedures and guidelines were fairly well defined and understood, operation was smooth and the routing of program elements through the county ASC committee offices, state forestry agencies and the Forest Service had become routine. Emphasis had shifted from developing an operational program to the continuing refinement of the program. Gradually, the program had become more widely known among potential participants. At the end of fiscal 1981, there was a backlog of applications for FIP cost-shares, for a total requested government share of $29.8 million, which could not be approved due to lack of funds (Agricultural Stabilization and Conservation Service, 1981). In 1979, $14.5 million in federal money was spent among 9,814[1] participating landowners (Agricultural Stabilization and Conservation Service, 1980). Reforestation was done on 211,987 acres that year and TSI on 117,585 acres.

Cost Effectiveness

Program Composition

More than 75 percent of the 1979 funds, nearly $11 million, was spent in the South (table 3 and figure 1). Alabama ranked first in funds received nationally (14.4 percent), a change from its third-place 1974 rank, which illustrates FIP policy of reallocating state funds according to program effectiveness. North Carolina was second overall with 8.8 percent, followed by Georgia, South Carolina, and Mississippi.

The North got the next largest regional amount of federal funds, $2.4 million. Ohio led individual states in the North in funds received, followed by Missouri, New York, and Michigan. West Virginia led in number of acres treated, followed by Missouri, New York, Indiana, and Ohio. There were also different rankings for average cost per acre and for program composition.

The Plains and Rocky Mountains region got only 1.2 percent of the total program funds, with no individual state exceeding 0.5 percent of the federal total. Since costs were higher in this region, with the average reforestation cost per acre nearly twice that of other regions, the percentage of acres treated is not as large as the percentage of total program funds expended. However, the three Pacific Coast states have Forest Practice Laws, which require regeneration following harvest. In these states the FIP is used only on lands being converted from agricultural use or from brushland. Federal reforestation costs per acre averaged $50 for the two Eastern regions and $95 for the two Western regions. Massachusetts had the top reforestation cost of the Eastern states—$114 per acre—although Illinois averaged $97 and both Delaware and Maryland averaged more than $80 per acre.

The South had the largest average reforestation tract size. In this region, only Kentucky (and Puerto Rico, which had negligible funds) had average refor-

[1] ASCS publications do not list the number of separate tracts, and there are a small number of farms with more than one cost-shared tract in a fiscal year.

estation tracts of less than 25 acres. The average reforestation tract size in the South nearly doubled since 1974. In the North, although the average tract had nearly tripled since 1974, only three states of 20 averaged more than 25 acres per tract. In the Pacific Coast region the average reforestation tract was 28 acres, an increase of 117 percent. It was 10 acres in the Plains and Rocky Mountains, an increase of 59 percent since 1974.

The South also had the largest intermediate treatment average tract size, with the average also increasing since 1974. Each state in the South had average tracts exceeding 23 acres. In the North, which had the smallest average of the four regions, there was little difference between the 1979 and 1974 averages and only Indiana and Missouri had tracts averaging more than 25 acres.

Costs of intermediate treatments, including precommercial thinning, understory release, cull tree removal, and pruning, averaged $27, with the two Western regions having a higher cost per acre than the other regions.

Regional statistics on total land size categories on which FIP practices were done are shown in table 4. Nationally, the largest portion of acres treated (34 percent) was on ownerships of 201 to 500 acres, with nearly 25 percent done on ownerships of more than 500 acres.

In all regions, average tract size increased as size of ownership category increased, with tract size more than doubling nationally between ownerships of 100 acres or less, and those exceeding 500 acres. In all regions except the North, the majority of acres treated were on ownerships larger than 200 acres. The South had the largest average tract size in all size classes. Even in the North, where many TSI practices, which may be under ten acres, are done, the average tract size for the smallest ownership class exceeded 11 acres.

Since 1974, average tract size in the first three ownership size classes has increased by 77 to 79 percent, with a 94 percent increase in the largest class (501 + acres). It is evident that giving increased cost-sharing priority to larger, more cost-effective and commercially feasible tracts spurred an increase in average tract size.

Prior Land Use

Approximately 77 percent of the acres treated under the 1979 program, and nearly nine of ten acres in the North, were classified as forest land prior to treatment (table 5). Nationally, less than 4 percent of the acres were previously cropland. A significant percentage of pasture and range was converted to forest land in the South and Pacific Coast regions, and in the South, 46,600 of the treated acres (20 percent) were formerly pasture and rangeland, much higher than the 9 percent conversion rate in 1974. Conversion from brushland accounts for most of the reforestation on the Pacific Coast.

It is not clear from the available data what proportion of the nonforest acres treated under FIP were undergoing natural conversion to forest land. Comparatively more land previously classified as pasture and rangeland, and less classified as forest and cropland, was treated in 1979 than in 1974.

Practices and Tract Sizes

Tract sizes were well-distributed from the standpoint of having potential for future commercial operations, as less than 10 percent of the 1979 cost-shared tracts were ten acres or less (table 6). In addition, 70 percent of these small tracts were in the program for precommercial thinning or release, or cull tree removal and pruning, which are treatments allowed if the work will eventually result in a stand of ten acres or more. More than half of the acres on small tracts in the North were treated by precommercial thinning and release.

The South showed the most favorable tract size data, with more than 64 percent of treated areas in tracts larger than 40 acres and less than 3 percent were in tracts of ten acres or less, while most acres treated in the other regions were on tracts of 11 to 40 acres. Nationally, however, more than half of the 1979 treatments were done on tracts exceeding 40 acres.

Although regional differences in ownership patterns and forest types may influence tract size, the higher funding priority placed on tracts of more than 40 acres for reasons of future economic viability has had a marked effect on creating a tract size distribution that is more economically favorable since the first year of the program. Compare the 1979 and 1974 programs with the tract size classes used by Mills (1976):

Percent of tracts in size classes

Region and program year	1-15 acres	16-50 acres	51+ acres
South			
1974	16	54	30
1979	7	39	54
North			
1974	43	36	21
1979	37	42	22
Pacific Coast/Rockies			
1974	35	46	19
1979	18	52	30
Total US			
1974	26	47	27
1979	15	41	45

In every region, the percentage of smaller tracts has decreased (by about 50 percent in the South and West) while the percentage of acres in the largest

tracts has increased. While the 1974 distribution was considered favorable, the 1979 program year is even more favorable, with the South dramatically increasing treatments on tracts larger than 50 acres.

Reforestation Tract Size and Expenditures

Most reforestation tract sizes, including more than 60 percent of the acres reforested in the South, were larger than 40 acres (table 7). Larger tracts are preferred because they are more likely to receive future commercial thinnings and harvests. Kentucky was the only Southern state that did less than 50 percent of its reforestation on these larger tracts. However, Kentucky, along with Oklahoma and Tennessee, accounted for less than 1.5 percent of total FIP reforestation acres. More than 90 percent of reforestation in 1979 was in the South, and one-third of the cost-shared acres reforested nationally were in a total of three states: Alabama, North Carolina, and Virginia. The distribution of funds spent on reforestation by tract size closely paralleled the acreage in each tract size class.

Approximately 5 percent of FIP reforestation was done in the North, with acres fairly evenly distributed among the four tract size classes, although the most acres were in the 11-20 acre class. Delaware, Indiana, Missouri, and New Jersey each had a majority of reforested acres in the largest tract size. Only Wisconsin, Illinois, and Michigan in the North had more than 0.5 percent of acres reforested nationally.

Most of the reforestation in the Pacific Coast was also done on tracts larger than 40 acres and every state in that region had more than a third of its acres in the largest tract size. Three percent of the national reforestation in 1979 was done in this region.

About 85 percent of acres reforested in the entire 1979 program were in tracts larger than 20 acres. In addition, the size class of larger than 40 acres was the only one in which there was a higher percentage of acres reforested than dollars spent. This may reflect the economics of scale possible with larger projects.

While the majority of tracts are of a size likely to be harvested, a significant proportion of reforestation was on small tracts. Although authorization for reforestation on tracts under ten acres was discontinued in 1978, nearly 4 percent of reforested acres nationally and a large percentage in the North and Plains and Rocky Mountains regions were on tracts of this size. Although some of these plantings may have been replants of earlier cost-shared cases that failed, only five of the cases sampled in the evaluation that were under ten acres (four in the South and one in the North) were identified as replants.

TSI Tract Size and Expenditures

Tract sizes in TSI showed regional patterns similar to those for reforestation (table 8). In the South, more than two-thirds of the tracts were larger than 40 acres, despite the fact that tracts of less than ten acres can be treated in any one year, if the treatments will total ten acres in following years.

Most of the TSI was done in the North, where Missouri had the greatest number of acres in TSI by far (11.7 percent of the national total), followed by New York, Michigan, and Indiana. These four states had 30 percent of the national total of acres in TSI in 1979.

As was true of reforestation in the North, acres of TSI per tract class were fairly evenly distributed and it is possible that the largest tracts may permit some economies of scale in relation to percentages of dollars spent.

Comparatively little TSI work was done in the West: the Plains and Rocky Mountains region treated 2.1 percent and the Pacific Coast 5.6 percent of the national total. In these regions, the greatest proportion of acres were in the largest and most favorable tract size class. Approximately 65 percent of acres improved nationally were in tracts larger than 20 acres and 60 percent of the TSI cost-shares were on these tracts, which shows that it may be more economical to treat larger tracts.

Federal Cost-Shares Per Acre

The average federal cost per acre for site preparation and/or planting is remarkably consistent between regions (table 9). In the two Eastern regions, the average per acre cost was $50, while it was $95 per acre in the two Western regions. Reforestation costs in the two Western regions averaged higher because of rough terrain and high volumes of slash per acre. Most site preparation and/or planting is done in the East, which explains why the national average is $51 per acre. This national average has dropped 34 percent since 1974 in terms of real dollars.

Intermediate treatments averaged $28 per acre in 1979, slightly less than the 1974 average of $29. However, the 1979 cost in real dollars was $19 per acre, an effective reduction of 35 percent (deflated by the wholesale price index for services).

Most acres treated in 1979 cost between $21 and $50, as was true in 1974. The national average cost for all treatments (site preparation and planting, and TSI) was $45 per acre, slightly more than the 1974 cost of $43 per acre.

Site preparation and planting is the most costly treatment per acre in all regions. The majority of site preparation and planting dollars were spent in the South even though it had the lowest regional per acre average. Most of the site preparation and planting acres were in the two middle cost-per-acre classes ($21-50 and $51-100). The Pacific Coast region, where costs for such treatment are typically higher, was an exception.

Precommercial thinning was the second most costly silvicultural practice. The average national rate per acre was $29, with the Pacific Coast and Plains and Rocky Mountains averaging $42 and $60

per acre, respectively; costs for other regions were much lower.

Cull tree removal and pruning was an important program component only in the East. In the North, the majority of acres treated cost less than $20 per acre and in the South, about three-fourths of the acres treated were in the $21-50 cost class.

Site Productivity of Treated Acres

Although less than 4 percent of the total acres treated in 1979 were on the Pacific Coast, 75 percent of them were on high productivity sites (table 10). In the South, which had 68 percent of the total acres treated, three-fourths were on sites in the 86 to 120 cubic feet per acre per year class. The majority of acres treated in the North and the Plains and Rocky Mountains were also in this productivity class. More than one-third of the Northern acres receiving cull tree removal and pruning, and 38 percent of the acres treated for precommercial thinning and removal in the Plains and Rocky Mountains, were in the lower (50-85 cubic feet per acre annually) productivity class.

Nationally, seven of ten treated acres had a site productivity of 86 to 120 cubic feet per acre per year and an additional 19 percent were in the highest site productivity class (more than 120 cubic feet per acre annually).

Since the 1974 FIP evaluation, the South has halved its percentage of acres treated on the poorer sites. Only three states (Alabama, Kentucky, and Oklahoma) cost-shared more than 10 percent of their treatment-acreage on tracts capable of producing less than 86 cubic feet per acre per year.

The North, and the Plains and Rocky Mountains were the only two regions which treated more low-site than better-site acreage. In Maine, Connecticut, Rhode Island, and Vermont in the North, and Colorado, Idaho, New Mexico, and South Dakota in the West, more than 50 percent of the treatments were done on poorer sites in 1979.

The program is successfully concentrating federal cost-sharing on the most productive sites generally available. Below are shown the relative percentages of forest lands owned by nonindustrial private owners by productivity class.

Percent of total acres, by productivity class

Region	cubic feet per acre per year		
	50-85	86-120	121+
		(percent)	
South	63	30	7
North	62	29	9
Plains/Rockies	71	21	8
Pacific Coast	37	22	41

Only 7 percent of high productivity lands in the South belong to nonindustrial private owners, yet more than 17 percent of FIP cost-shared acres were on these high sites. Further, 30 percent of forest lands held by these owners in the South are sites that will produce 86 to 120 cubic feet per acre per year; three-quarters of cost-shared acres in the South were on these lands. The small percentage of low productivity acres cost-shared in the South reflects favorably on the FIP allocation process, considering that 63 percent of lands in nonindustrial private ownership are in the 50 to 85 cubic feet per acre per year productivity class. Other regions exhibit similar relationships.

Combined Cost-Effectiveness Indicators

Table 11 combines several cost-effectiveness indicators—region, federal cost per acre, site productivity, and tract size class—allowing simultaneous examination of these important variables.

The fact that roughly 75 percent of acres treated were on tracts larger than ten acres and on good sites testifies to program effectiveness in the South. Few acres cost more than $81 to treat.

Although tract sizes in the North were smaller, the per acre federal costs for treatments were lower; high per acre costs were a small part of the region's program. Most treated acres were in the medium-high productivity class, with some in the medium-low class. (The lowest class, 0-49 cubic feet per acre per year, is excluded from cost-shares.)

The Pacific Coast had the highest regional proportion of the combination of larger tracts and higher productivity sites treated. However, this region has a significant percentage of acres in the high cost-per-acre class.

Nationally, the cost-effectiveness indicators combine to indicate that a large proportion of federal investments are of reasonable cost, on productive sites, and are in tracts large enough to support commercial harvest. A tangible increase in timber output from these cost-shared nonindustrial private acres can be expected.

Field Survey Study Methods

In addition to calculating cost-effectiveness from FIP administrative records, a sample of more than 650 cases was drawn from those administered in fiscal year 1979 for physical measurement and evaluation. The resulting field measurements were combined with data on management regimes, stumpage prices, and future practice costs in a marginal analysis to estimate the net impact of program expenditures.

Sampling Procedure

The 9,785 tracts enrolled in FIP cost-sharing in fiscal year 1979 were available for inclusion in the sampling frame with several exclusions. Tracts enrolled for treatments in special forestry practices, fencing, and fire breaks, were not included, which removed 106 tracts and $73,173 in cost-shares from the population sampled. Further, because only 1.2 percent of program funds were disbursed in the Plains and Rocky Mountain states and total acreage enrolled was only 1.1 percent of the national total, that region was excluded. These exclusions meant that 1.7 percent of the cost-shares expended in 1979 were not included in the sampling frame.

Administrative records were used to develop a final sampling frame and select samples. For each tract cost-shared a form (FIP-17) is filled out, containing information on productivity class, practice applied for, forest type, federal cost, and acreage. These data were used to classify the cases into 14 species-practice strata in the East (table 12). Thirty-one cells—one for each stratum in the North and South and one for individual states with a large number of cases—were developed within these strata. The number of cases in each state for a given stratum were identified, and the 31 largest became the cells, with at least one in each stratum. In strata that had one or more of the individual state cells, the remaining states were grouped into Other North or Other South cells. Strata that did not have individual state cells had cells consisting of all the species-practice cases in either the Forest Service's Southeastern or Northeastern Areas and four of the strata had cells for both Areas. Species-practice cases not numerous enough to justify separation were combined into a miscellaneous stratum, consisting of one cell for the East (including All North and All South). The complete sampling matrix for the East is contained in table 12.

Each cell was divided into nine subcells, consisting of three productivity classes (50-85, 86-120, and 121 + cubic feet of commercial timber growth per acre per year) and three size classes (1-40, 41-100, and 100 + acres).

Twenty cases were randomly drawn from each cell population with the cases from each subcell kept in proportion to the subcell's portion of its cell total. For example, if 15 percent of a cell's cases were in the subcell of 1 to 40 acres with 86 to 120 cubic feet of growth per acre per year, three samples were drawn from that subcell. This procedure assures that sample parameters such as future yields could be expanded to the entire population without case size or productivity bias.

In the East, 620 cases were sampled from the 8,266 cost-shared in 1979 for which complete FIP-17 forms were available. Ten of the 13 states in the South were assigned to separate cells in one or both of the Southern pine-plant bare land, and Southern pine-site preparation and plant strata. More than 50 percent of all cases were in these two strata, and 300 (7 percent) of them were sampled. Only two states—Michigan and New York—had enough cases to qualify as separate cells in any of the strata of practices done primarily in the North. These state cells were both in the maple-beech-birch precommercial thin and release stratum, which had 1,027 cases and was the largest of the Northern strata.

Thirty-nine (11 percent) of the 355 cases available for sampling in the West were sampled: 12 of 112 in Washington, 15 of 118 in Oregon, and 12 of 125 in California. These cases were included in one stratum for evaluation.

All study results are reported as population estimates. The expansion factor used was the ratio of the acreage of subcell sample cases to the total acreage of all subcell cases. All resulting population estimates, such as the average benefit-cost ratio or the average internal rate of return, were weighted by tract size.

Field measurements of each sample case were done by one of eight specially trained foresters. Five of these foresters were on loan from various state forestry agencies, two were with the University of Minnesota, and one was a Forest Service employee. After a week of training, each was assigned cases in several states, with no state forester working in his home state. The use of a small team of specially trained professional foresters minimized inconsistencies in data reporting. Further, because of their experience with a large number of cases in several states, they were able to provide useful suggestions for improving program management and delivery. They were assisted by the local state forester or the county ASCS employee, or both. Copies of all case documents, such as aerial photos, maps, management plans, receipts, and administrative forms, along with point tally sheets and summaries of the field data, were filed for analysis. This documentation helped determine total cost and justify the need for and clarify the intent of a practice, where necessary.

A small percentage of sampled cases were reassigned to another cell or subcell when actual acreage treated differed enough from the reported figure to place it in another class size, or when the field practice differed from the FIP-17 report.

In some instances, it was difficult to determine the actual practice in the field. For example, it was difficult to distinguish between cull tree removal and the site preparation for natural regeneration on some treated acres. In such cases, the reclassification decision was based on the summary data of the field tally forms, since occasionally either the intent was not clear or there were multiple objectives, when, as required, the available administrative records revealed only one.

When sampled cases were reclassified, a proportional number of subcell (or cell) population acres were transferred into the new subcell (cell) as it was assumed that any misclassifications in the sampled acres reflected misclassification in the population acres. For example, if a 15-acre case were trans-

ferred, and the sampled cases in the subcell totalled 300 acres, 5 percent of the subcell's population acres were also transferred.

Analysis Method

This study estimated the increase in quantity and value of timber which would result from 1979 federal and private investments on nonindustrial private forest lands. When allowance is made for timber quality and product mix changes, this estimate can be used to calculate financial returns to the FIP.

Two separate management regimes were required to determine the incremental timber yield for each sampled cost-share case. One regime contains the sequence of actions, starting with the FIP practice, that typify the reasonably intensive management owners could be expected to follow after making an extra investment in their forest land. The other regime reflects a lower level of management that regional silvicultural experts consider typical on nonindustrial, private forest lands.

The yield and mean annual increment increases attributed to the program are the differences between these two regimes. In order to obtain comparable time horizons, each regime consisted of both present and perpetual rotations, the latter repeated into infinity. In both regimes costs that are equal in magnitude and timing would cancel out and thus are not included in the financial returns calculations. Similarly, land costs, property taxes, and other taxes that must be borne regardless of the management intensity level are also not considered. Annual management costs are also excluded, although they would probably be somewhat higher with an intensive management regime.

The intensive regime assumes that owners will continue to apply a management level similar to the level present during the initial FIP practice throughout the rotation. The return and yield increases attributed to FIP practices are largely dependent on this assumption. The study did not determine whether the optimum management level for each cost-shared case's stand condition and site was applied.

Program analysis was somewhat different in the West, where, in Washington and Oregon, 10 percent of 1979 FIP cases had been randomly sampled as part of a regional analysis before this study plan was developed. Upon review of these cases, it was felt that there were enough data similar to that collected on Eastern cases to incorporate them into the national study. Ten percent of the 1979 cases in California were sampled for the national study. Management regimes were developed for each individual case in the three Western states (Forest Service Regions 5 and 6). Subsequent treatment costs and stumpage prices were also developed on an individual case basis. Averaged internal rates of return, benefit-cost ratios, and present net worths were determined in the same manner as for Eastern cases.

Sampled Case Physical Measurements

Cases selected for sampling were visited in the summer of 1981, about two growing seasons after the cost-shared practice. Measurements were taken on the existing stand, and as much as possible, measurements of the pretreatment condition were reconstructed using stump counts, dead trees present, and initial management plans. Variable radius plots employing a BAF 10 prism were used to tally trees of 3.0 inches and greater dbh. Trees from 1.0 to 2.9 inches dbh, planted seedlings, and natural regeneration were tallied on 1/300-acre plots. Depending on conditions, other plot sizes were occasionally used.

Sample plots were systematically located over the entire tract. Plot cruise traverses crossed drainages, ridges, and other physical features as much as possible. The number of tally points on each tract was at the discretion of the field crew, with the following minimums required:

Tally points required per sample plot

Tract size *(acres)*	Minimum required tally points
0-9	5, or 1 per acre
10	10
11-15	12
16-25	14
26-100	18, plus 1 for every 5 acres above 25
100+	40

The minimum number of points was doubled for cases involving tree planting or site preparation for natural regeneration.

Reconstruction of the previous stand was most critical for TSI cases. Pretreatment stand data were obtained from stump diameters and heights, from both felled and standing dead trees, and from management plans. For regeneration cases where site preparation was done, little of this information was typically available. In such cases, pretreatment stands were assumed to conform to a region-wide average under a current management level.

Data collected on individual point plots included species, tree class, competition class, dbh, site index, and site index species. In site preparation and planting cases, the number of surviving planted, volunteer crop and non-crop, and free to grow crop seedlings were counted by species. Data collected in TSI cases included pre- and post-treatment basal area by species, basal area removed, presumably for firewood, and number of crop trees released by the treatment. Additional data for each case included treatment applied, treatment cost, acreage, prior government assistance to the landowner, prior land use, average age of dominant and co-dominant trees, and any other relevant pre- or post-treatment stand conditions. Completed reporting forms for a site preparation and planting case and a TSI case are shown in tables 13 and 14, respectively.

Management Levels and Harvest Volumes

Both management levels were applied to each individual case. The typical management level under nonindustrial private ownership—as defined by regional silvicultural experts—often consisted of no commercial thinning, or only one, and a final harvest. Rotation was at somewhat longer intervals than for the other, more intensive, level of management, which it was assumed owners would follow after investing in their forest land. This more intensive level of management usually consisted of one, or at most two, precommercial practices, followed by a reasonable level of commercial thinnings, and a final harvest. Highly intensive management practices, such as fertilization, were not included. Both these levels of "stylized" management regimes applied to broad areas, by region, species group, treatment, and site index ranges (Wingerd, 1982). Once a regime was selected for a case it was adjusted as closely as possible to meet individual case characteristics, such as site index, and number of surviving planted seedlings in reforestation cases, or post-treatment basal area and stand age, in TSI cases. The volumes and timing of thinnings and final harvest could be adjusted to reflect various case parameters. These management regimes were developed for the 21 species groups defined in table 15. Broad case conditions were considered in applying management regimes. Sixty-five current level and 115 intensive level management regimes were developed for the East. Although 140 of these were available from the previous evaluation, about 40 additional regimes were developed to cover case conditions found in this sampling. Harvest yields and rotation ages with and without the FIP were determined on an individual basis for the Western cases, involving principally Douglas-fir, and some ponderosa pine.

Individual cases were first matched to both a current and an intensive management regime. Next, each case was subjected to a set of silvicultural standards that screened treatments and stand conditions not likely to result in a yield increase. The yield increase was set to zero for cases that did not exceed the standards. The stylized management regime was adjusted as closely as possible to match individual parameters of cases exceeding the minimum standards.

All management regimes consisted of a clearcut at final harvest age, except for Lake States northern hardwood management regimes which had an all-age management scheme with a 12-year cutting cycle. Each management regime lists expected management practices, consistent with the presumed level of management. Each management regime includes both the present rotation, and a perpetual rotation, which is included to enable the financial returns calculating package to repeat rotations into infinity to avoid any time frame bias between the two regimes. All timber harvests are recorded in yields of thousands of cubic feet per acre for up to four product groups: softwood sawtimber, softwood pulpwood, hardwood sawtimber, and hardwood pulpwood. Optimum stand conditions and management practices are assumed in the perpetual rotation of the intense regime.

The 140 management regimes developed for the first evaluation were reviewed by regional silvicultural experts considered leaders for their species group. An additional 40 management regimes, developed for cases whose conditions did not match any existing regime, were also reviewed. All 180 regimes fell into six broad practice categories: 1) planting, 2) precommercial thinning, 3) understory release, 4) site preparation for natural regeneration, 5) cull tree removal, and, 6) prune only. The stylized yields for the species group, practice, management level, and three site index ranges are contained in table 16. Sources consulted for developing and refining the management regimes are given in the bibliography of growth and yield literature.

Sampled cases with selected management regimes, including adjustments, are shown in table 17 for a TSI case and table 18 for a site preparation and planting case.

In virtually all instances, the current regime includes some harvestable timber at final rotation age. Current regimes were set to zero volume only for planting of some northern conifer species. Otherwise, the current regimes, particularly for the southern pines, included some harvestable volumes even for planting bare land. Especially in the South, old fields are invaded and produce a harvestable yield some time in the future.

The minimum silvicultural thresholds each case had to pass to be assigned an incremental volume are essentially the same as those applied in the first evaluation (Mills and Cain, 1978). They are: 1) a minimum number of surviving planted seedlings, below which stocking is insufficient to carry the stand to maturity; 2) a maximum stand age at time of treatment, beyond which the stand is too close to harvest age to accumulate sufficient growth increase and/or beyond which the trees are not physiologically capable of sufficient response; 3) minimum basal area reduction, below which stocking was not reduced enough to induce sufficient growth due to release; 4) minimum pretreatment stocking, below which the stand is so sparse that additional tree removal will not significantly affect growing space; and, 5) several miscellaneous thresholds, such as removal of suppressed understory trees in northern hardwood stands. Table 19 summarizes the actual silvicultural standards included in the management regimes.

Cases not meeting the minimum silvicultural standards were assigned a zero net volume increase, meaning that financial return calculations listed zero case benefits, and that the case's present net worth was the (negative) cost of initial treatment. For sample cases with a zero net volume increase, the

internal rate of return and the benefit-cost ratio were set at zero for expansion to population estimates. The number of cases not meeting the minimum silvicultural standards are given by sampling cell in table 20.

If a case met the silvicultural standards, the selected management regimes were adjusted as closely as possible to actual case conditions. Yields were adjusted upward or downward for site index. The number and volume of thinnings and the volume of the final harvest were changed to reflect stand volume, or number of surviving crop seedlings. For some TSI cases, the actual stand age neared the age at which the management regime called for a commercial thinning. If the difference between the actual stand age and the management regime age was less than five years, the thinning was dropped. If the difference was more than five years, the thinning was dropped. If the difference was more than five but less than ten years, the thinning was delayed until the tenth year, with any subsequent treatments delayed to maintain normal intervals.

For example, if a cull tree removal was done at age 54 in a northern hardwood stand in the Northeast, where the intensive stylized management regime called for commercial thinnings at ages 60 and 75, and a final harvest at age 90, the six-year difference between the actual stand age and the first scheduled thinning meant thinnings were delayed until stand ages of 64 and 79, with the final harvest at age 94.

Cases consisting of more than one treatment, or in which a portion of the tract was lost due to fire, insects, disease, or other causes, or in which conditions across the tract varied significantly, were split into several cases by the field observers. For example, if ten acres of a 40-acre cost-shared tract were plowed under for agriculture or converted to pasture, the case was treated as two separate cases: one ten-acre tract, considered a loss, and one 30-acre tract, treated normally if it passed minimum silvicultural standards.

Stumpage Prices

Stumpage prices (table 21) were developed for 67 species in 16 stumpage price regions. The regions are shown in figure 3. Prices are given in dollars per thousand cubic feet for sawtimber and pulpwood. Data sources were state price reports where available, and Timber Mart South. Prices were not available for certain species in several regions and where prices were needed because the species were present on sampled tracts, they were established by considering prices for similar species in the same region and for the same species in neighboring regions.

All stumpage prices consist of a three-year average, for the years 1978 through 1980, adjusted to 1979 dollars by the wholesale price index for industrial commodities.

Stumpage prices were inflated in real terms, according to estimates made by the Forest Service in the Resources Planning Act Assessment projections for future stumpage price trends (Forest Service, 1980). These are:

Real rate of increase in stumpage prices

Region	Softwood	Hardwood
Northeast	1.89	0.09
North Central	1.88	0.38
Southeast	2.45	0.43
South Central	2.45	1.30
Pacific Coast	2.50	—

Prices were projected for both pulpwood and sawtimber, the major products to be removed from cost-shared tracts in the future, and also for several pruned species. Further, allowance was made in the sawtimber prices for specialty products such as poles, piling, and veneer; in regions where the specialty product volume was considerable, prices were weighted by the respective volumes for sawtimber and specialty products.

In TSI cases, a management practice may increase future timber quality and future merchantable timber volume. In compensation, stumpage prices for hardwood TSI cases were increased by an average of 15 to 25 percent. The exact percentage figure for each stumpage price region and species was determined by taking the mid-point between the average price and the high price where ranges were given in state price reports and Timber Mart South. The differences between pre- and post-treatment prices for hardwood TSI are shown in table 22.

The average stumpage price per thousand cubic feet for each case was weighted by the respective crop tree basal areas or number of surviving seedlings of the various crop species using pretreatment data as a weight for the current management regime and post-treatment data as a weight for the intensive regime. The average stumpage price for each regime was determined by the following formula:

$$\text{price} = \frac{\Sigma(\text{species price}_i \times BA_i)}{\Sigma BA_i}$$

where:

price = the price per thousand cubic feet for pulpwood or sawtimber

species price$_i$ = the price for species i, for either pulpwood or sawtimber

BA_i = the basal area of species i for the case

Treatment Costs

As initial treatment costs greatly affect FIP economic returns, the total federal treatment cost for each sample case was obtained from county ASCS files. In some instances, the case file also contained the total cost; when the total cost was not available, a federal cost-share rate of 75 percent was assumed for determining the total cost, unless state guidelines called for less.

The ASCS estimated that the FIP had a 1979 overhead of $288 per case. The Forest Service's Washington and regional overhead costs were excluded from this estimate since they would exist independent of the FIP. Four initial cost options were used in calculating economic returns for each case. They were: 1) federal + private cost, 2) federal + delivery cost, 3) private cost only, and 4) federal + private + delivery cost.

Most of the results were displayed for the first cost option, since this puts the initial cost on a common basis with subsequent treatment costs.

The treatment costs of future noncommercial operations contained in the management regimes, such as hardwood control, prescribed burning, site preparation and planting, intermediate treatments, and pruning were also included in the financial analysis. These costs were estimated for four regions in the East (figure 2), by species group and treatment, as shown in table 23. Future treatment costs in the West were estimated for each state.

Future treatment costs were derived from several sources, primarily the 1979 FIP costs from administrative records for the various practices and species group by region. Other sources used included Moak, et al. (1980), and National Forest System costs from Mills, et al. (1982).

Future treatment costs were also varied by tract size; smaller tracts were assigned higher per acre costs because of the fixed cost of setting up an operation. Costs were adjusted based on tract size according to the following schedule:

Acres	Cost adjustment factor
0-10	2.0
11-20	1.4
21-40	1.0
41-75	0.8
76+	0.7

This cost schedule, derived from Row (1978), and Mills, et al. (1982), shows economic opportunities decreasing for smaller and increasing for larger tract sizes. This is assumed to better reflect the varying commercial feasibility of different tract sizes. However, sensitivity analysis shows that this discriminatory cost schedule does not greatly affect the financial returns in any tract size category because subsequent treatment costs occur several years into the future in the first rotation, and even later in the second rotation.

For this study, future treatment costs were held constant at 1979 levels. However, for the first cost option (federal + private costs), a 2 percent annual real rate of inflation for future treatment costs was used in calculating financial returns. This reduced the average internal rate of return by less than 0.1 percent.

Discount Rates

Financial return indicators including present net worths, internal rates of return, and benefit-cost ratios, were calculated for each 1979 FIP case using the computer program SASSY (Goforth and Mills, 1975).

Three discount rates were used to calculate present net worths and benefit-cost ratios. These rates included 4 percent and 7.125 percent (Forest Service Manual, 1982), and 10 percent, required for analysis by the Office of Management and Budget (1972).

Since the cost and stumpage prices used in this study are real (i.e., excludes inflation), the internal rate of return figures represent real rates of return. Hence, fluctuations of the value of the dollar due to changes in the general price level are excluded from the analysis. Therefore, in comparing the returns of this FIP analysis to other government programs, and analyses from other periods, real rates of return for alternative expenditures should also be used, to assure an equal basis for comparison.

Study Results

All study results are expanded from the sample to nearly all of the overall population, excluding a small portion of the program involved in special practices and the Rocky Mountains and Plains states, which were too small for economic sampling. These exclusions amount to 1.7 percent of program expenditures for 1979. Weights used to expand the results of the sample to the population include classification and post-stratification changes. The final number of sampled cases per cell is shown in table 20.

Financial Returns

Because the sample results were expanded to the total population, the results reflect the 1979 combination of tract sizes, site productivities, forest types, and treatments. Cases failing to pass the silvicultural standards are included. In the financial analysis, a failed case was averaged with a negative net present worth equal to the initial cost, and a zero benefit-cost ratio. The total benefit-cost ratio is a weighted average of the individual benefit-cost ratios for each case. The cases not meeting the minimum silvicultural standards were given a zero internal rate of return.

Table 24 gives the financial returns of the four cost options. The weighted average internal rate of return for federal and private investment is 8.6 percent. The total net worth of the program is $10.5

million when the 10 percent real discount rate required by the OMB for analysis is used. About 45 percent of the cases could earn this rate of return. The benefit-cost ratio for this discount rate is 1.3. When the 4 percent discount rate is used, as the Forest Service advocates (Row et al., 1981), the total present net worth is $418.8 million; 74 percent of the cases would support this rate of return.

Returns to the private investments only, in the 1979 program year, are higher than those for total investment because of the lower initial cost borne by the individual landowner. At a discount rate of 10 percent, the total present net worth of their investment is equal to more than $21 million and under this cost option more than half of the cases will earn this rate. The total present net worth at the 4 percent discount rate, which 75 percent of the cases would earn, is more than $426 million. The overall weighted average internal rate of return for this cost option is 10.9 percent.

When only the federal investment, including the average case delivery cost of $288, is considered, total present net worth is almost $10 million at a 10 percent discount rate. Slightly more than 45 percent of the cases will earn this rate. However, at a 4 percent discount rate more than two-thirds of the cases can pass, making the total present net worth of the federal investment, including the overhead cost, more than $421 million. The future cash flow generated from this federal investment yields a real rate of return of 8.9 percent.

Finally, when all costs of the 1979 program—federal, private, and program delivery (overhead)—are considered, the total present net worth at the highest discount rate used is $8.3 million. Using this cost option, slightly more than 40 percent of the cases will earn the 10 percent discount rate. At the 4 percent discount rate, which nearly 72 percent of cases will earn, the total present net worth of the program for this cost option still exceeds $400 million. When all cases are considered and weighted according to tract size, the average internal rate of return is about 8.3 percent.

Financial returns for each region for the federal plus private cost option are shown in table 25. As a weighted average for all cases, the South carries an internal rate of return of 8.6 percent, with a total program present net worth, evaluated at a 7.125 percent discount rate, of nearly $64 million. At the 4 percent discount rate, nearly 80 percent of the cases surpassed this level. More than 60 percent of the cases can earn a 10 percent return, the highest rate used in this evaluation. Three-quarters of the federal funds are spent in the South, with a high average internal rate of return. In the North, the weighted average internal rate of return is slightly less than 4 percent. The total present net worth at the medium discount rate is about zero. Fifty-five percent of the Northern cases will earn a rate of 4 percent, but only about 16 percent of the cases can earn more than 10 percent. However, only approximately 17 percent of the federal funds are expended in this region. The Pacific Coast cases had the highest average internal rates of return; 100 percent of the cases earned a 4 percent rate of return, and more than half earned a 10 percent rate. Although 6.5 percent of the 1979 funds were spent in this region, the present net worth of the expenditures (at a 7.125 discount rate) is nearly $6 million. The Plains and Rocky Mountain region was not sampled, so financial results are neither estimated nor included in the estimates in the tables.

Additional Timber Yields

As stated earlier, the evaluation was conducted to estimate the additional returns the program will produce over current levels of management on nonindustrial private land cost-shared under the 1979 program. Table 26 shows an average increase in mean annual increment (MAI) of nearly 98 cubic feet per acre per year in the South. This increase in annual production will yield a sawtimber increase of about 650 million cubic feet and a pulpwood increase of more than 340 million cubic feet throughout the South over the first rotation. In the North, the average MAI increase is slightly more than 25 cubic feet per acre and the additional sawtimber yield will be more than 200 million cubic feet, with additional pulpwood totaling more than 28 million cubic feet over the first rotation. However, nearly all rotation lengths are considerably longer in the North than in the South. In the three West Coast states, the additional investments made through the program will yield nearly 80 million cubic feet of sawtimber, although future pulpwood harvest will be reduced by the conversion of red alder to Douglas-fir. This region had the highest increase in MAI.

Estimates of the incremental timber yields by time period are shown in table 27. Over the first rotation, more than 1.3 billion cubic feet of timber—93 percent of it in softwoods—will be produced as a result of the 1979 investments. Sawtimber (both hardwood and softwood) accounts for 72 percent of the increase. Because most of the program funds were spent in regeneration, only about 13 percent of this additional timber yield will be available before the turn of the century, but two-thirds of the additional timber production will be produced in the first quarter of the 21st century. This consists largely of production from regeneration in the South. Although the additional hardwood yield of 7 percent is not large, it should be noted that much of the work done in hardwood produces higher quality timber, rather than a greater quantity of it.

Program Strata Financial Returns and Timber Yields

Table 28 shows the results of the 1979 FIP by the species group and practice sampling strata. Four of the sampling strata—the southern pines, northern pine and oak-pine, and the West Coast species—show

an average internal rate of return of 9 percent or higher. The table also shows the percentage of the federal funds expended in each sampling stratum. More than 80 percent of the federal funds were spent on the four strata with the highest rates of return and these strata accounted for 73 percent of the additional sawtimber and 92 percent of additional pulpwood produced. Site preparation and planting of Southern pine was by far the largest stratum and more than 63 percent of the 1979 FIP funds were spent on it. Several of the species group and practice strata had low internal rates of return, especially the oak-hickory and maple-beech-birch forest types. This does not necessarily mean these timber types are not economically viable, but it does mean that investments in practices applied on these types in those particular stands under the 1979 program will not pay off particularly well. In some instances, a disproportionately high percentage of the cases did not pass the minimum silvicultural standards necessary to have benefits assigned in the financial calculations. Internal rates of return for each sampling cell are contained in table 29.

The total present net worths of the species group and practice strata at a discount rate of 7.125 percent are also shown. Two strata consisting solely of Southern pines contain more than 80 percent of the present net worth of the 1979 program. Although several strata have negative present net worths at the discount rate of 7.125 percent they account for less than 5 percent of the federal funds spent for the 1979 FIP.

The financial return indicators are influenced by the accuracy of data used in the calculations. The computer program SASSY was used to estimate the sensitivity of data errors of the individual sampling cells' internal rates of return. The factors evaluated in this sensitivity check were initial treatment cost, subsequent treatment costs, the cost of precommercial thinnings, the volumes of commercial thinnings and final harvests, and stumpage prices. The estimates in table 30 show the percentage of change required in each of the previous factors to raise or lower the internal rate of return by one percentage point.

Because it occurs in the first year, the effect of initial treatment cost on the internal rate of return is relatively strong. Usually an initial treatment cost drop of 30-40 percent increases the internal rate of return by one point. An increase in the initial treatment cost of 50-60 percent is usually required to decrease the internal rate of return one percentage point.

Stumpage prices generally have the greatest effect on the internal rate of return. A one-point change in the internal rate of return often was produced by a 20-40 percent change in stumpage prices. However, the stumpage price data used here are considered of good quality.

The sampling stratum of southern pine and oak pine-site preparation for natural regeneration, did not have to pass minimum silvicultural standards. Because the field sampling occurred only two growing seasons after the practices were applied, seedlings were not fully established. Seedlings are usually evaluated after five years and thus there are no recorded failures in the stratum. However, the internal rate of return shown for this stratum is undoubtedly too high as the field samplers (see below) felt three-quarters of these cases did not meet the minimum silvicultural standards.

The field samplers, asked to indicate the probable cause of failure, as it was not always evident from the case summary, cited drought and excessive competition as the major causes of loss (table 31). Other important causes were adverse planting site, and poor TSI techniques that allowed treated trees to survive. Fire, insects, and disease apparently caused negligible losses. Most failures in the regeneration sampling strata were drought- or competition-related. Those in the TSI strata were management-related: stands that were too old, had insufficient basal area removed, or an inadequate number of crop trees released.

Fuelwood removals

Good fuelwood harvest opportunities exist in many TSI operations. In the eight sampling strata involving TSI, the field samplers measured the treatment-deadened basal area and the basal area for which the boles of the trees had been removed from the site and presumably utilized. Some deadened timber was removed in all of the strata (table 32). The highest proportion of basal area utilized occurred in the maple-beech-birch cull tree removal, where two-thirds of the basal area trees killed by frilling or cutting were removed from the tract. The lowest proportion of removal was in cull tree removal in southern pine and oak-pine. On the average, about one-third of the basal area removed from competition with the remaining stand was absent from the tract at the time of sampling.

Retention of 1974 Cases

Cases sampled in Mill's 1974 program evaluation were checked for retention during this study (Risbrudt et al., 1983). Information on each of the 1,528 sampled cases was sent to the ASCS office in the county in which the case occurred. County personnel were requested to ascertain the continued existence of the 1974 cost-shared practices and determine the extent and cause of any total or partial loss. Information was also requested on the amount of replanting or interplanting (table 33). Nationally, about 94 percent of the acres cost-shared in 1974 were still in the program as of December, 1981, seven growing seasons after installation. Tracts in the South have the lowest retention rate, and tracts in the Plains and Rocky Mountains the highest. As none of the regions had a retention rate below 92 percent, it appears that retention need not be a major concern in this federal program.

Conclusions

Study results suggest that the 1979 Forestry Incentives Program was an effective federal effort to produce additional timber on nonindustrial private forest land and that federal and private investment in these forest lands will yield more than an 8 percent real rate of return. The 1979 program will eventually result in more than 1.3 billion additional cubic feet of timber, 93 percent of it in softwoods, over the first rotation.

The Forestry Incentives Program is meeting its legislative and executive mandates by raising the level of management to efficiently produce more commercial timber on private nonindustrial lands. In addition, soil and water conservation, wildlife habitat, recreation, and aesthetics are enhanced.

Program efficiency has increased as the federal cost per acre treated has held constant in real dollars. At the same time, the average 1981 reforestation cost-shared tract has increased by 118 percent to 41 acres since 1974 and the average size of the TSI cases has increased to more than 31 acres. Retention of treated acres is high; nearly 94 percent of the acres cost-shared through FIP in 1974 are still in place.

However, there are problem areas in the program. A number of cases do not meet minimum silvicultural standards, particularly TSI in the oak-hickory and maple-birch-beech forest types. Failures in these forest types were strictly under the control and management of the forester. Many stands were either too old, with an insufficient amount of time to respond to treatments before harvest, or had too little basal area removed to make a difference in the growth and yield of the stand, or had only understory trees removed thus not releasing crop trees in the overstory. Guidelines which would have eliminated these problems were issued in the fall of 1979, too late to affect the cases sampled in this evaluation. However, many of those currently involved with the program believe such problems are still common. Also, it appears that reforestation tracts of ten acres or less are still being cost-shared despite the fact that this is no longer allowed. Improved administration of these kinds of cost-shared acres should significantly increase both the financial returns and timber volumes produced.

Figure 1. States and Regions in 1979 FIP.

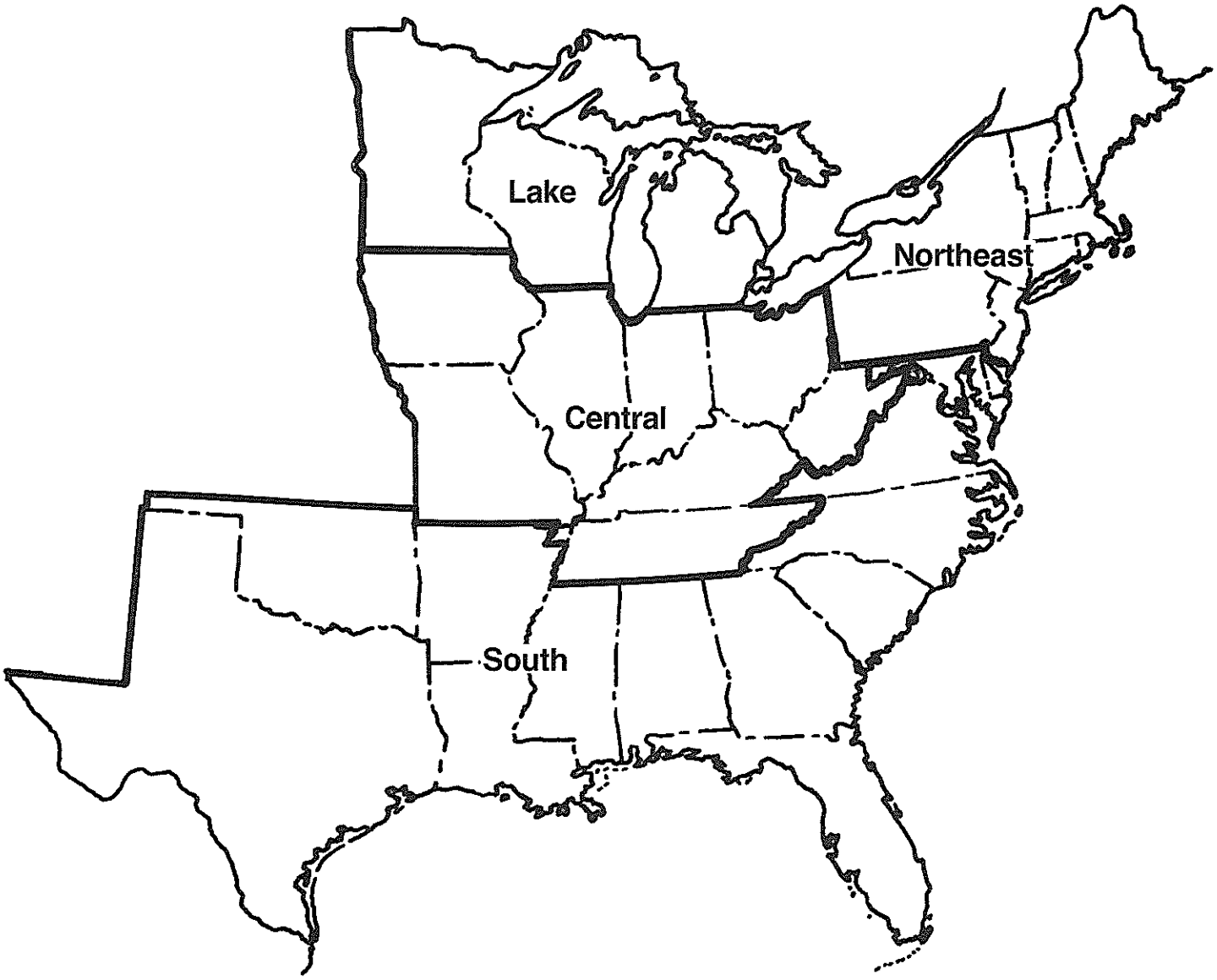

Figure 2. Stylized treatment cost regions in the East.

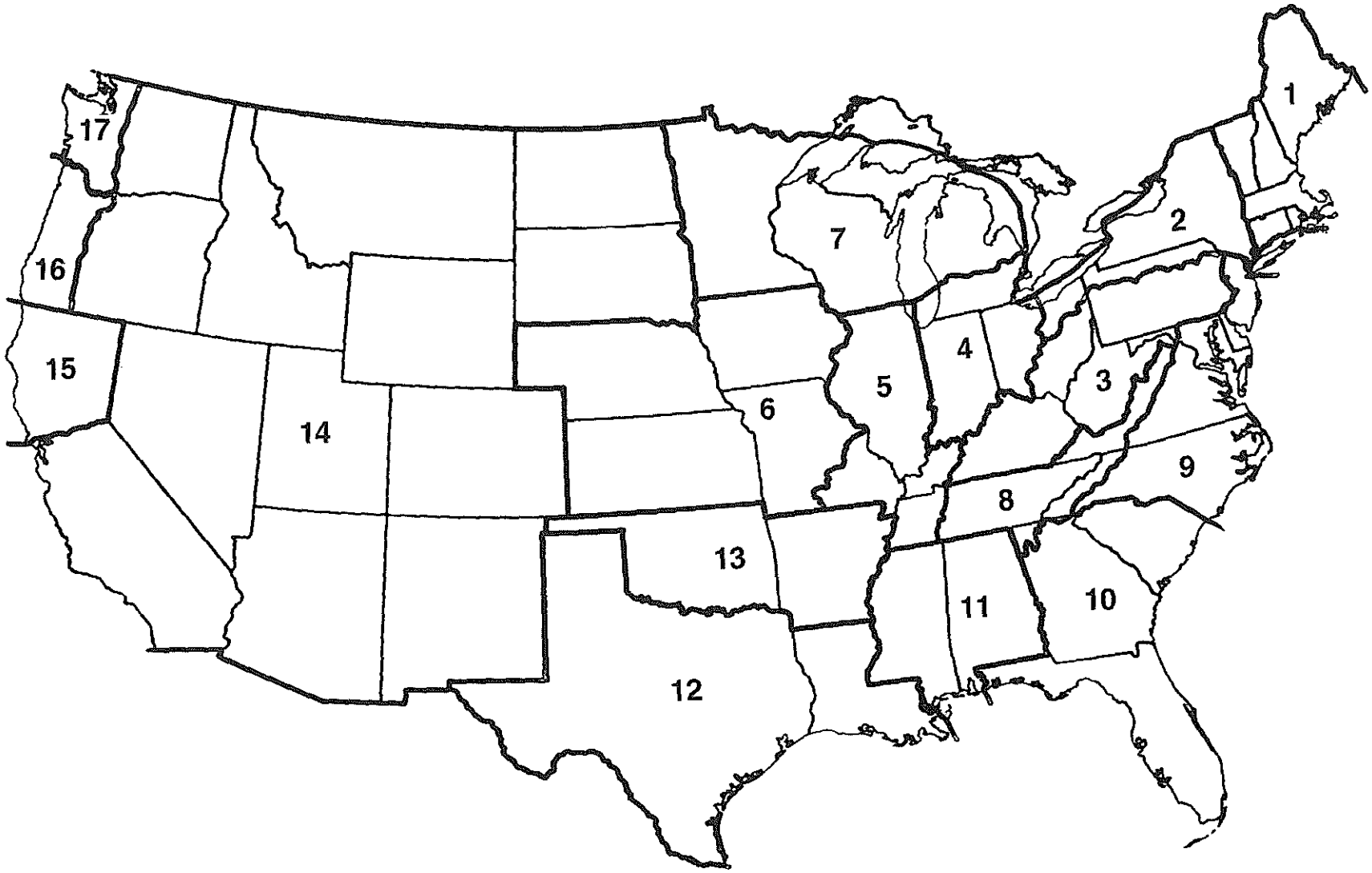

Figure 3. Stumpage price regions.

TABLES

Table 1. FIP accomplishments and funding, 1974-1981.

Year	Acres treated			Funding	
	Total	Reforestation	TSI	Cost-shares paid	Cost-shares allocated
	(thousands of acres)			*(millions of dollars)*	
1974	293	168	125	9.1	10.0
1975-76[1]	275	108	168	8.1	30.75
1977	307	153	155	10.3	13.5
1978	323	169	154	12.0	13.5
1979	329	212	117	14.5	13.5
1980	342	219	123	16.8	13.5
1981	314	211	103	17.8	11.25

[1]Includes the short 1975 year when funds were received late, the full FY 1976, and the transition quarter when the beginning of the FY was changed from July to October.

Table 2. Average FIP federal cost and average tract size, by practice, 1974-1981.

Year	Average federal cost per acre				Average tract in acres[1]	
	Reforestation		TSI		Reforestation	TSI
	(Current dollars)	*(Constant 1979 dollars)[2]*	*(Current dollars)*	*(Constant 1979 dollars)[2]*		
1974	39	57	20	30	18.7	21.8
1975-76[3]	48	62	18	23	18.6	32.7
1977	47	56	20	24	30.1	32.2
1978	51	57	22	24	33.4	32.6
1979	54	54	24	24	37.3	27.7
1980	61	54	26	23	43.0	31.6
1981	70	56	27	22	40.7	30.6

[1]Derived by dividing acres treated by number of farms, except for 1975-76, for which number of farms was unavailable; divided by number of participants.

[2]Deflated by the producer price index.

[3]Includes the short 1975 year when funds were received late, the full FY 1976, and the transition quarter when the beginning of the FY was changed from July to October.

Table 3. Spending, acres treated, and tract characteristics for the 1979 FIP.

Region and State	Federal spending		Area treated		Reforestation[3, 4]		TSI[3]	
					Average cost per acre	Average size per case	Average cost per acre	Average size per case
	(dollars)	*(percent)*	*(acres[1])*	*(percent[2])*	*(dollars)*	*(acres)*	*(dollars)*	*(acres)*
South								
Alabama	2,075,923	14.4	45,043	13.2	50	49.2	23	49.3
Arkansas	787,070	5.4	21,872	6.4	41	42.1	27	44.6
Florida	771,812	5.3	16,372	4.8	47	45.2	13	125.2
Georgia	1,213,230	8.4	18,700	5.5	62	44.2	19	39.3
Kentucky	118,258	0.8	5,005	1.5	68	11.4	34	23.3
Louisiana	708,418	4.9	16,748	4.9	45	45.1	28	51.0
Mississippi	977,251	6.8	20,130	5.9	48	37.6	24	69.9
North Carolina	1,278,645	8.8	25,615	7.5	51	32.7	25	34.0
Oklahoma	96,654	0.7	2,726	0.8	40	36.6	16	87.6
Puerto Rico	930	0.0	10	0.0	93	10.0	—	—
South Carolina	1,161,269	8.0	18,920	5.6	59	34.9	48	25.9
Tennessee	94,861	0.7	2,578	0.8	48	25.0	16	50.2
Texas	673,212	4.7	14,971	4.4	44	44.2	25	62.6
Virginia	990,241	6.8	22,730	6.7	45	38.2	14	28.8
Total	10,947,774	75.7	231,420	68.0	50	40.1	25	45.0

Table 3. Spending, acres treated, and tract characteristics for the 1979 FIP. *(continued)*

Region and State	Federal spending		Area treated		Reforestation[3, 4]		TSI[3]	
					Average cost per acre	Average size per case	Average cost per acre	Average size per case
	(dollars)	*(percent)*	*(acres[1])*	*(percent[2])*	*(dollars)*	*(acres)*	*(dollars)*	*(acres)*
North								
Connecticut	30,331	0.2	966	0.3	59	5.3	27	15.4
Delaware	21,462	0.1	266	0.1	81	66.5	—	—
Illinois	68,854	0.5	2,190	0.6	97	10.2	29	19.0
Indiana	154,269	1.1	7,871	2.3	36	25.3	20	25.4
Iowa	22,499	0.2	606	0.2	58	14.1	44	17.0
Maine	118,323	0.8	3,006	0.9	64	13.5	30	12.7
Maryland	100,369	0.7	2,336	0.7	83	23.3	35	17.2
Massachusetts	98,934	0.7	3,436	1.0	114	5.0	28	10.4
Michigan	200,297	1.4	7,056	2.1	38	17.2	23	15.4
Minnesota	110,684	0.8	3,424	1.0	61	12.4	32	15.2
Missouri	225,930	1.6	10,697	3.1	55	26.1	16	52.3
New Hampshire	107,175	0.7	2,979	0.9	9	23.7	36	12.4
New Jersey	32,349	0.2	1,948	0.6	10	20.5	20	8.7
New York	214,491	1.5	7,993	2.3	50	12.4	27	12.2
Ohio	256,456	1.8	7,618	2.2	48	14.6	35	22.8
Pennsylvania	172,707	1.2	4,299	1.3	45	7.4	44	12.7
Rhode Island	9,460	0.1	322	0.1	—	—	54	11.8
Vermont	76,202	0.5	4,817	1.4	26	3.6	25	10.9
West Virgina	180,243	1.2	15,688	4.6	52	11.4	20	12.8
Wisconsin	194,492	1.3	5,777	1.7	46	16.7	25	14.4
Total	2,395,527	16.6	3,295	27.4	50	16.1	26	16.6
Plains/Rockies								
Arizona	8,286	0.1	227	0.1	25	4.0	—	—
Colorado	20,507	0.1	356	0.1	53	10.0	49	16.5
Idaho	6,868	0.0	96	0.0	—	—	90	17.0
Kansas	18,450	0.1	396	0.1	148	14.0	37	14.5
Montana	65,907	0.5	925	0.3	50	2.0	66	20.0
Nebraska	7,471	0.1	205	0.1	76	16.0	35	11.0
Nevada	—	—	—	—	—	—	—	—
New Mexico	22,064	0.2	870	0.3	—	—	34	11.0
North Dakota	3,454	0.0	58	0.0	—	—	—	—
South Dakota	11,256	0.1	200	0.1	—	—	54	13.3
Utah	—	—	—	—	—	—	—	—
Wyoming	6,412	0.0	152	0.0	—	—	—	—
Total	170,675	1.2	3,458	1.1	95	10.0	58	17.2
Pacific Coast								
Alaska	—	—	—	—	—	—	—	—
California	293,641	2.0	2,967	0.9	101	25.2	93	20.4
Hawaii	9,693	0.1	60	0.0	161	50.0	—	—
Oregon	384,109	2.7	5,271	1.5	83	31.9	32	30.0
Washington	256,916	1.8	3,849	1.1	108	25.1	18	39.5
Total	944,359	6.5	12,147	3.6	95	28.0	42	29.8
US total	14,458,335	100.0	340,347	100.0	51	36.8	27	21.5

[1]Includes acreages of special forestry practices.

[2]May not add due to rounding.

[3]Averages derived from Forest Service administrative records (FIP-17's), which may differ from published ASCS reports, especially in states with smaller programs. Includes only Federal costs.

[4]Includes site preparation for natural regeneration.

Table 4. Average tract size, number of cases, and percent of acres treated by 1979 FIP, by region and ownership size class.

Region[1]	Acreage categories of total land ownership												
	1-100			101-200			201-500			501 +			
	Cases	Average tract acreage	Percent acres treated	Cases	Average tract acreage	Percent acres treated	Cases	Average tract acreage	Percent acres treated	Cases	Average tract acreage	Percent acres treated	Total[2] cases
North	1,254	11.8	26.6	933	15.1	22.5	832	18.6	27.9	345	32.2	20.0	3,364
South	1,422	25.0	17.0	1,230	36.0	21.3	1,607	46.6	36.0	874	61.4	25.8	5,133
Plains/Rockies	27	12.1	20.0	21	12.8	16.4	29	15.3	27.2	21	28.4	36.4	98
Pacific Coast	145	20.8	29.5	70	25.5	17.4	80	37.2	29.1	61	40.1	23.9	356
US total	2,848	18.8	19.4	2,254	26.8	21.9	2,548	36.8	34.0	1,301	52.1	24.6	8,951

[1]Regions here and in subsequent tables as shown in figure 1 and table 3.

[2]Derived from Forest Service administrative records (FIP-17s), which may differ slightly from published ASCS reports. The number of cases does not exactly coincide with the number of program participants or the number of farms because more than one case can occur on a farm, and there may be more than one participant per case.

Table 5. Land use by region before 1979 FIP treatment.

Region	Forest		Cropland		Pasture/range		Other		Total
	(acres—percent)		*(acres—percent)*		*(acres—percent)*		*(acres—percent)*		*(acres)*
South	168,594	74.0	9,220	4.0	46,602	20.4	3,494	1.5	227,910
North	75,079	87.2	2,127	2.5	5,817	6.8	3,055	3.5	86,078
Plains/Rockies	3,122	90.8	50	1.5	252	7.3	13	0.4	3,437
Pacific Coast	8,156	67.1	500	4.1	2,922	24.1	569	4.7	12,147
US total	254,950	77.4	11,897	3.6	55,593	16.9	7,131	2.2	329,572

Table 6. Acreage treated by 1979 FIP, by treated region, practice, and tract size.

Region and Practice	Tract size[1] in acres						Total[2]		Percent US total	Average tract	Post-treatment dominant type[3]
	1-10		11-40		41 +						
	(acres and percent)						*(acres)*	*(percent)*		(acres)	
South											
Site preparation and/or planting[4]	4,965	2.5	68,281	34.0	127,736	63.6	200,982	88.2	61.0	40.1	Loblolly-shortleaf
Precommercial thinning and release	556	3.1	4,897	27.1	12,639	69.9	18,092	7.9	5.5	45.3	Loblolly-shortleaf
Cull tree removal and pruning	305	3.5	2,839	32.1	5,692	64.4	8,836	3.9	2.7	44.2	Loblolly-shortleaf/oak-hickory
Total	5,826	2.6	76,017	33.4	146,067	64.1	227,910	100.0	69.2	40.6	
North											
Site preparation and/or planting[4]	3,565	22.5	8,300	52.4	3,988	25.2	15,853	18.4	4.8	16.1	White-red-jack pine
Precommercial thinning and release	16,336	34.0	22,058	45.9	9,673	20.1	48,067	55.8	14.6	14.4	Oak-hickory/maple-beech-birch
Cull tree removal and pruning	2,784	12.6	9,098	41.1	10,276	46.4	22,158	25.7	6.7	24.5	Oak-hickory
Total	22,685	26.4	39,456	45.8	23,937	27.8	86,078	100.0	26.1	16.5	
Plains/Rockies											
Site preparation and/or planting[4]	76	51.4	71	48.6	0	0.0	147	4.3	0.0	10.0	
Precommercial thinning and release	525	17.2	2,002	65.7	519	17.0	3,046	88.6	0.9	17.7	Ponderosa pine/Douglas-fir
Cull tree removal and pruning	38	15.5	206	84.5	0	0.0	244	7.1	0.1	12.9	
Total	639	18.6	2,279	66.3	519	15.1	3,437	100.0	1.0	16.7	
Pacific Coast											
Site preparation and/or planting[4]	373	5.2	3,590	50.1	3,195	44.6	7,158	58.9	2.2	28.0	Douglas-fir
Precommercial thinning and release	330	6.6	2,230	44.7	2,429	48.7	4,989	41.1	1.5	29.8	Douglas-fir
Cull tree removal and pruning	—	—	—	—	—	—	—	—	—	—	
Total	703	5.8	5,820	47.9	5,624	46.3	12,147	100.0	3.7	28.7	
US total											
Site preparation and/or planting[4]	8,979	4.0	80,242	35.8	134,919	60.2	224,140	68.0	68.0	36.8	
Precommercial thinning and release	17,747	23.9	31,187	42.0	25,260	34.0	74,194	22.5	22.5	19.4	
Cull tree removal and pruning	3,127	10.0	12,143	38.9	15,968	51.1	31,238	9.5	9.5	29.0	
Total	29,853	9.1	123,572	37.5	176,147	53.4	329,572	100.0	100.0	30.8	

[1]Percentage of acres in category by region and practice (e.g., 64.4 percent of the South's cull tree removal and/or pruning acres are in the 41 + tract size class).

[2]Figures, from Forest Service records, are less than published ASCS figures.

[3]Where more than one type is listed, the first is most common.

[4]Site preparation for natural regeneration included in this practice.

Table 7. State and regional percent of reforestation cost and acres treated by 1979 FIP, by tract class[1]

Region and state	Tract size in acres				Percent US total	Tract size in acres				Percent US total
	1-10	11-20	21-40	41+		1-10	11-20	21-40	41+	
	(percent of acres per class)					*(percent of cost per class)*				
South										
Alabama	1.6	7.6	16.8	73.9	14.6	1.6	7.7	18.6	72.2	14.4
Arkansas	1.9	9.6	23.6	64.9	7.0	2.3	11.7	25.6	60.4	5.7
Florida	1.9	7.5	23.7	67.0	8.0	1.5	7.7	26.7	64.1	7.4
Georgia	0.8	5.6	27.3	66.3	8.2	0.8	5.3	32.0	61.9	9.9
Kentucky	44.4	34.4	21.2	0.0	0.1	47.5	38.2	14.3	0.0	0.2
Louisiana	1.9	10.4	19.1	68.6	6.6	2.4	12.2	22.3	63.1	5.9
Mississippi	3.2	10.5	27.4	58.9	9.0	2.6	10.7	27.8	58.9	8.4
North Carolina	4.3	15.2	25.4	55.0	12.1	4.1	14.8	26.6	54.5	12.2
Oklahoma	2.4	13.2	20.4	64.0	0.9	3.1	15.9	20.0	61.0	0.7
South Carolina	3.1	10.5	36.1	50.3	8.7	2.3	10.1	36.7	50.9	10.0
Tennessee	6.4	28.9	14.4	50.4	0.5	7.7	32.0	10.0	50.4	0.5
Texas	1.8	8.8	20.2	69.2	4.9	1.4	7.5	20.6	70.5	4.2
Virginia	2.5	12.5	21.3	63.8	11.3	2.1	11.7	21.9	64.3	9.9
Average	2.5	10.2	23.8	63.6	91.9	2.3	10.2	25.8	61.7	89.3
North										
Connecticut	66.7	33.3	0.0	0.0	*	60.5	39.5	0.0	0.0	*
Delaware	3.0	4.5	0.0	92.5	0.1	4.8	4.1	0.0	91.1	0.2
Illinois	56.8	24.2	18.9	0.0	0.1	56.7	22.8	20.5	0.0	0.1
Indiana	12.6	12.2	23.0	52.2	0.3	26.8	16.5	20.8	36.0	0.2
Iowa	14.6	49.0	36.4	0.0	0.1	22.1	53.4	24.5	0.0	0.1
Maine	31.0	32.4	23.4	13.2	0.4	31.2	32.2	22.4	14.3	0.5
Maryland	6.8	31.5	21.4	40.4	0.3	7.8	32.5	23.8	35.9	0.5
Massachusetts	100.0	0.0	0.0	0.0	*	100.0	0.0	0.0	0.0	*
Michigan	23.6	29.0	18.0	29.3	0.9	23.5	30.1	17.8	28.6	0.7
Minnesota	25.3	45.4	29.3	0.0	0.4	22.7	46.1	31.2	—	0.5
Missouri	11.8	13.7	16.8	57.8	0.4	14.5	15.4	23.6	46.5	0.5
New Hampshire	8.5	0.0	91.5	0.0	*	28.9	0.0	71.1	0.0	*
New Jersey	20.2	3.6	6.4	69.9	0.2	54.9	24.2	12.5	8.4	*
New York	46.2	38.2	15.6	0.0	0.1	45.7	40.3	13.9	0.0	0.1
Ohio	26.9	37.3	35.8	0.0	0.3	28.1	35.3	36.6	0.0	0.3
Pennsylvania	38.9	61.1	0.0	0.0	0.1	37.3	62.7	0.0	0.0	0.1
Rhode Island[2]	—	—	—	—	—	—	—	—	—	—
Vermont	100.0	0.0	0.0	0.0	*	100.0	0.0	0.0	0.0	*
West Virginia	52.6	26.7	20.7	0.0	0.2	55.5	29.9	14.5	0.0	0.2
Wisconsin	18.6	40.4	27.7	13.4	1.0	22.6	43.4	24.6	9.4	0.9
Average	22.5	30.0	22.0	25.2	5.1	24.7	32.9	21.8	20.6	5.0
Plains/Rockies										
Arizona[3]	100.0	0.0	0.0	0.0	*	100.0	0.0	0.0	0.0	*
Colorado	100.0	0.0	0.0	0.0	*	100.0	0.0	0.0	0.0	*
Idaho	—	—	—	—	—	—	—	—	—	—
Kansas	35.7	64.3	0.0	0.0	*	12.0	88.0	0.0	0.0	*
Montana	100.0	0.0	0.0	0.0	*	100.0	0.0	0.0	0.0	*
Nebraska	0.0	100.0	0.0	0.0	*	0.0	100.0	0.0	0.0	*
New Mexico	—	—	—	—	—	—	—	—	—	—
North Dakota	—	—	—	—	—	—	—	—	—	—
South Dakota	—	—	—	—	—	—	—	—	—	—
Wyoming	—	—	—	—	—	—	—	—	—	—
Average	51.4	48.6	0.0	0.0	*	26.4	73.6	0.0	0.0	0.1
Pacific Coast										
California	8.6	27.0	28.0	36.3	0.9	9.5	26.3	32.9	31.3	1.7
Hawaii	0.0	0.0	0.0	100.0	*	0.0	0.0	0.0	100.0	0.1
Oregon	3.6	17.5	25.7	53.2	1.4	3.4	18.9	25.9	51.8	2.3
Washington	4.5	27.5	32.0	36.0	0.7	3.3	32.4	34.8	29.6	1.5
Average	5.2	22.5	27.7	44.6	3.1	5.2	24.6	30.1	40.2	5.6
US average	3.6	11.6	23.8	61.0	100.0	3.6	12.2	25.9	58.4	100.0

*Less than 0.05 percent

[1]Figures are derived from Forest Service administrative records (FIP-17's), which may differ slightly from published ASCS reports, especially for states with small programs. Totals may not add due to rounding.

[2]No FIP-17's in Forest Service files.

[3]Site preparation for natural regeneration, included in FP-2 in ASCS reports.

Table 8. State and regional percent of TSI cost and acres treated by 1979 FIP, by tract class.

Region and state	Tract size in acres				Percent	Tract size in acres				Percent
	1-10	11-20	21-40	41+	US total	1-10	11-20	21-40	41+	US total
	(percent of acres per class)					*(percent of cost per class)*				
South										
Alabama	2.2	7.6	0.0	90.2	0.8	1.9	7.1	0.0	91.0	0.7
Arkansas	2.3	7.5	26.7	63.5	6.9	2.4	7.5	28.2	61.9	6.8
Florida	0.9	0.0	3.7	95.3	1.0	1.0	0.0	3.3	95.7	0.5
Georgia	2.8	5.6	41.2	50.3	0.5	4.0	5.7	39.4	50.9	0.3
Kentucky	10.9	23.0	32.4	33.7	3.3	11.7	23.8	31.8	32.7	4.1
Louisiana	1.5	5.9	19.8	72.7	5.0	1.7	6.0	18.8	73.6	5.2
Mississippi	0.3	3.7	21.1	74.8	2.4	0.4	4.4	25.5	69.7	2.1
North Carolina	6.2	13.7	19.4	60.8	3.0	8.2	17.3	15.5	59.0	2.8
Oklahoma	0.7	2.4	12.1	84.8	2.9	1.0	3.0	20.1	75.8	1.7
South Carolina	5.7	6.0	75.6	12.8	0.4	3.7	3.7	84.7	7.9	0.8
Tennessee	5.4	7.3	5.9	81.5	1.3	11.7	9.1	7.2	72.1	0.8
Texas	0.7	4.6	11.7	83.0	4.3	0.9	4.9	12.4	81.8	3.9
Virginia	8.4	5.5	36.2	49.9	0.7	9.7	6.1	37.3	47.0	0.4
Average	3.2	8.0	20.8	68.1	32.6	4.0	9.3	23.3	63.4	30.1
North										
Connecticut	23.2	16.1	14.4	46.2	0.6	33.9	15.9	14.3	35.9	0.6
Delaware	—	—	—	—	—	—	—	—	—	—
Illinois	19.2	33.1	23.8	23.8	2.1	20.3	34.9	22.8	22.1	2.2
Indiana	6.8	21.3	44.3	27.7	5.4	7.6	20.5	45.1	26.8	3.9
Iowa	22.1	33.8	44.1	0.0	0.2	21.0	28.4	50.5	0.0	0.3
Maine	35.5	27.5	14.5	22.4	2.9	41.1	30.3	13.8	14.8	3.1
Maryland	17.6	32.1	29.9	20.3	0.6	18.6	29.7	27.9	23.8	0.8
Massachusetts	48.7	23.7	18.9	8.7	4.1	49.6	23.5	18.7	8.2	4.2
Michigan	29.6	29.1	26.0	15.3	6.0	30.0	27.3	25.5	17.2	5.1
Minnesota	26.5	24.5	22.6	26.4	1.1	32.6	30.2	20.5	16.8	1.3
Missouri	1.8	7.7	20.1	70.5	11.7	3.1	6.7	19.0	71.2	7.0
New Hampshire	39.4	21.5	21.0	18.1	3.4	41.4	21.8	17.7	19.1	4.4
New Jersey	62.5	4.5	13.7	19.3	1.7	62.4	4.8	13.3	19.4	1.2
New York	58.3	20.3	13.9	7.5	7.2	59.7	21.1	13.1	6.1	7.3
Ohio	7.5	29.7	35.6	27.2	5.2	8.7	30.9	34.7	25.6	6.6
Pennsylvania	33.8	25.5	19.7	21.0	2.8	37.5	24.0	19.4	19.2	4.4
Rhode Island	38.7	33.0	28.3	0.0	0.1	31.2	41.6	27.3	0.0	0.3
Vermont	46.2	20.5	13.3	20.0	1.8	50.3	20.6	15.2	13.8	1.7
West Virginia	47.0	26.6	18.2	8.2	0.7	55.7	23.7	13.5	7.0	0.5
Wisconsin	34.6	24.3	29.9	11.2	2.2	36.1	25.7	26.1	12.0	2.0
Average	27.2	21.0	23.4	28.4	59.8	31.3	22.7	22.5	23.5	57.0
Plains/Rockies										
Arizona[1]	—	—	—	—	—	—	—	—	—	—
Colorado	17.8	45.3	36.8	0.0	0.3	16.5	44.5	39.0	0.0	0.6
Idaho	0.0	100.0	0.0	0.0	*	0.0	100.0	0.0	0.0	0.1
Kansas	14.5	64.8	20.7	0.0	0.2	15.2	63.2	21.5	0.0	0.3
Montana	14.7	32.9	26.5	25.8	1.3	15.3	35.0	29.6	20.2	3.1
Nebraska	32.7	39.8	27.6	0.0	0.1	34.4	42.0	23.6	0.0	0.2
New Mexico	45.5	54.5	0.0	0.0	*	58.5	41.5	0.0	0.0	*
North Dakota[1]	—	—	—	—	—	—	—	—	—	—
South Dakota	25.0	45.0	30.0	0.0	0.1	23.6	50.1	26.3	0.0	0.2
Wyoming[1]	—	—	—	—	—	—	—	—	—	—
Average	17.1	39.9	27.2	15.8	2.1	16.6	40.0	29.2	14.1	4.4
Pacific Coast										
California	19.5	13.8	42.9	23.8	1.5	20.0	14.2	42.3	23.5	5.3
Hawaii	—	—	—	—	—	—	—	—	—	—
Oregon	3.0	22.9	26.2	47.9	1.2	4.7	29.3	29.3	36.7	1.4
Washington	1.1	10.7	25.5	62.6	2.8	1.8	14.6	20.2	63.4	1.8
Average	6.6	14.2	30.5	48.7	5.6	13.5	16.8	35.4	34.3	8.5
US Average	18.0	16.7	23.0	42.2	100.0	20.9	18.9	24.1	36.0	100.0

*Less than 0.05 percent.

[1]No FIP 17's in Forest Service files.

Table 9. Percent of acres treated by 1979 FIP, by cost per acre class, treatment, average cost per acre and region.

Region and Practice	Percent of acres, by cost per acre class				Average cost per acre
	$1-20	$21-50	$51-80	$81+	
					(dollars)
South					
Site preparation and planting[1]	12.1	37.8	40.6	9.5	49.6
Precommercial thinning and release	28.1	70.0	1.2	0.7	25.1
Cull tree removal and pruning	24.0	74.6	1.4	—	25.6
Total	13.9	41.8	35.9	8.4	46.7
North					
Site preparation and planting[1]	12.7	46.5	30.1	10.6	49.9
Precommercial thinning and release	28.6	69.1	2.0	0.3	28.1
Cull tree removal and pruning	59.7	37.9	1.7	0.7	21.5
Total	33.7	56.9	7.1	2.3	30.4
Plains/Rockies					
Site preparation and planting[1]	—	37.1	37.1	25.7	94.7
Precommercial thinning and release	0.3	33.9	43.9	21.9	59.8
Cull tree removal and pruning	—	100.0	—	—	36.9
Total	0.3	38.8	40.5	20.5	59.6
Pacific Coast					
Site preparation and planting[1]	4.1	9.1	17.9	68.9	94.9
Precommercial thinning and release	52.3	13.6	13.3	20.8	41.8
Cull tree removal and pruning	—	—	—	—	—
Total	23.9	10.9	16.0	49.1	73.1
US					
Site preparation and planting[1]	11.9	37.4	39.4	11.4	51.0
Precommercial thinning and release	29.6	64.1	3.8	2.6	29.1
Cull tree removal and pruning	46.5	51.5	1.6	0.4	23.1
Total	18.1	43.7	29.4	8.8	44.5

[1]Site preparation for natural regeneration included in this practice.
Note: Figures are for Federal cost per acre. Due to rounding, figures may not add to 100 percent.

Table 10. Percent of acres treated by 1979 FIP, by site productivity class, region and practice.

Region and practice	Productivity class in cubic feet		
	50-85	86-120	121+
		(percent)	
South			
Site preparation and planting[1]	7.3	74.2	18.5
Precommercial thinning and release	10.3	82.2	7.4
Cull tree removal and pruning	9.5	78.3	12.2
Total	7.6	75.0	17.4
North			
Site preparation and planting[1]	16.5	60.2	23.3
Precommercial thinning and release	21.9	64.9	13.2
Cull tree removal and pruning	34.0	57.7	8.4
Total	24.0	62.2	13.8
Plains/Rockies			
Site preparation and planting[1]	2.9	71.4	25.7
Precommercial thinning and release	38.3	56.2	5.5
Cull tree removal and pruning	6.0	81.9	12.1
Total	34.5	58.7	6.8
Pacific Coast			
Site preparation and planting[1]	12.6	13.5	73.9
Precommercial thinning and release	8.0	16.6	75.4
Cull tree removal and pruning	—	—	—
Total	10.7	14.8	74.5
US			
Site preparation and planting[1]	7.9	71.7	20.4
Precommercial thinning and release	17.7	66.2	16.1
Cull tree removal and pruning	25.0	65.2	9.8
Total	11.2	70.1	18.7

[1]Site preparation for natural regeneration included in this practice.

Table 11. Percent of acres treated by 1979 FIP, cost per acre, and site productivity class.

Region, and site productivity class	Cost per acre per class $1-20	$21-50	$51-80	$81+
South				
50-85 cubic feet				
1-10 acres	*	0.1	0.1	*
11-40	0.1	1.0	0.9	0.2
41+	1.1	1.5	2.3	0.3
86-120 cubic feet				
1-10 acres	0.3	1.1	0.5	0.1
11-40	1.9	11.1	8.7	3.0
41+	7.2	21.1	16.4	3.8
121+ cubic feet				
1-10 acres	0.1	0.1	0.2	*
11-40	1.1	1.9	3.0	0.4
41+	2.1	3.8	3.9	0.6
North				
50-85 cubic feet				
1-10 acres	0.8	3.6	0.2	0.2
11-40	2.6	5.7	0.5	0.2
41+	6.7	3.3	0.4	0.0
86-120 cubic feet				
1-10 acres	3.7	11.8	1.4	0.5
11-40	9.3	17.9	2.1	0.6
41+	8.1	6.5	0.2	0.1
121+ cubic feet				
1-10 acres	0.6	3.3	0.3	0.1
11-40	1.5	3.8	1.3	0.4
41+	0.6	1.0	0.7	0.2
Pacific Coast				
50-85 cubic feet				
1-10 acres	—	—	*	0.9
11-40	—	0.5	0.3	3.8
41+	—	—	1.4	3.7
86-120 cubic feet				
1-10 acres	—	0.1	0.4	2.0
11-40	1.1	0.7	0.5	7.3
41+	—	—	0.6	2.1
121+ cubic feet				
1-10 acres	0.2	0.4	0.7	1.0
11-40	7.0	5.6	5.4	15.8
41+	15.6	3.6	6.7	12.5

Region and site productivity class	Cost per acre per class $1-20	$21-50	$51-80	$81+
Plains/Rockies				
50-85 cubic feet				
1-10 acres	—	2.9	1.8	2.1
11-40	—	8.1	13.6	5.9
41+	—	—	—	
86-120 cubic feet				
1-10 acres	0.3	6.2	2.3	1.9
11-40	—	13.9	11.4	7.5
41+	—	5.5	9.6	—
121+ cubic feet				
1-10 acres	—	—	—	0.9
11-40	—	2.1	1.7	2.1
41+	—	—	—	—
US total				
50-85 cubic feet				
1-10 acres	0.2	0.8	0.1	0.1
11-40	0.6	2.0	0.9	0.4
41+	2.2	1.8	1.9	0.3
86-120 cubic feet				
1-10 acres	0.9	3.2	0.7	0.3
11-40	3.4	12.1	7.1	2.7
41+	7.1	17.3	12.5	3.0
121+ cubic feet				
1-10 acres	0.2	0.8	0.2	0.1
11-40	1.4	2.4	2.8	1.0
41+	2.3	3.2	3.4	1.0

☐ The shaded areas in regional tables contain roughly 80 percent of the acres treated in each region, derived by enclosing the closest large cells.

*Less than 0.5 percent.
Note: Due to rounding , figures may not add to 100 percent.

Table 12. Strata, sampling cells, cell populations, and sampling rates for 1979 FIP by region and state.

Species group and practice	Region					State												
	All East	All North	Other North	All South	Other South	AL	AR	FL	GA	LA	MS	MI	NY	NC	SC	TX	VA	Totals
Southern pine plant bare land					3.6% (1) 558	13.8% (2) 145				14.8% (3) 135	10.3% (4) 195					16.4% (5) 122		8.7% 1155
Southern pine site preperation and plant					14.2% (6) 141	4.5% (7) 442	11.6% (8) 173	7.6% (9) 263	6.1% (10) 326	13.4% (11) 149	7.1% (12) 283			4.0% (13) 500	4.9% (14) 411		4.6% (15) 437	6.4% 3125
Southern pine and oak-pine precommercial thin and release		17.5%[1] (16)[2] 114[3]		7.8% (17) 256														10.8% 370
Southern pine and oak-pine cull tree removal				19.4% (18) 103														19.4% 103
Southern pine and oak-pine site preparation for natural regeneration				22.0% (19) 91														22.0% 91
Northern pine and spruce-fir plant bare land		5.4% (20) 373																5.4% 373
Northern pine and spruce-fir site preparation and plant		22.7% (21) 88		14.0% (22) 143														17.3% 231
Northern pine and spruce-fir precommercial thin and release		5.0% (23) 403																5.0% 403
Northern pine and spruce-fir prune		12.9% (24) 155																12.9% 155
Oak-hickory precommercial thin and release		3.3% (25) 611																3.3% 611
Oak-hickory cull tree removal		9.4% (26) 212																9.4% 212
Maple-beech-birch precommercial thin and release			4.4% (27) 457									10.4% (28) 193	5.3% (29) 377					5.8% 1027
Maple-beech-birch cull tree removal		17.4% (30) 115																17.4% 115
Miscellaneous	6.8% (31) 295																	6.8% 295
Totals	6.8% 295	7.7% 2071	4.4% 457	13.5% 593	5.7% 699	6.8% 587	11.6% 173	7.6% 263	6.1% 326	14.1% 284	8.4% 478	10.4% 193	5.3% 377	4.0% 500	4.9% 411	16.4% 122	4.6% 437	7.5% 8266

Note: Sampling rate[1]; cell number[2]; cell population.[3]

Table 13. Field data summary for a 1979 FIP site preparation and planting case.

FY 79 FORESTRY INCENTIVES PROGRAM EVALUATION - FIELD DATA SUMMARY

A. SAMPLE CASE NUMBER (1-8) |0|2| |0|7| |2| |1|6|8| (dup columns 1-8 in all cards)

----------data card 1 (9)----------

B. STATE CODE (10-11) |3|7| North Carolina C. COUNTY CODE (12-14) |1|1|7| Martin

D. ASCS FARM NUMBER (15-21) |_|_|_|_|_|_|_| E. TREATMENT CODE (22) |2|

F. PRIOR RFA/FIP/ACP ASSISTANCE TO LANDOWNER (23) YES |X|1 NO |_|2 DON'T KNOW |_|3

G. PRIOR LAND USE (24) FOREST |X|1 CROPLAND |_|2 PASTURE/RANGE |_|3 OTHER |_|4

H. SITE INDEX (25-27) |_|8|5| 50 I. SITE SPECIES (28-30) |1|3|1| loblolly

----------data card number 2 (9)----------

J. PRE-TREATMENT STAND CONDITIONS:

	SPECIES CODE	BASAL AREA PER ACRE
1. CROP TREES	(10-12) |_|_|_|	(13-15) |_|_|_|
	(16-18) |_|_|_|	(19-21) |_|_|_|
	(22-24) |_|_|_|	(25-27) |_|_|_|
	(28-30) |_|_|_|	(31-33) |_|_|_|
	(34-36) |_|_|_|	(37-39) |_|_|_|
	(40-42) |_|_|_|	(43-45) |_|_|_|
	(46-48) |_|_|_|	(49-51) |_|_|_|
	(52-54) |_|_|_|	(55-57) |_|_|_|
	(58-60) |_|_|_|	(61-63) |_|_|_|
2. OTHER STOCKING		(64-66) |_|_|_|

3. Forest type code (from FIP-17) (67-68) |9|9|

4. Condition code (69) |6|

5. AVERAGE AGE OF DOMINANT AND CODOMINANT STAND (70-72) |_|5|0|

----------data card number 3 (9)----------

K. POST-TREATMENT STAND CONDITIONS:

	SPECIES CODE	BASAL AREA PER ACRE
1. CROP TREES	(10-12) |_|_|_|	(13-15) |_|_|_|
	(16-18) |_|_|_|	(19-21) |_|_|_|
	(22-24) |_|_|_|	(25-27) |_|_|_|
	(28-30) |_|_|_|	(31-33) |_|_|_|
	(34-36) |_|_|_|	(37-39) |_|_|_|
	(40-42) |_|_|_|	(43-45) |_|_|_|
	(46-48) |_|_|_|	(49-51) |_|_|_|
	(52-54) |_|_|_|	(55-57) |_|_|_|
	(58-60) |_|_|_|	(61-63) |_|_|_|
2. OTHER STOCKING		(64-66) |_|_|_|

3. Forest type code (from FIP-17 or list of sample cases) (67-68) |3|0|

4. AVERAGE AGE OF DOMINANT AND CODOMINANT STAND (69-71) |_|_|3|

5. ACRES TREATED (72-76) |_|_|_|3|2|

page 1

Table 13. Field data summary for a 1979 FIP site preparation and planting case. *(continued)*

FY 79 FORESTRY INCENTIVES PROGRAM EVALUATION - FIELD DATA SUMMARY

L. REFORESTATION: (PLANT BARE LAND, SITE PREP & PLANT, OR SITE PREP FOR NATURAL REGENERATION)

----------data card number 4 (9)----------

1. PRESCRIPTION: (TREES TO BE PLANTED)

		SPECIES CODE		STEMS PER ACRE	
SPECIES loblolly	(10-12)	1 3 1	(13-16)	6 8 0	8×8
	(17-19)		(20-23)		
	(24-26)		(27-30)		
	(31-33)		(34-37)		
	(38-40)		(41-44)		
	(45-47)		(48-51)		

----------data card number 5 (9)----------

2. OBSERVED STAND AFTER TREE PLANTING OR SITE PREPARATION FOR NATURAL REGENERATION:

	SPECIES CODE	NUMBER OF STEMS PER ACRE: PLANTED & SURVIVING		VOLUNTEERS		FREE TO GROW	
CROP TREES:							
(10-12)	1 3 1	(13-16)	5 7 8	(17-20)	5 3	(21-24)	6 2 2
(25-27)		(28-31)		(32-35)		(36-39)	
(40-42)		(43-46)		(47-50)		(51-54)	
(55-57)		(58-61)		(62-65)		(66-69)	

----------data card number 6 (9)----------

(10-12)		(13-16)		(17-20)		(21-24)	
(25-27)		(28-31)		(32-35)		(36-39)	
(40-42)		(43-46)		(47-50)		(51-54)	
(55-57)		(58-61)		(62-65)		(66-69)	

----------data card number 7 (9)----------

	TOTAL		FREE TO GROW	
RESIDUAL CROP TREE REPRODUCTION ESTABLISHED BEFORE TREATMENT (STEMS PER ACRE):	(17-20)		(21-24)	
NONCROP TREES - VOLUNTEERS (STEMS PER ACRE):			(25-28)	1 0 5 8

3. FOLLOWUP RELEASE TREATMENT NEEDED: (29) YES [ ]1 NO [X]2

IF YES, HOW MANY YEARS AFTER ORIGINAL FIP TREATMENT? (30-31) [ ][ ]

SAMPLE CASE NUMBER (do not keypunch) 2-7-2-168 - page 2

Table 13. Field data summary for a 1979 FIP site preparation and planting case. *(continued)*

FY 79 FORESTRY INCENTIVES PROGRAM EVALUATION - FIELD DATA SUMMARY

M. UNDERSTORY RELEASE (OF TREES LESS THAN 1.0 INCHES DBH):

1. ESTABLISHED CROP STEMS PER ACRE BEFORE TREATMENT (32-35) |__|__|__|__|
2. ESTABLISHED CROP STEMS RELEASED PER ACRE (36-39) |__|__|__|__|

N. PRECOMMERCIAL THINNING, UNDERSTORY RELEASE, OR CULL TREE REMOVAL:

1. STEMS REMOVED PER ACRE (40-43) |__|__|__|__|
2. BASAL AREA REMOVED PER ACRE - TOTAL (44-46) |__|__|__| - UTILIZED (47-49) |__|__|__|
3. NONCOMPETING STEMS REMOVED - STEMS PER ACRE (50-53) |__|__|__|__|
   BASAL AREA PER ACRE - TOTAL (54-56) |__|__|__| - UTILIZED (57-59) |__|__|__|
4. CROP TREES NEEDING RELEASE AFTER TREATMENT
   STEMS PER ACRE (60-63) |__|__|__|__| BASAL AREA PER ACRE (64-66) |__|__|__|
5. RELEASED CROP TREES
   STEMS PER ACRE (67-70) |__|__|__|__| - BASAL AREA PER ACRE (71-73) |__|__|__|

O. PRUNING - TREES PRUNED PER ACRE (74-76) |__|__|__|

----------data card number 8 (9)----------

P. PRINCIPAL CAUSE OF TREATMENT FAILURE (IF TREATMENT UNSUCCESSFUL) (10)

FIRE |__|A DROUGHT |__|B INSECTS/DISEASE |__|C SPECIES PLANTED OFF-SITE |__|D
ADVERSE PLANTING SITE |__|E EXCESSIVE COMPETITION |__|F LOW-VIGOR STOCK |__|G
POOR PLANTING TECHNIQUES |__|H TREATED TREES DID NOT DIE |__|I
OTHER (SPECIFY) |__|J _____

Q. NUMBER OF SAMPLE POINTS OBSERVED ON TRACT (11-13) |__|4|0|

R. COST OF TREATMENT - COST SHARE LEVEL (14-15) |6|0|% State average
FEDERAL COST (16-20) $|__|3|5|7|1| TOTAL COST (21-25) $|__|5|9|5|1|

S. NEXT RECOMMENDED TREATMENT FOR THIS TRACT prescribe burn @ age 15 WHEN? 1993

SAMPLE CASE NUMBER (do not keypunch) 2-7-2-168 - page 3

Table 13. Field data summary for a 1979 FIP site preparation and planting case. *(continued)*

FY 79 FORESTRY INCENTIVES PROGRAM EVALUATION - FIELD DATA SUMMARY

(nothing to keypunch on this page)

T. REMARKS: - Management Regime: 1st thinning @ age 20 w/ 14 cds/ac removed; 2nd thinning @ age 30 w/ 15 cds/ac. removed. Final clearcut @ age 45-50 w/ 15-20 MBF/ac removed
- Unproductive windrows account for approx. 1 ac. of the tract.
- Genetically improved stock was Not used.

U. FIELD OBSERVER _____ V. STATE FORESTRY REPRESENTATIVE _____

W. NAME AND COMPLETE CURRENT ADDRESS OF LANDOWNER FROM ASCS RECORDS:

_____

_____

_____

_____

_____

THIS FORM HAS BEEN DOUBLE CHECKED FOR ACCURACY AND COMPLETENESS. (INITIAL) _____

DATE OF FIELD OBSERVATIONS 9|15|81

SAMPLE CASE NUMBER 2-7-2-168 - page 4

Table 14. Field data summary for a 1979 FIP TSI case.

FY 79 FORESTRY INCENTIVES PROGRAM EVALUATION - FIELD DATA SUMMARY

A. SAMPLE CASE NUMBER (1-8) |1|2| |0|1| |1| |0|0|2| (dup columns 1-8 in all cards)

----------data card 1 (9)----------

B. STATE CODE (10-11) |2|6| Michigan C. COUNTY CODE (12-14) |1|3|3| Osceola

D. ASCS FARM NUMBER (15-21) | | | | | | | | E. TREATMENT CODE (22) |7|

F. PRIOR RFA/FIP/ACP ASSISTANCE TO LANDOWNER (23) YES | |1 NO |X|2 DON'T KNOW | |3

G. PRIOR LAND USE (24) FOREST |X|1 CROPLAND | |2 PASTURE/RANGE | |3 OTHER | |4

H. SITE INDEX (25-27) | |8|0|$_{50}$ I. SITE SPECIES (28-30) |3|1|8| Hard Maple

----------data card number 2 (9)----------

J. PRE-TREATMENT STAND CONDITIONS:

	SPECIES CODE	BASAL AREA PER ACRE
1. CROP TREES	(10-12) |3|1|8|	(13-15) | |9|6|
	(16-18) |5|4|1|	(19-21) | | |8|
	(22-24) |3|1|7|	(25-27) | | |7|
	(28-30) |7|6|2|	(31-33) | | |5|
	(34-36) |5|3|1|	(37-39) | | |4|
	(40-42) |9|5|1|	(43-45) | | |2|
	(46-48) | | |	(49-51) | | |
	(52-54) | | |	(55-57) | | |
	(58-60) | | |	(61-63) | | |
2. OTHER STOCKING----------		(64-66) | |2|0|

3. Forest type code (from FIP-17) (67-68) |8|0|

4. Condition code (69) | |

5. AVERAGE AGE OF DOMINANT AND CODOMINANT STAND (70-72) | \|7\|0\|

----------data card number 3 (9)----------

K. POST-TREATMENT STAND CONDITIONS:

	SPECIES CODE	BASAL AREA PER ACRE
1. CROP TREES	(10-12) |3|1|8|	(13-15) | |8|7|
	(16-18) |5|4|1|	(19-21) | | |8|
	(22-24) |3|1|7|	(25-27) | | |7|
	(28-30) |7|6|2|	(31-33) | | |5|
	(34-36) |5|3|1|	(37-39) | | |2|
	(40-42) |9|5|1|	(43-45) | | |2|
	(46-48) | | |	(49-51) | | |
	(52-54) | | |	(55-57) | | |
	(58-60) | | |	(61-63) | | |
2. OTHER STOCKING----------		(64-66) | | |6|

3. Forest type code (from FIP-17 or list of sample cases) (67-68) |8|0|

4. AVERAGE AGE OF DOMINANT AND CODOMINANT STAND (69-71) | \|7\|2\|

5. ACRES TREATED (72-76) | | | | \|1\|0\|

page 1

Table 14. Field data summary for a 1979 FIP TSI case. *(continued)*

FY 79 FORESTRY INCENTIVES PROGRAM EVALUATION - FIELD DATA SUMMARY

L. REFORESTATION: (PLANT BARE LAND, SITE PREP & PLANT, OR SITE PREP FOR NATURAL REGENERATION)

----------data card number 4 (9)----------

1. PRESCRIPTION: (TREES TO BE PLANTED)

SPECIES		SPECIES CODE		STEMS PER ACRE	
_____	(10-12)	|__|__|__|	(13-16)	|__|__|__|__|
_____	(17-19)	|__|__|__|	(20-23)	|__|__|__|__|
_____	(24-26)	|__|__|__|	(27-30)	|__|__|__|__|
_____	(31-33)	|__|__|__|	(34-37)	|__|__|__|__|
_____	(38-40)	|__|__|__|	(41-44)	|__|__|__|__|
_____	(45-47)	|__|__|__|	(48-51)	|__|__|__|__|

----------data card number 5 (9)----------

2. OBSERVED STAND AFTER TREE PLANTING OR SITE PREPARATION FOR NATURAL REGENERATION:

	SPECIES CODE	NUMBER OF STEMS PER ACRE: PLANTED & SURVIVING		VOLUNTEERS		FREE TO GROW	
CROP TREES:							
(10-12)	|__|__|__|	(13-16)	|__|__|__|__|	(17-20)	|__|__|__|__|	(21-24)	|__|__|__|__|
(25-27)	|__|__|__|	(28-31)	|__|__|__|__|	(32-35)	|__|__|__|__|	(36-39)	|__|__|__|__|
(40-42)	|__|__|__|	(43-46)	|__|__|__|__|	(47-50)	|__|__|__|__|	(51-54)	|__|__|__|__|
(55-57)	|__|__|__|	(58-61)	|__|__|__|__|	(62-65)	|__|__|__|__|	(66-69)	|__|__|__|__|

----------data card number 6 (9)----------

(10-12)	|__|__|__|	(13-16)	|__|__|__|__|	(17-20)	|__|__|__|__|	(21-24)	|__|__|__|__|
(25-27)	|__|__|__|	(28-31)	|__|__|__|__|	(32-35)	|__|__|__|__|	(36-39)	|__|__|__|__|
(40-42)	|__|__|__|	(43-46)	|__|__|__|__|	(47-50)	|__|__|__|__|	(51-54)	|__|__|__|__|
(55-57)	|__|__|__|	(58-61)	|__|__|__|__|	(62-65)	|__|__|__|__|	(66-69)	|__|__|__|__|

----------data card number 7 (9)----------

	TOTAL		FREE TO GROW	
RESIDUAL CROP TREE REPRODUCTION ESTABLISHED BEFORE TREATMENT (STEMS PER ACRE):	(17-20)	|__|__|__|__|	(21-24)	|__|__|__|__|
NONCROP TREES - VOLUNTEERS (STEMS PER ACRE):			(25-28)	|__|__|__|__|

3. FOLLOWUP RELEASE TREATMENT NEEDED: (29) YES |__|1 NO |__|2

IF YES, HOW MANY YEARS AFTER ORIGINAL FIP TREATMENT? (30-31) |__|__|

SAMPLE CASE NUMBER (do not keypunch) 12-1-1-2 - page 2

Table 14. Field data summary for a 1979 FIP TSI case. *(continued)*

FY 79 FORESTRY INCENTIVES PROGRAM EVALUATION - FIELD DATA SUMMARY

M. UNDERSTORY RELEASE (OF TREES LESS THAN 1.0 INCHES DBH):

1. ESTABLISHED CROP STEMS PER ACRE BEFORE TREATMENT (32-35) |__|__|__|
2. ESTABLISHED CROP STEMS RELEASED PER ACRE (36-39) |__|__|__|

N. PRECOMMERCIAL THINNING, UNDERSTORY RELEASE, OR CULL TREE REMOVAL:

1. STEMS REMOVED PER ACRE (40-43) |__|__|6|3|
2. BASAL AREA REMOVED PER ACRE - TOTAL (44-46) |__|2|5| - UTILIZED (47-49) |__|__|7|
3. NONCOMPETING STEMS REMOVED - STEMS PER ACRE (50-53) |__|__|__|7|
   BASAL AREA PER ACRE - TOTAL (54-56) |__|__|1|1| - UTILIZED (57-59) |__|__|0|
4. CROP TREES NEEDING RELEASE AFTER TREATMENT
   STEMS PER ACRE (60-63) |__|__|6|6| BASAL AREA PER ACRE (64-66) |__|1|7|
5. RELEASED CROP TREES
   STEMS PER ACRE (67-70) |__|__|8|4| - BASAL AREA PER ACRE (71-73) |__|5|4|

O. PRUNING - TREES PRUNED PER ACRE (74-76) |__|__|__|

----------data card number 8 (9)----------

P. PRINCIPAL CAUSE OF TREATMENT FAILURE (IF TREATMENT UNSUCCESSFUL) (10)

FIRE |__|A DROUGHT |__|B INSECTS/DISEASE |__|C SPECIES PLANTED OFF-SITE |__|D
ADVERSE PLANTING SITE |__|E EXCESSIVE COMPETITION |__|F LOW-VIGOR STOCK |__|G
POOR PLANTING TECHNIQUES |__|H TREATED TREES DID NOT DIE |__|I
OTHER (SPECIFY) |__|J _____

Q. NUMBER OF SAMPLE POINTS OBSERVED ON TRACT (11-13) |__|1|0|

R. COST OF TREATMENT - COST SHARE LEVEL (14-15) |7|5|%
FEDERAL COST (16-20) $|__|__|2|7|4| TOTAL COST (21-25) $|__|__|3|6|5|

S. NEXT RECOMMENDED TREATMENT FOR THIS TRACT Partial Harvest Cut WHEN? 1991

SAMPLE CASE NUMBER (do not keypunch) 12-1-1-2 - page 3

Table 14. Field data summary for a 1979 FIP TSI case. *(continued)*

FY 79 FORESTRY INCENTIVES PROGRAM EVALUATION - FIELD DATA SUMMARY

(nothing to keypunch on this page)

T. REMARKS: - Total cost information for this case was obtained from the estimate on the ACP-247.

- This stand is being managed on an all-aged basis. After the stand is regulated, partial harvest cuts should be possible every 10-15 years. These harvest cuts should be done when the BA/acre is between 110 and 120. The harvest cut should reduce the BA to between 70 and 90.

U. FIELD OBSERVER _____ V. STATE FORESTRY REPRESENTATIVE _____

W. NAME AND COMPLETE CURRENT ADDRESS OF LANDOWNER FROM ASCS RECORDS:

_____

_____

_____

_____

_____

THIS FORM HAS BEEN DOUBLE CHECKED FOR ACCURACY AND COMPLETENESS. (INITIAL) _____

DATE OF FIELD OBSERVATIONS September 8, 1981

SAMPLE CASE NUMBER 12-1-1-2 - page 4

Table 15. Definitions of the species group names used for 1979 FIP stylized management regimes.

Species group	Definition
Slash pine:	the greatest number of the surviving planted seedlings are slash pine; or in the case of a TSI where more than 50 percent of the crop basal area is longleaf, loblolly, shortleaf, and/or slash pine, slash pine has the greatest amount of basal area.
Longleaf pine:	the greatest number of planted seedlings are longleaf pine; or in the case of a TSI where more than 50 percent of the crop basal area is longleaf, loblolly, shortleaf and/or slash pine, longleaf pine has the greatest amount of basal area.
Loblolly pine:	the greatest number of the surviving planted seedlings are loblolly; or in the case of a TSI where more than 50 percent of the crop basal area is longleaf, loblolly, shortleaf and/or slash pine, loblolly pine has the greatest amount of basal area.
Shortleaf pine:	the greatest number of the surviving planted seedlings are short-leaf pine; or in the case of a TSI where more than 50 percent of the crop basal area is longleaf, loblolly, shortleaf and/or slash pine, shortleaf pine has the greatest amount of basal area.
Virginia pine and other southern pine:	the greatest number of the surviving planted seedlings are Virginia pine or other southern pine; or in the case of a TSI where more than 50 percent of the crop basal area is Virginia pine and/or other southern pine.
Oak-pine:	more than 50 percent of the crop basal area is northern red oak, southern red oak, white oak, other oaks, hickory, gums, and/or sweetgum, and 15 percent to 50 percent of the crop basal area is longleaf, loblolly, shortleaf and/or slash pine.
Red pine:	the greatest amount of the surviving planted seedlings are red pine; or in the case of pruning the greatest amount of the crop basal area is red pine.
White pine:	the greatest number of the surviving planted seedlings are white pine; or in the case of pruning the greatest amount of the crop basal area is white pine.
Spruce/ spruce-fir:	the greatest number of surviving planted seedlings are black spruce, red spruce, white spruce, Norway spruce, balsam fir, and/or other true firs; or in the case of a TSI more than 50 percent of the crop basal area is black spruce, red spruce, white spruce, Norway spruce, balsam fir, and/or other true firs.
Northern pine:	more than 45 percent of the crop basal area is eastern white pine, red pine, jack pine, pitch pine, Austrian pine, Scotch pine, northern white cedar, and/or hemlock, but less than 47 percent of the crop basal area is hemlock, and/or less than 45 percent is hard maple, soft maple, beech, yellow birch, black cherry, and/or basswood.
Jack pine:	the greatest number of the surviving planted seedlings are jack pine.
Oak-hickory:	more than 49 percent of the crop basal area is hickory, oaks, yellow poplar, elm, and/or white ash but less than 8 percent of the crop basal area is black walnut, less than 15 percent of the crop basal area is loblolly, longleaf, shortleaf, and slash, less than 60 percent is yellow poplar, and/or less than 41 percent is white ash.
Cove hardwood:	more than 60 percent of the crop basal area is yellow poplar or more than 41 percent of the crop basal area is white ash, but less than 8 percent of the crop basal area is black walnut.
Black walnut:	black walnut seedlings have been planted or in the case of a TSI more than 7 percent of the crop basal area is black walnut.
Northern hardwood	more than 45 percent of the crop basal area is hard maple, soft maple, beech, yellow birch, black cherry, basswood and/or white ash, but less than 8 percent of the crop basal area is black walnut, and/or less than 41 percent of the crop basal area is white ash.
Hemlock:	more than 47 percent of the crop basal area is hemlock, but less than 45 percent is hard maple, soft maple, beech, yellow birch, black cherry and/or basswood.
White birch:	more than 40 percent of the crop basal area is white birch and/or yellow birch, but less than 45 percent is hard maple, soft maple, beech, yellow birch, black cherry, and/or basswood, and/or less than 45 percent of the crop basal area is eastern white pine, red pine, jack pine, pitch pine, Austrian pine, Scotch pine, Northern white cedar, and/or hemlock.
Larch:	more than 90 percent of the surviving planted seedlings are larch.
Ponderosa pine:	ponderosa pine was the planted species, or the crop trees were predominantly ponderosa pine.
Douglas-fir:	Douglas-fir was the planted species, or the crop trees were predominantly Douglas-fir.
Lodgepole pine:	the crop trees were predominantly lodgepole pine.

Table 16. Stylized yields for 1979 FIP management regimes and current regimes by initial practice, species group, and three site index ranges.

			FIP management regime					Current regime			
Practice	Species	Site index range	Number of thins[1]	Rotation age	Sawtimber	Pulpwood	Total	Rotation age	Sawtimber	Pulpwood	Total
					(cubic feet per acre per year)				*(cubic feet per acre per year)*		
Plant[2]	Slash pine	56-65	2	30	10.69	43.17	53.86	30	0.00	20.00	20.00
		66-75[3]	2	30	15.27	61.67	76.94	30	0.00	20.00	20.00
		76-85	2	30	22.59	91.27	113.86	30	0.00	20.00	20.00
Plant	Longleaf pine	66-75	3	55	24.55	38.02	62.57	30	0.00	20.00	20.00
		76-85[3]	3	55	32.73	50.69	83.42	30	0.00	20.00	20.00
		86-95	3	55	39.27	60.83	100.10	30	0.00	20.00	20.00
Plant	Loblolly pine	66-75	3	45	59.20	33.12	92.32	30	0.00	20.00	20.00
		76-85[3]	3	45	82.22	46.00	128.22	30	0.00	20.00	20.00
		86-95	3	45	105.24	58.88	164.12	30	0.00	20.00	20.00
Plant	Shortleaf pine	50-65	3	50	29.64	34.64	64.28	30	0.00	20.00	20.00
		66-75[3]	3	50	42.34	49.48	91.82	30	0.00	20.00	20.00
		76-85	3	50	55.04	64.32	119.36	30	0.00	20.00	20.00
Plant	Virginia pine	55-65	0	30	0.00	71.23	71.23	30	0.00	14.23	14.23
		66-75[3]	0	30	0.00	94.97	94.97	30	0.00	14.23	14.23
		76-85	0	30	0.00	118.71	118.71	30	0.00	14.23	14.23
Precommercial thin	Loblolly pine	60-75	3	50	41.06	41.04	82.10	50	28.22	12.05	40.27
		76-85[3]	3	50	51.32	51.30	102.62	50	35.28	15.06	50.34
		86-95	3	50	61.58	61.56	123.14	50	42.34	18.07	60.41
Understory[4] release	Slash pine	56-65	2	30	9.57	38.73	48.30	50	25.23	10.77	36.00
		66-75[3]	2	30	13.67	55.33	69.00	50	33.16	14.16	47.32
		76-85	2	30	20.23	81.89	102.12	50	38.81	16.57	55.38
Understory[4] release	Loblolly pine	66-75	3	45	47.36	27.36	74.72	50	25.23	10.77	36.00
		76-85[3]	3	45	65.77	38.00	103.77	50	33.16	14.16	47.32
		86-95	3	45	84.20	48.64	132.84	50	38.81	16.57	55.38
Understory[4] release	Shortleaf pine	50-65	3	50	23.79	27.65	51.44	50	25.23	10.77	36.00
		66-75[3]	3	50	33.98	39.50	73.48	50	33.16	14.16	47.32
		76-85	3	50	44.17	51.35	95.52	50	38.81	16.57	55.38
Intermediate[5]	Loblolly pine	66-75	3	50	47.84	29.01	76.85	50	28.22	12.05	40.27
		76-85[3]	3	50	59.80	36.26	96.06	50	35.28	15.06	50.34
		86-95	3	50	75.35	45.69	121.04	50	42.34	18.07	60.41
Intermediate[5]	Shortleaf pine	66-75	4	60	45.99	25.62	71.61	60	26.27	9.33	35.60
		76-85[3]	4	60	57.48	32.03	89.51	60	32.83	11.67	44.50
		86-95	4	60	72.42	40.36	112.78	60	39.40	14.00	53.40
Intermediate[6]	Loblolly pine	66-75	2	50	35.79	21.92	57.71	50	28.22	12.05	40.27
		76-85[3]	2	50	47.72	29.22	76.94	50	35.28	15.06	50.34
		86-95	2	50	59.65	36.53	96.16	50	42.34	18.07	60.41
Intermediate[6]	Shortleaf pine	66-75	3	60	34.99	18.75	53.73	60	26.27	9.33	35.60
		76-85[3]	3	60	46.65	25.00	71.65	60	32.83	11.67	44.50
		86-95	3	60	58.31	31.25	89.56	60	39.40	14.00	53.40
Intemediate[7]	Loblolly pine	66-75	2	60	32.81	13.31	46.12	50	28.22	12.05	40.27
		76-85[3]	2	60	41.02	16.63	57.65	50	35.28	15.06	50.34
		86-95	2	60	49.22	19.96	69.18	50	42.34	18.07	60.41
Intermediate[7]	Shortleaf pine	66-75	2	60	30.56	12.39	42.95	60	26.27	9.33	35.60
		76-85[3]	2	60	38.20	15.48	53.68	60	32.83	11.67	44.50
		86-95	2	60	45.84	18.58	64.42	60	39.40	14.00	53.40
Intermediate[8]	Loblolly pine	66-75	1	60	28.73	12.32	41.06	50	28.22	12.05	40.27
		76-85[3]	1	60	35.92	15.40	51.32	50	35.28	15.06	50.34
		86-95	1	60	45.10	18.48	61.58	50	42.34	18.07	60.41
Intermediate[8]	Shortleaf pine	66-75	1	60	26.73	11.47	38.20	60	26.27	11.13	37.40
		76-85[3]	1	60	33.42	14.33	47.75	60	32.83	13.92	46.75
		86-95	1	60	40.10	17.20	57.30	60	39.40	16.70	56.10

Table 16. Stylized yields for 1979 FIP management regimes and current regimes by initial practice, species group, and three site index ranges. *(continued)*

			FIP management regime					Current regime			
Practice	Species	Site index range	Number of thins[1]	Rotation age	Sawtimber	Pulpwood	Total	Rotation age	Sawtimber	Pulpwood	Total
					(cubic feet per acre per year)				*(cubic feet per acre per year)*		
Site preparation for natural regeneration	Loblolly pine	76-85[3]	3	50	78.00	44.00	122.00	30	20.00	0.00	20.00
		86-95	3	50	99.84	56.32	156.16	30	25.60	0.00	25.60
		96-105	3	50	121.68	68.64	190.32	30	31.20	0.00	31.20
Plant	White pine	65-74	3	120	88.75	8.75	97.50	120	14.08	0.00	14.08
		75-84[3]	4	120	110.00	8.75	118.75	120	14.08	0.00	14.08
		85-99	4	120	129.80	10.33	140.13	120	14.08	0.00	14.08
Plant	Red pine	60-69[9]	4	120	80.88	12.50	93.38	0	0.00	0.00	0.00
		70-79[9]	5	100	116.37	12.85	129.22	0	0.00	0.00	0.00
		80-150[10]	4	120	159.67	2.83	162.50	0	0.00	0.00	0.00
Plant	Spruce	40-49	2	80	62.50	9.38	71.88	0	0.00	0.00	0.00
		50-59	4	70	49.78	44.80	94.58	0	0.00	0.00	0.00
		60-70	4	70	58.57	52.71	111.28	0	0.00	0.00	0.00
Plant	Black walnut	75-84	2	50	55.64	0.00	55.64	0	0.00	0.00	0.00
		85-94	2	50	63.99	0.00	63.99	0	0.00	0.00	0.00
		95-114	2	50	72.33	0.00	72.33	0	0.00	0.00	0.00
Plant	Cove hardwoods	95-104	3	70	106.37	9.94	116.31	0	0.00	0.00	0.00
		105-114[3]	3	70	138.14	12.91	151.06	0	0.00	0.00	0.00
		115-124	3	70	168.53	15.75	184.28	0	0.00	0.00	0.00
Plant	Oak-hickory	55-64[3]	4	100	28.79	15.37	44.16	0	0.00	0.00	0.00
		65-84[3]	5	100	44.95	36.90	81.85	0	0.00	0.00	0.00
		85-94	5	100	56.64	46.49	103.13	0	0.00	0.00	0.00
Precommercial thin	White pine	54-64	3	112	90.53	8.93	99.45	120	19.60	6.30	25.90
		65-74[3]	3	112	107.77	10.63	118.40	120	23.33	7.50	30.83
		75-94	3	112	129.32	12.76	142.08	120	28.00	9.00	37.00
Precommercial thin	Red pine	46-55	4	120	63.64	17.29	80.93	120	13.30	5.00	18.30
		56-65	4	120	76.67	20.83	97.50	120	13.30	5.00	18.30
		66-75	4	120	82.04	22.28	104.32	120	13.30	5.00	18.30
Precommercial thin	Hemlock	—	—	—	—	—	—	—	—	—	—
		56-70	1	100	97.50[11]	18.00	115.50	100	87.50[11]	15.00	102.50
		—	—	—	—	—	—	—	—	—	—
Precommercial thin	Northern hardwoods[12]	50-60	0	12[14]	33.33	6.67	40.00	50	12.80	0.00	12.80
		61-70[3]	0	12	41.67	8.33	50.00	50	16.00	0.00	16.00
		71-100	0	12	50.00	10.00	60.00	50	19.20	0.00	19.20
Precommercial thin	Northern hardwoods[13]	55-64[3]	2	90	44.44	11.11	55.55	100	17.60	5.00	22.60
		65-74	2	90	51.11	12.78	63.89	100	22.00	5.00	27.00
		75-84	2	90	57.78	16.67	74.45	100	26.40	5.00	31.40
Precommercial thin	Cove hardwoods	50-59	3	70	33.27	6.29	39.56	70	6.86	1.37	8.23
		60-70[3]	3	70	41.59	7.86	49.45	70	8.57	1.71	10.28
		—	—	—	—	—	—	—	—	—	—
Precommercial thin	Oak-hickory	50-67	3	100	39.60	39.20	78.80	100	13.67	29.00	42.67
		68-75[3]	3	100	49.50	49.00	98.50	100	13.67	29.00	42.67
		—	—	—	—	—	—	—	—	—	—
Precommercial thin	Black walnut	75-84[3]	2	61	26.89	0.00	26.89	60	19.03	0.00	19.03
		85-94	2	61	30.92	0.00	30.92	60	21.89	0.00	21.89
		91-114	2	61	34.95	0.00	34.95	60	24.74	0.00	34.95
Understory release	White pine	50-64	3	120	84.00	11.25	95.25	120	11.97	0.00	11.97
		65-80	3	120	106.50	10.50	117.00	120	11.97	0.00	11.97
		—	—	—	—	—	—	—	—	—	—

Table 16. Stylized yields for 1979 FIP management regimes and current regimes by initial practice, species group, and three site index ranges. *(continued)*

			FIP management regime					Current regime			
Practice	Species	Site index range	Number of thins[1]	Rotation age	Sawtimber	Pulpwood	Total	Rotation age	Sawtimber	Pulpwood	Total
					(cubic feet per acre per year)				*(cubic feet per acre per year)*		
Understory release	Northern pine	55-64[3]	3	110	85.45[11]	20.82	106.27	100	70.00	12.00	82.00
		65-74	3	110	111.09[11]	27.06	138.15	100	91.00	15.60	106.60
		75-84	3	110	136.73[11]	33.31	170.04	100	112.00	19.20	131.20
Understory release	Northern hardwood	54-64	2	100	31.20	9.2	40.40	100	17.60	4.00	21.60
		65-70[3]	2	100	35.88	10.58	46.46	100	22.00	5.00	27.00
		—	—	—	—	—	—	—	—	—	—
Understory release	Hemlock	—	—	—	—	—	—	—	—	—	—
		56-70	2	100	99.50[11]	8.00	107.50	100	87.50[11]	15.00	102.50
		—	—	—	—	—	—	—	—	—	—
Intermediate	Black walnut	75-84[3]	2	61	26.89	0.00	26.89	60	19.03	0.00	19.03
		85-94	2	61	30.92	0.00	30.92	60	21.89	0.00	21.89
		95-114	2	61	34.95	0.00	34.95	60	24.74	0.00	24.74
Intermediate	Oak-hickory	65-74	5	100	38.21	31.37	69.58	100	13.66	29.00	42.66
		75-84[3]	5	100	44.95	36.90	81.85	100	20.76	34.80	55.56
		85-94	5	100	49.45	40.59	90.04	100	27.32	39.15	66.47
Intermediate	Northern[15] hardwood	55-64[3]	2	100	39.20	8.80	48.00	100	22.00	5.00	27.00
		65-74	2	100	45.08	10.12	55.20	100	25.30	5.75	31.05
		75-84	2	100	50.96	11.44	62.40	100	28.60	6.50	35.10
Intermediate	Northern[16] hardwood	55-64[3]	2	100	38.40	8.80	47.20	100	22.00	5.00	27.00
		65-74	2	100	44.16	10.12	54.28	100	25.30	5.75	31.05
		75-84	2	100	49.92	11.44	61.36	100	28.60	6.50	35.10
Intermediate	Northern[17] hardwood	55-64[3]	2	100	36.80	8.80	45.60	100	22.00	5.00	27.00
		65-74	2	100	42.32	10.12	52.44	100	25.30	5.75	31.05
		75-84	2	100	47.84	11.44	59.28	100	28.60	6.50	35.10
Intermediate	Northern[18] hardwood	55-64[3]	2	100	36.80	8.80	45.60	100	22.00	5.00	27.00
		65-74	2	100	42.32	10.12	52.44	100	25.30	5.75	31.05
		75-84	2	100	47.84	11.44	59.28	100	28.60	6.50	35.10
Intermediate	Northern[19] hardwood	55-64	2	108	26.67	8.15	34.81	100	22.00	5.00	27.00
		65-74	2	108	30.67	9.37	40.03	100	25.30	5.75	31.05
		75-84	2	108	34.67	10.59	45.26	100	28.60	6.50	35.10
Intermediate	Northern[14] hardwood	50-60	0	12	33.33	6.67	40.00	50	16.00	0.00	16.00
		61-70[3]	0	12	41.67	8.33	50.00	50	20.00	0.00	20.00
		71-100	0	12	50.00	10.00	60.00	50	24.00	0.00	24.00
Intermediate	White pine	55-64[3]	3	120	99.33	12.50	105.83	120	70.00	12.00	82.00
		65-74	3	120	121.33	16.25	137.53	120	91.00	15.60	106.60
		75-84	3	120	149.33	20.00	169.33	120	112.00	19.20	131.20
Intermediate	Oak-pine	—	—	—	—	—	—	100[20]	—	—	—
		55-65	4	100	68.66	44.96	113.62	130[20]	73.23	30.77	104.00
		—	—	—	—	—	—	—	—	—	—
Prune	White[11] pine	55-64	3	120	93.33	12.50	105.83	120	93.33	12.50	105.83
		65-74[3]	3	120	118.33	11.67	130.00	120	118.33	11.67	130.00
		75-90	4	120	146.67	11.67	158.33	120	146.67	11.67	158.33
Prune	Red pine	60-64	4	120	80.92	12.50	93.42	120	75.13	19.42	94.55
		70-74[3]	5	100	111.85	19.00	130.85	120	111.85	19.00	130.85
		80-89	5	100	134.22	22.80	157.02	120	134.22	22.80	157.02
Prune	Spruce	50-59	2	70	48.57	20.80	69.37	70	24.29	48.57	72.86
		60-70[3]	2	70	60.71	26.00	86.71	70	28.57	57.14	85.71
				—	—	—	—	—	—	—	—

Table 16. Stylized yields for 1979 FIP management regimes and current regimes by initial practice, species group, and three site index ranges. *(continued)*

Practice	Species	Site index range	FIP management regime: Number of thins[1]	FIP management regime: Rotation age	FIP management regime: Sawtimber	FIP management regime: Pulpwood	FIP management regime: Total	Current regime: Rotation age	Current regime: Sawtimber	Current regime: Pulpwood	Current regime: Total
					(cubic feet per acre per year)				*(cubic feet per acre per year)*		
Site preparation for natural regeneration	Oak-hickory	65-84[3]	5	100	44.95	36.90	81.85	100	0.00	0.00	0.00
		85-94	5	100	56.64	46.49	103.13	100	0.00	0.00	00.0
		95-150	5	100	68.32	56.09	124.41	100	0.00	0.00	0.00
Site preparation for natural regeneration	Northern hardwood	55-64	2	90	44.44	11.11	55.56	100	22.00	5.00	27.00
		65-74	2	90	51.11	12.78	63.89	100	25.30	5.75	31.05
		75-84	2	90	57.78	14.44	72.22	100	28.60	6.50	35.10
Site preparation for natural regeneration	White pine	75-84[3]	4	120	110.00	8.75	118.75	120	14.08	0.00	14.08
		85-99	4	120	129.80	10.33	140.13	120	16.62	0.00	16.62
		100-125	4	120	143.00	11.38	154.38	120	18.31	0.00	18.31

[1]The number of commercial thins for the first rotation of the FIP regime.

[2]Planting bare land or planting following site preparation or site preparation for natural regeneration.

[3]This is the base regime from which all adjustments are made.

[4]MAI's when there are 200-1499 established pine.

[5]Practice done in stand that was 11-20 years old after treatment.

[6]Practice done in stand that was 21-30 years old after treatment.

[7]Practice done in stand that was 31-35 years old after treatment.

[8]Practice done in stand that was 36-40 years old after treatment.

[9]Yield based on 150-699 surviving planted conifers per acre.

[10]Yield based on 150-499 surviving planted conifers per acre.

[11]Yield includes only softwood sawtimber.

[12]Yield in the Lake States region.

[13]Yield in the Northeast.

[14]The FIP regime has a selection cut every 12 years.

[15]Practice done in stand that was 0-34 years old after treatment.

[16]Practice done in stand that was 35-44 years old after treatment.

[17]Practice done in stand that was 45-50 years old after treatment.

[18]Practice done in stand that was 51-55 years old after treatment.

[15]Practice done in stand that was 56-999 years old after treatment.

[20]Rotation lengths for softwood and hardwood, respectively.

Table 17. Sample management regime for a 1979 FIP TSI case.

Basic case identification information:

Sample number: 11-1-2-25	Species group: Northern hardwoods	County: Cheboygan
State: Michigan	Treatment: Precommercial thin	Acres treated: 29
Site index: 54	Price region: 7	Cost region: Lake
Pre-treatment stand age: 73	Regime number (current): 12404	
Regime number (intense): 22404	Cost option: 4 (Federal cost + private cost + program delivery)	

Management regime with yields, costs, and prices:

	Transaction number	Investment year[1]	Cost	Yield	Sensitivity group code[2]	Stumpage price	Sensitivity group code[3]	Perpetuity year[4]	Treatment	Stand age at harvest
			(dollars per acre)	*(1,000 cubic feet per acre)*		*(1,000 cubic feet per acre)*				*(years)*
Intense regime:										
First rotation	1	0	51.95	—	1	—	0	—		—
	2	12	—	0.320	5	390.52	6	—	final harvest	—
	3	24	27.00	—	2	—	0	—	TSI	—
	4	24	—	0.400	5	418.41	6	—	final harvest	—
	5	36	—	0.480	5	438.88	6	—	final harvest	—
	6	48	27.00	—	2	—	0	—	TSI	—
	7	48	—	0.430	5	427.54	6	—	final harvest	108
Perpetual rotation	8	60	—	0.480	5	448.46	6	24	final harvest	100
	9	72	27.00	—	2	—	0	24	TSI	—
	10	72	—	0.480	5	453.33	6	24	final harvest	100
Current regime:	11	10	—	0.640	5	367.10	6	—	final harvest	70
	12	60	—	0.640	5	383.99	6	50	final harvest	60

Mean annual increments in cubic feet per acre per year:

	Sawtimber	Pulpwood	Total
Intense regime	33.33	6.67	40.00
Current regime	12.80	0.00	12.80
Net change	20.53	6.67	27.20

Adjustments made to the stylized regimes:

	Adjustment parameter	Threshold class	Case value	Adjustment[5] factor	Treatments adjusted
Intense regime:	01 (site index age 50)	50 to 60 feet	54 feet	0.80	all yields, all harvests
	31 (post-treatment hardwood basal area and stand age)	36 to 57 square feet 50 to 69 years	48 square feet 60 years	0.54	1st rotation, 4th repetition final harvest, all yields
Current regime:	01 (site index)	50 to 60 feet	54 feet	0.80	all yields, all harvests

[1]Investment year is the number of years from the time the FIP treatment began.

[2]These are codes assigned to the subsequent treatments costs, commercial thin, and final harvest yields for use in the sensitivity analysis.

[3]These are codes assigned to the stumpage prices for use in the sensitivity analysis.

[4]Perpetuity year is the number of years until the treatment is repeated on a continued basis.

[5]The yield or the treatment under "Treatments adjusted" is increased, decreased, or eliminated by the adjustment factor.

Table 18. Sample management regime for a 1979 FIP site preparation and planting case.

Basic case identification information:

Sample number: 2-7-2-134	**Species group: Loblolly pine**	**County: Harnett**
State: North Carolina	**Treatment: Site preparation and plant**	**Acres treated: 16**
Site index: 95	**Total surviving planted: 396**	**Cost region: South**
Pre-treatment stand age: 8 yrs	**Regime number (current): 11103**	**Price region: 9**
Regime number (intense): 21104	**Cost option: 4 (Federal cost + private cost + program delivery)**	

Management regime with yields, costs, and prices:

	Transaction number	Investment year[1]	Cost	Yield	Sensitivity group code[2]	Stumpage price	Sensitivity group code[3]	Perpetuity year[4]	Treatment	Stand age at harvest
			(dollars per acre)	*(1,000 cubic feet per acre)*		*(1,000 cubic feet per acre)*				*(years)*
Intense regime:										
First rotation	1	0	113.88	—	1	—	—	—	site prep & plant	—
	2	4	56.00	—	2	—	—	—	hdwd weed contl	—
	3	10	5.60	—	2	—	—	—	prescribe burn	—
	4	17	—	0.720	4	141.85	6	—	comm thin	—
	5	25	—	0.864	4	172.16	6	—	comm thin	—
	6	35	—	1.280	4	1004.83	6	—	comm thin	—
	7	45	—	4.186	5	1590.83	6	—	final harvest	45
Perpetual rotation	8	45	134.40	—	2	—	—	45	site prep & plant	—
	9	55	5.60	—	2	—	—	45	prescribe burn	—
	10	62	—	0.960	4	421.57	6	45	comm thin	—
	11	70	—	0.960	4	511.64	6	45	comm thin	—
	12	80	—	1.280	4	2986.29	6	45	comm thin	—
	13	90	—	4.186	5	4727.82	6	45	final harvest	45
Current regime:	14	30	—	—	5	—	—	—	final harvest	30
	15	60	—	—	5	—	—	45	final harvest	30

Mean annual increments in cubic feet per acre per year:

	Sawtimber	Pulpwood	Total
Intense regime	19.91	43.73	63.64
Current regime	00.00	00.00	00.00
Net change	19.91	43.73	63.64

Adjustments made to the stylized regimes:

	Adjustment parameter	Threshold class	Case value	Adjustment[5] factor	Treatments adjusted
Intense regime:	01 (site index age 50)	86 to 95 feet	95 feet	1.28	all yields, all harvests
	02 (number of surviving planted conifers)	300-399 planted conifers	396 planted conifers	0.75	1st rotation, 1st comm thin, softwood pulpwood yield
	02 (number of surviving planted conifers)	300-399 planted conifers	396 planted conifers	0.90	1st rotation, 2nd comm thin, softwood pulpwood yield
Current regime:[6]	—	—	—	—	—

[1]Investment year is the number of years from the time the FIP treatment began.

[2]These are codes assigned to the subsequent treatments costs, commercial thin, and final harvest yields for use in the sensitivity analysis.

[3]These are codes assigned to the stumpage prices for use in the sensitivity analysis.

[4]Perpetuity year is the number of years until the treatment is repeated on a continued basis.

[5]The yield or the treatment under "Treatments adjusted" is increased, decreased, or eliminated by the adjustment factor.

[6]No current regime because of the intense site preparation; even though there was a stand before treatment, it was assumed that the pretreatment stands in southern pine planting cases were of no value.

Table 19. 1979 FIP stand and silvicultural practice thresholds by species.

Species	Practice	Maximum age (yrs)	Minimum basal area reduction[1]
	Timber stand improvement		
Loblolly, shortleaf pine	Intermediate treatment	40	10 square feet
Slash pine	Intermediate treatment	40	10 square feet
Virginia pine	Intermediate treatment	10	10 square feet
Oak-pine	Intermediate treatment	45	15 percent
Oak-hickory	Intermediate treatment	45	15 percent
Cove hardwoods	Intermediate treatment	50	15 percent
Black walnut	Intermediate treatment	60	—
Black walnut	Prune	60	—
Northern hardwood (Northeast)	Intermediate treatment	60	10 square feet
White birch	Intermediate treatment	45	10 square feet
Northern pine	Intermediate treatment	60	15 percent
White pine	Prune	60	—
Red pine	Prune	60	—
Spruce-fir	Intermediate treatment	50	20 square feet
Hemlock	Intermediate treatment	60	15 percent

Species	Minimum surviving planted or established seedlings per acre
	Planting and understory release
Southern pine[2]	200
White pine	200
Red pine	150
Jack pine	200
Spruce	200
Black walnut	120

Species	
	Miscellaneous practice
Oak-hickory and cove hardwoods	Removal of grapevines more than 7 years before final harvest

[1] A pretreatment B-level stocking was normally required.
[1] Except for Virginia pine, which has a 250-tree threshold.

Table 20. Number of sampled cases per cell after reclassification, and the number of cases that did not meet minimum silvicultural standards.

Species group and practice	Region					State												
	All East	All North	Other North	All South	Other South	AL	AR	FL	GA	LA	MS	MI	NY	NC	SC	TX	VA	Totals
Southern pine plant bare land					3[1] / 27[2]	0 / 18				7 / 20	2 / 20					8 / 21		20 / 106
Southern pine site preparation and plant					8 / 20	3 / 21	13 / 20	0 / 19	2 / 20	5 / 21	3 / 21			4 / 24	1 / 20		1 / 22	40 / 208
Southern pine and oak-pine precommercial thin and release		7 / 12		5 / 15														12 / 27
Southern pine and oak-pine cull tree removal				11 / 25														11 / 25
Southern pine and oak-pine site preparation for natural regeneration				0 / 16														0 / 16
Northern pine and spruce-fir plant bare land		1 / 23																1 / 23
Northern pine and spruce-fir site preparation and plant		0 / 18		0 / 14														0 / 32
Northern pine and spruce-fir precommercial thin and release		19 / 30																19 / 30
Northern pine and spruce-fir prune		1 / 21																1 / 21
Oak-hickory precommercial thin and release		17 / 18																17 / 18
Oak-hickory cull tree removal		9 / 24																9 / 24
Maple-beech-birch precommercial thin and release			8 / 16									5 / 19	16 / 21					29 / 56
Maple-beech-birch cull tree removal		1 / 24																1 / 24
Miscellaneous	4 / 27																	4 / 27
Totals	4 / 27	55 / 170	8 / 16	16 / 70	11 / 47	3 / 39	13 / 20	0 / 19	2 / 20	12 / 41	5 / 41	5 / 19	16 / 21	4 / 24	1 / 20	8 / 21	1 / 22	164 / 637

[1] Upper number is number of cases that did not meet minimum silvicultural standards.
[2] Lower number is number of cases sampled, after reclassification.

Table 21. Stylized stumpage prices in 1979 dollars per 1000 cubic feet by species, product, and region.

Species	Stumpage regions[1]																							
	1		2		3		4		5		6		7		8		9		10		11		12		13	
	Pulp-wood	Saw-timber	Pulp-wood	Saw-timber	Pulp-wood	Saw-timber	Pulp-wood	Saw-timber	Pulp-wood	Saw-timber	Pulp-wood	Saw-timber	Pulp-wood	Saw-timber	Pulp-wood	Saw-timber	Pulp-wood	Saw-timber	Pulp-wood	Saw-timber	Pulp-wood	Saw-timber	Pulp-wood	Saw-timber	Pulp-wood	Saw-timber
	(dollars)																							
Eastern white pine	55	298	40	251	39	278	37	468	37	526			90	277	83	584	83	584	83	584						
Red pine	54	241	40	156	39	240	37	468					127	277												
Jack pine													147	188												
Shortleaf pine					39	230			37	210	37	206			83	426	94	575	207	670	132	728	106	893	110	689
Slash pine															83	426	94	575	207	670	132	728	106	893	110	689
Virginia pine					39	215									83	260	94	260	207	280						
Loblolly pine									37	410					83	426	94	575	207	670	132	728	106	893	110	689
Longleaf pine																	94	922	207	973	132	1000	106	1078	110	976
Other southern pine																			207	350						
Black spruce	100	225	61	156									121	156												
Red spruce	100	225	61	156																						
White spruce	100	225	61	156	39	220	37	230					116	160												
Balsam fir	100	225	61	156									55	67												
Other true firs	100	225	61	156																						
Tamarack	64	200	61	156									55	88												
Eastern hemlock	62	199	61	165	39	200							67	105												
Other northern conifers	60	231																								
White oak	60	444	45	650	30	672	37	697	22	351	27	560	55	449	32	2320	34	1949	42	1449	43	1680	35	1500	33	2703
Southern red oak															32	333	34	267	42	258	43	304	35	277	33	264
Northern red oak	60	494	45	576	30	369	37	648	22	314	27	484	55	488	32	333	34	267	42	258	43	304			33	264
Other oaks	60	450	45	260			37	455	22	275			55	232	32	245	34	267	42	258	43	304	37	277	33	264
Yellow-popular			45	388	33	317	37	475	28	290	27	560	39	633	35	303	42	293	49	312	55	332	44	471	44	459
All hickory	60	250	45	277	30	289	37	304	22	252	27	250	38	329	32	245	34	225	42	247	43	279	37	252	33	233
Black walnut			45	1498	30	2026	37	1982	22	1413	27	3057	25	4630	32	2320	34	1949	42	1449	43	1680			33	2703
Butternut			45	258									25	276	32	245	34	225	42	247	43	279	37	252	33	233
American elm	60	158	45	261	30	270	37	268	22	248			22	192	32	245	34	225	42	302	43	279	37	252	33	233
Black cherry	60	414	45	754	30	850	37	787	22	750			47	209	32	245	34	225	42	247	43	279	37	252	33	233
Basswood	60	257	45	370	30	178	37	481	28	256			39	149	35	245			42	247					44	225
White ash	60	410	45	560	30	767	37	713	22	323			36	235	35	245	34	225	42	259	43	279	37	252	33	233
Beech	60	248	45	227	30	270	37	270	22	253			46	252	35	245	24	225	42	247	43	279	37	252	33	233
Yellow birch	60	374	41	381									24	273												
White birch	60	326	52	273	30	255							31	164			34	225	42	247	43	279	37	252	33	233
Hard maple	60	353	45	490	30	408	37	584	22	261			39	382	32	264	34	225	42	278	43	300	37	366	33	351
Soft maple	60	238	45	392	30	371	37	456	22	260			50	220	32	264	34	225	42	278	43	300	37	366	33	351
Quaking aspen	62	144	37	104									46	103												
Eastern cottonwood			37	315	33	270	37	251	28	242			42	179	35	245	42	225	49	247	55	279	44	252	44	233
Sweetgum							37	143	22	249					32	275	34	225	42	284	43	304	37	273	33	255
Other gums			43	250			37	135									34	225	42	284	43	304	37	273	33	255
Other hardwoods			45	300			37	325	22	315							34	225	45	247	49	279	40	252	38	233
Eastern white pine pruned	55	420			39	345							90	350												
Red pine pruned					39	315							127	345												
Black walnut pruned	60	9500	45	12750	30	9550	37	12700					25	11250					42	9500						

[1]See figure 3.

Table 22. Percentage of increase in 1979 FIP post-treatment stumpage prices by species and region.

Species	Regions								
	1	2	3	4	5	6	7	8	13
					(percent)				
White oak	21	40	38	46	43	31	59	22	15
Southern red oak	—	29	35	41	33	30	—	18	14
Northern red oak	21	34	35	41	33	30	46	18	14
Other oaks	18	29	33	36	32	27	32	30	12
Yellow poplar	15	30	31	39	40	32	—	14	15
All hickories	23	25	33	24	28	26	30	26	16
Black walnut	—	31	30	34	31	32	58	12	20
Butternut	—	22	—	—	—	—	35	—	—
American elm	7	31	31	33	32	26	40	13	11
Black cherry	18	30	32	36	37	29	36	14	15
Basswood	12	30	30	38	30	—	31	14	—
White ash	22	34	32	44	41	33	42	22	20
Birch	16	28	28	33	33	—	40	14	—
Yellow birch	18	22	34	30	32	—	43	30	—
White birch	15	29	34	29	31	—	44	30	—
Hard maple	22	30	31	41	36	30	38	13	15
Soft maple	15	30	32	38	35	22	37	18	—
Aspen	9	23	36	22	28	—	36	30	—
Cottonwood	—	33	27	33	30	21	30	26	10
Sweetgum	—	—	33	33	30	—	—	26	—
Other gums	—	30	33	33	30	—	—	26	—
Other hardwoods	13	29	33	42	30	26	31	26	11

Table 23. 1979 FIP management regime practice costs per acre by region.

Practice	Species group	Region			
		South	Central	Northeast	Lake
			(dollars)		
Site prep and plant	Southern pine	96	87	87	—
	Oak-pine	96	107	87	—
	Northern pine	112	117	97	79
	Other northern conifers	54	54	69	80
	Black walnut	91	119	42	74
Hardwood control	All groups	40	40	40	40
Prescribed burn	Southern pine	4	4	4	—
Precommercial thin	Southern pine	61	34	40	—
	Northern hardwood	45	35	40	32
	Black walnut	22	22	22	22
Intermediate	Southern pine	33	28	—	—
	Other northern conifers	21	21	21	21
	Oak-hickory	31	30	33	26
	Cove-hardwood	31	39	34	27
	Northern hardwood	—	39	34	27
	Black walnut[1]	32	32	32	32
	Black walnut[2]	44	36	62	73
Pruning	Northern pine	43	75	29	34
	Black walnut[1]	15	15	15	15
	Black walnut[2]	19	19	19	22

[1] Natural stands.
[2] Plantations.

Table 24. 1979 FIP aggregate financial returns by cost options and discount rates.

Cost option, weighed IRR, discount rates	Total PNW	Average PNW	Total benefit-cost ratio	Cases earning discount rate
	(millions of dollars)	*(dollars per acre)*		*(percent)*
Federal and private (weighted average IRR = 8.56)				
10 percent	10.5	39	1.3	45.3
7.125	70.2	260	3.6	59.0
4	418.8	1,554	14.1	74.3
Private (weighted average IRR = 10.94)				
10 percent	21.4	80	3.3	55.1
7.125	80.9	300	7.8	65.9
4	426.8	1,583	25.1	75.0
Federal and delivery (weighted average IRR = 8.85)				
10 percent	13.2	49	1.5	45.9
7.125	73.0	271	4.0	57.5
4	421.6	1,564	15.7	72.8
Federal, private and delivery (weighted average IRR = 8.26)				
10 percent	8.3	31	1.2	41.1
7.125	68.0	252	3.3	55.9
4	416.7	1,546	13.1	71.9

Table 25. 1979 FIP financial returns results for federal plus private costs by region.

Region	Average IRR	Total PNW at 7.125 percent	Percent of cases earning discount rate			Percent of total funds
			4.0 percent	7.125 percent	10 percent	
		(millions of dollars)		*(percent)*		
South	8.64	63.75	78.7	75.6	60.8	75.7
North	3.89	0.46	54.9	25.2	15.8	16.1
Pacific Coast	9.63	5.99	100.0	74.4	51.3	6.5

Table 26. 1979 FIP additional timber yield, by region.

Region	Average MAI increase	Total yield increase	
		Sawtimber	Pulpwood
	(cubic feet per acre)	*(millions of cubic feet)*	
South	97.5	647.6	341.4
North	25.4	214.3	28.4
Pacific Coast	104.0	79.9	–3.3

Table 27. Estimated first rotation yield increase for 1979 FIP, by product and period.

Period	Softwood		Hardwood		Total
	Sawtimber	Pulpwood	Sawtimber	Pulpwood	
		(millions of cubic feet)			
1979-2000	17.8	132.0	8.7	5.7	164.3
2001-2025	570.2	241.7	20.6	10.2	842.8
2026-2050	100.6	3.1	26.4	4.7	134.8
2051-2075	69.8	–12.8	11.1	–2.9	65.3
2076-2100	102.9	–7.5	13.5	–7.9	101.0
Total	861.3	356.7	80.3	9.9	1,308.2

Table 28. Program strata financial returns and timber yield increases for 1979 FIP federal plus private cost option.

Species group and practice	Average IRR	Total benefit-cost ratio at 7.125 percent	Total PNW at 7.125 percent	Percent of cases earning IRR			Average MAI increase	Total yield increase		Percent of 1979 Federal funds
				4.0	7.125	10.0		Sawtimber	Pulpwood	
			(millions of dollars)				*(cubic feet per acre)*	*(millions of cubic feet)*		
Southern pine plant bare land	10.1	5.4	13.409	81.1	81.1	78.3	96.3	109.8	65.7	8.7
Southern pine site prep and plant	9.9	3.9	45.078	80.8	79.3	60.1	110.6	387.9	256.1	63.1
Southern pine and oak-pine precommercial thin and release	7.2	2.8	1.274	55.6	51.9	37.0	17.9	31.2	5.0	3.1
Southern pine and oak-pine cull tree removal	8.0	2.9	.524	52.0	44.0	32.0	5.3	5.3	–1.9	1.1
Northern pine and oak-pine site prep for natural regeneration	13.0	11.6	3.263	100.0	100.0	100.0	108.0	22.9	9.7	2.2
Northern pine and spruce-fir plant bare land	6.3	0.7	–.169	95.7	8.7	0	104.3	53.0	8.6	2.2
Northern pine and spruce-fir site prep and plant	7.4	1.7	.128	100.0	40.6	6.3	120.2	56.3	4.2	1.5
Northern pine and spruce-fir precommercial thin and release	4.5	1.4	.250	36.7	30.0	23.3	42.8	56.6	6.7	0.4
Northern pine and spruce-fir prune	8.6	2.5	.118	90.5	71.4	33.3	0.1	4.4	–1.9	2.6
Oak-hickory precom. thin and release	0.2	*	.006	5.6	5.6	0	1.4	4.2	1.2	1.8
Oak-hickory cull tree removal	4.1	2.1	.154	33.3	33.3	25.0	27.8	13.0	1.0	3.2
Maple-beech-birch precommercial thin and release	3.8	0.6	.169	42.9	14.3	8.9	6.0	20.7	6.9	0.5
Maple-beech-birch cull tree removal	7.5	0.3	–.059	58.3	41.7	37.5	0.2	5.6	–0.5	1.1
Douglas-fir and ponderosa pine all practices	9.6	3.9	5.993	100.0	74.4	51.3	104.0	79.9	–3.3	6.5
Miscellaneous all practices	3.6	0.7	0.064	63.0	22.2	14.8	24.2	91.1	8.9	1.6
Total	8.6	3.6	70.203	70.0	57.1	44.3	84.1	941.7	366.5	100.0

*Less than 0.05.

Table 29. Weighted average IRR by sampling cell, for the 1979 FIP federal plus private cost option.

Species group and practice	Region					State												
	All East	All North	Other North	All South	Other South	AL	AR	FL	GA	LA	MS	MI	NY	NC	SC	TX	VA	Totals
Southern pine plant bare land					11.0	13.4				5.3	12.0					7.4		10.1
Southern pine site preparation and plant					6.2	10.5	2.8	11.4	10.9	9.0	9.6			8.6	12.3		11.0	9.9
Southern pine and oak-pine precommercial thin and release		6.3		7.3														7.2
Southern pine and oak-pine cull tree removal				8.0														8.0
Southern pine and oak-pine site preparation for natural regeneration				13.0														13.0
Northern pine and spruce-fir plant bare land		6.3																6.3
Northern pine and spruce-fir site preparation and plant		6.1		7.9														7.4
Northern pine and spruce-fir precommercial thin and release		4.5																4.5
Northern pine and spruce-fir prune		8.6																8.6
Oak-hickory precommercial thin and release		0.2																0.2
Oak-hickory cull tree removal		4.1																4.1
Maple-beech-birch precommercial thin and release			5.0									2.8	2.7					3.8
Maple-beech-birch cull tree removal		7.5																7.5
Miscellaneous	3.6																	3.6
Totals	3.6	3.9	5.0	8.8	9.7	10.9	2.8	11.4	10.9	7.1	10.4	2.8	2.7	8.6	12.3	7.4	11.0	8.4

Table 30. 1979 FIP cell IRR sensitivity.

Cell[1] number	Change needed to increase IRR threshold one percentage point						Change needed to lower IRR threshold one percentage point					
	Initial treatment cost	Subsequent treatment cost	Pre-commercial thin	Commercial thin	Final harvest	Stumpage price	Initial treatment cost	Subsequent treatment cost	Pre-commercial thin	Commercial thin	Final harvest	Stumpage price
1	–44.6	–66.5		51.3	86.2	30.4	64.7	80.7		–46.1	–55.7	–24.0
2	–47.6	–59.2		51.3	92.4	32.2	69.4	78.5		–45.8	–59.1	–25.3
3	–45.4	–57.1		62.5	83.4	32.7	65.6	75.5		–55.2	–54.5	–25.4
4	–43.7	–59.1		50.3	85.7	30.9	63.1	77.3		–45.3	–55.5	–24.5
5	–55.2	–55.9		69.6	79.2	36.5	82.2	75.7		–59.4	–52.1	–27.4
6	–46.9	–105.6		82.3	84.2	40.1	72.5	143.8		–70.0	–54.2	–29.6
7	–34.8	–114.4		67.0	378.9	35.1	51.1	149.7		–59.6	–51.5	–26.9
8	–40.4	–83.8		60.9	96.2	35.6	59.9	112.4		–53.7	–61.2	–27.3
9	–27.7	–85.3		59.3	49.6	25.8	38.5	100.6		–56.3	–36.5	–21.3
10	–27.1	–103.4		57.1	60.9	26.9	37.8	124.4		–53.9	–42.3	–22.1
11	–38.9	–102.2		62.7	89.3	35.8	57.0	136.8		–54.6	–57.1	–27.2
12	–36.3	–114.9		66.6	85.1	35.9	53.5	152.7		–58.0	–54.9	–27.4
13	–40.3	–128.4		76.5	90.9	41.0	63.4	176.3		–65.9	–57.0	–30.2
14	–31.4	–118.3		47.8	108.2	31.9	45.1	153.8		–42.3	–67.3	–25.2
15	–39.6	–96.5		64.9	86.7	36.6	59.1	129.7		–57.4	–55.4	–27.9
16	–31.6	–340,000	–17,000	61.2	721.3	51.3	55.3	100,000	7,477.9	–45.0	–259.1	–32.7
17	–23.7	–29,000		31.0	415.5	29.4	35.1	9,268.8		–26.0	568.5*	–23.9
18	–40.1	–100,000,000		17.4	–840,000*	3.4	72.7	32,000,000		–17.8	260,000*	–25.8
19	–41.2	–133.1		75.6	111.6	44.4	64.4	173.1		–61.4	–65.7	–31.4
20	–70.8	–27,000		90.1	908.4	77.9	153.0	6,745.2		–63.5	169.2*	–46.6
21	–52.7	–90,000		106.7	1,115.0	89.4	115.6	21,000		–70.3	–239.1	–50.2
22	–48.4	–1,000,000		100.1	2,518.5	94.4	102.5	230,000		–58.0	–558.1	–50.4
23	–26.4	–4,700,000		40.0	130,000	40.7	44.9	1,000,000		–27.9	–31,000	–27.5
24	–29.9	–640,000		41.7	2,894.9	37.8	52.6	110,000		–35.8	–931.1	–29.1
25	–31.3	–50.3	–4,300	27.0	199.9	23.8	43.7	56.0	1,955.6	–23.4	–117.5	–19.5
26	–293.4	–210,000	–1,400	12,000	441.8	–132.0*	4,062.9	73,000	738.4	–4,100	–588.4	–43.4
27	–37.1	–120,000	–10,000	53.7	372.6	56.4	67.8	49,000	4,737.5	–39.0	–129.2	–31.4
28	–73.0	–172.9			62.4	62.4	122.5	152.5			–35.0	–35.0
29	–21.2	–5,400,000	–85,000	35.4	822.2	30.6	36.8	1,900,000	40,000	–25.3	–453.2	–20.2
30	–158.1	–3,300,000	–79,000	1,400,000	–3,100*	–88.9*	–777.8*	990,000	32,000	–510,000	–1,500	–36.9
31	–928.7	–630,000	–1,300	235.6	180,000	28.8	14,000	220,000	750.2	–158.4	–63,000	–49.2

*Parameters with a sign opposite of that expected is usually the result of the FIP regime having a lower volume at final harvest than the current regime, particularly when the former has a series of commercial thinnings, and the latter has only a final harvest. See, for example, the volumes of thinned and unthinned stands in N.F. Rodgers and A. Brinkman, Shortleaf Pine in Missouri: Understory Hardwoods Retard Growth, USFS Res. Pap. CS-15, 1965.

[1] See table 12 for identification of cells.

Note: Sensitivity of Western cases was not computed.

Table 31. 1979 FIP cases judged failures by field samplers, by cause, species group and practice.

Species group and practice	Fire	Drought	Insects/ disease	Adverse planting site	Excessive competition	Poor planting technique	Treated trees lived	Other	Total	Total cases sampled[1]
Southern pine plant bare land		14	1	4	4	1		8	32	106
Southern pine site preparation and plant	2	30		5	18	2	3	5	65	208
Southern pine and oak-pine precommercial thin and release					3		3	3	9	27
Southern pine and oak-pine cull tree removal							3	2	5	25
Southern pine and oak-pine site preparation for natural regeneration	1	4			4		2	1	12	16
Northern pine and spruce-fir plant bare land				2	1				3	23
Northern pine and spruce-fir site preparation and plant		1			2			2	5	32
Northern pine and spruce-fir precommercial thin and release					1		1	2	4	30
Northern pine and spruce-fir prune								3	3	21
Oak-hickory precommercial thin and release								3	3	18
Oak-hickory cull tree removal							1	4	5	24
Maple-beech-birch precommercial thin and release							1	3	4	56
Maple-beech-birch cull tree removal								1	1	24
Miscellaneous all practices		2		1	2			4	9	27
Total	3	51	1	12	35	3	14	41	160	637

[1] Post-stratification.

Table 32. TSI-deadened basal area removed from the site in Eastern 1979 FIP cases.

Species group and practice	Deadened basal area per acre		Percent of basal area utilized
	Total	Utilized	
	(square feet per acre)		
Southern pine and oak-pine precommercial thin and release	24	5	21
Southern pine and oak-pine cull tree removal	25	4	16
Northern pine and spruce-fir precommercial thin and release	29	9	31
Oak-hickory precommercial thin and release	16	6	38
Oak-hickory cull tree removal	15	3	20
Maple-beech-birch precommercial thin and release	29	13	45
Maple-beech-birch cull tree removal	21	14	67
Miscellaneous	4	1	25
Average	21	7	33

Table 33. Percent of 1974 FIP treated acres retained by region and tract size class.

Region	Tract size class (acres)					All sizes
	1-10	11-20	21-40	41-80	81+	
South	92.9	93.4	92.0	91.0	94.3	92.3
North	94.4	96.9	98.3	92.6	100.0	96.5
Plains/Rockies	86.0	100.0	100.0	100.0	—	96.7
Pacific Coast	92.2	91.4	96.9	100.0	—	94.6
US	93.4	95.3	94.0	91.6	96.4	93.9

Table 34. 1979 FIP's proportion of suitable nonindustrial private forest land managment opportunities.

Region[1]	Suitable opportunities[2]		Acres treated by 1979 FIP		Percent covered by FIP	
	TSI	Reforestation	TSI	Reforestation	TSI	Reforestation
	(thousands of acres)		*(thousands of acres)*			
North	22,971	7,401	74	12	0.32	0.16
South	22,403	65,613	36	192	0.16	0.29
Plains/Rockies	64	73	*	1	0.02	1.37
Pacific Coast	2,774	3,788	4	7	0.14	0.18
Total	48,212	76,875	114	212	0.24	0.28

*Less than 500 acres

Note: Totals do not add due to rounding.

[1] See figure 1.

[2] Opportunies for forest management practices on nonindustrial private forest lands that will return a 4 percent interest rate or greater. Source: Forest Industries Council: Forest Productivity Report. National Forest Products Assn., Washington, D.C. 1980.

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