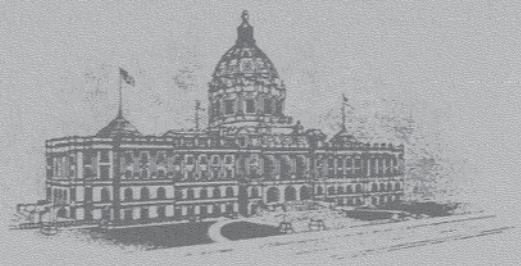
EVALUATION OF STATE TIMBER SALES

February 19, 1982

PROGRAM EVALUATION DIVISION
Office of the Legislative Auditor
State of Minnesota



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PREFACE

In June 1981, the Legislative Audit Commission directed the Program Evaluation Division to conduct an evaluation of the Department of Natural Resources' timber sale program. Legislators were concerned about the prices charged by the state for its timber, the ability of different sale methods to produce state revenues, and the adequacy of timber sale procedures. Accordingly, our study focused on differences between the auction and informal timber sale methods, the quality of timber appraisals, the accuracy of timber sale data, and the overall management of the program. In order to place Minnesota's program in a larger perspective, we examined timber sale policies and procedures in certain other states and jurisdictions.

We would like to thank employees of the Forestry Division for their assistance and cooperation during the course of this study. In addition, we would like to thank our consultant, Dr. Alan Ek of Forestronics, Inc., for help in conducting our appraisal experiment and for his expert advice.

This study was directed by Roger Brooks. Major research components were conducted by Sherry Enzler and Gerald Cathcart. Additional assistance was provided by Kevin Stroup, an intern from Southwest State University.

Gerald W. Christenson
Legislative Auditor

James R. Nobles
Deputy Legislative Auditor for
Program Evaluation

PROGRAM EVALUATION DIVISION

The Program Evaluation Division was established in 1975 to conduct studies at the direction of the Legislative Audit Commission (LAC). The division's general responsibility, as set forth in statute, is to determine the degree to which activities and programs entered into or funded by the state are accomplishing their goals and objectives and utilizing resources efficiently. A list of the division's studies appears at the end of this report.

Since 1979, the findings, conclusions, and recommendations in Program Evaluation Division reports are solely the product of the division's staff and not necessarily the position of the LAC. Upon completion, reports are sent to the LAC for review and are distributed to other interested legislators and legislative staff.

Currently the Legislative Audit Commission is comprised of the following members:

Senate	House
Donald Moe, Chair	Ann Wynia, Vice-Chair
Robert Ashbach	Lon Heinitz, Secretary
John Bernhagen	John Clawson
Jack Davies	William Dean
Frank Knoll	Shirley Hokanson
Steven Lindgren	Joel Jacobs
Robert Tennessen	Randy Kelly
Gerald Willet	Tony Onnen

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EXECUTIVE SUMMARY

Until 1931, the State Auditor conducted timber sales for the State of Minnesota and the Surveyor General conducted all scaling, or measuring, of harvested timber for billing purposes. Today all timber sale functions, including the identification of saleable tracts, appraisals, supervision of harvests, scaling, and billing, are the responsibility of the Forestry Division of the Department of Natural Resources (DNR). In FY 1980, DNR sold more than 500,000 cords of timber worth an estimated $3.6 million. In the same year, the budget for the Forestry Division was approximately $17.1 million, of which about $1.5 million was spent to administer timber sales.

This report presents our evaluation of the Forestry Division's performance in conducting timber sales. We also discuss selected timber sale policies. Our research was designed to address the following questions:

- Timber Sale Methods: How often are the auction or informal timber sale methods used by DNR? Which method yields the greatest net revenue for the state?

- Timber Sale Procedures: How do DNR's timber sale procedures, costs, and revenues compare with those of other public jurisdictions?

- Timber Appraisals: How accurate and consistent are DNR's timber appraisals?

- Timber Prices: How adequate are DNR's methods of setting prices for state timber? How do Minnesota's timber prices compare with those of other states?

- Information Management: How efficient is DNR's timber information management and data collection capability?

In the course of our research, we reviewed timber sale data compiled by DNR, collected information on timber sales from other states and jurisdictions, collected an independent sample of timber sale permits for the period 1970-81, and conducted a controlled experiment of the department's timber appraisal capabilities.

We acknowledge that the state's timber sale program is designed to respond to competing interests and to reach diverse goals, some of which may be in conflict with one another. Maximizing revenues in a given year, for example, may be difficult to reconcile with the state's goals of ensuring a steady supply of timber for industry and providing a source of livelihood for independent loggers. However, we hope that our analysis clarifies these issues and provides alternatives for the state.

In our report we provide a sketch of the history of timber sales in Minnesota and a description of the main features of the current program. Our major findings and conclusions are noted in this summary. We conclude with our specific recommendations to the Legislature and to DNR for improving the state's timber sale program.

A. FINDINGS AND CONCLUSIONS

1. TIMBER SALE METHODS IN MINNESOTA

The State of Minnesota currently uses three separate methods to sell its timber: the regular auction method, the intermediate (or smaller) auction method, and the informal method. Under the regular auction method timber stands valued up to $20,000 are sold to the party with the highest bid. Bidding begins at the appraised value of the timber and in oral auctions (the commonest type) increases at five percent increments.

The intermediate auction method, used between 1955 and 1967, was reintroduced in 1981. It allows DNR to auction smaller tracts (under $7,000 in appraised value) to qualified logging operators; large companies are excluded from bidding. Because this method was so recently reinstalled, we did not have an opportunity to evaluate it.

The informal method allows DNR to sell timber in small tracts (appraised value of less than $3,000) without a public auction. Under this method timber is sold at the appraised price.

Our review of DNR's timber sale documents, including a detailed study of a sample of 564 timber permits sold between 1975 and 1981, has produced these findings:

- Since 1955 the state has sold about 2/3 of its timber by the informal method.

- Since the early 1950s, the proportion of timber sold informally has increased, reaching a peak in the 1960s and declining somewhat in the 1970s.

- Minnesota uses the informal sale method far more often than any other public jurisdiction we studied. Wisconsin sells only about five percent of its timber informally and Michigan only about ten percent.

- The average revenue from auction sales over the past 25 years was $4.87 per cord, while that from informal sales was just $3.22 per cord. We believe that the higher rate of revenue from auction sales is primarily due to the competitive bid-up of timber prices in auctions, not to differences in the value of species sold by the two methods.

- The auction sale method appears to be a more powerful generator of net revenue for the state even though auction sales may cost more to administer than informal sales. If all 1980 informal sales had been sold at auction at the average auction price for 1980, the state might have received an additional $700,000 in timber sale receipts.

- Auction competition has increased over the past 25 years. About 50 percent of auction tracts sold in the 1970s were bid-up beyond the appraised price as compared with just 10 percent during the 1950s and 1960s.

- Despite a 1975 legislative directive, DNR has not enacted administrative rules regarding the sale of state timber. In addition, the department has not established formal policies and not provided formal guidelines to its field staff concerning the proportion of timber to be sold by either sales method.

2. TIMBER SALE PROCEDURES

Minnesota's timber sale procedures are outlined in law and more specifically detailed in DNR's timber sales and scaling manuals. We studied most of DNR's major sale procedures, including appraising, scaling, and collecting payments for state timber.

The objective of a timber appraisal is to estimate the monetary value of a sale stand. This is accomplished by establishing a rate per cord for each species and by estimating the total volume of each species in the sale tract. Some timber is simply sold at the prices established in the appraisal. From our sample of timber sale permits, we estimate that:

- About 24 percent of Minnesota's timber volume between 1975 and 1981 was "sold as appraised" with no measurement or "scaling" after the timber was cut.

Most timber is scaled after the harvest--either by a consumer weigh scale, or by a forester who examines the cut and stacked timber. Scaling provides a direct measure of timber volume that can be substituted for the volume estimate made in the appraisal. The sale price is determined by multiplying the rate per cord established in the appraisal (or as bid-up) with the number of cords scaled, or measured, after the harvest. Sold as appraised sales are paid in advance, scaled sales require a post-harvest billing process.

In the course of our review of DNR's timber sale procedures, we learned that:

- Although DNR requires individual loggers to comply with specified cutting requirements, loggers in Minnesota are not required to submit cutting plans as loggers are in many other jurisdictions.

- DNR has not developed specific appraisal techniques or provided guidelines for its appraisers. As a result, DNR appraisers use a variety of appraisal methods.

- In approximately 54 percent of all scaled timber sale transactions between 1975 and 1981, the appraisal and scale were conducted by the same DNR forester. In these cases the scale did not serve as an independent check on appraisal accuracy.

- Approximately 21 percent of all permit holders between 1975 and 1981 requested and received extensions. Since almost no extension requests were rejected, DNR's extension policy may be too lenient.

- There is little evidence that loggers delay harvesting sale tracts in hopes of receiving a higher price from timber consumers. Between 1975 and 1981, the average informal permit was active for just 15 months and the average auction permit was active for 19 months.

3. APPRAISAL AND SCALING QUALITY

Appraisal and scale accuracy are important in all timber sales. For most sales, scaling determines tract volume and appraisals set the rate per cord; in "sold as appraised" sales, both the volume and rate are set in the appraisal.

Our review of DNR's timber appraisal program revealed that:

- DNR does not have an adequate reappraisal and inspection program.

- DNR does not have a clear and complete picture of the degree to which timber appraisals are being done in an accurate and consistent manner.

- Using scale results as a basis for verification, DNR's timber appraisals appear to be frequently inaccurate. From a sample of cases between 1975 and 1981, we found that the volume estimates for about one-half of all sales were underestimates of 10 percent or more.

In the course of our study, we conducted a test of the department's appraisal capability. We selected a representative sample of 41 qualified DNR appraisers and gave them instructions to conduct independent appraisals of two timber tracts. We found that:

- DNR appraisers gave widely varying estimates of timber volume and timber values in the two test tracts.

The estimates appeared to vary because appraisers:

- used different methods to pick sample plots from the test tracts,
- selected too few sample plots,
- used different methods to calculate timber volumes,
- used different methods to estimate tree defects,
- made different estimates of tract area size, and
- developed different species and product type specifications.

We conclude from our test of DNR's appraisal capabilities that there is much the department should do to standardize its appraisal methods, and to provide better training and guidance to its field staff.

DNR's program to check the accuracy of scaling appears to be operating without major deficiencies but we found two flaws:

- DNR does not use a systematic or random method for selecting the scales which are to be checked. In addition, the work of some scalers is not reviewed annually.
- Although state law prohibits a permit holder from scaling timber which he has purchased from the state unless supervised by DNR, 19 percent of all consumer scales between 1975 and 1981 were conducted by the permit holder with only an annual formal review by DNR.

4. TIMBER PRICES

In our study we examined the procedures used by DNR appraisers to determine a price rate for the timber in a sale tract and we compared Minnesota's timber prices with those of other jurisdictions in the Great Lakes region.

We found that:

- Although there have been recent improvements, DNR's methods of setting base stumpage prices are still highly subjective, relying extensively on impressionistic input from division field and office staff.
- The application of price guide factors (adjustments in base prices depending upon the condition of the stand and the timber market) by appraisers is highly subjective and variable.

- Timber market conditions are considered twice in the pricing process--both in the setting of base stumpage prices and in the price guide adjustments.

- In general, Minnesota's base stumpage prices have risen more slowly than national lumber prices over the past 10 years.

- Although there are variations among species, Minnesota's base stumpage prices are not significantly higher or lower than those in other Great Lakes states or in national forests in Minnesota.

5. INFORMATION MANAGEMENT

During this study we encountered many difficulties in using the division's computerized files of timber sale data. Even though the division relies on these files to compile periodic reports--including an annual report to the Legislature--indicating the volume and value of timber sold and scaled in each district of the state by species and product type, we found these data to be incomplete and of questionable accuracy. Although some problems can be traced to weaknesses in the Department of Administration's Information Services Bureau (ISB), many problems have their origins within DNR.

We found that:

- The overall planning for timber sales information systems has been haphazard and piecemeal. The division has not succeeded in managing or linking its systems, such as the timber sale permit system and the inventory system.

- The division did not use standardized systems development methodology nor provide support documentation for any of its computerized systems.

- The general lack of standard procedures for data entry and verification has resulted in data files which are of questionable accuracy.

- The division's data processing systems are not extensively used for timber sales or forest resource management. Given the shortcomings of these systems, extensive reliance on them by management would, at present, be ill advised.

B. RECOMMENDATIONS

The following is a summary of our recommendations to DNR and to the Legislature regarding the state's timber sale program:

- We recommend that DNR develop a formal policy regarding the use of the informal, regular, auction, and intermediate auction methods, including guidelines to field staff to assist in determining under what conditions each method should be used and setting volume targets for each method.

- We think the Legislature should consider various strategies, including the possibility of limiting informal sales to a specific proportion of all sales, to improve the overall rate of return received by the state from its timber sales.

- The Division of Forestry should explore ways to develop a systematic or random method of selecting scales for check scale and ensure that all scalers are monitored periodically.

- The Division of Forestry should review its permit extension policy to ensure that it is consistent with the interests of the state.

- While there are problems associated with both appraisals and scaling, retaining both ensures that each serves as a check on the other. Until appraisal quality is significantly improved, we think that DNR should reduce the number of "sold as appraised" sales and continue to scale most timber.

- We think that DNR should adopt a policy to ensure that--whenever possible--DNR foresters do not scale timber from a sale tract which they have previously appraised.

- The Legislature should require DNR to establish detailed appraisal standards, including guidelines to help appraisers decide what methods to use under different field circumstances. Such standards should include a specification of the maximum allowable appraisal sampling error, and the procedures for determining tree defect allowance, tract area estimation, product volume estimation, and product value determination.

- We recommend that DNR establish an improved program of reappraisals and inspections. Reappraisal standards should be established and results should be systematically reviewed and summarized statewide each year.

- We recommend continued use of DNR's appraisal workshop to improve the Forestry Division's appraisal capabilities. However, we think the division should seek additional input from outside experts such as staff from the University College of Forestry. In addition, we think that experienced appraisiers as well as novices might benefit from such a workshop experience.

- The Division of Forestry should continue to reduce the role of subjective judgment in the setting of base stumpage prices.

- The Division of Forestry should establish stringent guidelines to ensure that price guide factors are applied uniformly and consider eliminating those factors which are applied least consistently.

- The Division of Forestry should use a standardized systems development methodology in all new systems projects; all systems should be documented.

- DNR should review all aspects of data collection, data entry, editing, and report generation, and institute procedures that will ensure the accuracy of timber sale data.

INTRODUCTION

From its earliest days, Minnesota has been renowned for its forests. At the time of statehood, about two-thirds of the state was covered with forest--pine in the north, hardwoods to the south. Logging, one of the mainstays of its early economy, brought people and money to Minnesota and produced the raw materials that built thousands of midwestern communities.

Today, only about one-third of the state is forested and the timber industry, while still important, is less significant to the state than it once was. In 1977, about 12,800 persons were employed in lumber and wood products manufacturing, about 16,400 in paper and allied products manufacturing, and an estimated 10,000 in logging. This represents less than three percent of all state employment. Nevertheless, the total value added by lumber, paper, and other wood products manufacture was estimated in 1977 to be somewhat over $1 billion.[1]

In addition to timber production, today's forests have many other demands placed upon them, including recreation, wildlife management, and the preservation of unique ecosystems. The forests owned by the state, some 4.6 million acres, must therefore serve many diverse, and often conflicting, purposes. The Legislature has sought to balance these diverse interests and to define the purposes and uses of the state's forests.

However, recent concern has centered on the overall productivity of Minnesota forests. The Legislative Commission on Minnesota Resource (LCMR) has studied the problem. In 1978, a consultant's preliminary report outlined the need for a broad-based study of the state's timber resources. The report observed that "only a fraction of the economic potential of the Minnesota forests is being realized. Also, the non-timber uses of forests could be substantially increased."[2]

Ultimately, LCMR contracted with George Banzhaf and Company to conduct a major survey of the state's timber resource and to outline state policy options in areas such as timber supply, industry organization, scientific information and data, and future forest product demand. The study was completed in August 1980.[3] A Joint

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[1] U.S. Census of Manufacturers.

[2] Jaakko Pöyry, Broad-based Study on Forestry in Minnesota: Proposed Terms of Reference, consultant report prepared for the Legislative Commission on Minnesota Resources (1978), p. 1.

[3] George Banzhaf & Co. (Milwaukee), Draft Final Report, Minnesota Timber Resource Study, consultant report prepared for the Legislative Commission on Minnesota Resources (1980).

Select Legislative Committee on Forestry was created in June 1981 to review the findings of the Banzhaf study and to develop a comprehensive Forest Management Act for the 1982 legislative session.

At the same time in 1981, the Legislative Audit Commission, concerned about the management efficiency of the Department of Natural Resources' Forestry Division and the revenue generated for the state by timber sales, directed the Program Evaluation Division to conduct an evaluation study to examine timber sales policies and practices. Specific questions were raised about the amount of revenue generated by the informal method of selling state timber (on a first-come, first-served basis at appraised prices) as compared with the auction method (in which there is competition among potential purchasers). There were other questions concerning Minnesota's base stumpage prices as compared with neighboring states. In response, we designed a study to focus on the following questions:

- How do DNR's timber sale procedures, costs, and revenues compare with those of other public jurisdictions?
- Which timber sale method (informal or auction) yields the greatest net revenue for the state?
- How accurate and consistent are timber appraisals as performed by DNR?
- How adequate are DNR's methods of setting a price for the timber to be sold by the state?
- How efficient is DNR's information management and data collection capability?

Our preliminary research convinced us that, while we lacked the technical expertise of foresters, we could gather certain relevant information and consider some of the broad policy issues.

During the course of our study we did the following:

- We interviewed DNR foresters in St. Paul and in several field locations.
- We followed closely the work of the Joint Select Legislative Committee on Forestry and accompanied committee members on several visits to timber management and wood products processing sites around the state.
- We reviewed relevant literature, including the Banzhaf study and other recent policy studies.
- We reviewed information and data on timber sales compiled by DNR.
- We collected information and data on timber sales from several other states, federal jurisdictions, and Minnesota counties.

- We collected data from a carefully selected sample of more than 700 timber permits for the period 1970-81 to examine various aspects of the sale procedure in Minnesota.

- We conducted a timber appraisal experiment involving 41 DNR appraisers and two test tracts of timber to determine the accuracy and consistency of timber appraisals as conducted by DNR.

In general, this report is organized so as to facilitate an analysis of the major issues outlined above. In Chapter I we describe the DNR's Forestry Division and discuss the scope and objectives of the state's timber sale program. Chapter II provides a comparison of the two principal methods of sale in Minnesota, the informal method and the auction method. Chapter III presents an overview of the state's timber sale procedures and indicates how Minnesota's timber sale policies and procedures differ from those in other jurisdictions. Chapter IV presents our findings concerning the accuracy and reliability of DNR's timber appraisals, and Chapter V focuses on the method used by the state to set timber prices and compares Minnesota's timber prices to those in other jurisdictions. Finally, Chapter VI presents our findings concerning DNR's management information systems.

In conducting this study we have proceeded cautiously, recognizing both the complexity of this policy area and our own limitations. We acknowledge that there is no consensus regarding the ultimate goals and purpose of the state's forestry and timber sales programs and that many diverse groups have different economic or political stakes in forestry policy. We further acknowledge that the interests of these diverse groups may not be fully reconcilable and that the goal of increasing timber sale revenues may be incompatible with the goal of ensuring a healthy and balanced timber economy in the state. Nevertheless, we have proceeded under two major assumptions: first, that the management efficiency of DNR's timber sale program is a concern that cuts across these diverse interests, and second, that the policy choices which must be made by the Legislature may be illuminated and clarified by the kind of third-party fact-gathering and review we have striven to provide in this report. We hope that this report will prove useful both to the Forestry Division and to the Legislature.

I. TIMBER SALES AND THE DIVISION OF FORESTRY

The Division of Forestry of the Minnesota Department of Natural Resources (DNR) is the state agency responsible for managing the timber resources owned by the State of Minnesota and protecting public and private forest resources throughout the state. The division conducts sales of timber from state owned land, plans for the reforestation of cut-over land, provides technical assistance to private timber owners, provides forest fire protection for 22.8 million acres of forest land, and controls insects and disease for 19 million acres. In addition, the division operates two state forest nurseries to provide seedlings to private individuals, forest industries, and public agencies for conservation plantings. In FY 1980, the division spent $17.1 million, earned $4.7 million in revenues, and employed 402 persons.

The State of Minnesota is the largest single owner of commercial forest land in Minnesota. Its holdings, approximately 3.3 million acres, represent about 19 percent of all such land in the state. Approximately equal proportions of commercial forest land are owned by counties and municipalities, farmers, various units of the federal government, and miscellaneous private owners. But since the state's forest land is managed exclusively by a single entity--the Division of Forestry--the State of Minnesota is capable of having perhaps the greatest impact on the forest economy in the state. This fact, coupled with the public trust placed in the Division of Forestry justifies a detailed study of DNR's timber sales program.

A. HISTORY AND GOALS

Timber sales were initially the responsibility of the State Auditor.[1] Acting in his role as the state land commissioner, the Auditor managed state timber lands, conducted timber auctions, and maintained financial accounts. In the 19th century, the heyday of Minnesota's logging industry, the state's virgin White Pine forest was considered a resource to be exploited. Little thought was given to resource management or reforestation. The State Auditor was not a professional forester; he simply oversaw the harvest of timber to minimize conflicts among loggers and to protect the state's financial interest.

At the outset, the technical aspects of timber sales--timber appraising and post-harvest scaling--were handled by the Surveyor General of Logs and Lumber. In 1885, the appraisal function was turned over to the State Auditor, and in 1931, all aspects of the sale

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[1] A good discussion of the history of Minnesota timber sales can be found in Alvin R. Hallgren's Development of Timber Sale Policies and Practices on State-Owned Land in Minnesota, (PhD dissertation, University of Minnesota, 1967).

process, except scaling, were transferred to the newly created Department of Conservation (now the Department of Natural Resources). Scaling by the Surveyor General was gradually phased out; the office was abolished in 1967.

The history of timber sales in Minnesota is peppered with instances of abuse and improprieties. Many of those entrusted with the authority to manage and sell the state's timber resources have not always done so with the best interests of the state in mind. The worst abuses were in the 19th century. In 1874 the state land commissioner was accused of selling timber at below market prices and conspiring to stifle auction competition. In 1894 further allegations of wrongdoing led to a study by the Pine Land Investigating Committee, appointed by the Legislature. This committee found many instances of corruption and lax enforcement of existing timber sale laws among timber appraisers and scalers. With each new scandal, the state's timber sale statutes were further refined and reformed.

By the time timber sales became the responsibility of the Department of Conservation, concern about outright abuse had largely abated. More recent criticism of timber sale activities has focused on management efficiency and policy issues arising from the application of legislative mandates. A 1965 study of timber sales by the Office of the Public Examiner (the forerunner of the Office of the Legislative Auditor) revealed little wrongdoing for personal gain by DNR foresters, but criticized some for using illegal procedures in the sale of state stumpage. Some foresters were found to be dividing up auction tracts into smaller tracts so that they could be sold informally at appraised prices. Others were found to be allowing a single operator to harvest timber from more informal tracts than the law allowed.

Two significant trends characterize the changes in the state's timber sale process in the 20th century. First, forestry management in Minnesota has become increasingly professionalized. Professional forestry in Minnesota grew out of the realization that the state's forest resource was limited and had to be husbanded. In the late 1800s, forest fires did considerable damage to the dwindling pine resources and caused significant human losses. The Chief Fire Warden's Office was created in 1895. By 1911, this post evolved into the State Forester's Office which, in turn, became the Forestry Division of the Department of Conservation in 1931. The College of Forestry, founded at the University of Minnesota in 1903, began educating professional foresters trained in scientific techniques of forest management. In the hands of such professionals, state timber sales gradually became a tool of efficient forest management.

Second, the professionalization of forestry in Minnesota resulted in the gradual elimination of the built-in system of interagency checks and balances that once characterized the timber sale program. For most of the history of Minnesota's timber sales, personnel in one agency (State Auditor or Forestry Division) set the rate per cord of timber to be sold while personnel in another agency (Surveyor General) determined the volume of timber which had been cut from a tract. The final amount owed to the state for the timber

was based on these independent determinations. But as forestry professionals in the Division of Forestry acquired increasing responsibilities for all aspects of the sale process, authority for timber sales became concentrated in this single unit of state government.

The general goal of the Division of Forestry, as expressed in DNR's most recent biennial report, is to "achieve effective management and protection of Minnesota's forest environment." The division hopes "this will provide improved wildlife habitat, quality forest recreational opportunities, increase yields of wood fiber, and land and water conservation practices that will contribute to the economic and social well-being of Minnesota citizens."[2]

The division's goals in selling timber are multiple and complex. In general, timber sales may be viewed as a management tool, but they may also work to the benefit of numerous private interests. In 1931, the Director of Forestry issued a policy statement indicating that it was the goal of the state to:

- "manage and establish (merchantable timber) so as to better sustain local industry, provide winter employment for surplus farm labor and teams, and a market for produce."
- "cut and manage the forest in such a manner as to make it safer from fire, disease, and insect infestation."
- "secure the greatest cash revenues and returns from all possible sources not inconsistent with the best management of the forest."[3]

In a 1954 policy statement, DNR noted that, ". . . the state aims to make forest lands a source of income to as many forest industries and wood workers as possible and to encourage new wood using industries to locate in the timbered areas of the state." It was the policy of the state, according to this statement, that, ". . . sales will be made for the purpose of improving timber stands, game habitat and food conditions, and at the same time providing employment for as many local people as possible."[4]

More recently the Division of Forestry, in its 1977 Long Range Forest Management Plan, identified the goal of state forest management as " . . . the development and implementation of programs which will improve the resources and productivity of forest lands . . . to meet projected resource needs." The diversity of these needs is reflected in the multiple programs developed by the division to balance the conflicting interests of all parties involved--including lumber producers, pulp and paper companies, individual

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[2] DNR, Biennial Report (1980-81), p. 23.

[3] Quoted in Hallgren, op.cit., p. 197.

[4] Ibid, p. 201-2.

private loggers, fuelwood users, and private forestry professionals--as the division strives to increase the harvest of merchantable timber from 500,000 to 1,000,000 cords per year by the year 2000.

B. ORGANIZATION AND BUDGET

The Division of Forestry is one of the chief operating units of the Department of Natural Resources, along with the Land Bureau, and the Divisions of Minerals, Waters, and Fish and Wildlife. The division is organized by function (Forest Management, Forest Resources and Products, Fire Control, and Operations and Planning) and by region (with regional headquarters at Bemidji, Grand Rapids, Brainerd, New Ulm, Rochester, and St. Paul). Figure 1.1 shows the general organization of the division as of June 1981.

The division's St. Paul staff is responsible for developing, coordinating, and administering division activities. These employees develop programs, establish guidelines, monitor overall activities and, with regard to timber sales, collect and compile data, retain records, and perform billing.

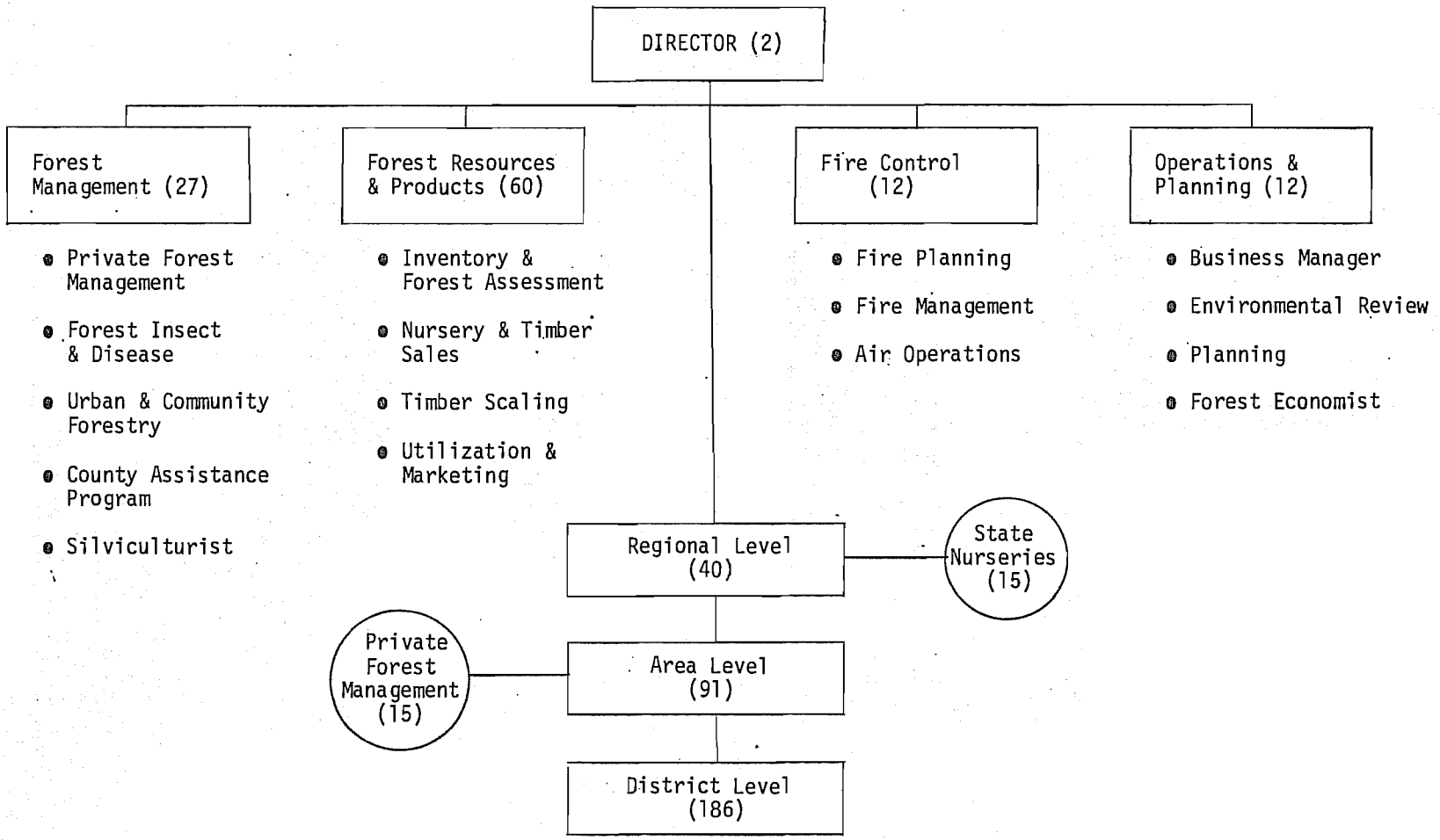
The six regional field offices are in charge of implementing daily forest management activities, including fire control, insect and disease identification and control, timber sales, and reforestation. As shown in Figure 1.2, each region is divided into areas (21 statewide), and each area is further subdivided into districts (85 statewide). Additional field units include the Northern Service Center in Grand Rapids which is headquarters for the division's scaling and inventory operations, and nurseries at Badoura and Willow River. Altogether, out of 469 funded positions in June 1981, 45 were located in St. Paul and 424 outstate. (See Table 1.1)

Most of the basic forestry management activities take place at the district level, where there is usually a district forester and an aide, or at the area level, where there are generally two to four foresters assisted by two to four technical or clerical aides. Timber sale activities performed by field personnel at these levels include locating saleable timber, conducting timber appraisals, selling the timber informally or in an auction, monitoring the logging process, and establishing the quantity and value of timber that has been removed (scaling).

Overall, the budget for the Forestry Division in the two-year period, 1979-80, was approximately $26.77 million. (See Table 1.2) According to DNR, about $2.78 million of that was spent on timber sale administration. Fire fighting expenditures were particularly low in 1979 because of wet weather and forest management intensification increased in 1980 with the influx of $3 million in federal BWCA payments to the state. During this two-year period, approximately 64 percent of the division's revenues came from the state's

FIGURE 1.1

DNR DIVISION OF FORESTRY ORGANIZATION (June 1981)

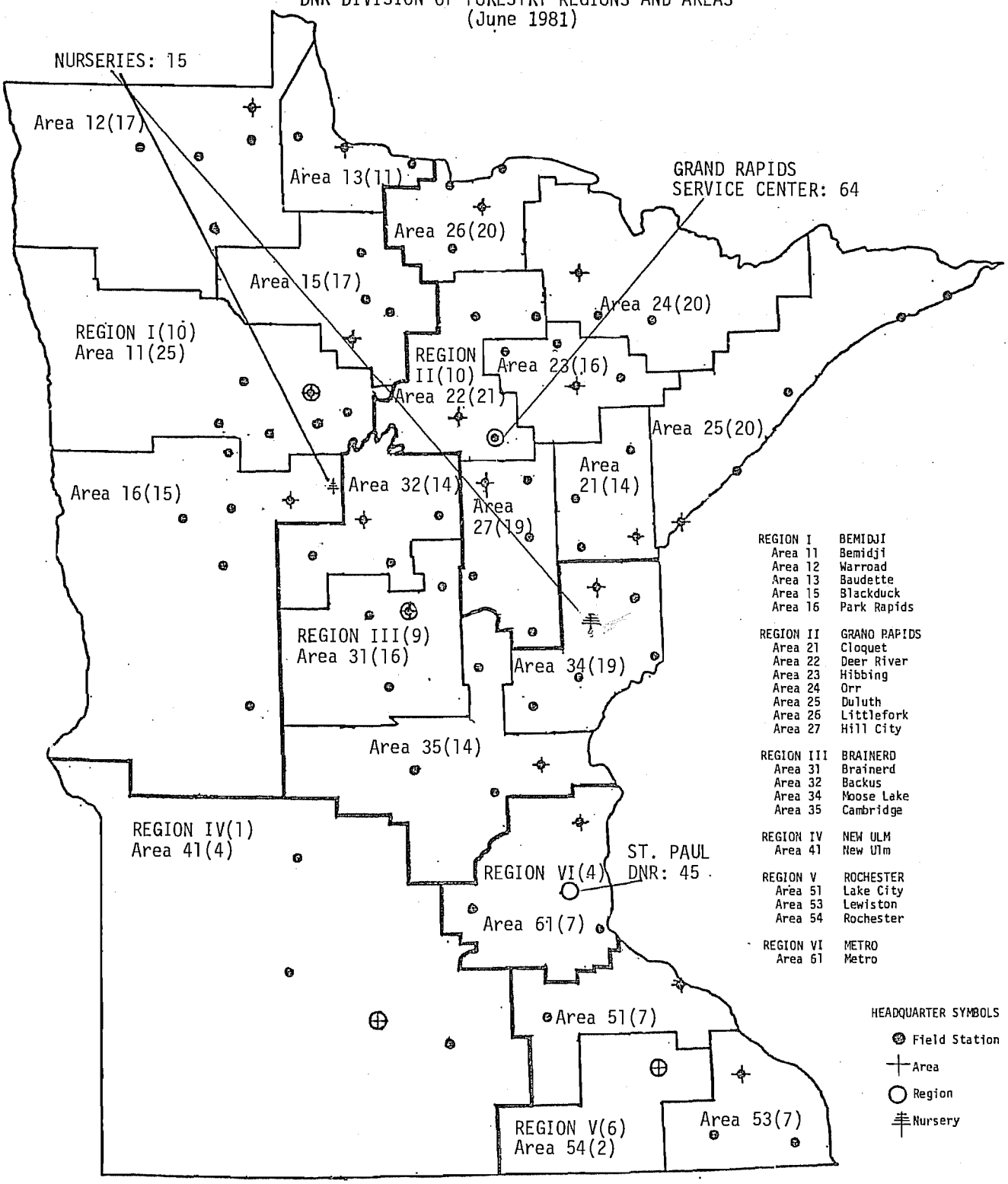


SOURCE: DNR

Note: Numbers indicate approximate number of professional and clerical positions in each unit.

FIGURE 1.2

DNR DIVISION OF FORESTRY REGIONS AND AREAS[1]
(June 1981)



[1]Numbers in parentheses indicate approximate numbers of staff.

TABLE 1.1

DNR DIVISION OF FORESTRY

Funded Positions
(June 1981)

	St. Paul	Field	Grand Rapids Service Center	Nursery	Total
Professional	24	302	44	11	381
Clerical	13	29	4	2	48
Vacancies	8	14	16	2	40
	45	345	64	15	469

SOURCE: DNR

TABLE 1.2

DIVISION OF FORESTRY EXPENDITURES

FY 1979 and 1980

	1979 ($ millions)	1980 ($ millions)	Total ($ millions)
General Operations and Management	$6.88	$ 7.26	$14.14
Timber Sale Administration	1.24	1.54	2.78
Fire Fighting	.63	3.36	3.99
Forest Management Intensification	.82	4.67	5.49
Special Projects (LCMR)	.05	.32	.37
TOTAL	$9.62	$17.15	$26.77

SOURCE: State of Minnesota, Detailed Biennial Budget Proposal, 1981-83.

general fund, 21 percent from the federal government, 13 percent from special revenues (including the consolidated conservation fund), and two percent from the Legislative Commission on Minnesota Resources (LCMR).

Between 1977 and 1980, DNR estimates that the Forestry Division spent a total of $61.4 million. About $4.72 million (eight percent) was expended for timber sale administration. At the same time, the division managed to sell approximately 1.62 million cords of timber from state lands. Therefore, over the four year period, the division's timber sale administrative costs were about $2.91 per cord of timber sold.

Table 1.3 provides estimates of the timber sale budgets of several other jurisdictions, including the U. S. Forest Service, 12 Minnesota counties which sell timber, Michigan, and Wisconsin. These data are highly tentative and subject to interpretation. The criteria for determining administrative costs were the same in each case; reforestation costs are not included. However, the species mix varies from one jurisdiction to another and since some species may be easily sold in greater volumes than others and because local markets vary, the costs per cord sold may vary considerably. In addition, the total volume sold by each jurisdiction may affect the average costs per cord. Wisconsin, for example, sells relatively little timber at the state level; Wisconsin's counties sell the bulk of its timber. In any case, these data suggest that Minnesota's administrative costs for timber sales have been about average for the region.

TABLE 1.3

COMPARATIVE ADMINISTRATIVE COSTS FOR TIMBER SALES

FY 1977-1980[1]

	Total Forestry Budget ($ millions)	Timber Sale Administrative Budget ($ millions)	Total Volume of Timber Sold (cords)	Timber Sale Administrative Costs per Cord
Minnesota	$61.4	$4.72	1.62	$2.91
Wisconsin[2]	10.1	.83	.23	3.61
Michigan	21.6	5.01	1.81	2.77
U.S. Forest Service (Chippewa)[3]		.25	.27	.92
U.S. Forest Service (Superior)	33.2	2.48	.57	4.35
Bureau of Indian Affairs (Minnesota)	3.5	.90	.13	6.92
Minnesota Counties	5.2	1.41	.72	1.96

[1]Unaudited estimates provided by each jurisdiction.

[2]Data missing for 1980.

[3]Data missing for 1977 and 1978; total forestry budget not compiled in manner useful for comparison.

II. TIMBER SALES METHODS IN MINNESOTA

The State of Minnesota currently uses three distinct methods to sell its timber: the regular auction method, the intermediate (or smaller) auction method, and the informal method. Each has a unique history and each plays a unique role in the state's timber sale program. In this chapter we review the development and characteristics of these sale methods and assess the relative capabilities of the regular auction method and the informal method to generate revenue for the state. Since the intermediate auction method has been used for only a brief period, we discuss it along with regular auctions.

In the course of our analysis we reviewed historical accounts of Minnesota's timber sale programs, reviewed documents such as DNR's Timber Sales Manual and surveyed other states and governmental agencies to assess and compare the methods which they use to implement their own timber sales program. In addition, we examined a representative sample of Minnesota timber sale permits from DNR's archives. This sample covered the period FY 1970-1981 for auction permits and FY 1975-1981 for informal permits. To facilitate comparison between the two major sale methods, we have generally limited our analysis for all permits to the period FY 1975-1981.

A. REGULAR AUCTION METHOD

1. HISTORY

In 1863, the Legislature authorized the State Auditor to sell state timber stumpage at public auctions. The Surveyor General conducted pre-sale appraisals to establish a starting price for the bidding and managed post-harvest scaling operations to determine the volume of timber and the amount of money owed by the logger to the state. But this first timber sale law did little more than give the State Auditor the authority to sell timber when he thought it was in the best interests of the state. It soon became clear that the Legislature had to define more precisely the terms under which timber could be sold.

The first major changes came in 1877 when the Legislature required a surety bond equal to double the amount of the selling price to the timber tract before cutting could commence. This was designed to ensure that the state would be paid for its timber. Eight years later, the Legislature required a $100 down payment to be paid at the time of the auction and forfeited after 30 days if the surety bond was not put up. In 1895 the Legislature changed the down payment to a deposit equal to 25 percent of the appraised value of the tract. The down payment served as a guarantee from the successful bidder that he would actually harvest the sale tract.

The down payment plus the surety bond, however, forced the logger to put up approximately 225 percent of the value of the timber tract before harvest. He was, of course, refunded any amount over-paid after harvest and scaling, but the requirement placed a heavy burden on the logger and made it difficult for small operators to qualify for large tracts. Accordingly, in 1967, the Legislature reduced the surety bond requirement to an amount exactly equal to the selling price of the timber and further specified in 1981 that the 25 percent down payment could be subtracted from the surety bond. As a result of these changes, loggers today put up the equivalent of 100 percent of the value of the timber prior to harvest.

Permit duration was first limited in 1895 when the Legislature specified that cutting had to be completed within two seasons with a one-year extension if approved by the Timber Board. In 1925, the Timber Board (later the Executive Council) was allowed to vary the permit duration, so long as the total time with extensions did not exceed six years. Nevertheless, permit duration remained two years for most of the next 40 years. In 1967, the total duration allowed for auction permits including extension was extended to 10 years and in 1975 it was reduced to two years with three one-year extensions permissible.

In order to discourage speculation and to provide an incentive for the logger to harvest a tract soon after buying it, the Legislature in 1913 approved an interest rate surcharge of eight percent on the value of uncut timber for each year an extension was granted. The interest rate was lowered to six percent in 1933 and increased again to eight percent in 1981.

The size of an individual auction sale was not limited until 1895 when the Legislature specified that no sale could exceed one section (640 acres) of timber land. In 1931, the maximum placed on the sale of state forest timber was one section and no greater than $15,000 in appraised value. In 1961, the area limit was eliminated and in 1975 the maximum appraised value permissible for a sale tract was lowered to $7,500. Finally, the dollar limit was raised again in 1981 to $20,000, reflecting the effects of inflation in the timber market.

During most of the state's history, the auction method has been considered the principal technique for selling the state's timber. But large, public auctions do not necessarily ensure equal access for all parties to the state's timber resources. Large tracts, for example, may be priced too high for the small, or part-time, logger. Often the major timber operators may be able to outbid smaller operators even on small tracts.

These concerns led to the development of both the informal sales program, discussed later, and the intermediate auction sales program, first enacted by the Legislature in 1955. Intermediate auctions were held according to regular auction rules except that the maximum appraised value of sale tracts could not exceed $800 and only one permit could be held at a time. Permit duration was for two years with a one-year extension. Because the program never became fully established nor fully utilized, it was dropped in 1967.

A new intermediate auction program was enacted by the Legislature in 1981. Under this program, sale tracts must be appraised at $7,000 or less, permit duration is for one year with two one-year extensions, and no more than four permits may be held by one person at a time. In addition, intermediate auction permits may be held only by persons who employ 20 or fewer employees. The department anticipates that, as this program becomes established, it may succeed in making more timber available to small operators. However, since relatively few of these intermediate sales have been issued to date, we have not had an opportunity to analyze their impact.

2. AUCTION SALES TODAY

Today's auction sale procedures are outlined in Minnesota Statutes Chapter 90. Although all auctions were once held at the State Capitol, today they are held in the county in which the timber tracts are located. Several tracts of timber are offered at each auction sale. From 1979 to 1981, an average of 11 tracts were offered per sale. At least 30 days before the scheduled sale a list of tracts is drawn up and furnished to the appropriate county auditor and prominently posted. In addition, a notice of sale is published for three consecutive weeks in a newspaper in the county. Such notices specify the date and place of the sale, the legal descriptions of the sale tracts, and the method of bidding (oral or sealed bid) to be used.

If the oral auction method is used, the auction is held in a prominent public facility in the county in which the stands are located. The auction is open to the public and any person present is eligible to bid. The auction is conducted by the area or regional forester and a representative of the St. Paul office is often present. Each sale tract is offered individually at the appraised price. If there is competition, bidding proceeds in 5 percent increments over the appraised price. The cutting permit for the tract is awarded to the bidder with the highest total offer for the tract. Tracts not receiving bids are reserved for future auction sales or are later subdivided and sold by the informal method.

If a sealed bid method is used, the prospective buyers submit written bids to the area forestry office on or before the specified closing date for the sale. Bidders are permitted to make separate bids on each species in the sale tract. Bids are opened at a designated time and the bidder with the highest overall offer for each tract is declared the winner.

Figure 2.1 summarizes the current legislative guidelines under which regular and intermediate auctions are held today and compares them with the informal method.

FIGURE 2.1

COMPARISON OF TIMBER SALE METHODS

1982

	Regular Auction	Intermediate Auction	Informal Sales
Maximum Appraisal Value	$20,000	$7,000	$3,000
Required Down Payment	25% of appraised value	25% of appraised value	100% payment of appraised value
Bond Required	Surety bond or equivalent equal to selling price minus down payment	Surety bond or equivalent equal to selling price minus down payment	None
Permit Eligibility	No restrictions	Only loggers with fewer than 20 employees	No restrictions
Right to Transfer Permit	Yes	Yes	No
Concurrent Permits Allowed	No limit	Four	Two
Permit Duration	2 years	1 year	1 year
Number of Extensions	3 one-year	2 one-year	1 one-year
Interest Charge on Extensions	8% for each year of extensions	8% on second year of extensions	None

B. INFORMAL METHOD

1. HISTORY

The informal timber sale procedure began in 1925 when the Legislature passed a law permitting the sale of "dead, down, dying, or insect infested or diseased timber" up to a maximum appraised value of $100 as fixed by two appraisers.[1] Although this timber lacked commercial value, except as fuelwood, harvesting it eliminated a fire hazard. Between 1925 and 1931, there was relatively little use made of the informal sale method, but during the ensuing twenty years, several factors led to a tremendous growth in the use of the informal method.

The first factor was the temporary suspension of auction sales between 1931 and 1936 so that state timber would not compete with privately held timber in the depression-afflicted marketplace. During this period, state timber could only be sold informally, and cutting on informal permits became an important source of employment in some parts of the state.

A second factor was the Legislature's decision in 1939 to allow the sale of commercially marketable green timber by the informal method. At the same time the maximum appraised value was raised to $250, cutting had to be done within one year (with the possibility of a further one-year extension), an individual was allowed to have only one permit at a time, and scaling was required for most informal sales. This decision to expand the applicability of the informal sale method was made in the context of the Great Depression. An interim study commission report noted that "state timber is an important factor in employment and income in northern Minnesota," and further recommended changes in the timber sale laws that would "fit timber sale procedure more closely to present-day conditions."[2]

A third factor was the elimination of scaling costs for informal sales which before 1951 had been charged against the per unit cost of timber cut under any permit. This legislative change made the informal sale method more attractive as a means of harvesting state timber.

As a result of these factors, the proportion of timber value sold by the informal method rose from approximately 16 percent in 1938 to 53 percent in 1958. In 1959, the Legislature raised the maximum appraised limit to $350 and in 1961 the provision requiring two appraisals for informal sales was eliminated. In 1967 the maximum limit was raised to $500 and an individual was allowed to hold two permits simultaneously instead of just one. Subsequently, the maximum limit was raised to $1,500 in 1975 and, finally, to $3,000 in 1981.

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[1] Minn. Laws (1925), Ch. 276, Sec. 10.

[2] Quoted in Alvin R. Hallgren, The Development of Timber Sale Policies and Practices on State-Owned Land in Minnesota, p. 100.

2. INFORMAL SALES TODAY

Minnesota law now permits the sale of state timber in tracts valued at $3,000 or less without the formalities of a public auction. Prospective purchasers must submit a completed application form at the local district office, specifying the kind of timber desired. The law allows each person two informal permits at one time. As of 1981, each partner in a formal partnership, or each member of a family corporation, may hold two permits each, up to a maximum of six permits simultaneously per partnership or corporation. Requests are handled by the district forester on a first-come, first-served basis. A tract previously identified as available for informal sale is selected and appraised. A permit along with an appraisal form, is prepared and sent to the area office for approval. Finally, the area office sends a notice of sale approval to the prospective purchaser and, upon payment equal to the appraised value of the tract, the permit becomes valid and cutting can begin.

The informal permit is valid for one year, with a one-year extension if approved by the area forester. Unlike auction permits, there is no interest charged on extensions.

C. THE USE OF TIMBER SALE METHODS

1. MINNESOTA

Before 1925, as we have seen, the only method by which state timber could be sold was the public auction. But by the early 1950s more timber was sold informally than by the auction method. Table 2.1 presents DNR's estimates of the volume and value of timber sold by each sale method since 1955. (Full data are presented in Appendix A.) Although we found many inconsistencies and inaccuracies in these data (see Chapter VI), these are the best estimates available of the volume and value of timber activity sold in each year. Figure 2.2 illustrates the growth in the proportion of timber volume sold by the informal method.

These data show the following:

- Since 1955 the state has sold approximately 4.9 million cords of timber by the informal method (66.8 percent) and 2.4 million cords by the auction method (33.2 percent).

- During that period, the proportion of timber sold informally has increased, reaching a peak in the 1960s and declining somewhat during the 1970s.

Despite these changes in the balance between the two methods of sale, it is difficult to trace them to an explicit department policy. These changes may reflect logger pressure on the department to sell more timber informally. In 1975, the Legislature declared that:

TABLE 2.1

DNR's ESTIMATE OF ANNUAL TIMBER SALE VOLUME AND VALUE

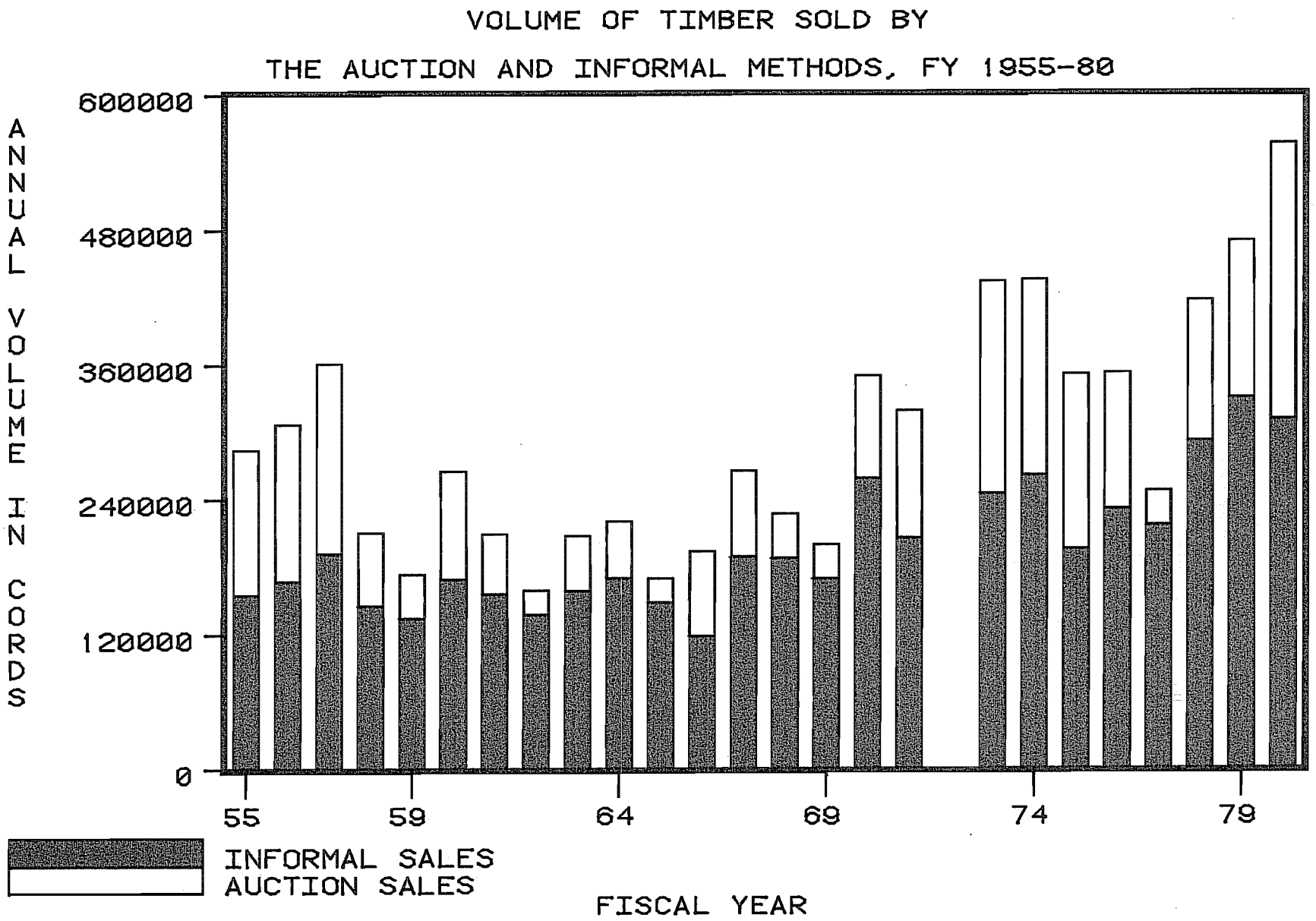
Fiscal Years 1955-1980

Fiscal Year	INFORMAL			AUCTION		
	Number of Sales	Volume in Cords	Dollar Value	Number of Sales	Volume in Cords	Dollar Value
1955	2524	155,125	$ 403,084	76	129,607	$ 494,983
1956	2610	166,940	433,068	82	140,657	483,985
1957	3080	192,225	543,078	128	169,386	612,911
1958	2398	145,904	NA	116	64,899	263,332
1959	2687	134,747	NA	68	38,617	99,525
1960	2970	169,053	454,258	236	96,868	325,210
1961	2741	155,723	440,478	128	54,121	208,310
1962	2601	137,734	402,168	120	21,727	107,602
1963	3028	158,500	401,627	120	48,790	199,193
1964	2912	169,704	401,220	83	51,104	154,134
1965	2742	148,488	399,756	57	21,361	79,167
1966	2348	117,955	370,516	121	75,709	248,058
1967	2714	188,574	476,195	113	76,926	223,032
1968	2304	187,219	426,779	35	39,781	115,851
1969	2230	169,192	466,824	39	30,593	95,699
1970	2477	258,273	548,497	87	92,001	272,084
1971	2246	204,847	512,832	105	114,209	324,763
1972	2402	NA	546,314	105	NA	241,404
1973	2663	244,758	624,124	225	189,986	562,486
1974	3032	261,184	757,612	270	174,372	982,736
1975	2994	195,170	790,406	275	156,779	1,310,830
1976	2487	231,086	998,197	183	122,004	742,480
1977	2353	216,038	1,025,924	69	31,576	263,655
1978	2815	291,610	1,280,457	176	126,120	737,730
1979	2587	329,880	1,486,580	237	140,610	871,820
1980	2856	310,900	1,719,000	346	246,100	1,926,000
TOTAL	94901	4,940,830*	$15,908,994*	3600	2,453,903*	$11,946,980

SOURCE: Department of Natural Resources, Division of Forestry Annual Reports; and Alvin R. Hallgren, The Development of Timber Sale Policies and Practices on State-Owned Land in Minnesota.

*Totals do not include data for missing years.

FIGURE 2.2



SOURCE: DNR Division of Forestry

> It is the intent and desire of the Minnesota legislature to provide equal opportunity for all segments of our society to participate in the sale process; and attempt to prevent the purchase or acquisition of excessive volumes of the state's timber resources by any one individual or corporation.
>
> The department of natural resources is directed to enact regulations to reach this objective; including provision for sale of all timber species by both the informal and the auction sale method; and maintaining reasonable proportions of volume in each method of sale.[3]

Nevertheless, we have found that

- the department has not enacted administrative rules regarding the sale of state timber. Nor has the department established formal policies nor provided formal guidelines to its field staff concerning the proportion of timber to be sold by either sales method.

As a result of this lack of a formal policy, decisions concerning the proportions of timber sold by each method have been made by area and district personnel. These decisions have been influenced by informal communications within the department and by local conditions. The absence of a formal policy does not make it easier for the department's field staff to resist local pressure to sell more timber informally and to "maintain reasonable proportions of volume in each method of sale" as required by law.

From a forestry management standpoint, each sale method is best suited for a different management objective. The auction method--with its larger permissible tract size--is well suited to manage and reforest large timber stands in a uniform manner. Carving up such stands into small parcels so that they may be sold informally may leave a post-harvest patchwork resulting from different cutting techniques and timber utilization patterns. Since many different loggers may be involved, such stands may not be harvested uniformly during one cutting season. These are obstacles to efficient forest management and may make reforestation planning more difficult.

The informal method, on the other hand, may be best suited for small, irregular, or inaccessible tracts, or for circumstances when a large-scale harvesting operation is impractical. And, of course, the smaller maximum size of the informal sale tract places such tracts within the financial means of small timber operators.

Our review of DNR's sales data by region suggests that there is variation from one part of the state to another regarding the use of the two sales methods. In 1980, for example, only 48 percent of the sawtimber sold in one region was sold informally while 73 percent in another region was sold informally. These data are shown in Table 2.2.

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[3]Minn. Stat. §90.02.

TABLE 2.2

PROPORTION OF TIMBER VOLUME SOLD INFORMALLY, BY REGION AND PRODUCT TYPE

Fiscal Year 1980

	Proportion Sold Informally		
Region	Pulpwood	Pulp & Bolts	Sawtimber
I	61%	56%	73%
II	49	47	48
III	66	55	71
IV	--	--	3*
V	100*	100*	43
VI	--	--	100*
STATEWIDE	55	51	58

SOURCE: DNR

*Less than 500 cords sold.

2. OTHER JURISDICTIONS

In order to place the Minnesota timber sale program in a broader perspective, we gathered and analyzed timber sale information from several other public jurisdictions, including neighboring states, federal agencies, and Minnesota counties.[4] Our review of timber sales policies in these jurisdictions has led us to observe that:

- Minnesota uses the informal sale method far more often than other public jurisdictions studied.

[4]Jurisdictions examined included the U. S. Forest Service, the Bureau of Land Management, the Bureau of Indian Affairs, Wisconsin, Michigan, California, Washington, and Maine. Minnesota counties examined were Atkin, Becker, Beltrami, Carlton, Cass, Clearwater, Crow Wing, Itasca, Hubbard, Koochiching, Lake, Pine, and St. Louis.

With the exception of Minnesota counties and the Minnesota Area Office of the Bureau of Indian Affairs, all other jurisdictions we examined rely principally on public auctions to sell their timber. Wisconsin and California, for example, sell about 95 percent of their timber by auction, while Michigan sells about 90 percent by auction. The U. S. Forest Service in Minnesota sells about 99 percent of its timber by the auction method.

Most other jurisdictions require that all timber be sold at auction unless there is a demonstrated lack of competitive interest. This generally means that non-auction sales will be either salvage, small undesirable tracts, or tracts which did not sell at an auction. Federal law requires the Bureau of Land Management to specify the reasons for granting informal sales in its semi-annual report to Congress. Congress has not prohibited informal sales, but it does require that where there is a belief that more than one party may be interested in a given timber tract the sale method should be an open one.

One noteworthy exception to this pattern is Maine, which sells 50 percent of its timber at public auction. The remaining timber is issued through negotiated bids. Generally, a single tract is offered to two or three potential buyers. The state initiates negotiations with each potential buyer and the permit to cut is awarded to the one with the best offer. This process allows Maine to offer selected tracts of timber to those loggers best able to harvest the tract and utilize the particular species and product type.

In Minnesota, as we have seen, the informal sale has traditionally been used to guarantee small independent loggers a portion of the state's timber supply. The desirability of such an objective has been recognized by most of the jurisdictions we examined, but methods other than an informal sale procedure have generally been used. The U. S. Forest Service and the Bureau of Land Management, for example, have established a "set-aside" program under an agreement with the Small Business Administration. The program is designed to ensure that small operators receive an equitable proportion of the sale volume in each forest unit. All set-aside sales are auction sales, but bidding is limited to those operators who meet small business requirements.

Several of the states we examined, including Wisconsin and Michigan, ensure timber availability to small operators by limiting tract sizes offered by auction. This practice discourages major logging companies from bidding since small tracts are generally uneconomical for them to harvest. At the same time, competition is facilitated among the smaller operators.

D. REVENUE FROM TIMBER SALES

The data in Table 2.I show DNR's estimates of the value of timber sold by each method over the period 1955 to 1980. Most of the revenue represented by these sales is not actually collected by the state at the time of the sale but, rather, after the timber is harvested. The revenue collected in a given year derives from informal sales made over the last two years (the maximum permissible permit duration) and auction sales over the last five years.

These data estimates on sale value show the following:

- Since 1955 the state has sold timber whose value totaled approximately $27.8 million. Of that timber value, approximately $15.9 million (57 percent) was sold informally and $11.9 million (43 percent) at public auctions.

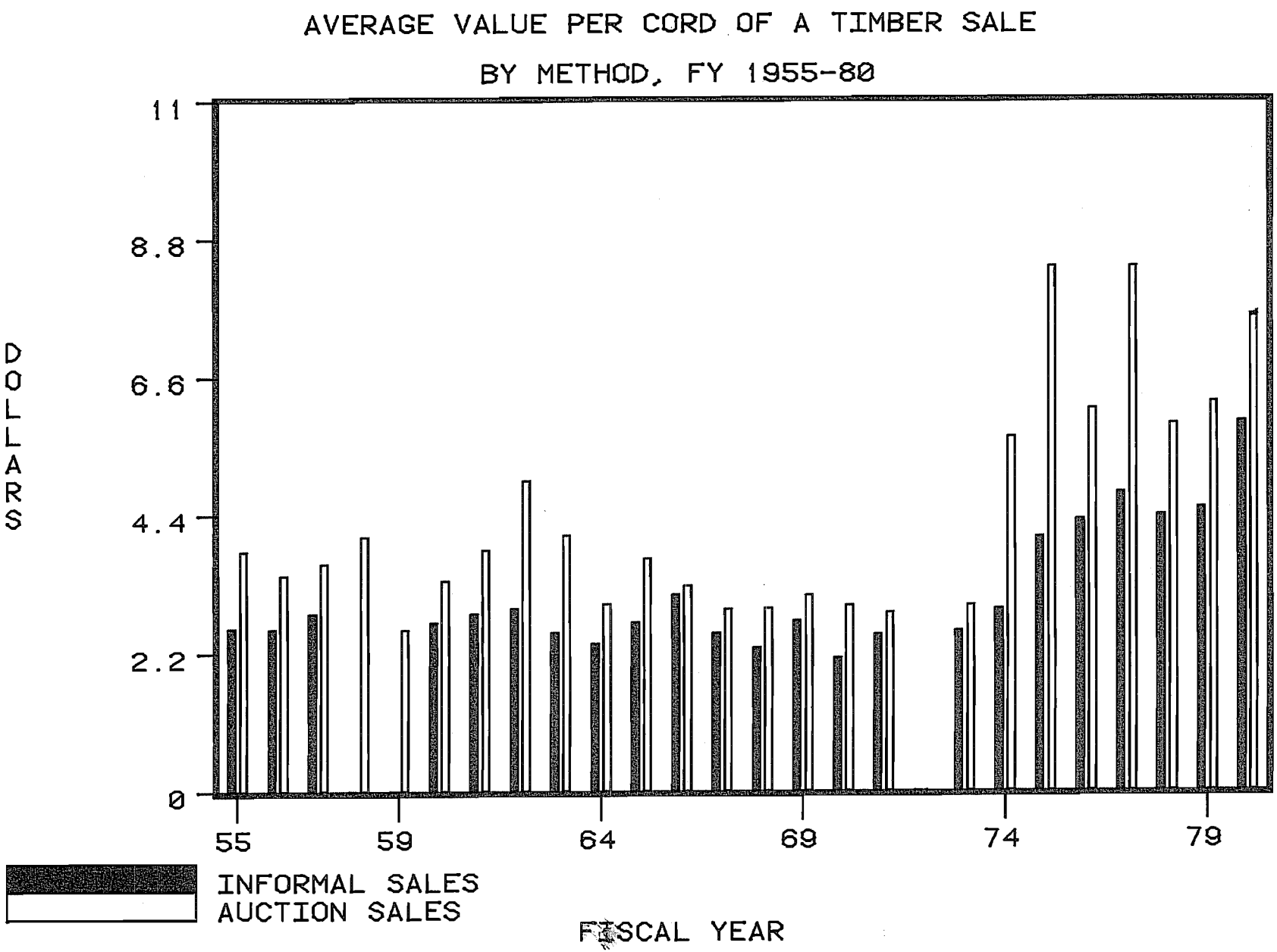
The fact that informal sales represented about 67 percent of timber volume but only 57 percent of timber value sold in this period is significant. It indicates that:

- Over the past 25 years, the value per cord of timber sold by the auction method was greater than that of timber sold informally.

DNR's data show that this was true in each of the past 25 years. Figure 2.3 shows the average value per cord of timber sold by each sale method during this period. (Full data are in Appendix A.) Over the 25 year period, the average value per cord sold by the informal method was $3.22 while the average value per cord by the auction method was $4.87. This finding could be attributed to a pattern by which higher value species and product types have been sold at auction and lower value species and product types have been sold informally. However, a review of several species and product types sold in 1980 does not support this contention. In 1980--a fairly typical year--higher value species and product types were not being sold by the auction method but by the informal method. For example, more high value pine sawtimber was sold informally (2,034 MBF) than at auction (I,830 MBF) and more high value Spruce pulpwood was sold informally (40,350 cords) than at auction (23,128 cords). At the same time, less low value Aspen pulpwood was sold informally (30,968 cords) than at auction (35,584 cords).

Instead, the high average return realized by the auction method is due principally to the competitive bidding-up of timber prices in the auction setting. Since informal sales are always consummated at the timber's appraised value, the returns from such sales are never higher than the appraised value. But since the bidding in auction sales begins at the appraised value and increases at five percent increments (when there is competition), the state often realizes a return from such sales much higher than the appraised value of the timber. Assuming that informally sold timber had been sold at the average auction price in 1980, the state might have received an additional $700,000 in receipts from timber sales in that year.

FIGURE 2.3



SOURCE: DNR Division of Forestry

During the period 1975 to 1981, the average auction sale price per cord was approximately 53.6 percent higher than the average informal price per cord. Since we found that the average bid-up in auction sales was about 37 percent, we conclude that:

- the competitive bidding-up of timber prices in auctions has caused the greater return realized from auction sales as compared with informal sales.

Another perspective from which to compare the financial return from the state's timber sale methods is the average return per sale transaction. The revenue from each sale method per dollar of administrative expense shows the cost/benefit ratio for each sale method.

In the course of our study, we attempted to gather specific information and data which would allow us to calculate the actual average cost of a timber sale transaction. Ultimately, however, this proved difficult and impractical. DNR does not accumulate cost accounting data in a manner conducive to such an analysis. We could not, for example, separate out in any meaningful way the time spent on informal or auction sales activities. However, as a result of interviews with St. Paul and field office staff, we believe that the average amount of administrative effort spent in processing informal permits is somewhat less than that required to process auction permits. As we demonstrate in the next chapter, many aspects of the sale process are virtually identical for both sale methods. The appraisal effort, for example, is essentially the same when adjusted for tract size. It is possible that somewhat more intensive appraisals are conducted for some informal sales since more than a quarter of them are "sold as appraised" sales. However, that is roughly balanced by the added effort required to process and check timber scale results for all other sales. Timber sale permits are different for the two sale methods, but the time required to process permits does not appear to diverge significantly between the two methods.

The two principal reasons why auction sales may require a greater expenditure of administrative expenses are a) the public auction itself, and b) the extended duration of auction permits. In order to hold an auction, lists of sale tracts must be prepared, sent to potential bidders, and advertised in local newspapers, a public hall must be engaged, and someone must run the auction. According to the department's Timber Sales Manual, "procedures necessary to fulfill the requirements of the law consume considerable time. Approximately eight weeks are needed" from the initiation of the auction process to the auction itself. However, the costs incurred in setting up and conducting an auction should be spread over the five to seven tracts which are typically sold in a single auction sale.

As we have noted, the informal permit is currently valid for a maximum of two years. Our study of a sample of informal permits issued between 1975 and 1981 suggests that the average permit is actually active for only about 15 months. The auction permit may be

valid for up to five years and our study has shown that, on the average, auction permits are active for about 19 months. These additional months during which the average auction permit is active add additional administrative expense. In those cases in which the harvest itself is spread over several cutting seasons, with separate billings at the end of each season, the administrative expenses of carrying the active auction permit may be significant. However, without an intensive study of our own, we cannot place an exact figure on these factors.

These considerations have led us to conclude that:

- On the average, auction sale transactions are probably more expensive to administer--perhaps by a factor of two--than informal sales.

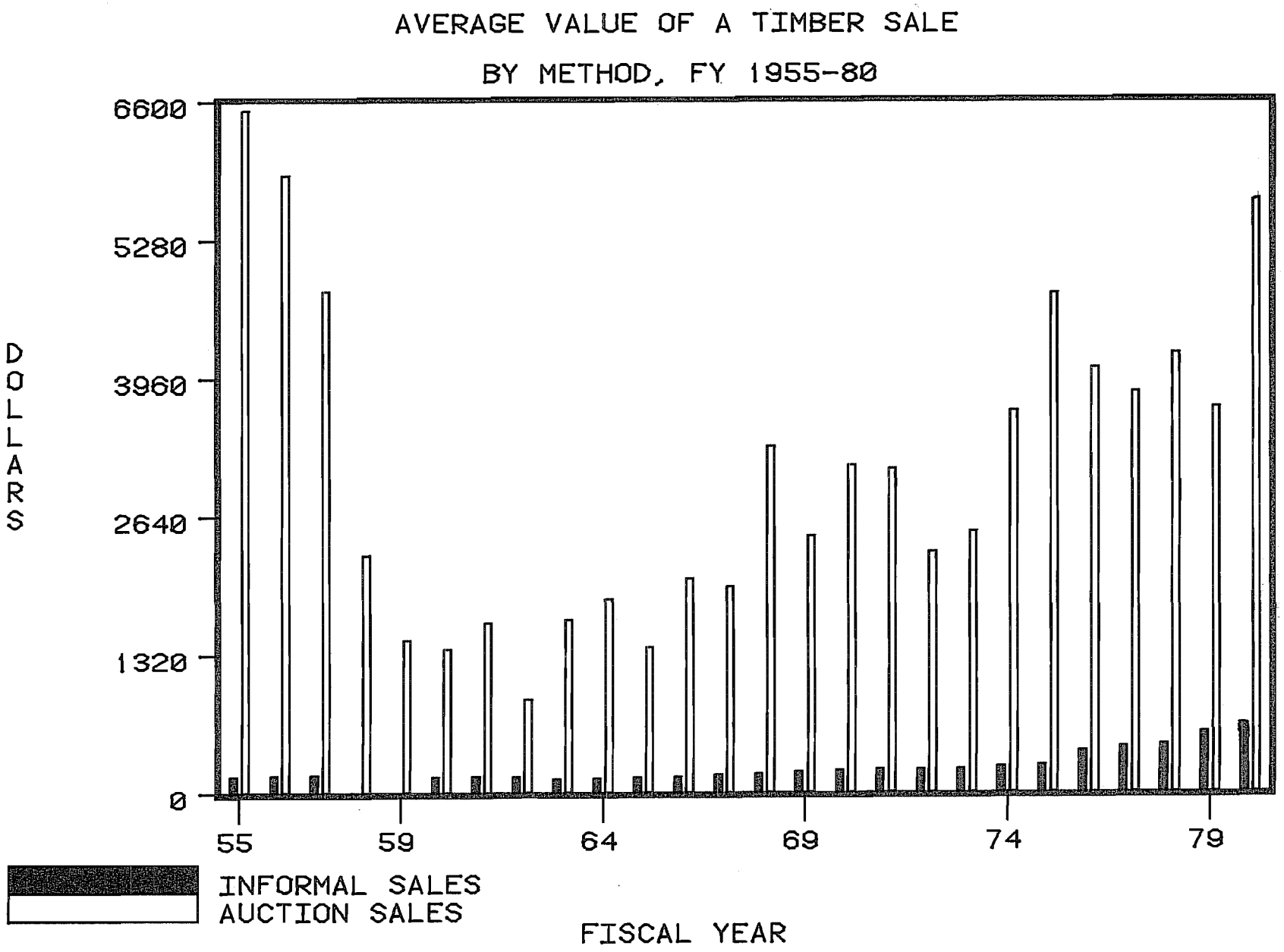
Against these considerations, we must weigh the average "benefit" realized from a typical sale transaction. Figure 2.4 shows the estimated average value of timber sale transactions during the period 1955 to 1980. These data show that in every year the value of the typical auction sale was significantly greater than that of the average informal sale. In 1980, for example, the average auction sale value was $5,566 while the average informal sale value was just $602. This "benefit ratio" of roughly 9:1 in favor of auction sales appears to far outweigh the "cost ratio" discussed above which favors the informal sale. As a result, we conclude that:

- The auction sale method appears to be a more powerful generator of net revenue for the state than is the informal method.

The sealed bid method was introduced in 1979. By 1980 the proportion of sealed bid auctions reached 14 percent; in 1981 it increased to 32 percent. Many believe that the sealed bid method, used extensively in some jurisdictions, yields more thoughtful and realistic bids from potential timber buyers, therefore increasing the likelihood that timber will eventually be cut and paid for and reducing the likelihood of default by the permittee. Minnesota's experience with sealed bid auctions has not been extensive enough to draw conclusions about the validity of this supposition.

We examined the average selling price and bid-up in both sealed bid auctions and oral auctions for 1980 and 1981. The data presented in Table 2.3 shows that the average bid-up for oral auctions was slightly higher (61.3 percent) than that for sealed bid auctions (53.7 percent) in 1980, but that the reverse was true in 1981. These data are too limited and mixed to draw any definitive conclusions about the two auction methods.

FIGURE 2.4



SOURCE: DNR Division of Forestry

TABLE 2.3

SEALED BID AND ORAL AUCTIONS COMPARED

Fiscal Years 1980 and 1981

	1980	1981
ORAL AUCTIONS:		
Number of tracts sold	299	293
Average appraised value per cord	$4.83	$7.17
Average selling price per cord	7.79	9.69
Average bid-up for all tracts sold	61.3%	35.1%
SEALED BID AUCTIONS:		
Number of tracts sold	49	140
Average appraised value per cord	$5.12	$6.99
Average selling price per cord	7.87	9.89
Average bid-up for all tracts sold	53.7%	41.5%

SOURCE: DNR Timber Sale Ledger Books, Numbers 16 and 17.

E. AUCTION COMPETITION

The degree of competition among potential buyers in state timber auctions is a function of market conditions and the supply of timber offered by DNR. Obviously, both of these factors vary from year to year. Market conditions may vary considerably from month to month. When the prices of public timber are too high, timber users--such as industrial pulp buyers--may turn to private sources of timber. Most of the largest timber users in Minnesota own considerable timber land of their own which they may rely on in adverse market and supply conditions. Consequently, the degree of overall competition for state timber may fluctuate.

We examined timber auction competition in Minnesota for the period 1955 to 1980. Although there are significant year-to-year fluctuations, in general we found that:

- auction competition for the state's timber has risen over the past 25 years.

Table 2.4 shows that in this period the number of tracts sold as a proportion of all tracts offered has been relatively consistent; on the average about 72 percent of all tracts offered were sold. At the same time, the number of tracts sold at the appraised price has significantly declined. During the 1950s and 1960s, approximately 90 percent of those tracts sold at auction were sold at the appraised price per cord; during the 1970s the proportion dropped to about 50 percent. In other words, a far higher proportion of auction sales were being bid-up in the 1970s than in the previous two decades.

This increased willingness of timber buyers to bid-up the price of timber may be due to increased demand, more desirable sale stands, or some other economic factors. Whether these trends will continue during a recessionary period is unknown. In any case, these data seem to indicate that the recent timber market in Minnesota has been more competitive than it was two decades ago and that, at least over the past 10 years, timber buyers have been willing and able to pay more than the appraised prices for state timber.

F. RECOMMENDATIONS

Given these data, it is clear that, as a generator of revenue, the competitive public auction method is preferable to the informal method. At no time over the past 25 years has the informal method in Minnesota yielded an average rate of return per cord or per transaction as high as the public auction method. Even considering the somewhat higher administrative costs for auction sales, the state does better financially with auction sales.

Nevertheless, we are reluctant to conclude from these findings that Minnesota should eliminate the informal method and sell all of its timber at auction. There are several considerations which contribute to our reluctance. First, the state's timber sale program is designed to accomplish a variety of goals--only one of which is revenue generation. DNR has repeatedly indicated that its forestry objectives include ensuring a reliable supply of timber resources for the state's wood products industry and for recreation. In addition, it has explicitly stated that its timber sales program should contribute to employment in northern Minnesota. The Legislature--through its willingness to expand the informal sales program--has implicitly endorsed this approach. If the Legislature wishes to place revenue generation as a higher priority than other program objectives, it should pass legislation directing DNR to do that.

Second, we believe that efficient forest management requires flexibility in the use of sales methods. As we have pointed out, there are circumstances when the informal sales method may be best suited to accomplish forestry management goals. Accordingly, we think DNR should retain the authority--within certain guidelines--to sell some timber informally and some by the auction method. The Legislature's action in 1981 to create a new intermediate auction

TABLE 2.4

REGULAR AUCTIONS: NUMBER OF TRACTS OFFERED AND SOLD

Fiscal Years 1955-1980

Fiscal Year	Tracts Offered	Percent Sold	Percent Sold At Appraised Price	Percent Sold At Bid Up Price
1955	80	95	91	9
1956	94	87	78	22
1957	139	92	81	19
1958	139	78	84	16
1959	54	89	100	0
1960	178	83	90	10
1961	158	78	83	17
1962	120	76	97	3
1963	93	74	84	16
1964	108	66	82	18
1965	65	60	95	5
1966	124	64	92	8
1967	152	71	82	18
1968	98	41	88	12
1969	98	41	70	30
1970	118	74	92	8
1971	140	66	73	27
1972	207	51	67	33
1973	307	76	51	49
1974	303	89	31	69
1975	353	80	39	61
1976	257	72	58	42
1977	137	51	54	46
1978	293	60	50	50
1979	361	66	52	48
1980	403	82	40	60
Total	4,584	72	64	36

SOURCE: Department of Natural Resources, Timber Sale Ledger Books, Numbers 14, 15, 16, and 17; and Alvin R. Hallgren, The Development of Timber Sale Policies and Practices on State-Owned Land in Minnesota.

method (by which smaller tracts appraised at a maximum of $7,000 may be sold to qualified bidders in an auction setting) should introduce a competitive factor into more timber sales than has been practical before.

Finally, it may be unrealistic to conclude that the same high rate of return realized in past auction sales could be sustained if all of the state's timber were sold at auction. An increase in the supply of timber sold at public auctions would probably depress buyer enthusiasm and somewhat decrease the average bid-up.

Under current law, DNR has complete authority to determine the proportion of timber to sell by each sales method--so long as it maintains "reasonable proportions of volume in each sale method." As we have seen, the proportions have fluctuated significantly in the past. However, DNR has not fulfilled its obligation to "enact regulations" governing the use of sale methods as the 1975 law requires. Accordingly:

- We recommend that DNR develop a formal policy regarding the use of the informal, regular, auction, and intermediate auction methods, including guidelines to field staff to assist in determining under what conditions each method should be used and setting volume targets for each method. This formal procedure should be validated and adopted according to the terms of the Administrative Procedure Act.

We would anticipate that such a formal policy would bring greater uniformity to the use of the various sales methods over time and across the state. It would also ensure that this major policy issue was addressed systematically on a statewide basis by the agency's management staff instead of on a regional basis by the department's field staff.

In addition,

- we think the Legislature should consider various strategies to improve the overall rate of return received by the state from its timber sales.

It seems likely that the state could increase the total revenues it receives from timber sales by reducing the proportion of timber it sells informally. One strategy might be for the Legislature to place a cap on the proportion of timber which could be sold informally in any given year. Such a cap would buttress the department's efforts to set a formal policy regarding sale methods. If the Legislature were to limit informal sales to, perhaps, 25 percent of statewide timber volume, the department would still have the flexibility it needs to respond to local needs and to special management circumstances.

Alternatively, the Legislature might consider adopting a requirement that all state timber--except for small tracts appraised at, perhaps, less than $300--be offered in a public auction before it can be offered informally. The state could still guarantee access to

its timber resources for small logging operators, but such a plan would guarantee that attractive tracts desired by more than one small logging operator would be sold on a competitive basis. This would be fair to all loggers and it would ensure that the state would sell only a minimum amount of timber at appraised prices when market conditions were highly favorable and competitive. In order to implement this plan, the department could offer many small tracts appraised at between $500 and $3,000. Only tracts which did not sell at auction would be sold informally. To preserve the competitive character of the auctions, this plan might operate most effectively if coupled with an overall statutory limit on the total volume of timber which could be sold informally.

These alternatives should be explored carefully in light of the multiple and competing goals which have been defined for the state's timber sales program. We want to emphasize that whatever the Legislature decides to do, increasing timber revenues by selling less timber informally involves a rebalancing of competing priorities.

III. TIMBER SALE PROCEDURES

In the last chapter we discussed the features of Minnesota's timber sale program which are specific to the auction or informal method. In this chapter we discuss sale procedures which are common to both: the identification of sale stands, the appraisal, the determination of harvest requirements, scaling, and payment for timber. In order to assess Minnesota's timber sale procedures, we examined sale policies and procedures for five other states, several Minnesota counties, and those units of the federal government which sell public timber. A summary of our findings concerning these jurisdictions is included in Appendix E.

Minnesota's timber sale procedures are outlined in law and further delineated in DNR's timber sales and scaling manuals. An overview of these procedures is provided in Figure 3.1. The volume of timber to be sold and harvested each year is determined by the "allowable cut"--a specifically identified volume of each species which can be harvested in each area without depleting the growing stock base. Allowable cuts vary by species according to their growth cycles. Aspen in Minnesota, for example, has a growth cycle of 40 years; each year approximately 1/40th of the Aspen stock may be harvested.

Having determined the allowable cut for each area and district, a "planned cut" list is developed identifying the specific tracts to be sold and harvested in each district. Tracts are placed on the planned cut list according to their age, health, product type, and other management considerations. The decision to offer a specific tract by the auction or the informal method is made at the area or regional level based on district recommendations.

A. THE TIMBER APPRAISAL

In Minnesota state timber may not be sold without an appraisal. A timber appraisal is an on-the-ground inspection of a timber stand whose primary objective is "to determine as accurately as possible the monetary value of standing timber to be converted into commercial products such as lumber or pulpwood."[1] A timber appraisal is carried out in two stages: a field inspection to estimate the quantity and quality of timber and a calculation of value, usually done by the appraiser at the district forestry office. Under normal circumstances, one forester performs both tasks, spending perhaps 2-4 hours in the field for an average tract and 2-3 hours doing mathematical calculations and filling out the required appraisal report form.

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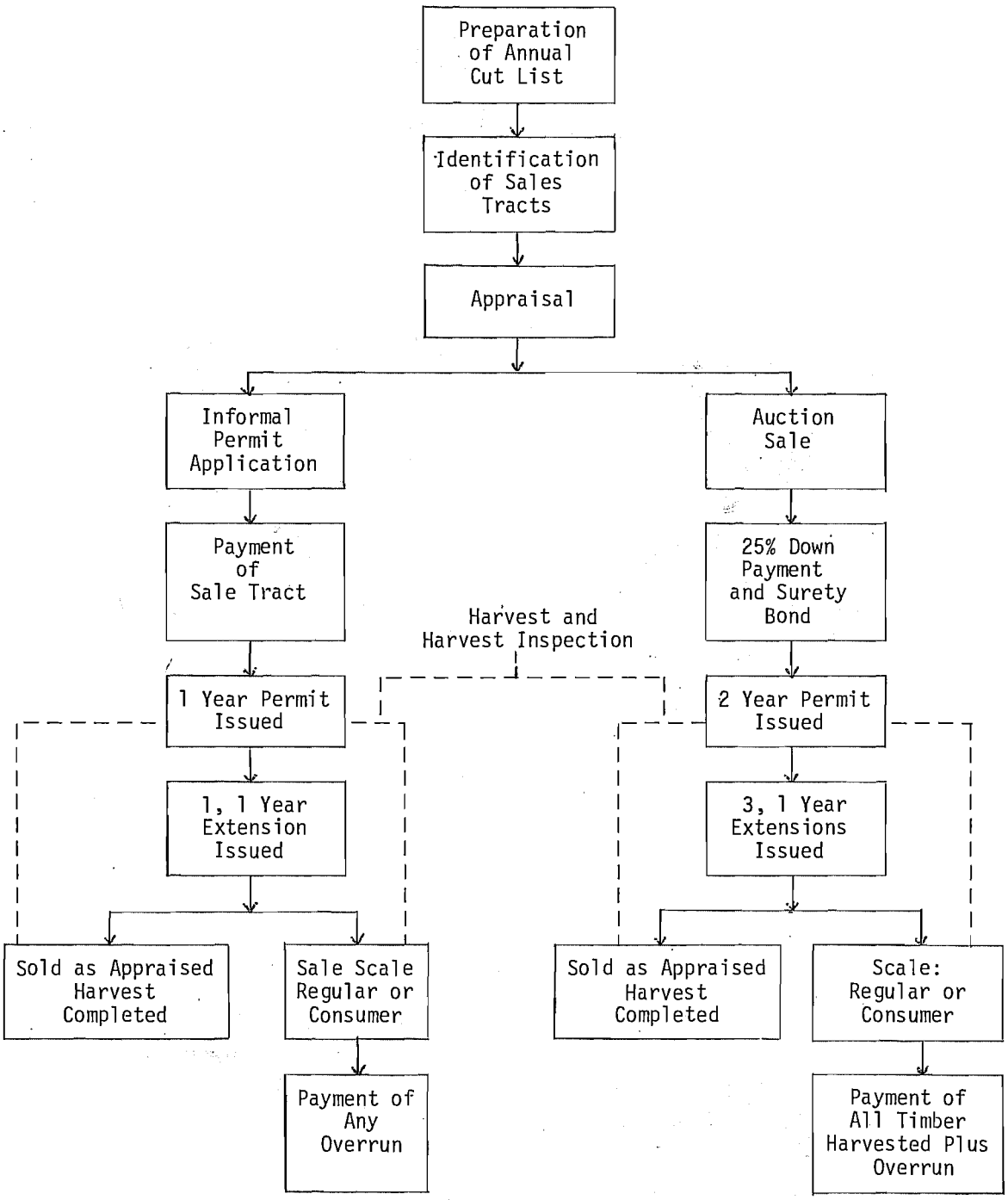
[1] Reginald D. Forbes (ed.), Forestry Handbook, (New York: The Ronald Press Company, 1955), Chapter 15, page 17.

FIGURE 3.1

MINNESOTA TIMBER SALE PROCEDURES
(Auction and Informal Sales)



An appraiser must go to the site of the stand to determine the volume, quality, mix of species, and the potential for commercial use of the trees in question. By walking through the stand, the appraiser can estimate the volume of wood by species and product type and he can estimate the tract area. While on the site the appraiser can also mark the boundaries of the tract for the logger, determine the appropriate logging specifications, make silvicultural recommendations, and make plans for reforestation.

After determining what is on the stand and recording the details in an appraisal book, the appraiser must estimate its value. The real value of timber is determined by the cost of harvesting the timber and converting it into a marketable commodity as well as the level of demand in the marketplace. Since these are highly variable factors, dependent on local tract conditions, logger capabilities, industry efficiency, current market conditions, and market proximity, a useful timber appraisal method must be flexible.

As we discuss in Chapter V, the method of setting a price for timber in Minnesota requires the use of a base stumpage price table, compiled annually by DNR. This table provides the appraiser a base price (per cord or unit of board feet) for each species and product type. Based on his cruise of the sale tract, the appraiser uses his judgement to adjust these base prices by certain price guide factors, and to set the sale value for the entire stand.

A typical "appraisal report form" is reproduced from the DNR Timber Sales Manual in Appendix B.

With some sales, the appraisal is less important, either because a.) the wood is sold at an auction and the price per cord is bid-up beyond the rates established by the appraiser or b.) the wood is scaled after being cut and the final amount paid to the state is based on the volume measured in the scaling process not the volume estimated to be in the tract by the appraiser. Approximately one-half of the state's timber is both sold competitively and scaled. In these cases, the appraisal serves primarily to define the sale tract and to set a minimum price for starting the bidding.

With other sales, the appraisal is far more important. In some auctions, for example, the price per cord is bid-up, but the timber is not scaled after harvest, so the final tract value is determined by multiplying the bid-up price per unit (e.g., cord) by the volume of timber estimated by the appraiser. In other auction sales, there is scaling after the harvest to determine the timber volume (this volume figure replaces the volume estimates of the appraiser in the final calculations) but there is no competition over the tract and the tract is simply sold at the price per cord set by the appraiser. Finally, for all informal sales where there is no post-harvest scaling, the appraisal is the sole device for setting both the price per unit and the tract volume. These are often called "sold as appraised" since the sale transaction is completed at the prices set in advance by the appraiser.

Figure 3.2 shows the particular combination of factors which determine for each case how important the appraisal is in setting the final price for a tract of timber.[2] In general, the significance of appraisals in the sale process depends on the sale method and whether or not scaling is done. Generally, appraisals protect the interests of the state in that they ensure that the state receives a fair return for its timber resources.

FIGURE 3.2

ROLE OF THE APPRAISAL IN MINNESOTA TIMBER SALES

	Auctions With Competition[a]	Informal Sales and Auctions Without Competition
Scaling	Rate/unit Bid-up Value=Rate x Scaled Volume	Rate/unit set by Appraisal Value=Rate x Scaled Volume
No Scaling (Sold as Appraised)	Rate/unit Bid-up Value=Rate x Appraised Volume	Rate/unit set by Appraisal Value=Rate x Appraised Volume

[a]An auction in which two or more parties are present and competitive bidding takes place.

[2]To illustrate further, consider the following examples. Example A consists of a tract appraised as 530 cords of Aspen pulpwood priced at $3.10 per cord for a total tract value of $1,643. At auction, the tract is bid-up 20 percent to $3.72 per cord. Thus, if there were no scaling (or if scaling produced exactly 530 cords), the value would be $1,971.60. But if scaling shows that 585 cords were actually cut from the tract, the final value is calculated as ($3.72 X 585 =) $2,176.20. This is the amount due the state for the sale. In this example, the appraisal is important in that it sets a floor price and provides an estimate of the volume, but the final value is determined by the auction bid-up and by the scale results.

Example B consists of a tract appraised as 55 cords of mixed hardwood fuelwood, valued by the appraiser at $1.75 per cord, or $96.25. Since this tract is sold informally, there is no bid-up of the price per cord. Since the tract is not scaled, but rather sold as appraised, the volume is assumed to be as appraised. The tract is sold for $96.25 and the appraisal is the sole mechanism for setting that price.

State law currently places limits on the size of timber sales. Informal sales cannot exceed an appraised value of $3,000 and auction sales cannot exceed a value of $20,000. In order to meet these requirements, a pre-harvest appraisal is necessary. There is no other obvious mechanism for carrying out this provision of the current law.

Timber appraising is both a science and an art. An appraiser must learn various techniques of tree measurement and wood volume estimation. He must know about surveying, watershed management, silviculture, forest road engineering, aerial photography, and the economics and techniques of logging. Each timber stand is unique and the appraiser must use his judgement in applying the tools of his trade to arrive at a fair and just price for the timber offered for sale by the state.

As with any profession, there are many "schools" of forestry. What is accepted practice in one part of the country is rejected in another. In addition, techniques and methods change with time, as research brings new perspectives and as technology makes new tools available.

Not all DNR foresters were trained at the same time in the same school and, therefore, the techniques they use in the field to conduct appraisals and to carry out other timber management tasks may vary. For example, in Minnesota most timber appraisals involve some kind of sampling technique. In general, only certain high value timber, such as Black Walnut, is appraised by counting and measuring each and every tree. In deciding how to take a sample from a timber tract, a forester has many options. He may move through a tract in a straight line, keeping a tally of all trees in a strip of a given width on both sides of the line. He may randomly draw points on a map of the tract, orienteer his way to those points on the ground, and tally all the trees within a fixed radius of each point. He may systematically plot points on the tract map, go to those points, and use a variable tree sample method (sometimes using a hand-held prism) to tally the trees close to the points. Finally, he may use some combination of these methods, or some other technique entirely.

Similarly, there are alternative methods to estimate the density of the tract, the total volume of timber in the tract, the area of the tract, and the other factors which enter into an appraisal. The particular combination of appraisal techniques used by an appraiser is determined by his training, experience, judgement about the situation at hand, and considerations of efficiency.

The department's Timber Sales Manual provides a summary of current department policies on timber sales and outlines the sale management procedures which are to be followed by appraisers. It does not, however, offer guidance regarding the specific appraisal techniques to be used in the field. These are assumed to be within the realm of the professional forester's competence. As we have suggested, good appraisal methods must be flexible since the conditions under which sales are conducted are highly variable. However,

DNR is responsible for ensuring that appraisals are done in a competent, accurate, and consistent manner. The challenge for DNR is to ensure that appraisal quality is high while allowing the flexibility to the individual appraiser needed for a fair and equitable appraisal.

Our findings and recommendations concerning appraisal quality are contained in Chapter IV.

B. HARVEST REQUIREMENTS

Each appraisal and resulting sale permit include harvesting regulations specified by the appraising forester. Harvest regulations are designed to ensure that all timber is removed and facilitate regeneration. Each appraisal must specify:

- The minimum merchantable top diameter for each species,
- Species which shall be cut,
- Method of cutting (i.e., clear cut, partial cut, thinning),
- Areas to be cut,
- Utilization standards by species,
- Any special regulations that specify seasonal limitations on harvest, and
- Slash disposal.[3]

Each sale is periodically reviewed by the district forester to ensure compliance with the cutting regulations established in the appraisal. These reviews include regular site visits which may vary from once a month to once a week. Foresters responsible for such supervision may recommend that the logger suspend cutting if and when it is determined that the harvesting regulations have been violated by the permit holder.

Many jurisdictions outside Minnesota require individual loggers to submit cutting plans prior to the initiation of harvest activities. Such plans generally include a harvesting schedule, a plan for road development, and specifications of the methods of harvest and slash disposal. These plans are used by some forest management agencies to ensure prompt and adequate harvest of the resource.

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[3] Timber Sales Manual, Minnesota Department of Natural Resources, Division of Forestry (September 1981), p. G-1.1-2.

Some jurisdictions use a "tract harvest" method to achieve compliance with harvest requirements. Agencies which use this method subdivide individual sale stands into harvesting tracts to manage both the harvest and payment. Individual loggers are required to harvest the stand by "sub-tracts," paying for each sub-tract in advance. All timber must be removed to the satisfaction of the managing agency before the logger may proceed to harvest any of the remaining sub-tracts. Consequently, the tract harvest technique provides a controlled method of collecting payments and ensures that all timber will be harvested according to the plan.

- Although DNR requires individual loggers to comply with specified cutting requirements, loggers are not required to submit cutting plans. The lack of such documentation increases the difficulty of verifying compliance with state law and permit requirements.

C. TIMBER SCALING

As previously noted, payment for timber harvested from state lands may be based solely on the appraisal (a "sold as appraised" sale) or it may be based on a scale, or measurement, of harvested timber. A sold as appraised sale involves the sale of a stand of timber at the price fixed in the appraisal.

Minnesota law authorizes sold as appraised sales at the discretion of the Commissioner of the Department of Natural Resources. The Division of Forestry has established guidelines for the sale of timber using this method. These include:

- Fuelwood, hardwood, Aspen pulpwood, and boughs;
- Tracts of timber composed mainly of hardwood and Aspen pulpwood and containing a relatively small volume of other species or products;
- Cut products;
- High value species;
- Small amounts of miscellaneous material that may be salvaged from logging residue or from the forest floor; and
- One or more species in a sale may be sold as appraised and the balance scaled.[4]

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[4] Timber Sales Manual, Minnesota Department of Natural Resources, Division of Forestry (September 1981), p. B-3.7.

Although DNR personnel in the St. Paul office have estimated that about 15 percent of all state timber is sold as appraised, a review of a sample of auction and informal permits issued between FY 1975-1981 demonstrates that:

- approximately 24 percent of all timber sold by Minnesota over the past seven years was sold as appraised. (See Table 3.1)

TABLE 3.1

FREQUENCY OF SCALING

(Volume Sold FY 1975-81)

	Informal	Auction	Total
Sold as Appraised	27.6%	9.5%	24.1%
Scaled	65.4%	78.9%	68.1%
Combination[a]	6.9%	11.6%	7.8%
N=465			

SOURCE: DNR Timber Sale Permits, FY 1975-81.

[a]Sales in which some timber was sold as appraised and some was scaled.

Interviews with some DNR Forestry Division field personnel have substantiated this finding. They note that as recently as 1979 as much as 90 percent of the timber sold in some northern Minnesota districts was sold as appraised.

While these data do not permit us to examine the species and products which are sold as appraised, in our opinion a greater proportion of wood is being sold without scaling than the St. Paul staff are aware. The division's guidelines are sufficiently broad to allow a great disparity in application among districts. For example, division guidelines provide that Aspen pulpwood may be sold as appraised but the conditions under which such a sale may be made are not specified. Thus, one district may sell a majority of its Aspen as appraised while a neighboring district, under virtually identical circumstances, may sell none of its Aspen as appraised.

These data show, however, that most state timber is scaled. State law requires that "all timber cut on lands in the charge of the commissioner (of DNR), except as expressly provided otherwise by the commissioner shall be scaled." Scaling provides a direct measure

of timber volume that is substituted for the volume estimate provided in the appraisal. The price of scaled timber is determined by multiplying the rate per cord (established in the appraisal or bid-up at auction) with the number of cords scaled, or measured, after the harvest.

Minnesota uses two scale methods: the regular scale and the consumer scale. (See Table 3.2)

TABLE 3.2

THE USE OF SCALING METHODS

(Volume Sold FY 1975-81)

	Informal	Auction	Total
Regular Scale	38.3%	23.7%	34.9%
Consumer Scale	35.8%	26.8%	33.6%
Regular/Consumer Scale	25.9%	49.5%	31.5%
N=334			

SOURCE: DNR Timber Sale Permits, FY 1975-81

Regular scaling entails the volumetric measure of felled timber in the woods by a qualified DNR scaler. Generally, scaling functions are delegated by the Area Forester to District personnel who have met the "standards of proficiency" set by DNR. All scalers undergo a period of training either at DNR's training workshop or in the field, after which they are deemed qualified to conduct scaling on their own. Currently there are approximately 230 qualified DNR scalers.

Minnesota law also allows scaling by the permit holder or by the consumer, usually at a mill. The Director of Forestry may enter into a scaling agreement which requires the consumer to adhere to specified scaling requirements, keep certain records, and provide any scaling data required by the DNR.

All consumer scale agreements make use of "lock box" system. Each logger is supplied with a book of "tickets" in triplicate form. As each load of timber is removed from the sale stand the logger is required to deposit a ticket in a locked box located at the sale site. This ticket is collected by DNR field personnel for later verification. A duplicate is provided to the scaling agent who indicates the scaled volume and forwards the completed ticket to DNR.

The lock box ticket and scale ticket are then matched by DNR and the volume of harvested timber is recorded for billing purposes. The logger retains the final copy of the scale ticket.

Consumer scaling is conducted with a weigh scale or by regular methods. Weigh scaling is normally used for scaling pulpwood and bolts. Weight figures are converted to cordage or MBF by DNR for billing purposes.

D. PAYMENT METHODS

As we have seen, Minnesota Statutes outline two methods of payment for timber sales: one for auction sales and another for informal sales.

Parties who buy timber at public auction are required to submit a down payment equal to 25 percent of the appraised value of the sale stand immediately upon approval of the bid. In addition, the logger is required to deliver a valid surety bond equal to the sale value minus the down payment within 90 days from the date of purchase. Under this method, final payment for harvested timber is due upon completion of the harvest. The amount due equals the total harvest value (usually determined by scaling) minus the 25 percent down payment.

A second method of payment is used for informal sales. This method requires loggers to pay the full appraised price prior to the harvest. If it is a "sold as appraised" sale, as we have indicated, there are no further transactions. If it is a scaled sale, any overrun or under-cut is rectified upon completion of the harvest. The logger pays for excess timber within 30 days of the final billing issued at the close of the sale. Refunds for under-cuts are also issued by the department within 30 days of the completion of the sale. Individual loggers often opt to apply refunds to their next permit.

In all cases, when a logger leaves all or part of a sale tract uncut, he is required to pay for the standing timber at the appraised price.

According to state law, an account which is more than 60 days late is considered delinquent and should be turned over to the Attorney General for collection.[5] As of January 1982, there were 202 delinquent accounts (25 for auction sales, 166 for informal sales, and the remainder for trespass incidents). Some of these delinquencies were nearly 25 years old, but most date from the 1970s. The Attorney General has concluded that 58 accounts are uncollectable and

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[5]The Forestry Division, however, generally waits 90 days before turning delinquent accounts over to the Attorney General.

should be reviewed by the Executive Council for possible removal from the files. The remaining files are being processed so as to use the Revenue Reclamation Act to recover funds owed to the state. However, the need to identify permittees' social security numbers has slowed this effort.

Although the problem of delinquent accounts is not large, individual delinquencies may exceed $10,000. In addition, recent changes in state law reducing the bonding requirement to an amount equal to the appraised value of auction sales leaves the state somewhat more vulnerable to delinquencies than in the past.

Some of the other jurisdictions we studied have begun to use other techniques to ensure payment for their timber. Maine, for example, employees a "withholding" scheme on some scaled sales. Under this system, the consumer scaler withholds payments to the logger and transfers them directly to the state up to the total amount owed by the logger to the state.

E. SALE DURATION

All timber sold by the state of Minnesota for harvest must be removed within prescribed time periods. Regular auction permits are valid for two years while intermediate auction and informal permits are valid for one year. All sales are granted the maximum duration unless a special condition exists and immediate removal of the stand is necessitated.[6]

According to Minnesota law, all loggers holding active permits are eligible for extensions on their harvesting permits when they can demonstrate a "good and sufficient reason" why the harvest could not be completed within the normal permit duration. Certain other jurisdictions require a reappraisal of a sale stand and a reassessment of the timber value based on current market prices. Unlike Minnesota's method, this allows the sale price to be adjusted for any increase or decline in the timber market.

Our analysis of a sample of Minnesota timber sale permits issued between FY 1975-81 revealed that:

- approximately 21 percent of all permit holders requested and received extensions of one year or more. (See Table 3.3)

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[6]The average sale duration for auction sales used by other jurisdictions ranges from three to five years with a maximum of 10 years used by the U.S. Forest Service. In actuality, sale durations seldom reach the maximum allowed. In most cases, the duration is set in the permit at a level below the maximum duration. Large sales or those which are difficult to harvest are generally allotted more time for harvesting.

TABLE 3.3

EXTENSIONS GRANTED ON MINNESOTA TIMBER SALE PERMITS

FY 1975-81

	Percent of Total Sales	Average Length in Years
Auction	2.7%	1.58
Informal	18.9%	1.27
No Extensions	78.4%	
N=564		

SOURCE: DNR Timber Sale Permits, FY 1976-81.

State law allows extensions for "good and sufficient reaons." DNR's permit files indicated that all loggers with permits scheduled to expire were notified of the impending expiration and informed that they could receive an extension upon request. Loggers desiring an extension then notified DNR after which an automatic extension was granted. The files did not demonstrate an effort by the Division of Forestry to screen extension applicants. The only instances in which extensions were refused were those cases which were submitted after the termination date established by permit. Since almost no extension requests were rejected, DNR's extension policy may be too lenient.

However, we have found little evidence that loggers delay harvesting sale tracts in hopes of receiving a higher price from timber consumers. Our review of timber permits from 1975 to 1981 revealed a few auction permits active for more than seven years,[7] but as shown in Table 3.3:

- The average auction permit was active for just 19 months and the average informal permit was active for only 15 months.

Accordingly, we do not consider "timber speculation" to be a serious problem at this time.

[7]These auction permits were sold at a time when permit duration could extend to 10 years.

E. RECOMMENDATIONS

As we have shown, there are several problems associated with the system of appraising and scaling state timber. In the next chapter we examine the quality of appraisals and review the department's program of scaling verification. Our recommendations regarding these procedures are contained at the end of the next chapter.

In most other respects, DNR's timber sale procedures appear to be free from significant problems. However,

- We think the department should review its permit extension policy to ensure that it is consistent with the interests of the state.

It is in the financial interest of the state to encourage loggers to harvest sale tracts as soon as possible after the sale transaction. In addition, prompt harvests enable DNR to proceed with planned reforestation efforts. Permit extensions should, therefore, be granted only when loggers have made a genuine effort to complete the harvest within the prescribed time limits.

In order to assist in the rapid collection of delinquent accounts according to the Revenue Reclamation Act,

- The division should require permit holders to give their social security numbers on timber sale applications and auction forms.

IV. APPRAISAL AND SCALING QUALITY

A. APPRAISAL INSPECTIONS

Since the appraisal is such a crucial part of the DNR timber sale procedure, we sought information on the steps taken by the department to ensure appraisal quality. Each timber appraiser is required by law to keep detailed records of his appraisal results, and the state executive council is empowered by law to appoint agents to investigate the correctness of any appraiser's report, but there is no formal mechanism established in law to check appraisal results or to control their quality.

The DNR Timber Sales Manual outlines the department's new policy on timber inspections. A distinction is made between an "inspection," which is a field check by area or regional staff to ensure that an appraisal has been done according to departmental policy and to ensure compliance with cutting regulations, and a "check cruise," which is a reappraisal or check appraisal by a supervisor to ensure that timber volumes have been accurately estimated in an earlier appraisal. Regions are required to conduct at least one inspection per district each year. Areas are required to inspect at least 20 percent of each district's permits and conduct at least one check cruise in each district each year.

We systematically contacted all regional and area forestry offices to determine what methods have been used to ensure appraisal accuracy. In general, we found that

- local forestry offices have not yet established appraisal inspection and check cruise programs in compliance with DNR policy.

While many report having a regular program of inspections, few appear to conduct such inspections with the frequency now required by the department. Moreover, no check cruising was done at the regional level in the past two years. Only seven out of 16 areas which reported to us had done any check cruising.[1] Based on information supplied by regional and area offices, we estimate that,

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[1]These seven areas conducted a total of 30 documented check cruises during the two year period. Data supplied to us by the area offices showed that, on the average, the volumes determined by the check cruises were 24.5 percent different than the original appraisals.

One regional office reported having done an experiment with nine appraisers to determine how close they could come in estimating the volume of timber in a tract that was later cut and scaled at 12,800 board feet. The low estimate was 9,700 board feet, the high estimate was 19,800 board feet.

statewide, fewer than one percent of all appraisals over the past two years were subjected to check cruises, somewhat fewer than the five percent estimated by DNR staff in St. Paul.

The most common reason cited by field office staff for the lack of check cruises was a shortage of manpower. But others simply reported that a regular comparison of appraisal results with scale results was an adequate method of checking on appraisal accuracy. Nearly half of all responding field offices reported having a practice of doing this kind of analysis at least occasionally. When scaled timber volumes are significantly at variance with appraisal estimates, the appraiser involved is ostensibly singled out and an attempt is made to determine why the original appraisal estimate was different from the scale result.

However, even this scant information on appraisal quality is not regularly forwarded to St. Paul nor analyzed on a statewide basis. As a result, we have found that:

- the department does not have a clear or complete picture of the degree to which timber appraisals are being done in an accurate and consistent manner.

There is a general acknowledgement among department staff that appraisal quality could be improved, but few steps have been taken to find out when errors occur, why they occur, and what could be done to tighten up the appraisal process.

In each of the last two years, the department has conducted an appraisal workshop designed to improve the appraisal capabilities of its least experienced personnel. We witnessed part of the five-day workshop in June 1981, and considered it a good training session. However, few of those attending were personnel currently authorized to do appraisals. This fact mitigated the usefulness of the session as a vehicle for learning how appraisals are being done and how they might be improved.

B. APPRAISAL ACCURACY

In order to determine the accuracy of DNR timber appraisals, we examined a representative sample of timber permit files for the period 1975-81. We compared appraisers' estimates of the total volume of timber in each sale tract with the total volume of timber actually scaled in each tract after the wood was harvested. In addition, we compared the value of the timber as sold (taking into consideration the value added as a result of competitive auction bidding where appropriate) with the value of the timber as scaled. Those cases which were "sold as appraised" and which therefore had no final scaling (about 27 percent of all sales in our sample) were left out of this analysis.

Generally speaking, scale results ought to be close to appraisal estimates. The appraisal is supposed to produce the forester's best estimate of marketable timber volume by species and product type; the scale is a post-harvest measurement of the amount of timber actually cut from a tract. Accurate appraisals are a concern because the size of a timber sale (which are limited by law) are set by the appraisal and because a great deal of timber in Minnesota is sold with no further check on volume than that provided in a pre-harvest appraisal. In addition, of course, accurate appraisals are a convenience for the logger since he must commit his resources to a job of predictable dimensions.

Under certain circumstances, however, scale results may be expected to differ from appraisal estimates. First, scale methods, like appraisal methods, are inexact. Consumer scaling requires the transposition of timber weights (which may differ seasonally or by the age of the cut wood) into volume estimates. Regular scaling involves an on site inspection and measurement by a forester, using many of the same techniques used in pre-harvest appraising. Second, the logger may cut to slightly different specifications than those set by the appraising forester. This may result in a somewhat higher or lower utilization rate. Finally, the logger sometimes leaves timber standing on a tract for various reasons. In these cases, what is scaled may be significantly less than what was originally appraised. During our study we were unable to control for the first two of these factors, but we did adjust scale results to reflect the amount of timber left standing, if any.

Given these considerations, we expected scale results to approximate, but not necessarily equal, appraisal estimates. However, our study of timber permit files over the past seven years led us to conclude that:

- DNR's timber appraisals are usually at variance with scale results and often significantly inaccurate.

Of 253 cases, we found that the average number of cords per sale was estimated through the appraisal process to be 153. The average number of cords actually scaled per sale was 175. As shown in Figure 4.1, nearly 70 percent of sales were under- or over-appraised by more than 10 percent. Most of these were under-appraised. We estimate that about one-half of all sales are under-appraised by more than 10 percent.[2] About four percent were under-appraised by more than 100 percent.

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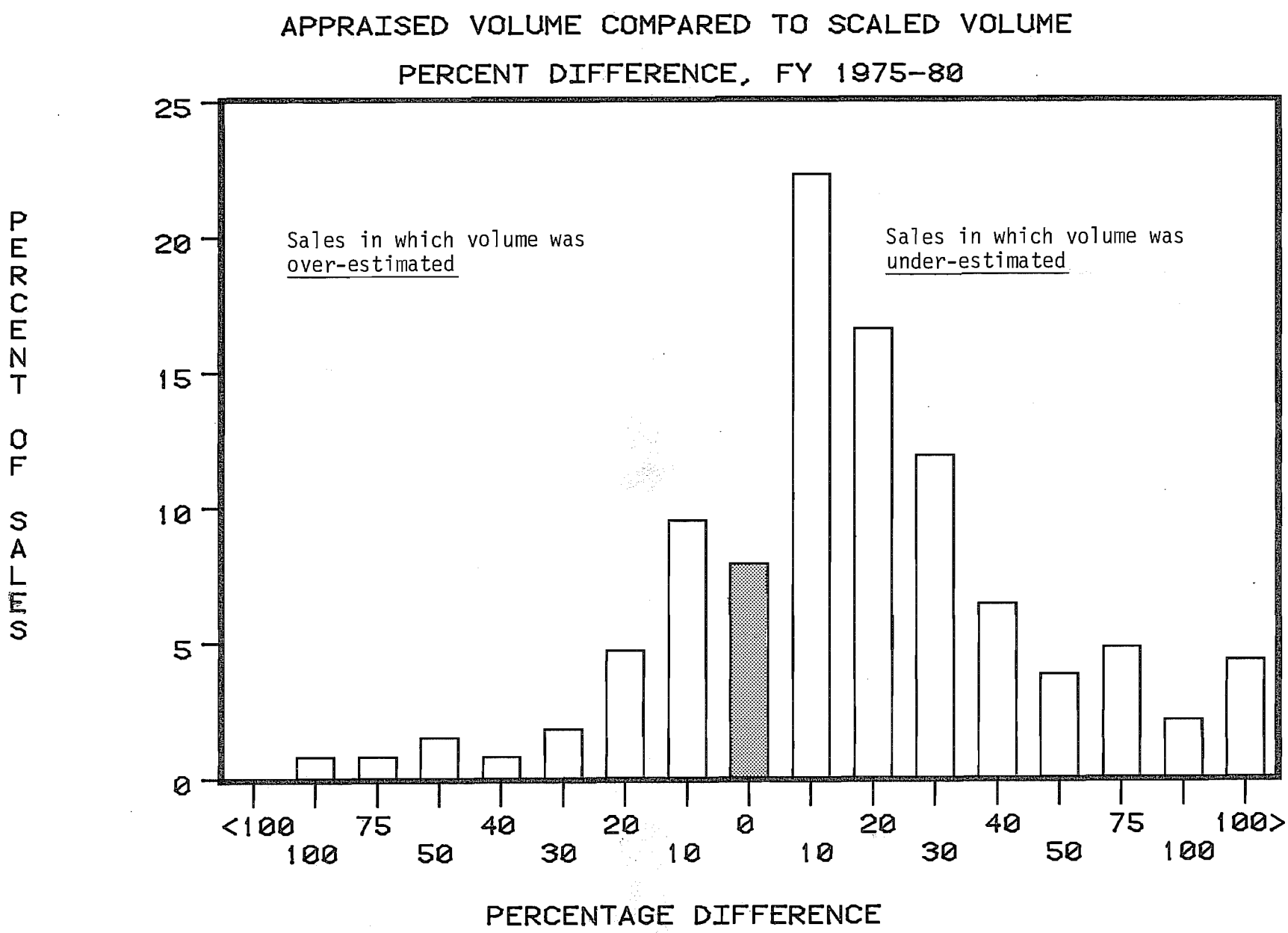
[2]State statute currently requires a surety or cash bond from the logger prior to harvest. If scaling reveals a lower quantity of timber in a sale tract than was originally estimated, a refund of the excess cash paid must be made by the state. We were informed by DNR personnel that as a matter of routine, timber values are often under-estimated in order to avoid the administrative expense and trouble of making refunds.

However, the practice of under-appraising results in the need to collect additional payments from loggers. The delinquent account problem discussed in Chapter III has been exacerbated by this practice.

FIGURE 4.1



Sample Size = 253

These data suggest that appraisals are often inaccurate. In these cases, however, the state's interests were protected insofar as timber revenues were calculated on the volume of timber scaled, not the volume estimated to be in the sale tract by the appraisal. Scaling, therefore, may be considered a kind of safety net. Scaling protects the state's interests when appraisal estimates are significantly low; it protects logger interests when estimates are too high. If all state timber were sold with scaling, inaccurate appraisals would be less troublesome. However, at present, much state timber (approximately 25 percent) is sold as appraised, with no final scaling of any kind. For these sales, appraisal accuracy is important since the revenues which accrue to the state are based solely on volume estimates made in the appraisal.

C. A TEST OF APPRAISAL RELIABILITY

In order to examine further the reliability and consistency of DNR's timber appraisals and to determine the sources of any observed variations in appraisal results, we conducted a controlled test of the department's appraisal capability. We selected a representative sample of 41 qualified DNR appraisers and gave them instructions to conduct independent appraisals of two pre-selected tracts of timber near Grand Rapids, Minnesota.[3] Each appraiser was provided with maps, a list of appraisal specifications, timber utilization assumptions, and asked to work independently, conducting the appraisals according to the methods usually employed by the appraiser when a tract is to be sold without scaling. All work was completed between October 27 and November 5, 1981.

Each appraiser was asked to fill out a standard DNR appraisal report form, modified to exclude information not relevant to the purposes of the experiment. On this form each appraiser indicated his estimate of the volume and value of each species and product type in the tract, specified the price guide factors used to calculate the values, estimated the tract size in acres, and recorded other pertinent information. On a separate form each appraiser reported on his appraisal methods, his years of appraisal experience, and the time he expended to complete the field and office work.

The results, including each appraiser's estimates of each tract's total timber volume and value, were tabulated and analyzed to determine the degree of consistency among the appraisers' estimates and to pinpoint the reasons for observed variations.

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[3] One tract, about 20 acres with regular boundaries, consisted of Aspen and other hardwoods; the other, about 18 acres with irregular boundaries, consisted primarily of Norway and Jack Pine. Both were on private land.

Our experiment with DNR appraisers shows that even under closely controlled conditions and when instructed to conduct careful "sold as appraised" appraisals,

- DNR appraisal methods yield highly inconsistent and unreliable results.

As shown in Table 4.1, the 41 appraisers' estimates of the total volume and value of timber in the two test tracts varied widely. For Tract 1, the pine tract, one appraiser estimated the volume to be as low as 346 cords while another estimated it as high as 1,143 cords; one estimated the value at less than $10,400 while another thought it was worth nearly $43,200. For Tract 2, the mixed hardwood stand, volume estimates ranged from 217 cords to 940 cords; value estimates ranged from just $710 to almost $5,000.

TABLE 4.1

TIMBER APPRAISAL EXPERIMENT: VARIATIONS IN APPRAISERS' ESTIMATES OF TIMBER VOLUME AND VALUE

	Tract #1 (Mixed Pine)	Tract #2 (Mixed Hardwoods)
Average timber volume estimated	705 cords	614 cords
Highest single estimate	1143 cords	940 cords
Lowest single estimate	346 cords	217 cords
Proportion of volume estimates within ± 10 percent of the average for all	29%	41%
Proportion of volume estimates within ± 20 percent of the average for all	75%	68%
Average timber value estimated	$19,700	$2,600
Highest single estimate	$43,160	$4,956
Lowest single estimate	$10,370	$ 710
Proportion of value estimates within ± 10 percent of the average for all	24%	24%
Proportion of value estimates within ± 20 percent of the average for all	66%	66%

N=41 appraisers

Significantly, only between 2/3 and 3/4 of all appraisers were able to give an estimate of timber volume within plus or minus 20 percent of the mean volume estimated by all appraisers. This indicates a high degree of variability in volume estimates. A similar observation was made for timber value estimates.

Our test conditions were artificial and some appraisers said that they would have done the appraisal somewhat differently had it been a genuine sale appraisal. Some said that the test tracts would have been sold with scaling. Nevertheless, typical field conditions were closely replicated and timber utilization specifications were given. Only appraisers who were experienced in doing "sold as appraised" sales were selected for participation. These factors, coupled with an assumed incentive to do an especially careful job, should have narrowed the range of appraisal estimates. These findings, then, seem all the more remarkable.

The reasons for these variations in appraisal estimates are complex. Estimates were not related to the appraiser's experience, specific appraisal techniques used, or the part of the state in which the appraiser usually works. Instead, our research suggests that appraisers' estimates varied for a combination of the following reasons:

- The sample sizes (or number of plots) taken by appraisers in the field were generally small. On the average, appraisers selected about 20 plots for each tract. Those who selected a larger number of plots were generally closer to the mean estimates than others.

- Plot layouts varied among the appraisers. Most used a systematic sample plot layout with plots separated by fixed distances, but others moved through the tract in a horseshoe or circular pattern. These different methods of appraising increased the variations in estimates.

- Appraisers used different methods to calculate timber volumes. Some used a standard volume table which estimates tract timber volume from information on tree diameter and height tallied in the field. Others used one of several shortcut formulas which only require a tree height tally. Depending on the specific formula used, volume differences varied by as much as eight percent.

- Different methods were used to allow for trees that were unmarketable because of defect, disease, or insect infestation. Some appraisers simply deducted the defective trees from their gross estimate of tract volume; others included defective trees in volume estimates and adjusted the value estimate downward through the price guide factors.

- Appraisers arrived at different estimates of tract areas. Tract 1 estimates, for example, ranged from 15 acres to 22 acres. This variation was due, in part, to different methods of tract area estimation. Some appraisers used a dot grid method using aerial photographs; others used a hip chain traverse method which relies on pacing and compass readings in the field.

- Appraisers made different judgements about applying price guide adjustments. Overall, Tract 1 price guide adjustments ranged from 110 percent of base stumpage prices to 165 percent. Tract 2 adjustments ranged from just 90 percent of base stumpage prices to 170 percent. Some of this variability may have been due to the difficulty some appraisers from outside the Grand Rapids area had in estimating costs for hauling, road maintenance and construction, and local market conditions. However, there was great variability among other price guide factors as well. In addition, some appraisers applied separate price guide factors for each species and product type in the test tracts. In these cases, for example, jack pine sawlogs might have been priced according to one set of price guide factors, while white pine pulp and bolts were priced according to another set of price guide factors. In contrast, other appraisers simply applied a single set of price guide factors to all species and product types in the tract. Our research suggests that these latter appraisers were somewhat closer to one another in their estimates of timber value than were the former appraisers.

- Appraisers developed different species and product type breakdowns. Some listed as few as two species and product types (such as Aspen pulpwood) on their appraisal forms while others listed as many as nine. These differences, resulting in part from the size of the samples selected by appraisers, added to the overall variability in volume and value estimates. We found that the more species and product breakdowns, the higher the appraisers' value estimates.

Each of these sources of variation was significant. Although this was a test conducted under artificial circumstances, the results strongly suggest that DNR appraisals conducted under normal field circumstances lack precision and consistency because appraisal techniques vary widely among appraisers.

D. SCALING VERIFICATION

It was beyond the scope of our original study to evaluate the overall quality of DNR's timber scaling operations. However, because scaling plays such a major role in the determination of timber values, we sought information on the department's program to verify the accuracy of scale results.

The verification of scale results is complicated by the fact that nearly two-thirds of the timber volume sold by the state is scaled by the consumer or by a combination of DNR and consumer efforts. This means that a great deal of timber is scaled without on-site scrutiny by DNR. All consumer weigh scales are inspected and approved annually by the Division of Weights and Measures of the

Minnesota Department of Transportation, and consumers who are authorized to conduct regular scales (generally of sawtimber) are reviewed annually by DNR's Scaling Specialist. But since DNR personnel are not actually present when most consumer scaling takes place, verification of scale results must depend on indirect methods or spot checks.

DNR's check scaling program is designed to re-check or confirm scale results for a small sample of regular scales (conducted by DNR foresters) and consumer scales (conducted by timber consumers). While it appears that there are no major deficiencies in the check scale program, the system is not designed in such a manner that regular accurate check scales can be guaranteed. DNR's scaling specialist must be notified upon completion of each scale, and a scaling specialist may be dispatched to conduct a check scale. Although scaling specialists attempt to check scale all scalers at least once each year, we have found that:

- DNR does not use a systematic or random method for selecting the scales which are to be checked.

Generally, the factor determining whether a given scale will be checked is the length of time the timber will be at the landing or scale site. Because loggers are free to remove lumber from the scaling site after the initial scale, there is often no practical opportunity for a check scale. During slow harvest years when little timber is cut, timber sometimes remains at the scaling site for only one day. The quicker the timber is removed from the scaling site, the less likely it is to be check scaled.

These facts make it difficult for the DNR scaling specialist to ensure that all scaling personnel are subjected to regular review. There were 230 qualified scalers in 1981 of whom abount 50 actively do scaling. However, only 38 of these were checked in 1981. An average of 500-700 regular scales are conducted in an average year; in 1981 just 44 check scales were done.

As we have noted, Minnesota law specifies that timber sold at auction may not be scaled by the permit holder unless the scale is supervised by a state scaler. Nevertheless, we have learned that:

- Approximately 19 percent of all consumer scales between 1975 and 1981 were conducted by the permit holder with only an annual review by DNR.

These scales represent a potential for fraud. As previously mentioned, the Forestry Division lacks a systematic method for selecting scales for verification. This holds true for consumer scales as well as regular scales conducted by DNR foresters. Because only timber which remains at the scaling point for a significant length of time will be checked, the likelihood of a consumer check scale depends on how quickly the timber is removed. DNR regulations do not require the scaled timber to be held for checking.

In a separate problem we have found that regular scales are sometimes conducted by the same DNR forester who conducted a sale tract's original appraisal. From our study of timber permits from 1975 to 1981, we found that:

- In approximately 54 percent of all scaled timber sale transactions, the appraisal and scale were conducted by the same DNR forester. (See Table 4.2)

As we have suggested earlier in this chapter, a common means used by DNR supervisors to monitor the quality of appraisal work is to compare appraisal results with scale results. However, when regular scales are conducted by the same individual who did the appraisal, the independent check is absent.

TABLE 4.2

PROPORTION OF SCALED TIMBER SALES IN WHICH APPRAISING AND SCALING ARE DONE BY THE SAME FORESTER

FY 1975-81

	Informal	Auction	Total
Appraiser/Scaler Same	54.7%	45.1%	54.0%
Appraiser/Scaler Different	37.9%	49.0%	38.8%
Not Applicable	7.4%	5.9%	7.2%
N=334			

SOURCE: DNR Timber Sale Permits, FY 1975-81.

E. RECOMMENDATIONS

As we have seen, there is room for improvement in both the quality of DNR's timber appraisals and the effectiveness of the department's program to control appraisal quality. In this section, we review some of the options available to the state to deal with these problems and we recommend ways that DNR can improve its timber appraisal program. As we have shown, it is difficult to consider appraisal issues apart from the issues of sale method and scaling, since these factors affect fundamentally the process of fixing the value of the state's timber.

One option is to adopt a sale method which reduces the current appraisal effort and relies almost exclusively on scaling to set timber prices. It may be easier to control the quality of scaling, some contend, than to control the quality and consistency of appraisals. Under this option, only a very rough estimate of timber volume and value would be provided before the harvest. Such an estimate would give a potential purchaser a general idea of the volume, species mix, and the probable value. Further investigations of tract quality and quantity could, of course, be conducted by the interested purchaser. Most importantly, the revenues accruing to the state would be based, as they are for the most part now, on the volume of timber scaled after the harvest. The resources now expended on relatively detailed appraisals could be largely saved, according to this scenario.

As attractive as this option seems, there are some drawbacks. First, it would work best when all timber is sold at an auction so that a market mechanism could be used to set the ultimate price of timber. It is difficult to envision the abandonment of appraisals altogether when the state sells a significant amount of wood by the informal method at the price rate determined in an appraisal. Second, scale results only provide volume data. There still needs to be an independent process of determining the rate per cord. This is an important function of an appraisal and some pre- or post-harvest substitute for this would have to be found.

Another sale option would eliminate all scaling and rely exclusively on the appraisal as the technique for determining the value of the state's timber. This procedure would have certain advantages since it would reduce the current reliance on consumer scale evidence for a final calculation of timber values. The best consumer scale safeguards cannot remove the potential for abuse when the private purchaser of timber is alone responsible for reporting the quantity of timber the logger has cut from state lands. Selling all of the state's wood as appraised would also save all of the bureaucratic paperwork associated with scaling.

As we have seen, certain other jurisdictions, such as the U.S. Forest Service, do rely exclusively on the appraisal to determine the value of timber which is to be sold. Without exception, however, these jurisdictions conduct far more intensive appraisals than those currently being done by DNR. The Forest Service, for example, generally conducts 100 percent tallies of sale tracts, using multi-person teams of appraisers. This effort is obviously expensive, perhaps two to five times as expensive as the less intensive methods used by DNR.

Years ago, Minnesota law required two independent appraisals of timber before it could be offered for sale and for many decades all scaling was conducted by the independent Surveyor General. Today the program is run without these checks. Although the fear of corruption or abuse has not increased, appraisal quality is questionable. We think that it would only be prudent for the Legislature to devise a system of safeguards which would deter abuse and ensure the protection of the state's interests.

Given the alternatives, and given our findings concerning DNR's current appraisal capabilities,

- We think that the state should continue to rely on a timber sale method which involves both pre-harvest appraisals and post-harvest scaling.

While there are problems associated with both appraisals and scaling, retaining both ensures that each serves as a check on the other. Based on our research, we think that appraisal quality is not sufficiently consistent to permit the state to abandon scaling at the present time.

However, we think that the scaling process should be separated more definitively from the appraisal process. As we have seen, many regular scales are conducted by the same individual who conducted the original appraisal. In the interests of retaining the scale as a check on the appraisal,

- We think that DNR should adopt a policy to ensure that--whenever possible--DNR foresters do not scale timber from a sale tract which they have previously appraised.

This policy might be difficult to implement only in those districts (perhaps a fifth of all districts) staffed by just one person. In lieu of applying this policy in those districts, DNR could simply implement more comprehensive check scaling.

In addition,

- We think that DNR should work to develop a more systematic method of selecting scales for re-scaling and ensure that all approved scalers are periodicaly reviewed.

Sold as appraised timber sales should probably be reduced to a minimum by DNR. But since there will always be a need to retain some flexibility in sale methods, it is probably not possible to require scaling of all sales. The Legislature could require that all sold as appraised sales be subjected to two independent appraisals, but that solution would be costly and duplicative.

In the long run, improving the quality of the sale process rests on improving the appraisal capabilities of the Forestry Division.

- We recommend a tightening up of the appraisal procedure.

Although there may not be a single appraisal method which is "best" for all circumstances in all parts of the state, there may well be preferred techniques under certain conditions. What is most important is to standardize appraisal methods, improving consistency among appraisers.

- We think the department's Timber Sales Manual should provide better appraisal guidelines for field staff, specifying what methods and techniques are to be used under given conditions. We think that the department should require its appraisers to use sampling methods with given error rates and confidence limits. To this end we recommend that the Legislature require DNR to establish detailed appraisal standards, including guidelines to give appraisers help in deciding what methods to use under different field circumstances.

Based on an analysis of results from our appraisal experiment, we recommend guidelines to standardize the following specific appraisal procedures:

- The method of estimating timber volumes. The department should specify under what conditions standard volume tables or formula shortcuts are to be used.

- The tree defect estimation procedure. The department should establish a uniform method of allowing for tree defect in its appraisals. It should specify under what conditions defective trees are to be subtracted from gross volume estimates and under what conditions tree defect should enter into the price guide factors.

- The tract area estimation procedure. A good and reliable method of determining tract area needs to be developed and used uniformly.

- The use of price guide factors. The department should review its entire price guide system, eliminating those components which are most susceptible to subjective variability and reducing the range of adjustments which are possible. In addition, there should be better guidance as to when individual species and product types require separate price guide calculations and when a single set of factors may be applied to an entire stand.

- The proper sampling method and plot layout. The department should provide more specific guidelines regarding the use of various methods of sampling and laying out sample plots in the timber tract.

We also recommend that the department take steps to ensure that a reasonable program of inspections and check cruising is established and that such a program is subjected to frequent scrutiny by the regional offices as well as the St. Paul office. Check cruising standards should be established and results should be systematically reviewed and summarized statewide each year. The work of each appraiser should be reviewed periodically by a supervisor, through inspections, check cruises, and comparing scale results to appraisal estimates.

Finally,

- We recommend continued use of the appraisal workshop to improve the department's appraisal capabilities. However, we think that more experienced as well as novice appraisers might benefit from such a workshop experience.

In any case, those appraisers who are identified through the inspection and check cruising program as needing additional training should participate in the workshop. Workshop presentations might well draw on expertise from the University College of Forestry and might utilize appraisal tests such as the one we organized as part of this study in Grand Rapids.

V. STATE TIMBER PRICES

In this chapter we review the specific steps used by DNR to establish timber prices and we compare Minnesota's timber prices with those of Wisconsin and Michigan. Timber prices are controversial because they determine how much revenue the state receives for its timber resources and because they affect the viability of the state's forest products industry. Although the issues relating to timber prices involve many complex economic factors, we believe that our brief review may clarify some of these issues.

A. SETTING TIMBER PRICES

According to state law, all timber on state lands must be sold at or above its "appraised value."[1] As we have already shown, this value is set in two stages: the determination of regional base stumpage prices for each species and product types and the adjustment of those prices during the appraisal according to certain standard price guide factors. The base stumpage price is the "normal" price for a unit (cord or MBF of timber) in a given region. But an appraiser may raise or lower that price after he examines a specific sale stand and decides the quality of the stand, how difficult it will be to harvest and transport, and whether market conditions make the stand more or less valuable.

1. BASE STUMPAGE PRICES

Some jurisdictions, such as the U.S. Bureau of Land Management, use a "residual value" method for setting base stumpage prices. Jurisdictions using this method begin with the value of the finished wood product, such as lumber or pulp, and deduct the estimated harvest and production costs. The remaining value is assumed to be the true value of the timber in a given stand and it is, therefore, the base stumpage price.

Minnesota uses a modified "transaction analysis" method to set base stumpage prices. This method employs data from sales in a previous period to calculate new base prices. The U.S. Forest Service calculates new prices quarterly; the State of Minnesota, like Wisconsin and Michigan, sets new base prices annually by this method. However, the DNR, unlike its counterparts in Wisconsin and Michigan, does not simply take the prices received for each species and product type and publish those as next year's base prices. The Minnesota method is somewhat more complex.

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[1] "Appraised value" has been defined as "the monetary value of standing timber to be converted into commercial products and does not include the intangible values of timber such as watershed protection or recreation." See Reginald D. Forbes, Forestry Handbook, pp. 15.17-15.18.

The major steps in setting base stumpage prices in Minnesota today are illustrated in Figure 5.1. The forest economist's recommendation is based, in part, on an analysis of timber prices actually received in each region of the state for each species and product type.[2] He uses a pricing formula which incorporates the average auction and informal prices from the previous year, an inflation factor, and a market factor (see Appendix C). However, as shown in Figure 5.2, the forest economist utilizes additional indicators to arrive at his recommendations. The "pricing formula without indexing" indicator drops out the inflation and market factors, the "constant value" indicator is a simple adjustment in the current base price based on the average annual wholesale inflation rate over the past five years, and the "simple transaction" indicator is the average price per cord actually received over the past year. As previously noted, Wisconsin and Michigan mechanistically use this "simple transaction" indicator to set their base prices. However, Minnesota's forest economist uses all four indicators in order to arrive at a recommendation.

According to DNR, the forest economist's recommendation is based on two general rules:

1. When the "pricing formula" and the "simple transaction" indicators call for a price change, the forest economist makes a recommendation for change keeping in mind his anticipation of future economic conditions.

2. When the "pricing formula" indicators and the "simple transaction" indicator move in opposite directions, stumpage prices should remain unchanged from the previous year.

The forest economist's recommendations are reviewed by regional and area staffs. Regional directors consider the proposed changes and, keeping in mind local timber supply and market conditions, submit their own recommendations to St. Paul. Finally, at a meeting of all senior division staff, including section managers and regional directors, final price determinations are made for each species in each region. After approval by the Director of Forestry and the commissioner, the prices are published. In general, new base stumpage prices go into effect in May or June of each year.

Figure 5.2 shows how these procedures produced new 1981 base stumpage prices for Birch sawtimber and Spruce pulpwood. In these instances, the new base prices were not those recommended by the forest economist, a typical outcome in 1981.

In general, we conclude that:

- DNR's methods of setting base stumpage prices are highly subjective, relying extensively on impressionistic input from division field and office staff.

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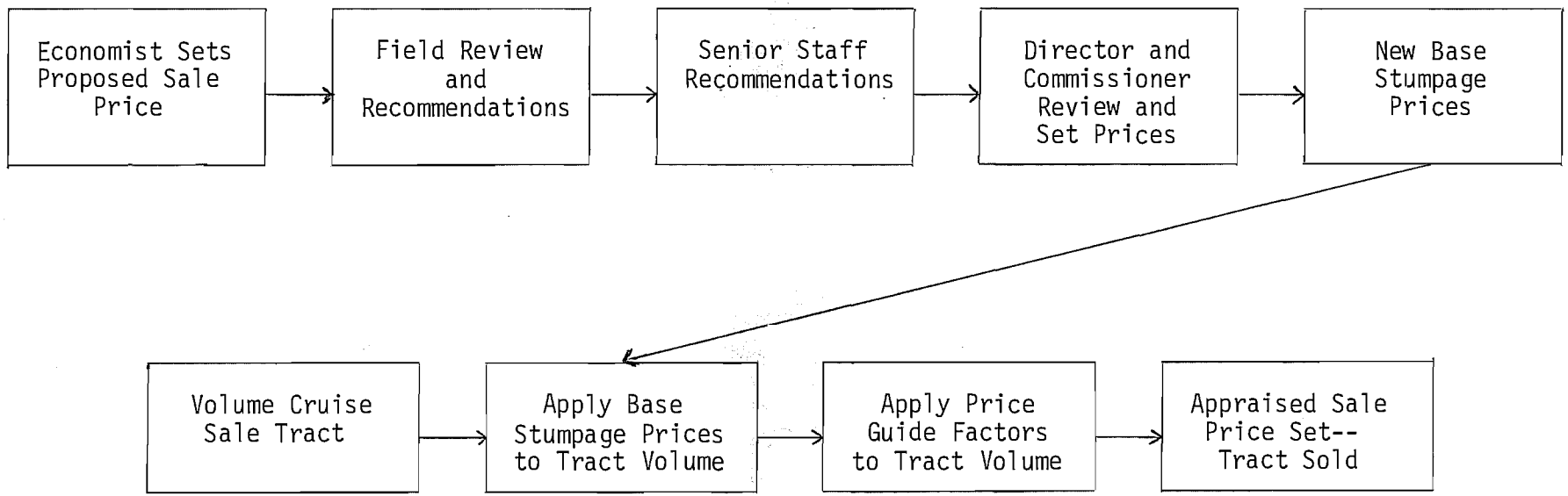
[2]These price data, however, are of questionable accuracy; see our discussion in Chapter VI.

FIGURE 5.1

PROCEDURES FOR SETTING APPRAISED TIMBER PRICES



SOURCE: DNR, 1981.

FIGURE 5.2

BASE STUMPAGE PRICE ANALYSIS: BIRCH SAWTIMBER AND SPRUCE PULPWOOD, REGION II (1981)

	Old Base Price (1980)	Economist's Analyses		Economist's Recommendations	Field Recommendations	New Base Price (1981)
Birch Sawtimber	$32.00	Pricing Formula:	$24.27	$32.00	$24.00	$28.00
		Pricing Formula Without Index:	$28.65			
		Constant Value:	$34.73			
		Simple Transaction:	$31.95			
Spruce Pulpwood	$14.00	Pricing Formula:	$17.60	$16.00	$14.00	$14.00
		Pricing Formula Without Index:	$20.55			
		Constant Value:	$15.20			
		Simple Transaction	$16.75			

SOURCE: DNR, Division of Forestry, May 1981.

Although the forest economist has attempted to develop an objective means by which to calculate new base stumpage prices, DNR's current pricing method relies more on regional and senior staff perceptions of timber supply and market conditions than on a scientific technique to measure those conditions. Prior to the development of the pricing formula, DNR's method was even less objective.

The degree of subjectivity in setting base stumpage prices runs contrary to the practices of most other jurisdictions we studied. For most, prices are determined by concrete data compiled on a regular basis. And in each case, prices are not subject to discretionary field approval before they become applicable.

2. PRICE GUIDE FACTORS

In Minnesota the base stumpage price for each species and product type may be adjusted up or down by an appraiser to reflect a particular sale stand's quality and marketability. Ideally, those stands requiring average expenditures to harvest and for which there is average demand should not be subject to adjustment. Only those stands with especially adverse or good characteristics should be subject to price guide adjustment.

Many jurisdictions, including Wisconsin and Michigan, use some form of price guide adjustment when appraising sale stands. The U.S. Forest Service computes estimates of harvesting costs for each sale stand. In those cases where estimates fall below the average cost for harvesting similar stands in previous years, prices are adjusted by prescribed formulas.

The price guide tables currently in use by DNR are reprinted from the Timber Sales Manual in Appendix D. During the appraisal process, the appraiser assesses the following processing and marketing factors:

- felling, limbing, and bucking (removing limbs and cutting into marketable sections),
- skidding (moving timber to a loading site),
- hauling (distance to market),
- road maintenance and construction,
- market conditions, and
- quality of the timber.

Each factor affects the net return the logger can expect to realize from the sale of the harvested timber.[3] If all factors are judged "average" by the appraiser, the price guide adjustment is set at 100 percent, which means that the base stumpage price for the timber is unchanged. Factors judged "below average" or "above average" will tend to increase or depress the base stumpage price.

Minnesota's price guide factors permit appraisers to lower timber prices to just 25 percent of the established base price or to raise prices as much as 170 percent of the base price.[4] In practice this means that a stand of White Pine sawtimber, with a base stumpage price of $70 per MBF in 1981, depending on the appraiser's judgement about stand and market conditions could be priced as low as $17.50 or as high as $115.50 per MBF. Aspen pulpwood, on the other hand, with a base stumpage price of $2.75 per cord in 1981, could be priced at just 69¢ per cord or as much as $4.68 per cord.

Figure 5.3 illustrates that a hypothetical stand consisting of 30 MBF of White Pine sawlogs and 150 cords of Aspen pulpwood could be priced as low as $629 or as high as $4,167. The final appraised value within these parameters is left entirely to the discretion of the appraiser.

Uniform application of these discretionary factors should result in fairly uniform prices for similar stands of timber. However, our timber appraisal test (discussed in Chapter IV) suggests that price guide factors are not uniformly applied. For example, overall price guide factors for our mixed test tract ranged from 110 percent up to 165 percent. Applying adjustments to the base stumpage price for Norway Pine sawlogs in Region II (the site of the test), participating appraisers priced Norway Pine as low as $70.40 per MBF and as high as $140.00 per MBF. These significant variations are directly attributable to the subjective judgements made by individual appraisers.

We conclude, therefore, that:

- The application of price guide factors by appraisers is highly subjective and variable.

The price guide system devised by DNR affords too much latitude to appraisers in determining the price for state timber, a conclusion which is only strengthened by the variations which we have seen in the application of price guide factors.

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[3] Note that "market conditions" are included as a price guide factor even though market conditions play a significant role in the setting of base stumpage prices. This double consideration of the market is confusing and, perhaps, unwarranted.

[4] Actually, according to the Timber Sales Manual, a forester may adjust base stumpage prices even lower or higher than this if, in his judgement, stand or market conditions warrant. In our study we found several instances in which price guide adjustments did exceed these parameters.

FIGURE 5.3

APPLICATION OF PRICE GUIDE FACTORS, FY 1981

	Base Stumpage Price	For Poor Stand (Minimum Factors)		For Excellent Stand (Maximum Factors)		Hypothetical Range of Stand Values
		Factor Values	Price Per Unit	Factor Values	Price Per Unit	
Aspen Pulpwood (150 cords)	$ 2.75	.25[1]	$ .69	1.70[2]	$ 4.68	$104 - $ 702
White Pine Sawlogs (30 MBF)	$70.00	.25[3]	$17.50	1.65[4]	$115.50	$525 - $3,465
					TOTAL VALUE	$629 - $4,167

SOURCE: Timber Sales Manual, DNR, Division of Forestry (September 1981), p. B-4.1 - B-4.8.

[1]Minimum pulpwood factors for poor harvest and market conditions are .04 + .04 + .02 + .02 + .02 + .01 + .03 + .02 + .05 = .25

[2]Maximum pulpwood factors for excellent harvest and market conditions are .18 + .24 + .13 + .11 + .09 + .05 + .18 + .07 + .25 + .20 + .20 = 1.70

[3]Minimum sawtimber factors for poor harvest and market conditions are .08 + .04 + .05 + .03 + .02 + .03 = .25

[4]Maximum sawtimber factors for excellent harvest and market conditions are .32 + .29 + .42 + .13 + .15 +.34 = 1.65

B. STUMPAGE PRICES IN THE GREAT LAKES REGION

The forest economy of any state is highly sensitive to local conditions. The character of the local market, the demand for locally grown species, the speed with which new harvest or production technologies are adopted, and many other factors influence the level of local economic activities and help determine local timber price levels. We acknowledge the inherent difficulties in comparing timber prices across jurisdictions, particularly when those jurisdictions are separated by hundreds or thousands of miles and when the timber economies of those jurisdictions are built on different kinds of timber stands and different wood products industries.

Comparing prices is doubly complicated since timber prices for each species are generally set for specific regions within each jurisdiction. It is no simple matter, then, to compare Minnesota's base stumpage prices with those of Wisconsin or Michigan. Prices for Aspen pulpwood, for example, may be compared across regions within these three states but it is difficult to compare Minnesota's prices overall with those of the other states.

Nevertheless, a comparison of timber prices across jurisdictions enables us to determine whether there are significant inconsistencies which might require corrective action. In our general review of Minnesota's base stumpage prices we found that:

- Minnesota's timber prices have risen more slowly than national lumber prices over the past 10 years.

During the period 1970-1979, Minnesota softwood prices rose a total of 220 percent while national softwood prices rose 336 percent. At the same time, the national Lumber Price Index rose 269 percent. Base stumpage prices in Minnesota have grown less dramatically than those in the Pacific northwest and in the southeast. However, these differences are probably due to regional conditions rather than a lackluster performance on the part of DNR.

A somewhat different picture emerges when we compare changes in DNR's timber prices with those in the state of Minnesota as a whole. While DNR's sawtimber prices have grown faster than the state average, its pulpwood prices have not. The data in Table 5.1 suggest that DNR's pulpwood base stumpage prices have grown more slowly than the average for the state.

It is generally assumed that because Minnesota, Wisconsin, and Michigan have comparable timber resources, it is reasonable to compare timber prices among these states. In the remainder of this chapter, we present the results of our efforts to compare timber prices in the three states and in the two U.S. Forests in Minnesota. We have examined base stumpage prices across the region for six species and product types: Red Oak sawtimber, Red Pine sawtimber, Red Pine pulpwood, Jack Pine pulpwood, Spruce pulpwood, and Aspen pulpwood. In addition, we have collected data indicating the actual

prices received in each state for these species. Since base prices may be adjusted with price guide factors during the appraisal or bid-up at auction, actual prices received may be different than base prices.

TABLE 5.1

CHANGES IN TIMBER PRICES IN MINNESOTA[a]

1969-1979

	Total Change		Annual Average Change	
Sawlogs:	DNR	State Average	DNR	State Average
Aspen	317%	201%	12.2%	7.7%
Mixed Hardwoods	494%	399%	17.3%	14.8%
White/Red Pine	350%	389%	13.4%	14.6%
Spruce	268%	224%	10.4%	8.4%
Pulpwood:				
Aspen	166%	212%	5.2%	7.8%
Mixed Hardwoods	126%	175%	2.4%	5.7%
Jack Pine	307%	455%	11.9%	16.4%
Spruce	255%	349%	9.8%	13.3%

SOURCE: DNR, Division of Forestry July 1981.

[a]Covers 70-80 percent of all wood, by volume, harvested in Minnesota.

The data presented in Figures 5.4 through 5.15 show the base stumpage prices and the actual prices received for the six species and product types in FY 1981. In regions where no price is indicated, no product was sold in that year.

These data indicate that, except in a few cases, actual prices were higher than base stumpage prices. For all six species Minnesota's actual prices in 1981 were about 25 percent higher than the base stumpage prices. This relationship undoubtedly varies significantly from one year to another, depending on market conditions and the degree of auction competition.

These data also demonstrate that:

- Although there are variations among species and product types, Minnesota's base stumpage prices and actual prices received are not significantly higher or lower than those in other Great Lakes states or in national forests in Minnesota.

FIGURE 5.4
RED PINE SAWTIMBER: BASE STUMPAGE PRICES (1981)[1]

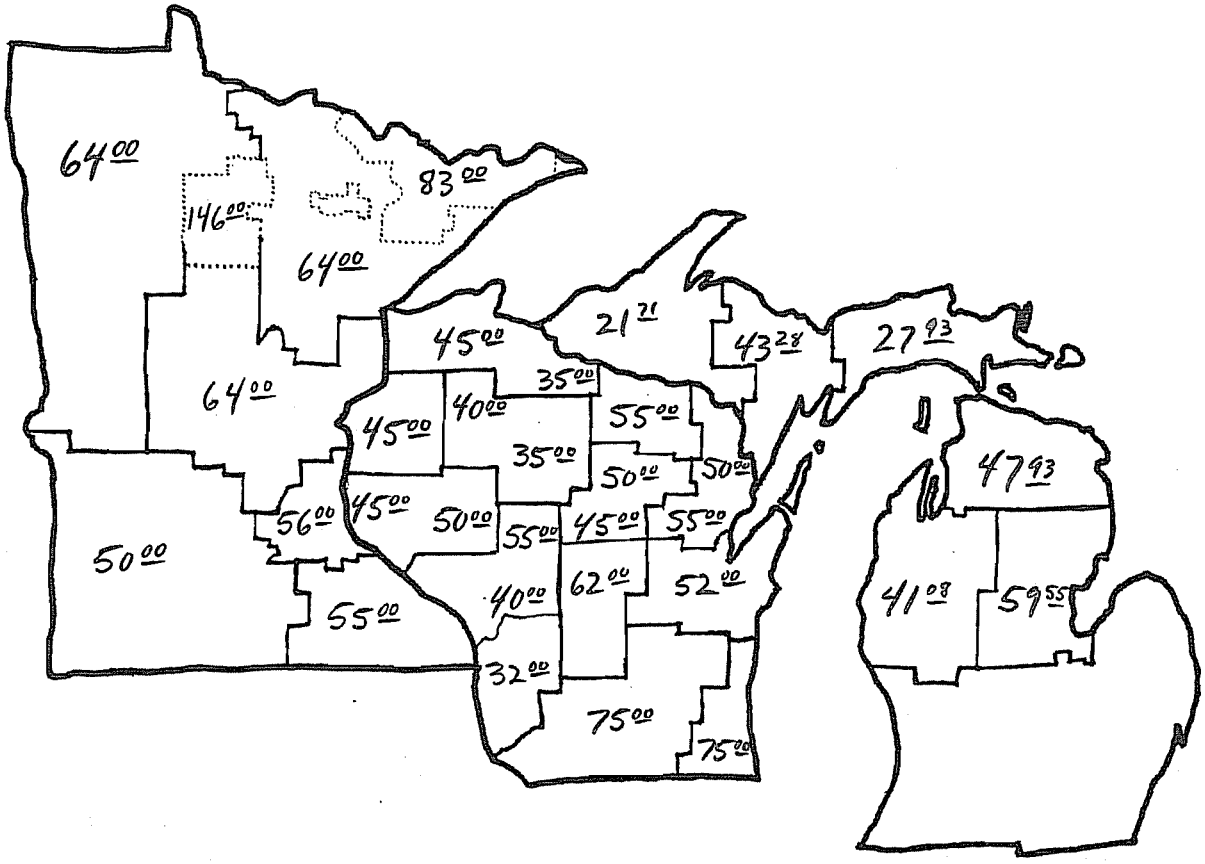
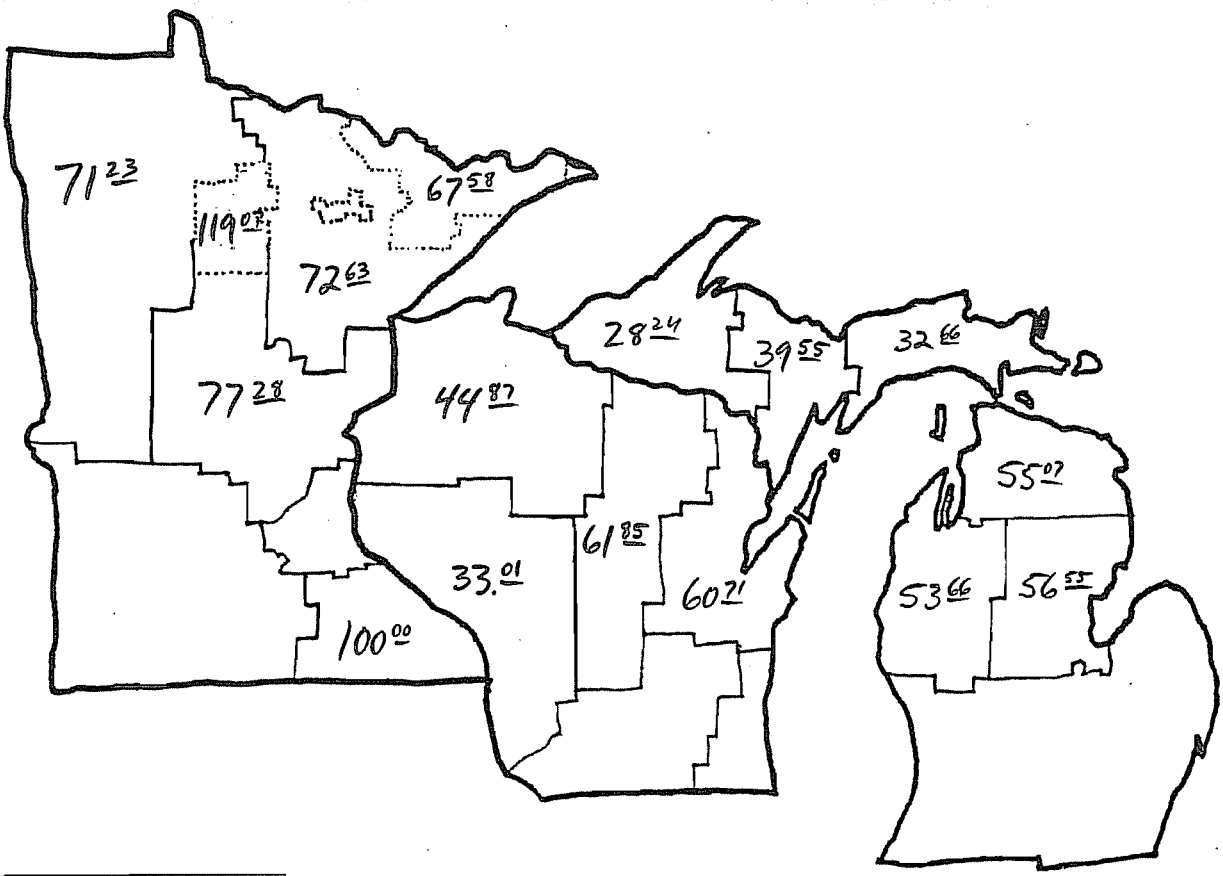


FIGURE 5.5
RED PINE SAWTIMBER: ACTUAL AVERAGE PRICES RECEIVED (1981)[1]



[1]Per MBF

FIGURE 5.6
RED OAK SAWTIMBER: BASE STUMPAGE PRICES (1981)[1]

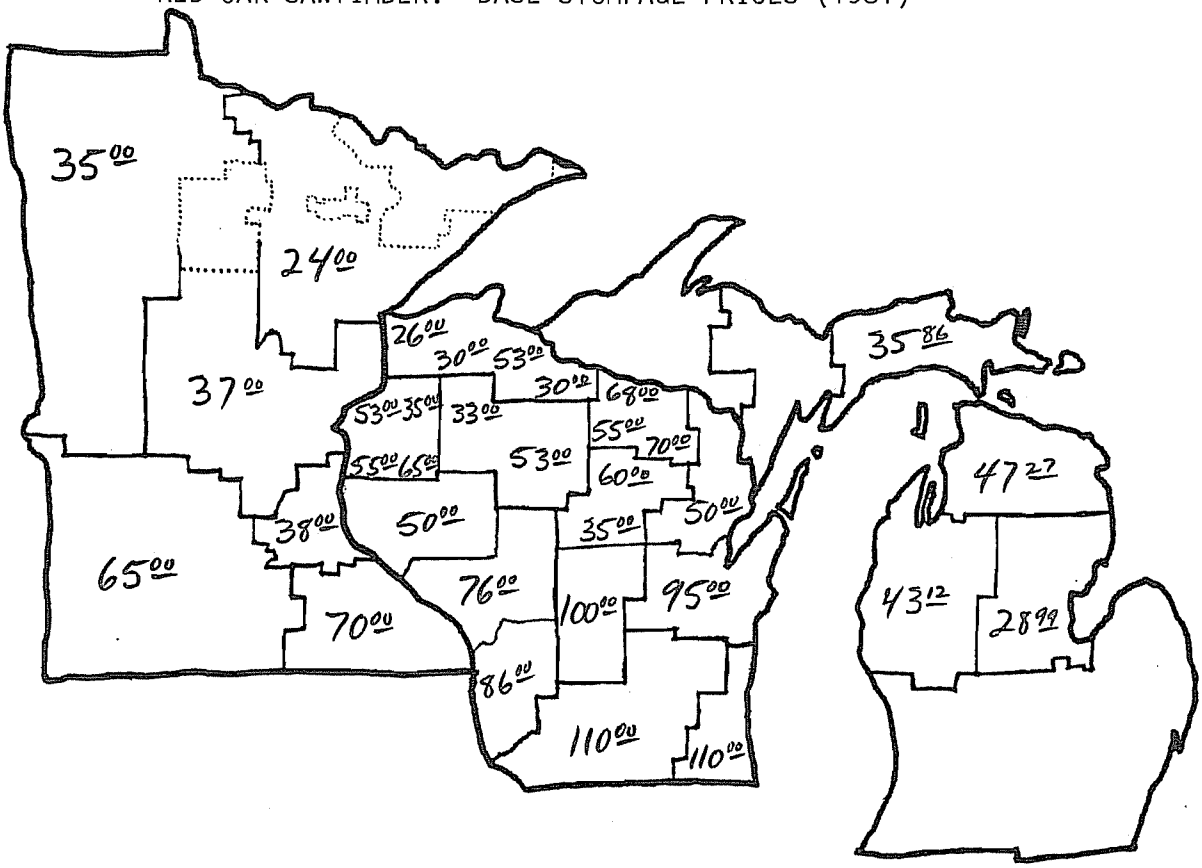
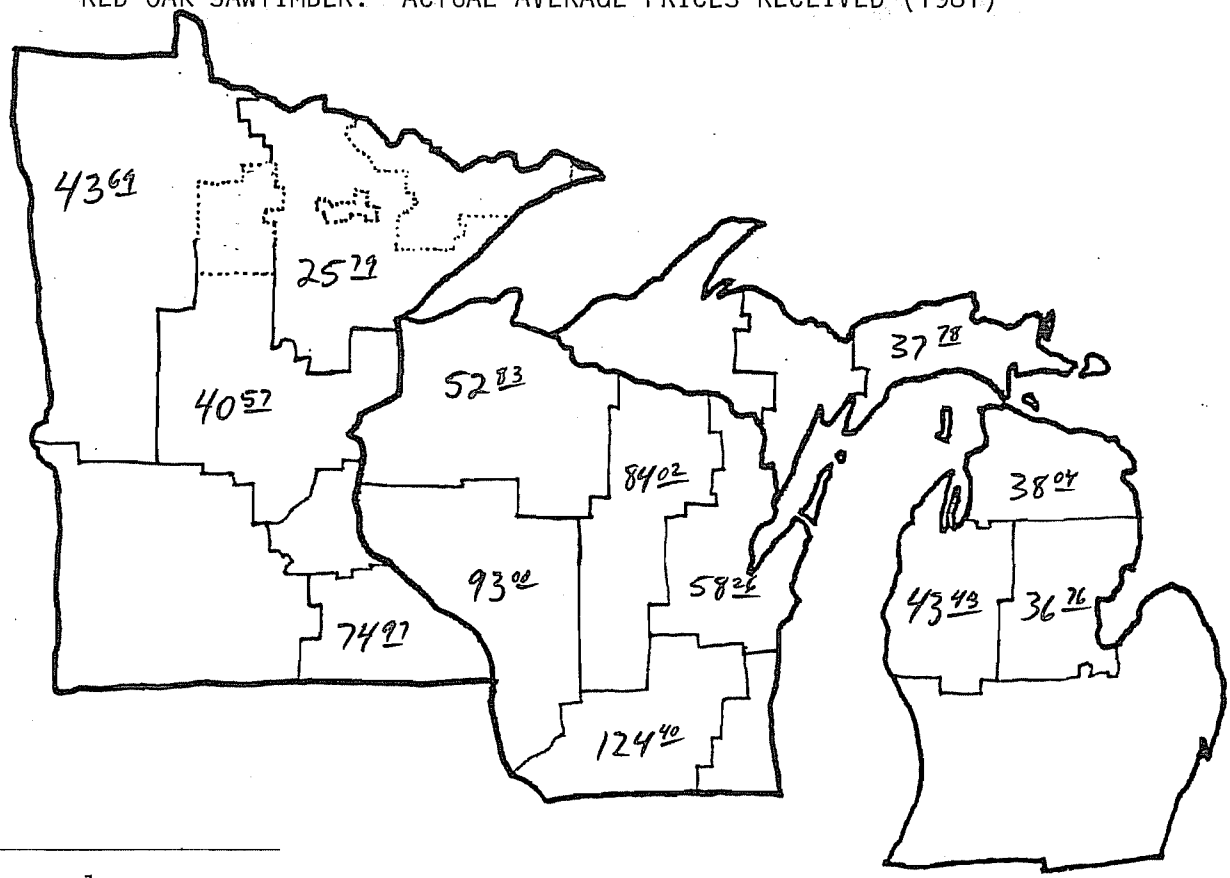


FIGURE 5.7
RED OAK SAWTIMBER: ACTUAL AVERAGE PRICES RECEIVED (1981)[1]



[1]Per MBF

FIGURE 5.8
RED PINE PULPWOOD: BASE STUMPAGE PRICES (1981)[1]

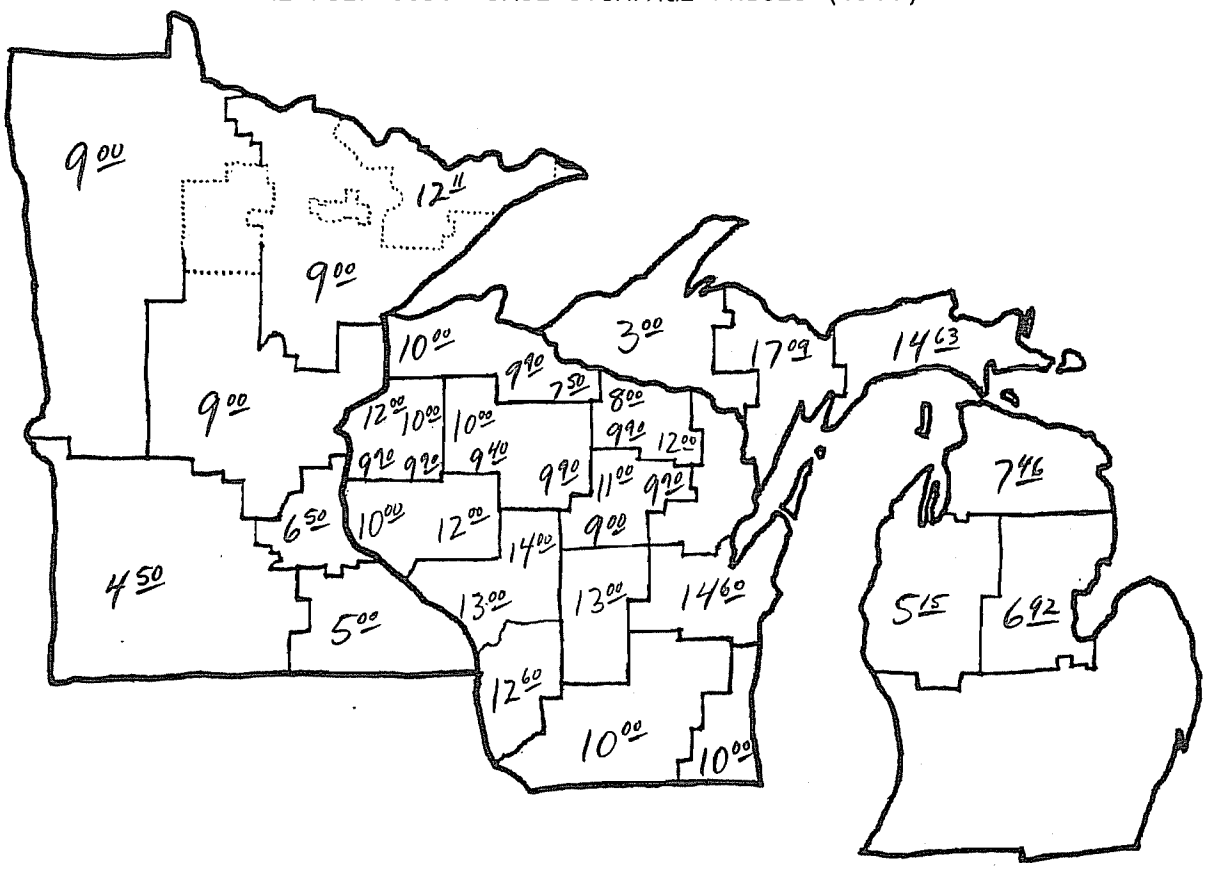
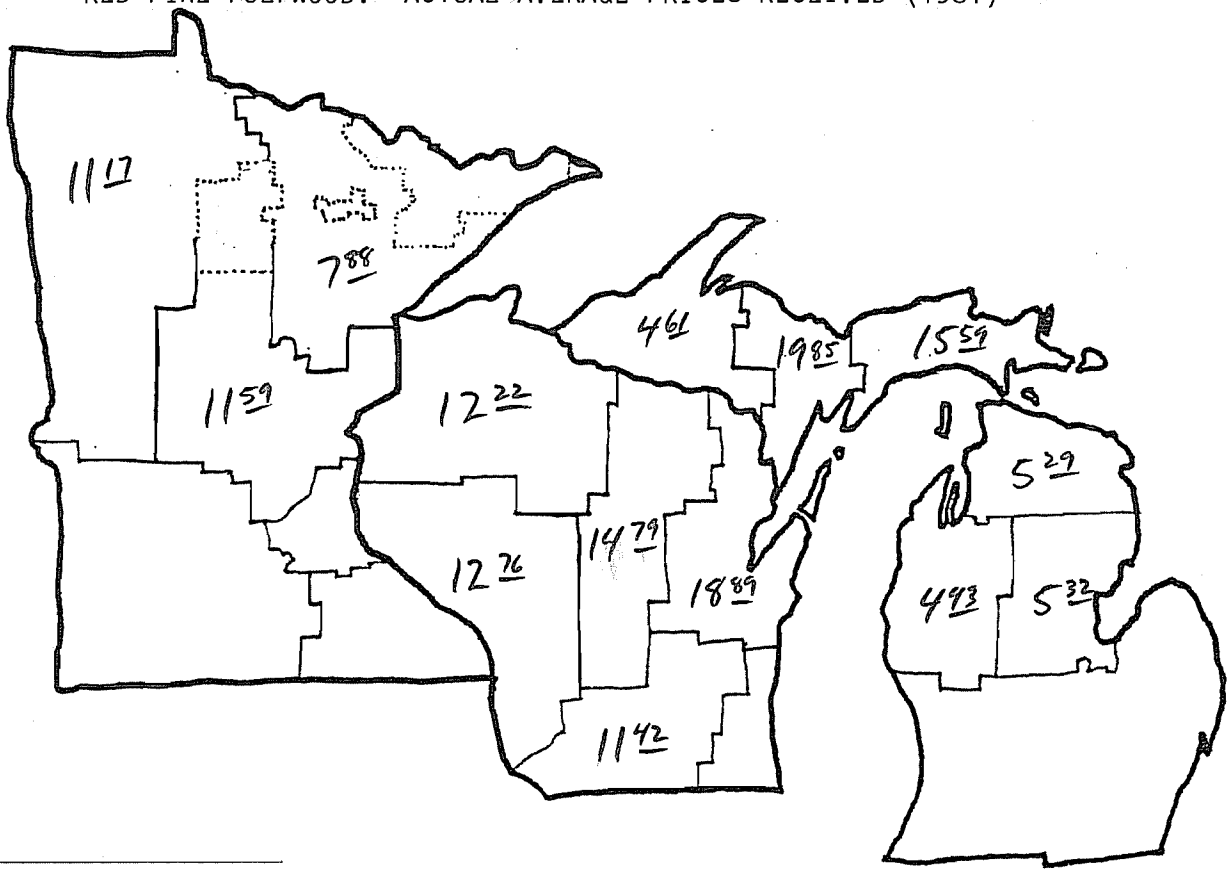


FIGURE 5.9
RED PINE PULPWOOD: ACTUAL AVERAGE PRICES RECEIVED (1981)[1]



[1]Per Cord

FIGURE 5.10
SPRUCE PULPWOOD: BASE STUMPAGE PRICES (1981)[1]

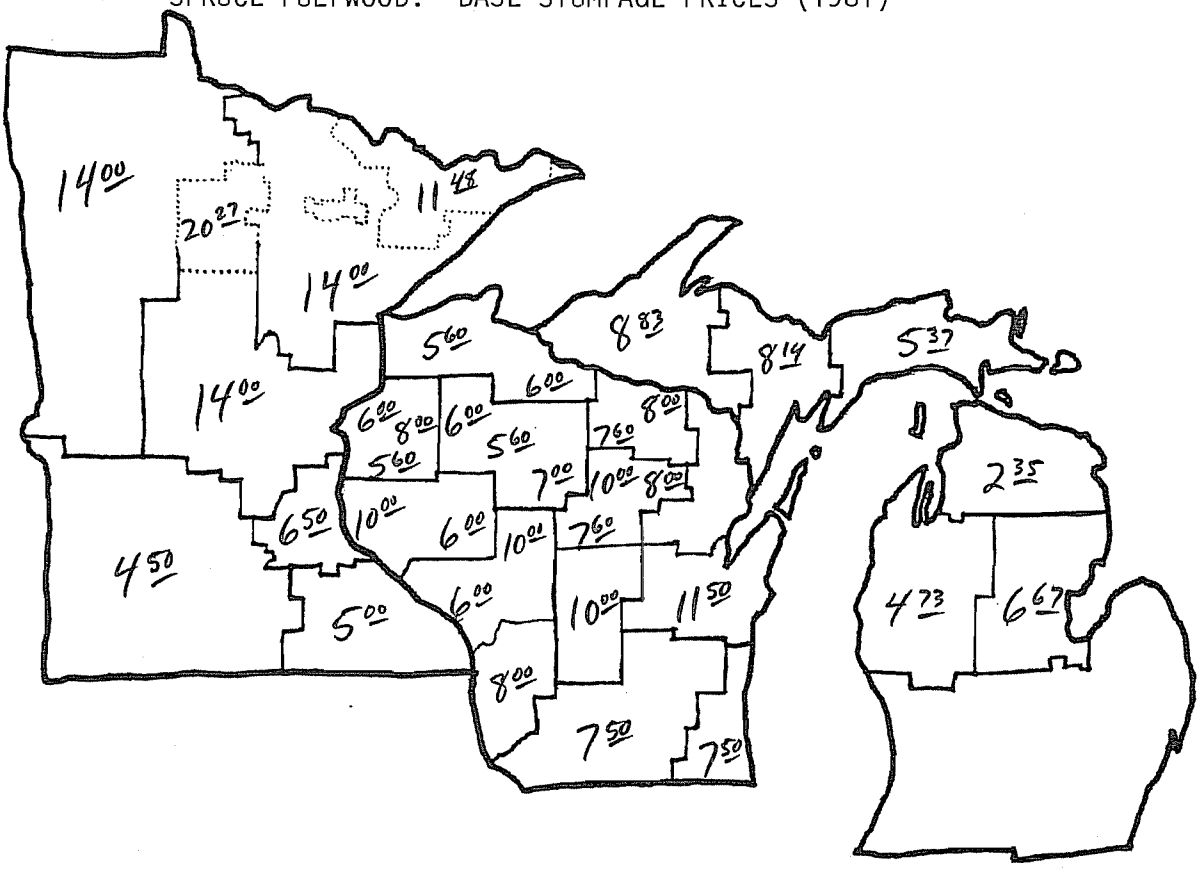
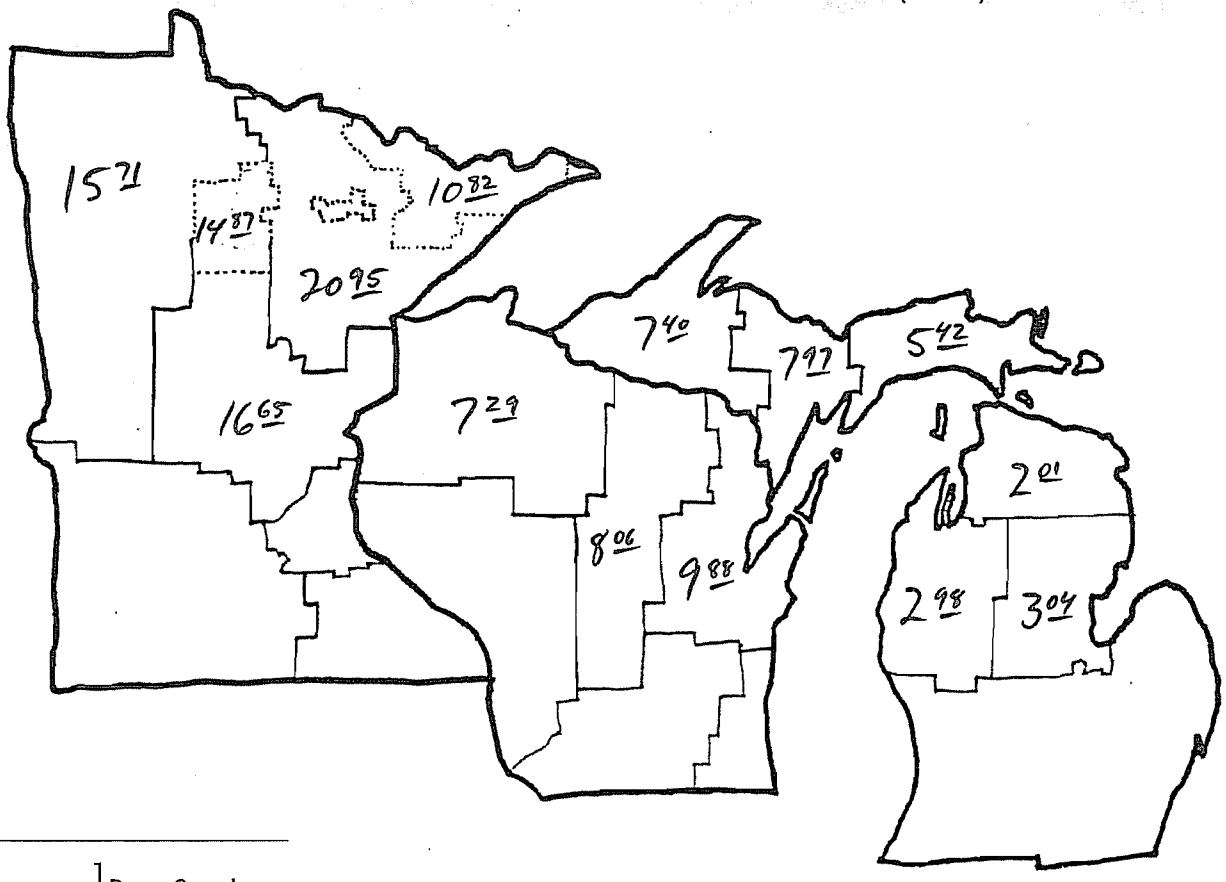


FIGURE 5.11
SPRUCE PULPWOOD: ACTUAL AVERAGE PRICES RECEIVED (1981)[1]



[1]Per Cord

FIGURE 5.12
ASPEN PULPWOOD: BASE STUMPAGE PRICES (1981)[1]

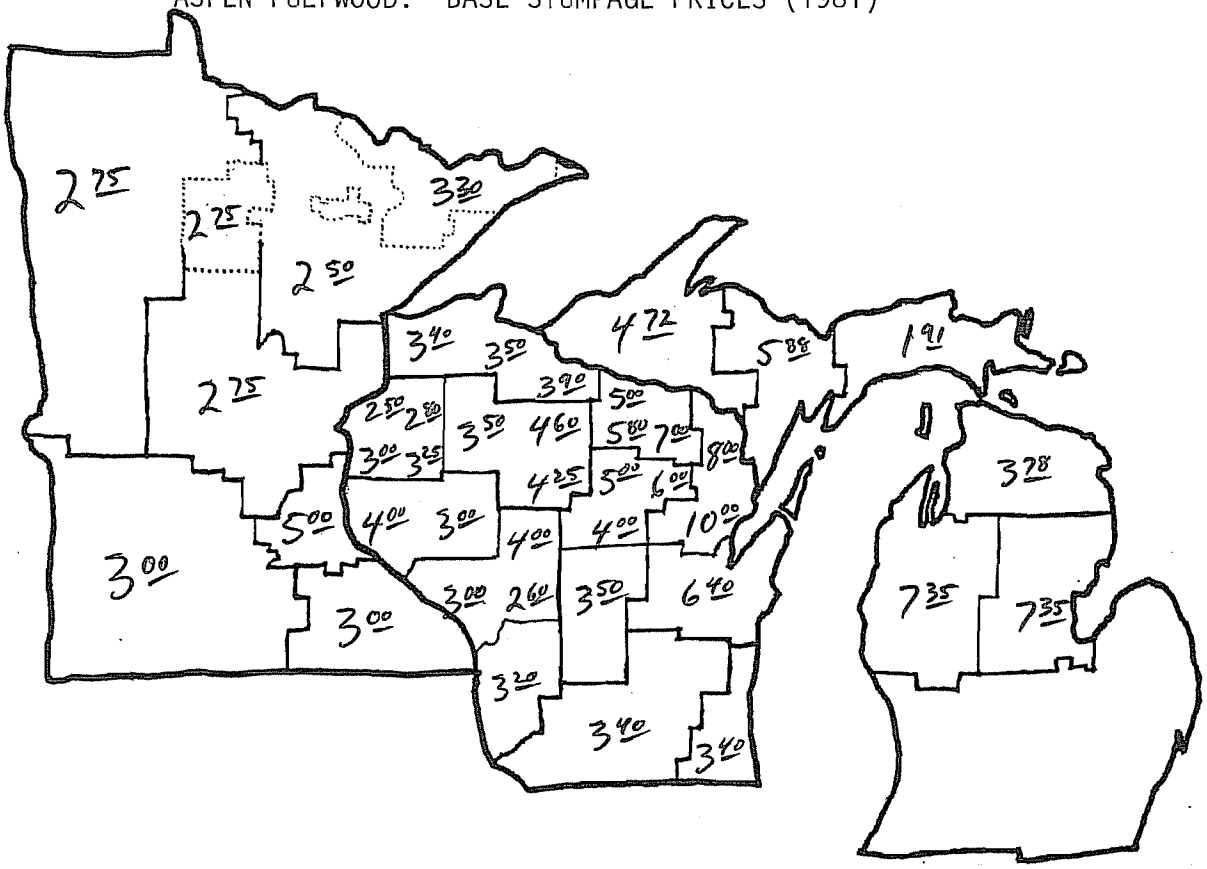
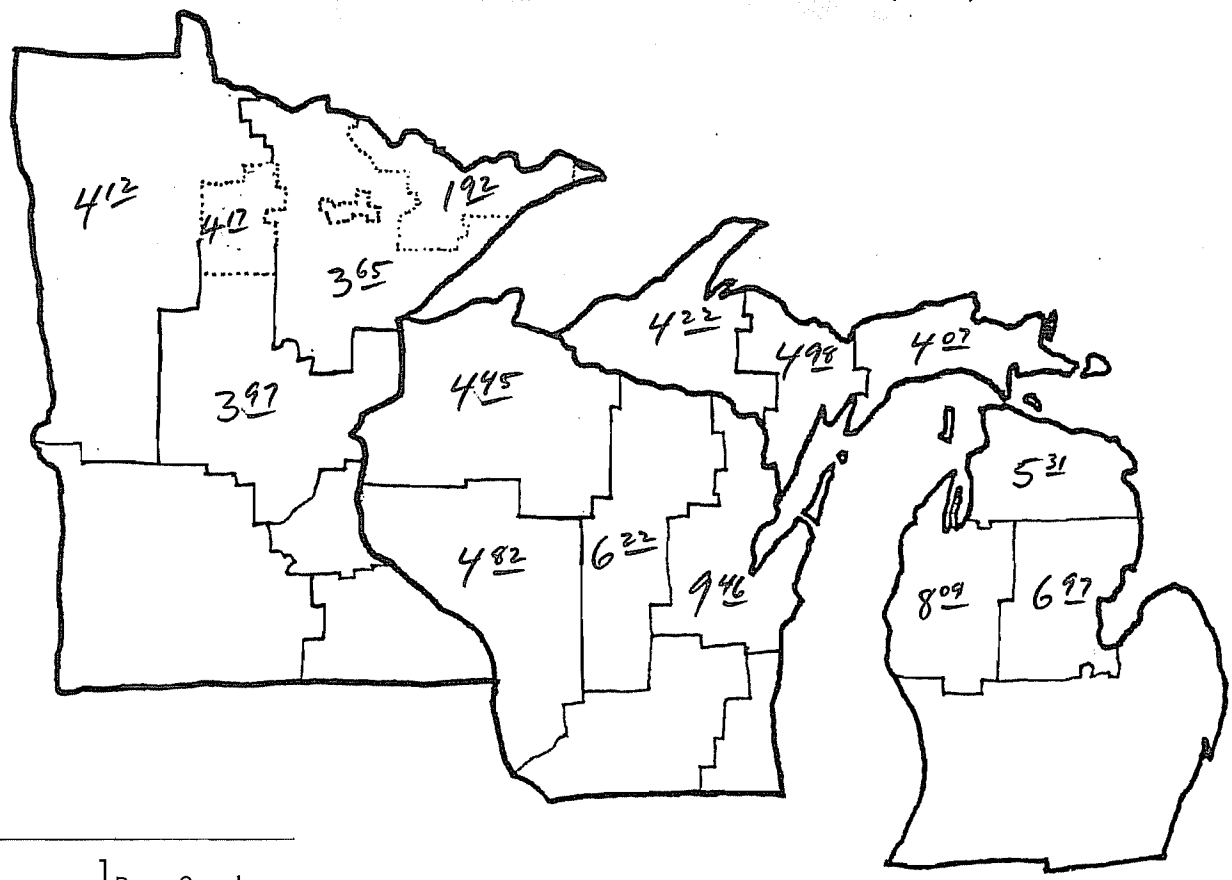


FIGURE 5.13
ASPEN PULPWOOD: ACTUAL AVERAGE PRICES RECEIVED (1981)[1]



[1] Per Cord

FIGURE 5.14
JACK PINE PULPWOOD: BASE STUMPAGE PRICES (1981)[1]

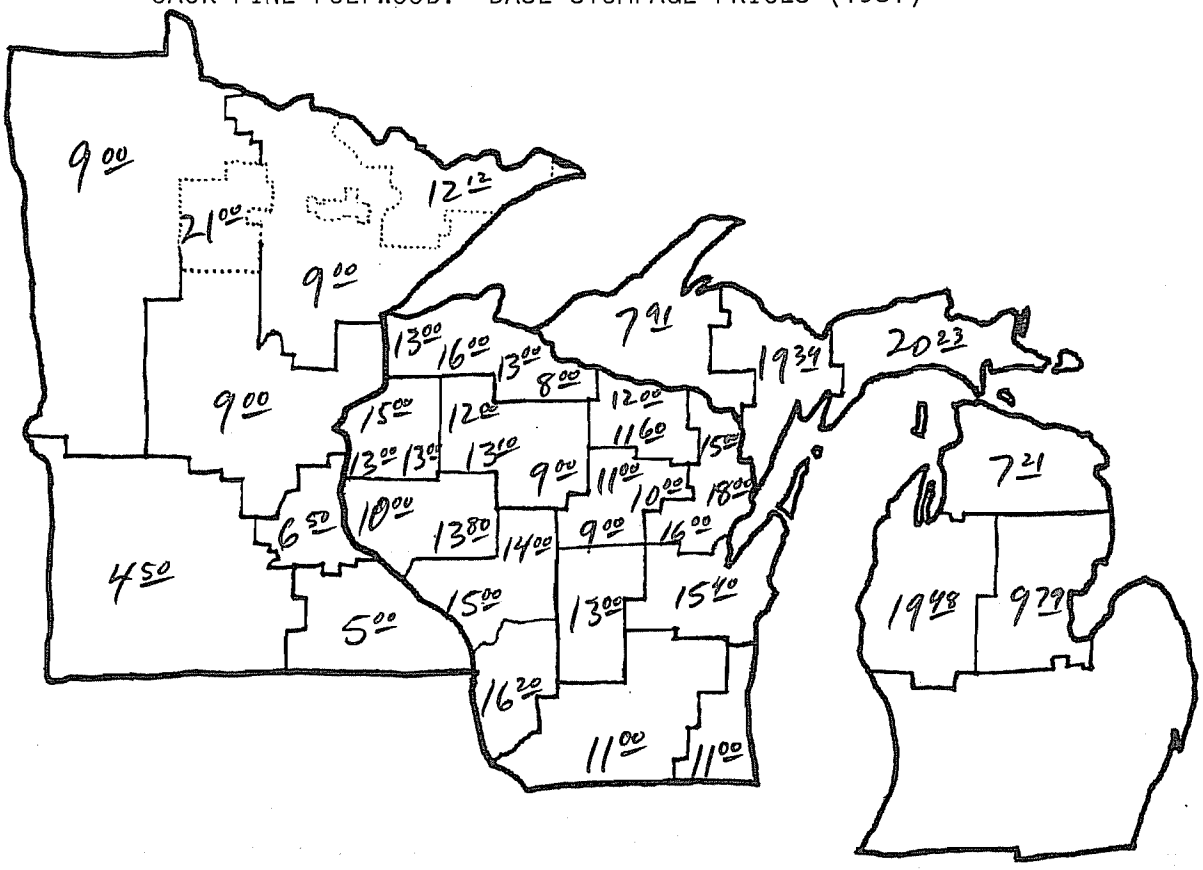
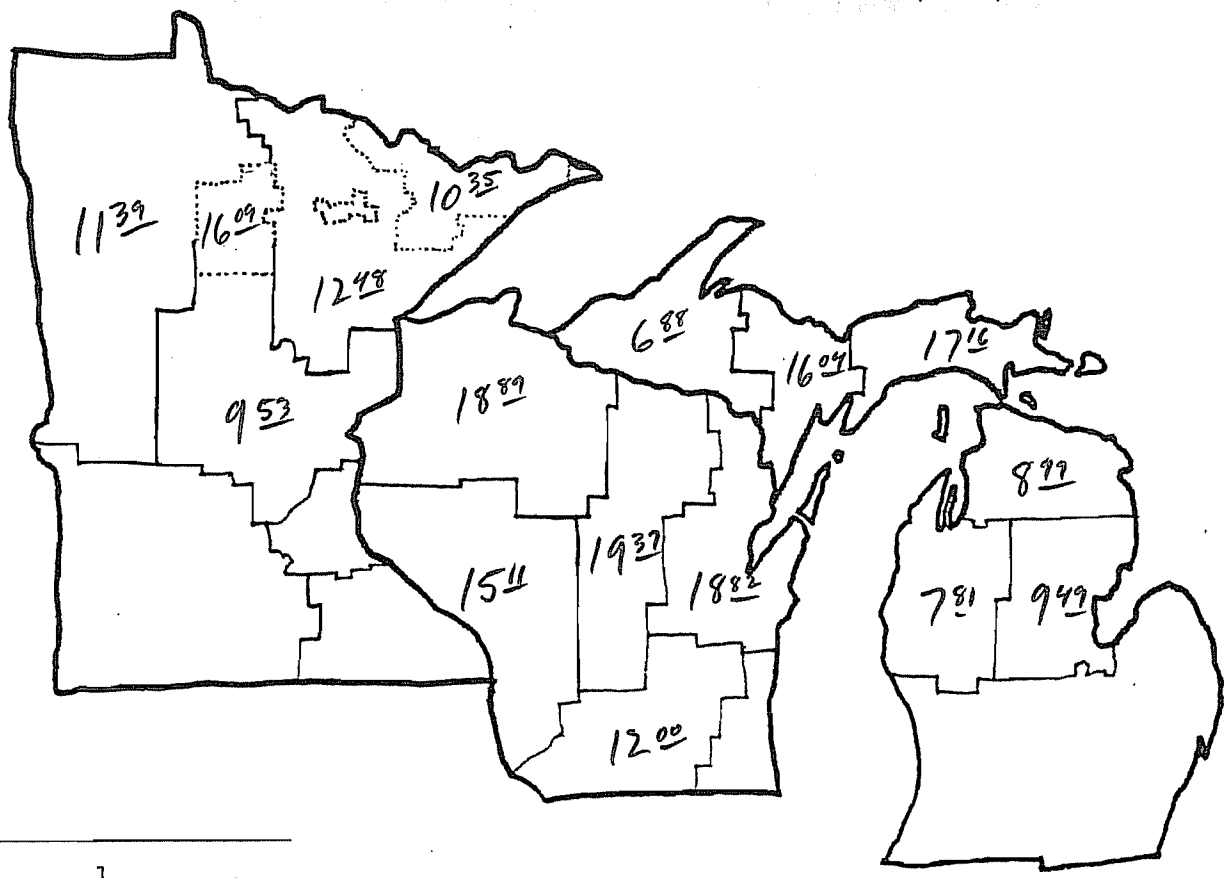


FIGURE 5.15
JACK PINE PULPWOOD: ACTUAL AVERAGE PRICES RECEIVED (1981)[1]



[1]Per Cord

Base stumpage prices tend to cluster within relatively narrow ranges. Minnesota prices tend to fall somewhere near the middle of these ranges or perhaps slightly below the middle, but there is significant variation among species. Base stumpage prices for Jack Pine pulpwood, for example, tend to be higher in Michigan and Wisconsin; those for Spruce pulpwood tend to be higher in Minnesota.

We observe even more variation in the prices actually received for the six species and product types in 1981. Sawtimber prices are particularly variable. Undoubtedly, these differences are due primarily to the condition of local timber markets and the high demand for specific species in regions where there are processing mills. Significantly, there is as much price variability within states as there is between states.

C. RECOMMENDATIONS

From our study we conclude that the DNR's method of computing timber prices is too subjective. Accordingly,

- We recommend that DNR review its method of setting annual base stumpage prices and continue to reduce the influence of subjective input from field and office staff.

But more importantly, we are concerned about the degree of latitude afforded field appraisers in the application of price guide factors. We acknowledge the need for appraisers to retain a degree of flexibility in determining the value of sale stands, but we question the validity of a price guide system which permits the significant variability in application which we have observed.

- We recommend that DNR establish stringent guidelines to ensure that price guide factors are applied uniformly by appraisers. We also recommend that DNR consider reducing its price guide factors to those components which are least variant.

Despite these problems, Minnesota's base stumpage prices and the prices actually received for timber do not appear to be significantly out of line with those received by Wisconsin or Michigan. However, we think the DNR should carefully monitor the timber prices realized by other jurisdictions and periodically compare prices across jurisdictions to ensure that Minnesota remains competitive in the timber market.

VI. FORESTRY MANAGEMENT INFORMATION SYSTEMS

In the course of our study of DNR's Timber Sale Program, we sought information from the Forestry Division's computerized files of timber sale data. From these files the division issues its periodic reports indicating the volume and value of timber sold by species and product type and listing the names and addresses of permit holders. During our attempts to construct a special file which would allow us to compare appraisal estimates with scale results, we encountered many difficulties and discovered many significant errors in these computerized data.

These problems drew our attention to the division's management information systems. We sought information on what computerized systems existed, how they were organized, and to what extent they were utilized. This chapter presents our findings and concludes with certain specific recommendations for improvement in the division's information systems.

A. DESCRIPTION OF SYSTEMS

The Division of Forestry has developed four major data processing systems connected with timber sales. They are:

- Timber Sales Permit and Scaling System
- Timber Sales Permit Name and Address System
- Timber Sales Invoice System
- Forest Assets and Inventory System

1. TIMBER SALES PERMIT AND SCALING SYSTEM

The development of the permit and scaling system was started in 1971 and was completed in 1973. The system was developed to provide information desired by the Legislature "concerning the status of the state timber sales and timber management program."[1] Data included in the permit and scaling system consist of permit numbers, geographic descriptors locating the site of the sale, the type of sale, type of land, and the quantity, product type, and value of the timber as "sold" and scaled. The data is collected in the field by DNR foresters, sent to St. Paul and key punched, edited, and

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[1] M.S. 90.041, Subd. 3.

stored in two data bases, one for permits and one for scaling. These data bases are used to produce an annual report for the Legislature as required by state law.[2]

Although this system was designed as a single system, the two data bases (permit information and scaling information) cannot be combined to provide comprehensive analyses of timber sale transactions. Using the system, it is not possible to follow a timber sale from the issuance of the permit through scaling operations to final billing. As a result, it is not currently possible to produce reports comparing appraisal estimates to scale results. Each data base is used to produce an entirely separate report at the end of each year.

2. TIMBER SALES PERMIT NAME AND ADDRESS SYSTEM

The permit name and address system is used to collect data on permittees' names and addresses. This system, developed in 1975 as a result of legislative mandate, produces an annual report entitled the "Permit Name and Address Report." The data is collected from the same permit forms as the data used in the permit and scaling system. However, unlike the permit and scaling system, the data in this system is completely erased once the annual report is produced. The combined annual cost for the permit and scaling system and the name and address system is estimated at $7,200.

3. TIMBER SALES INVOICE SYSTEM

This system was originally designed to be a part of the permit and scaling system. But after a short period of service, technical difficulties in linking the two segments of the system and the lack of timely data entry caused DNR to lay this system aside. At present a new system for processing timber sale invoices is being designed and developed on an in-house word processing micro-computer system.

4. FOREST ASSETS AND INVENTORY SYSTEM

The forest Assets and inventory system is designed to collect data on state and county forest resources, including volume of timber, species, types, and geographic location. Of the 5 million acres in state lands, and 2.7 million acres in county lands covered by this program, approximately 20 percent of the acreage has been analyzed and the data entered on the system. All the data for the system is collected by on-site visits to stands of timber owned by the state or counties. Begun in 1980 with an LCMR grant, DNR completed the system's design in 1981, and is now in the data collection phase.

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[2] M.S. 90.172.

The completion of the forest assets and inventory system is scheduled for early 1985 at a cost of approximately $1 million. When completed, the system will provide an updated and relatively accurate inventory of the state's forest resources. This should prove to be an invaluable tool for managing and controlling those resources.

B. PROBLEMS

As part of our study, we evaluated the division's use of data processing systems for operations support. Our research included an analysis of the four systems outlined above to determine: (1) how well the Forestry Division conducted systems development, (2) whether the current level of computer support was adequate, and (3) whether computer support was effectively used. In this section we describe the Forestry Division's performance in these three areas. We acknowledge that the division's systems are only a small part of DNR's data processing operations, and that other factors, including the performance of the Information Services Bureau (ISB) of the Department of Administration, have affected the performance of DNR in this area. Nevertheless, in this report we analyze these problems and recommend solutions which are within the division's ability to achieve.

1. SYSTEMS DEVELOPMENT

In order to maximize the potential use of computerized information systems for management purposes, care must be given to systems development. The development process includes identifying needs, systems design, programming, testing, and documentation. To this end, ISB and the Legislature now require the use of a standardized systems methodology to assist in the development, implementation, and documentation process.[3] There are several different methodologies that can be used, including PRIDE (Profitable Information by Design). However, any systems design methodology provides certain checks and balances during the initial phases of systems development and may help to make programming easier and more accurate. Furthermore, these methodologies result in documentation that makes it easier to operate the system, maintain it, change it, and solve problems.

Our review of the four systems used by the Forestry Division shows that:

- No standardized system development methodology was used to design or develop any of these systems.

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[3]M.S. 16.995, Subd. 5 and 6; Department of Administration Policy and Procedures Memo (ADM-199).

All systems were developed prior to the administrative and legislative requirement for system development procedures. However, subsequent modifications have been conducted without compliance with these requirements. We were not able to determine if the failure to use a development methodology led to any substantial time delays or cost overruns. However, certain technical problems such as the inability to use the permit and scaling system to produce comprehensive reports and the failure to complete the invoice system could have been avoided.

In addition, we have found that:

- Virtually no support documentation exists for these systems.

There are only cursory technical documents meant to be used by ISB operators in order to correctly access data tapes and to start system operations in the proper sequence. At present, practical user information concerning these systems resides with individuals in and outside the division and, in some cases, outside DNR. But even this information is sketchy and not formally documented, and if certain key individuals were to leave DNR, so would the knowledge of how the systems work.

In addition to poor technical documentation, we found problems with the documentation of administrative procedures relating to these systems. These procedures, such as data collection, data editing, and data entry, are crucial to keeping the systems current and in good order. However, the information concerning these procedures resides exclusively with the individuals who work with them daily. Although most operations appear to be functioning smoothly, this is due more to the work of the clerks who handle the operation than to any plan or systematic set of procedures.

Along with the failure to use a standardized systems development methodology, the Forestry Division has been lax in its efforts to coordinate the development of systems in general within the division. In our judgment:

- The planning for timber sales systems has been haphazard.

There have been no long-range or short-range plans made concerning the development of the timber sales program's data processing systems. The systems currently in use by the division to collect, organize, and generate information on timber sales activities were designed in a piecemeal manner. Changes and adjustments to the system, data collection, and reporting occured through independent decision making at various levels within DNR. For example, over the brief lifetime of the permit and scaling system, the method of numbering and organizing permits has changed several times. The result has been confusion, potential loss of data, and an inordinately complex system of filing and information retrieval.

Because of the lack of long-range planning and the sporadic and uncoordinated development of data processing systems, the Forestry Division has not acquired computerized information systems which are genuinely valuable for the management of the state timber sales program. This situation is due to failures within DNR, as well as the failure of ISB to provide consistent and comprehensive system development services. However, given that the basic data collection and reporting requirements have been laid out in the timber sale statutes for several years, it would seem that the Forestry Division has had ample time to seek help and plan the development of both office procedures and data processing systems.

2. MANAGEMENT PROBLEMS

The lack of coordinated planning for systems development has resulted in a number of serious management problems in the timber sales program. We have found that:

- The division's data processing systems cannot easily generate the annual reports required by the Legislature.

In fact, reports are issued biennially rather than annually, and they require considerable staff time to construct basic tables giving the volume and value of timber sold in each year by each sales method. For most recent years, the information included in the formal reports are acknowledged by DNR staff to be estimates.

In addition, we have found that:

- The present computerized information systems are almost useless for the management of timber sales or forest resources.

Although the reports generated by the division's information systems generally satisfy the reporting requirements laid out in the timber sale statutes, they are seldom used by the Forestry Division itself. Currently, the division collects a great deal of information on the current quantity and value of forested lands and the quantity and value of timber taken off those lands annually, but it is unable to use these data for day to day administrative and planning decisions. This is true because:

- The data contained in timber sale information systems are often inaccurate and, as a result, the reports generated by those systems are generally unreliable.

We have found many serious data errors in the permit and scaling systems, apparently resulting from data entry errors and the lack of effective means of verifying data. Control over the process of data collection, correction, entry and verification is crucial to ensuring the reliability of any data base. While the division has made an effort to develop an accurate and consistent means of data collection in the field (with its Timber Sales Manual and the use of forms), it has

failed to develop a consistent and reliable method of correcting and editing the data once entered on the computer. Edit routines have been developed which produce a listing of possibly erroneous entries. However, these routines are seldom used and the workload of the clerks responsible for these procedures prevents timely correction of errors. Over time, the correction of data entry errors has become a low priority and the problems have redoubled.

Presently, the Forestry Division is waiting for Time Share Option (TSO) capability from ISB. This will allow a computer terminal to be placed in the Forestry Division which will be connected to ISB's computers. This will give the division the ability to perform data editing, updating, and error correction on an immediate basis. It is felt by timber sales management that the addition of this capability will go a long way towards solving data base error problems. However, even the addition of TSO will require the careful development of standards and procedures to make the system operate smoothly.

C. RECOMMENDATIONS

Since the Forestry Division has recently received an LCMR grant specifically meant to address the issue of data processing within the division, we feel it is opportune for us to present recommendations for improving the division's ability to gather and present accurate and timely timber sale information. We hope that the division will consider these comments in their decision process.

Our review showed that one of the major problems was the lack of a systems development methodology. This led to problems in the design, development, and documentation of the division's computerized systems. As the division proceeds with the development of new data processing systems we think that:

- The Division of Forestry should use a standardized systems development methodology in all new systems projects.

The methodology used need not be as complex or as involved as PRIDE. However, a formalized development process which conforms to ISB standards should be used. Along with this methodology:

- The division should document all computerized systems, including procedures for data entry, data editing, updating, and report generation.

This documentation should conform to ISB standards and requirements; copies should be sent to the ISB systems library.

In conjunction with the improved systems development procedures it is important that:

- The management of the Division of Forestry increase and maintain substantial efforts in short and long-range systems planning.

It is imperative that in the planning process all levels of management be involved and that clearly defined goals and objectives for data processing systems be established. Specifically, we think that a member of the Forestry Division's staff should be assigned to the LCMR MIS grant steering committee. It is crucial that someone with a solid understanding of the Forestry Division's needs and operations provide input into the steering committee's activities and the planning process.

But better system design and development will not by itself solve all of the division's data processing problems. As we have shown, the data on annual timber sales currently maintained by the division are unreliable. Too many entry errors and ineffective procedures to correct errors have rendered the division's historical data bases difficult to use. In order to provide more accurate reports in the future, we strongly urge the division to:

- Review all aspects of data collection, data entry, editing, and retrieval, and institute procedures that will ensure the accuracy of timber sale data.

It may not be cost-effective to go back and attempt to correct errors in the historical files. At the very least, however, all data relevant to timber sales in this fiscal year, including active permits from previous years, should be verified so that all future reports generated by the division's computerized systems will be reliable. The implementation of procedures to detect and correct errors should be a top priority since DNR and the Legislature have no alternative sources of information about the scope and activities of the state's timber sale program.

We also believe it is imperative for the division to develop a permit numbering and filing system which will allow easy access to the physical files and facilitate the electronic sorting of files by relevant criteria. The division needs to develop an effective system and to maintain it consistently. We think that the division should seek outside advice from ISB or other management consultants to resolve this problem.

GLOSSARY

ADVANCE PAYMENT	The payment made for state timber prior to being granted a permit to harvest. The advance payment for an auction sale is 25 percent of the appraised value. The advance payment for an informal sale is equal to the total appraised value.
ALLOWABLE CUT	The volume of wood which can be harvested, under management, for a given period without depleting the desired growing stock base. The allowable cut is determined by the condition of timber and management goals.
APPRAISAL	The official estimate of the volume, species and product types, and value of a stand of timber prior to its sale. All state timber is appraised by a state forester before it is sold.
AUCTION SALE	The procedure for selling state timber by competitive bidding. In Minnesota regular auction tracts may not exceed $20,000 in appraised value. Auction sale permits are valid for two years, with the possibility of three one-year extensions. (See also Intermediate Auction).
BASE STUMPAGE PRICES	Standard prices established annually by region for each timber species, and product type. Base stumpage prices, adjusted by "price guide factors," are used by the appraiser to establish a timber tract's selling price.
BID BOND	Security or cash bond paid by bidders as a prerequisite for participating in an oral timber auction. In most cases the bid bond represents 10 percent of appraised value.
BOLT	As used by DNR, a merchantable log shorter than 8 feet.
BUCKING	Cutting of felled trees into merchantable lengths.
CHECK CRUISE	Reappraisal or check appraisal performed to verify the accuracy of a previous appraisal.
CLEAR CUT	A logging technique that removes all (or all merchantable) timber from the harvest tract.

CORD	A volumetric unit used by appraisers to measure the quantity of timber in a given stand. A cord is generally a 4x4x8 foot pile of wood containing 128 cubic feet of wood, bark, and air.
CRUISE	An on-the-ground examination of a proposed sale tract in order to estimate the quantity and quality of timber to be cut; the field work portion of an appraisal.
HAULING	Transporting cut lumber from the landing site to the consumer.
INSPECTION	A field check by area or regional staff to ensure that an appraisal has been done according to departmental policy and to ensure compliance with cutting regulations by the logger.
INFORMAL SALE	The sale of state timber without the formalities of a public, competitive auction. Informally sold timber is sold at its appraised value in tracts not to exceed $3,000. Informal permits are valid for one year, and may be granted a one-year extension if needed.
INTERMEDIATE AUCTION	A method for selling state timber at an auction in tracts appraised at $7,000 or less. Participants are limited to individuals or companies with 20 or fewer employees. Permits are valid for one year and loggers may receive a single one-year extension without interest penalties and a second one-year extension with interest.
MBF	Thousand board feet; a unit of measurement for saw-timber. Commonly transposed into cords at the rate of .5 MBF per cord.
ONE HUNDRED PERCENT TALLY	A cruise method by which all trees in a given sale tract are counted.
PERFORMANCE BOND	A security or cash bond required to ensure the execution of all terms in the timber sales contract.
PLOT	Sample locations within a sale tract on which the appraiser determines the volume and species of timber as the basis for estimating the volume of the entire tract.

PRICE GUIDE FACTORS	Weighting factors used by appraisers to adjust the base stumpage price of timber so that the sale price reflects market and stand conditions. Factors included in setting stumpage values include: market conditions, distance to mill, ease of access and harvest, and quality of timber. Each factor is a numerical weight applied to the base stumpage price of timber in a given tract to adjust the stumpage price up or down to reflect the individual characteristics of the sale tract.
PRODUCT TYPE	Refers to the various uses that the cut timber can be used for, such as pulp, sawlogs, poles, etc.
PULP	Timber of lower quality, useful in making paper products and chipboard.
REFORESTATION	The natural or artificial regeneration of a logged or burned area in order to return the area to a forested state.
SAWTIMBER	Timber of a size and quality considered suitable for producing lumber or boards.
SCALING	The process of measuring harvested timber to determine its volume. There are two basic scaling techniques: "regular" or "stick" scaling and "consumer" scaling. Regular scaling of sawlogs is performed by a forester who measures the length and diameter of felled logs at the harvest site. Cordwood scaling is based on pile dimensions. Consumer scaling is performed by the company buying the wood from the logger. Timber volume may be derived indirectly by weighing the timber as it is delivered to the consumer. The logger pays the state by a cord per unit weight conversion factor.
SKIDDING	The process of moving felled logs to a landing site where they can be loaded and transported to the consumer.
SOLD AS APPRAISED	The sale of a stand of timber at the price fixed in an appraisal with no post-scaling to verify the volume of timber actually harvested. Also referred to as a "lump sum" sale.
STAND	A group of trees growing in a continuous and defined area.

STUMPAGE	Uncut marketable timber.
SURETY BOND	A bond covering the total sale value of a timber tract. Required of auction sales within 90 days of the sale.
TRACT HARVEST	A procedure for harvesting timber in which a large stand is divided into several smaller "tracts" and harvested one tract at a time to ensure logger compliance with cutting regulations and payment requirements. Not used in Minnesota.
TRESPASS	Cutting or removing any state timber without a valid permit.

APPENDICES

STATEWIDE TIMBER SALE DATA, BY METHOD OF SALE, FY 1955-59

	FY 55	FY 56	FY 57	FY 58	FY 59
Total Number of Sales	2,600	2,692	3,208	2,514	2,755
% Informal	97.1%	97.0%	96.0%	95.4%	97.5%
% Auction	2.9%	3.0%	4.0%	4.6%	2.5%
Total Cords Sold by Volume	284,732	307,597	361,611	210,803	173,364
% Informal	54.5%	54.3%	53.2%	69.2%	77.7%
% Auction	45.5%	45.7%	46.8%	30.8%	22.3%
Total Value Sold	$ 898,067	$ 917,053	$1,155,989	$ --	$ --
% Informal	44.9%	47.2%	47.0%	-- %	-- %
% Auction	55.1%	52.8%	53.0%	-- %	-- %
Size of an Average Sale					
Volume (Cords)	109.51	114.26	112.72	83.85	62.93
Informal	61.46	63.96	62.41	60.84	50.15
Auction	1,705.36	1,715.33	1,323.33	559.47	567.90
Value ($)	$ 345.41	$ 340.66	$ 360.35	$ --	$ --
Informal	159.70	165.93	176.32	--	--
Auction	6,512.93	5,902.26	4,788.37	2,270.10	1,463.60
Total Value/Cord Sold	$ 3.15	$ 2.98	$ 3.19	$ --	$ --
Informal	$ 2.60	$ 2.59	$ 2.83	$ --	$ --
Auction	3.82	3.44	3.62	4.06	2.58

STATEWIDE TIMBER SALE DATA, BY METHOD OF SALE, FY 1960-64

	FY 60	FY 61	FY 62	FY 63	FY 64
Total Number of Sales	3,206	2,860	2,721	3,148	2,995
% Informal	92.6%	95.5%	95.6%	96.2%	97.2%
% Auction	7.4%	4.5%	4.4%	3.8%	2.8%
Total Cords Sold by Volume	265,321	209,844	159,461	207,290	220,808
% Informal	63.7%	74.2%	86.4%	76.5%	76.9%
% Auction	36.3%	25.8%	13.6%	23.5%	23.1%
Total Value Sold	$ 779,468	$ 648,788	$ 509,770	$ 600,820	$ 555,354
% Informal	58.3%	67.9%	78.9%	66.8%	72.2%
% Auction	41.7%	32.1%	21.1%	33.2%	27.8%
Size of an Average Sale					
Volume (Cords)	82.94	73.14	58.60	65.84	73.73
Informal	56.92	56.81	52.95	52.34	58.28
Auction	410.46	422.82	181.06	406.58	620.53
Value ($)	$ 243.128	$ 226.14	$ 187.35	$ 190.86	$ 185.43
Informal	152.95	160.70	154.62	132.49	137.78
Auction	1,378.01	1,627.42	896.68	1,659.94	1,857.04
Total Value/Cord Sold	$ 2.94	$ 3.09	$ 3.20	$ 2.90	$ 2.51
Informal	$ 2.69	$ 2.83	$ 2.92	$ 2.53	$ 2.36
Auction	3.36	3.85	4.95	4.08	2.99

STATEWIDE TIMBER SALE DATA, BY METHOD OF SALE, FY 1965-69

	FY 65	FY 66	FY 67	FY 68	FY 69
Total Number of Sales	2,799	2,348	2,827	2,339	2,269
% Informal	98.0%	95.1%	96.0%	98.5%	98.3%
% Auction	2.0%	4.9%	4.0%	1.5%	1.7%
Total Cords Sold by Volume	169,849	193,664	265,500	227,000	199,786
% Informal	87.4%	60.9%	71.0%	82.5%	84.7%
% Auction	12.6%	39.1%	29.0%	17.5%	15.3%
Total Value Sold	$ 478,923	$ 618,574	$ 699,137	$ 542,630	$ 562,523
% Informal	83.5%	59.9%	68.1%	78.7%	83.0%
% Auction	16.5%	40.1%	31.9%	21.3%	17.0%
Size of an Average Sale					
Volume (Cords)	60.68	78.44	93.92	97.05	88.05
Informal	54.15	50.24	69.48	81.26	75.87
Auction	374.75	625.69	680.76	1,136.60	784.44
Value ($)	$ 171.10	$ 250.54	$ 247.31	$ 231.99	$ 247.91
Informal	145.79	157.80	175.43	185.23	206.65
Auction	1,388.89	2,050.07	1,973.73	3,310.03	2,453.82
Total Value/Cord Sold	$ 2.82	$ 3.19	$ 2.63	$ 2.39	$ 2.81
Informal	$ 2.69	$ 3.14	$ 2.52	$ 2.28	$ 2.72
Auction	3.71	3.28	2.90	2.91	3.13

STATEWIDE TIMBER SALE DATA, BY METHOD OF SALE, FY 1970-74

	FY 70	FY 71	FY 72	FY 73	FY 74
Total Number of Sales	2,564	2,351	2,507	2,888	3,302
% Informal	96.6%	95.5%	95.8%	92.2%	91.8%
% Auction	3.4%	4.5%	4.2%	7.8%	8.2%
Total Cords Sold by Volume	350,274	319,056	N/A	434,744	435,556
% Informal	73.7%	64.2%	N/A	56.3%	60.0%
% Auction	26.3%	35.8%	N/A	43.7%	40.0%
Total Value Sold	$ 820,581	$ 837,595	$ 787,718	$1,186,610	$1,740,348
% Informal	66.8%	61.2%	69.4%	52.6%	43.5%
% Auction	33.2%	38.8%	30.6%	47.4%	56.5%
Size of an Average Sale					
Volume (Cords)	136.61	135.71	N/A	150.53	131.91
Informal	104.27	91.21	N/A	91.91	86.14
Auction	1,057.48	1,087.70	N/A	844.38	645.82
Value ($)	$ 320.04	$ 356.27	$ 314.20	$ 410.88	$ 527.06
Informal	221.44	228.33	227.44	234.37	249.87
Auction	3,127.40	3,092.98	2,299.09	2,499.94	3,639.76
Total Value/Cord Sold	$ 2.34	$ 2.62	$ N/A	$ 2.73	$ 4.00
Informal	$ 2.12	$ 2.50	$ N/A	$ 2.55	$ 2.90
Auction	2.96	2.84	N/A	2.96	5.64

STATEWIDE TIMBER SALE DATA, BY METHOD OF SALE, FY 1975-79

	FY 75	FY 76	FY 77	FY 78	FY 79
Total Number of Sales	3,269	2,670	2,422	2,991	2,824
% Informal	91.6%	93.1%	97.2%	94.1%	91.6%
% Auction	8.4%	6.9%	2.8%	5.9%	8.4%
Total Cords Sold by Volume	351,949	353,090	247,614	417,730	470,490
% Informal	55.5%	65.4%	87.2%	69.8%	70.1%
% Auction	44.5%	34.6%	12.8%	30.2%	29.9%
Total Value Sold	$2,101,236	$1,740,677	$1,289,579	$2,018,187	$2,358,400
% Informal	37.6%	57.3%	79.6%	63.4%	63.0%
% Auction	62.4%	42.7%	20.4%	36.6%	37.0%
Size of an Average Sale					
Volume (Cords)	107.66	132.24	102.23	139.66	166.60
Informal	65.19	92.92	91.81	103.59	127.51
Auction	570.11	666.69	457.62	716.59	593.29
Value ($)	$ 642.78	$ 651.94	$ 532.44	$ 674.75	$ 835.13
Informal	264.00	401.37	436.01	455.05	574.63
Auction	4,766.65	4,057.27	3,821.09	4,191.65	3,678.57
Total Value/Cord Sold	$ 5.97	$ 4.93	$ 5.21	$ 4.83	$ 5.01
Informal	$ 4.05	$ 4.32	$ 4.75	$ 4.39	$ 4.51
Auction	8.36	6.09	8.35	5.85	6.20

STATEWIDE TIMBER SALE DATA, BY METHOD OF SALE, FY 1980

	FY 80
Total Number of Sales	3,202
% Informal	89.2%
% Auction	10.8%
Total Cords Sold by Volume	557,000
% Informal	55.8%
% Auction	44.2%
Total Value Sold	$3,645,000
% Informal	47.2%
% Auction	52.8%
Size of an Average Sale	
Volume (Cords)	173.95
Informal	108.57
Auction	711.27
Value ($)	$ 1,138.35
Informal	601.89
Auction	5,566.42
Total Value/Cord Sold	$ 6.54
Informal	$ 5.53
Auction	7.83

SOURCE: DNR, Division of Forestry

NA-02136-02
F-121 6/80

TIMBER APPRAISAL REPORT

Permit Number

DEPARTMENT OF NATURAL RESOURCES

Permittee

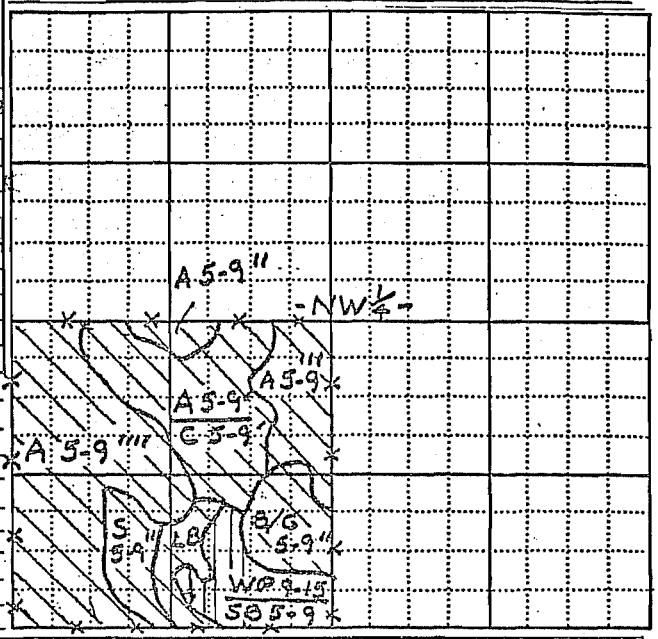
County: 36 KOOCHICHING

State Forest Number: 28 | Section: 26 | Township: 65 | Range: 24 | Region, Area & District Number: 261

CUTTING REGULATIONS:

	Land Status	Forty or Lot	% of Total Value
XXX CLEAR CUT - CUT ALL TREES 2" DBH AND LARGER			
/// PARTIAL CUT - CUT N & W. PINE, BALSAM & SPRUCE WITH 2 OR MORE STICKS; AVOID DAMAGE TO PINE, SPRUCE & BALSAM REPRODUCTION.	01	SWNW	100
/ / RESERVE - NO CUTTING			
-X-X- BLUE RESERVE LINES			
UTILIZE ASPEN & BALM TO A 4" TOP; PINE, SPRUCE, CEDAR, & BALSAM TO A 3" TOP	XXX	XXX	100

SCALE (Mark One) ☐ 4" to Mile ☒ 8" to Mile



Slash Disposal Regulations: FULL TREE SKID BLACK SPRUCE

Price Guide Factors: 40-20-10-15-10-10 = 105%

Planned Cut No. 80-43, 81-2, 81-4
Acres Sold by Type (Drain) A-32, S-4, SB-4
Total Acres in Sale Area 40 ACRES

Species	Products	M Feet	Cords	Pieces	Weight M LBS.	Unit Price	Value
N & W PINE	SAWLOGS	15				67.20	1008.00
ASPEN	PULP & BOLTS		530			3.10	1643.00
CEDAR	PULP & BOLTS		35			9.05	316.75
BLACK SPRUCE	PULP		60			14.70	882.00
BALSAM	PULP		25			3.95	98.75
BALM/GILEAD	PULP		40			2.65	106.00
N & W PINE	PULP		3			9.45	28.35

Pole Sizes	10'	12'	14'	16'	20'	25'	30'	35'	40'	45'	50'				Total Value	4,082.50
Pole Prices																

Remarks: N. & W. PINE IS 20% NORWAY & 80% WHITE PINE; IF SCALED TREE LENGTH WILL BE CHARGED AS 95% SAWTIMBER AND 5% PULPWOOD.
BLACK SPRUCE SITE - 40% SPHAGNUM WITH SCATTERED SPRUCE & CEDAR IN LB AREA.
N. & W. PINE SITE - 350 STEMS/ACRE OF 1-5" W. PINE, SPRUCE, AND BALSAM.
Forest Development Plans: SITE INDEX: ASPEN-68, SPRUCE-42
NATURAL REGENERATION IN ASPEN & BALM CLEARCUTS; BLACK SPRUCE SITE WILL BE AERIAL SEEDED TO SPRUCE ALONG WITH OTHER SITES IN VICINITY; PINE SITE HAS SUFFICIENT STOCKING OF W. PINE, SPRUCE, AND BALSAM

PULP & BOLTS BREAKDOWN

Species	% Bolts	(Price using P.G.F.) Pulp	Bolts
ASPEN	15	2.63	5.88
CEDAR	10	8.40	15.12

State Appraiser Signature	Date	Area Forest Supervisor Signature	Date
William J. Tomsen	7-21-80	Charles J. Gordon	7-25-79

APPENDIX C

DNR'S TIMBER PRICING FORMULA

$$P_{B'} = i \times j \times \left[k \left(\frac{\bar{P}_A - \bar{P}_I}{2} \right) + P_B \right]$$

$P_{B'}$ = New base stumpage price

i = Percentage change in the producer price index for intermediate materials (Source: Producer Prices and Price Indexes, U.S. Department of Labor, Bureau of Labor Statistics)

j = A market factor representing the percentage change in the physical output of paper or lumber products over a one year period. (Source: Current Industrial Reports: Pulp, Paper, and Board, U.S. Department of Commerce, Bureau of Census)

k = Percentage of timber volume sold at auction in relation to total volume of timber sold.

$\bar{P}_A$ = Average auction sale price

$\bar{P}_I$ = Average informal sale price

$\frac{}{2}$ = Reflects the average bidder rather than the high bidder

P_B = Base stumpage price in effect during the period when transaction data is accumulated

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SOURCE: Minnesota Department of Natural Resources, Division of Forestry, 1981.

PULPWOOD PRICE GUIDE FACTORS[1]

Production Factors	Items to Consider	STAND A — Poor Quantity	Poor Factor	Fair Quantity	Fair Factor	Average Quantity	Average Factor	STAND A — Good Quantity	Good Factor	Excellent Quantity	Excellent Factor
Felling Limbing Bucking	Cords/acre	0-4	.04	5-7	.07	7	.12	8-20	.15	20+	.18
	DBH" and	5"		6"		8"		8-10"		10+"	
	sticks/tree	2	.04	2.5	.09	3.5	.15	4	.19	4+	.24
	other factors[2]		.02		.04		.08		.11		.13
	Total		.10		.20		.35		.45		.55
Skidding	Cords/acre	0-4	.02	5-7	.05	7	.07	8-20	.09	20+	.11
	Slope (%)	25+	.02	15-25	.03	15	.05	10-15	.07	0-9	.09
	# of chains[3]	10+	.01	7-10	.02	5-7	.03	3-5	.04	0-2	.05
	Total		.05		.10		.15		.20		.25
Hauling Distance	[4]Secondary Road Haul (miles)	15+	.03	10-15	.07	5-10	.10	3-5	.14	0-3	.18
	[5]Haul to Mill	90+	.02	60-90	.03	40-60	.05	20-40	.06	0-20	.07
	Total		.05		.10		.15		.20		.25
[6]Road Maintenance/ Construction	[6]Cost/Cord	1.00+	.05	.75-1.00	.10	.75	.15	.50-.75	.20	0-.50	.25
Market Outlook	Demand		.00		.05		.10		.15		.20
Quality	Soundness		.00		.05		.10		.15		.20
Grand Total			.25		.60		1.00		1.35		1.70

1 To be used for each species on the Sale.
2 Limbs, underbrush, stocking, distribution, rocks, terrain, and residual stand requirements.
3 Skidding distance in chains plus other factors noted above.
4 Distance to all weather road.
5 Include secondary road haul mileage. Destination may be a concentration yard or railroad car landing.
6 Rocks, terrain, wet areas, and bridges must be considered.
7 Amount of rot and knots, sticks per tree, straightness and clarity of bole should be considered.

SAWTIMBER FACTORS AND DEFINITIONS

Production Factors	Items to Consider	S T A N D A R D				
		Poor	Fair	Average	Good	Excellent
Felling Limbing Bucking	Board feet/acre Logs/tree Percent cull[1]	.08	.15	.20	.25	.32
Skidding	Board feet/acre Slope 2&3	.04	.10	.18	.23	.29
Hauling	Distance to mill only[4]	.05	.15	.30	.36	.42
Road Maintenance/ Construction	MBF Cost in Board Feet[5]	.03	.05	.08	.10	.13
Market Outlook	Demand	.02	.04	.09	.12	.15
Quality	Cull factor and log grade[6]	.03	.06	.15	.24	.34
Grand Total		.25	.55	1.00	1.30	1.65

1 To be used for each species on the sale.
2 Residual stand problem, steep slopes, hilly and rocky, heavy underbrush, scattered timber, swampy or low areas.
3 Skidding distance in chains plus other factors and slope noted above
4 Miles to mill.
5 Consider drainage hill, slope, all weather and length.
6 Amount of rot, knots, clear bole, log size, log grade.

Sale Method:

- Approximately 45 percent of all timber sold in Minnesota in FY 1980 was sold at public auction.
- Auction sales are limited in value to sales of $20,000 or less.
- 68 percent of all auction sales conducted in 1982 were oral auctions.
- 55 percent of all timber was sold using the informal method in FY 1980. Sales lots are currently set at $3,000 or less.

Scale:

- Approximately 24 percent of all sales issued between FY 1975-81 were sold as appraised. Sold as appraised sales are technically to be limited to high value species or low value stands.
- The majority of timber sold was subject to scale. 35 percent of all sales issued between FY 1975-81 were scaled in the woods by DNR foresters, the remainder were scaled by consumer scale in the mill yard.

Cruise:

- The predominant method of cruise used by DNR foresters is the point sample although foresters are allowed to use the "method they feel most comfortable with."
- The degree of cruise accuracy is not specified although sold as appraised are to be subjected to a tighter cruise than scaled sales.

Stumpage Prices:

- Base stumpage prices are set annually. Proposed stumpage prices are set in St. Paul using a modified transaction evidence method based on the previous year's sales and base stumpage prices. Proposed prices are then subject to approval and alteration by DNR personnel.
- The base price of each sale is subject to adjustments using the price guide factors. The factors consider costs of felling, limbing, bucking, skidding, hauling, road maintenance and construction, market outlook, and quality of timber. The price is adjusted by percentage based on the judgement of the cruising forester.

Appraisal Accuracy:

- Appraisals are to be compared to scale results to verify accuracy. DNR allows a difference of 20 percent.
- Less than one percent of all appraisals are subject to reappraisal. The allowable difference is 20 percent.

Payments:

- Advance payment required on all auction sales immediately after the bid has been awarded. Advance payment is to equal 25 percent of the appraised value.
- Auction sale permit bidders are required to submit a purchaser's bond equal to the total value of the sale less the advanced payment.
- Payment for informal sales due prior to issuance of permit.
- The balance of any payment due is to be paid upon completion of the sale.

Permit Duration:

- Auction sales run two years. Informal and intermediate permits run one year.

Extensions:

- Auction permits may receive up to three one-year extensions. No prerequisite for receiving extensions. The sale price on all standing timber is increased eight percent with each extension.
- Informal permit holders may receive a one-year extension if there is "good and sufficient reason to grant." No interest penalty is assessed.
- Intermediate permit holders are eligible for two one-year extensions. The sale price on all standing timber is increased eight percent with the second extension.

Harvest Requirements:

- Method of cut established in the appraisal. No cutting plan is required.

Default:

- Defaulting logger must pay for all standing timber not harvested when the sale is closed.

Sale Method:	• Oral auction used on all sales over $3,000. In 1980, 20 percent of the volume of timber was sold at public auction. Only 8 of the 12 Land Commission counties use the auction method. • Sales less than $3,000 may be issued informally. All 12 counties use this method. In 1980, 80 percent of the total timber volume was sold informally.
Scale:	• Use of the sold as appraised sale varies by county. Five counties issue over 50 percent of their sales as appraised. The remaining seven counties use the sold as appraised method to a lesser extent. • Six counties use a scale sale in over 60 percent of their sales. The majority of sales are subject to regular scale in the woods.
Cruise:	• Method of cruise to be used is not specified by the majority of counties. The most common methods used are 100 percent tallies (sold as appraised) and point sample cruises (scale sales).
Stumpage Prices:	• All counties use Minnesota DNR base stumpage prices and price guide factors. A few counties have made minor modifications.
Appraisal Accuracy:	• DNR reviews all aerial photos from county sales and reappraises one out of every 20 county appraisals. • DNR requires that original appraisals be within ± 20 percent of the check appraisal. Seven counties require that the original appraisal be within ± 10 percent of the DNR check appraisal.
Payments:	• Performance bond equal to 25 percent of the sale price to be paid prior to issuing the permit. • Total payment at bid or appraised price due at the time of the sale. Balance due upon completion of the harvest.
Permit Duration:	• Sales duration ranges from one to three years depending on the county and tract size.
Extensions:	• Six counties offer automatic one-year extension to all applicants. Five counties require demonstration of hardship. • The majority of counties assess a 10 percent price adjustment on standing timber when an extension is granted.
Harvest Requirements:	• No special requirements.
Default:	• Defaulted timber subject to resale. Price of standing timber deducted from the original buyer's performance bond.

Sale Method:	• All sales over $1,000 are to be sold at public auction. (95 percent of all timber sold) All auction sales are by sealed bid. All auction sales exceeding $19,999 require the approval of the Commissioner of the Department of Natural Resources. • Remaining timber is sold informally. Informal sales normally consist of small stands, salvage, and standing timber from previous sales.
Scale:	• Sold as appraised sales may be used on sales under $1,000. • Scales conducted on 95 percent of the timber sold. Majority of pulpwood subject to consumer scale using the lock box method. Saw log scales are conducted by the Department of Natural Resources.
Cruise:	• Predominant cruise method a point sample cruise designed to allow for a 20 percent error rate.
Stumpage Prices:	• Base stumpage prices are based on the average sale price over the past 12 months. Prices are set annually by district. • Price guide factors are the same as those used in Minnesota.
Appraisal	• All cruises are checked against scale results. No established error rate. Individual appraisers are required to explain "substantial" deviations. • Check cruise required on 10 percent of all cruises. No established allowable error rate.
Payments:	• Performance bond equal to 15 percent of the sale value required prior to issuing the permit. • Sale is divided into cutting tracts. Payment for each tract due prior to harvesting. Any overruns are paid upon completion of the individual cutting tracts.
Permit Duration:	• Maximum sale duration is four years including any extensions. Duration of each permit is determined by tract size and volume.
Extensions:	• Each logger may receive up to three six-month extensions as long as the total sale duration does not exceed four years. • To qualify for an extension the logger must demonstrate a good faith effort to comply with the cutting plan. • Timber reappraised prior to the second and third extension.
Harvest Requirements:	• Sale divided into cutting tracts. Harvesting to take place on one tract at a time. Harvesting may not be initiated on a second tract until the first tract is complete.
Default:	• All defaulted timber is subject to resale. Sale cost and price differences between the original sale cost and the subsequent sale to be paid by the original purchaser.

Sale Method:

- 90 percent of all timber sold at auction using a sealed bid.
- Sales less than $1,000 in appraised value with only one potential buyer may be offered informally. Informal sales greater than $1,000 may be offered occasionally, but must be approved by the Commissioner of DNR.

Scale:

- 80 percent of all timber is sold using a sold as appraised method; the remaining 20 percent is sold based on a scale. Most pulpwood sales use weight scale. Sawlogs are scaled by state personnel.

Cruise:

- Three methods used:
  (1) 100 percent tally used on small stands with high value.
  (2) Sample tree management, unmarked sale used when density exceeds 2.5 plots per acre.
  (3) Point sample done on unmarked timber sales where density is less than 2.5 plots per acre.
- Degree of allowable error rate varies from 17 percent to 7 percent, depending on the sale value. The greater the value, the more accurate the appraisal.

Stumpage Prices:

- Base stumpage prices are set once a year. New base stumpage prices equal the average sale price per product and species in a given district over the past 12 months.
- Price guide factors are similar to those used in Minnesota.

Appraisal Accuracy:

- All appraisal sale sheets are reviewed.
- Cruises are verified against scales.
- Very few check appraisals.
- No established degree of allowable deviation. Extreme over runs must be justified by the cruising forester.

Payments:

- Performance bond equal to 15 percent of the sale price must be paid prior to receiving the permit.
- Payment schedule specified in the permit. Each sale is divided into cutting tracts. Payment is due on each tract before harvest on the next tract may be initiated.
- Consumer scale payment conducted by means of a withholding agreement. The consumer withholds the state's payment from the logger and forwards it to the state.

Permit Duration:

- Maximum sale duration is five years. The average sale is three years.
- All sales scheduled for three or more years are subject to price redetermination based on current prices.

Extensions:

- All permits eligible for one automatic six-month extension. About 40 percent of all loggers take this option.
- Additional one-year extensions granted in 10 percent of the cases when hardship is demonstrated. All second extensions are subject to a 10 percent penalty.

Harvesting Requirements:

- No special requirements.

Default:

- No major default problems in the past, so a program has not been established.

Sale Method:
- 95 percent of the volume of wood is sold at auction using a sealed bid.
- 5 percent of all wood sold informally. Maximum sale size under $10,000.

Scale:
- All timber sales based on scaled volume.
- In Jackson State Forest, the largest state forest, 95 percent of wood is weight scaled by the consumer. The remaining five percent is subject to scale by the Department of Natural Resources.
- All wood on the remaining three state forests is subject to regular scale.

Cruise:
- The majority of timber is subjected to a 100 percent tally cruise. Only 20 percent of the volume sold from the Jackson State Forest is subject to a plot sample or strip cruise. Maximum allowable error rate is 10 percent.

Stumpage Prices:
- Combination residual value-transaction evidence.
- District has the discretion to change the base stumpage price with the director's approval.
- Price guide factors not applied; they are included in the residual value calculation.

Appraisal Accuracy:
- Department headquarters do a five percent sample scale. A ± 2 percent difference is allowed.
- Field forest supervisor checks individual sale plots on an ongoing basis. Generally a percentage of plots per sale. A difference of one tree per plot is allowed.

Payments:
- Bid deposit equal to five percent of the appraised value required as a prerequisite to bidding.
- Performance bond equal to 10 percent of the sale price due prior to issuing the permit.
- Advance payment equal to 25 percent of the sale value due prior to the harvest of large sales.
- Remaining payments made as the timber is harvested and scaled.

Permit Duration:
- Maximum duration in the Jackson State Forest is two years. All other sales have a maximum duration of one year.
- Sales generally terminate on November 15 of each year.

Extensions:
- Extensions are granted in cases of hardship. The logger must demonstrate good faith performance effort.
- Penalty equal to the state bond rate assessed on the value of standing timber.
- Less than 10 percent of all permits due to expire receive extensions.

Harvesting Requirements:
- No special requirements.

Default:
- No clear policy. First default occurred in 1980.

Sale Method:

- 99 percent of all timber sold at public auction. The state uses oral auctions on 75 percent of its auction sales and sealed bids on the remainder.
- Informal sales reserved for salvage sales.

Scale:

- 80 percent of volume of timber is sold based on a scale. All scaling is conducted by three private scaling bureaus using a regular scale. The bureaus are selected jointly by the state and industry.
- 20 percent of all timber sold as appraised.

Cruise:

- Use both a 100 percent tally and a point sample. 100 percent tally used on small sales.
- Point sample/variable plot strip cruise used on the majority of sales. Cruises of this type are to be designed to allow only a six percent degree of error.

Stumpage Prices:

- Residual value set by sale stand using current processing costs cited by the Washington timber industry.
- No price guide factors used. Sale stand conditions are assessed when setting the residual value.

Appraisal Accuracy:

- Check cruises are conducted on one in twelve sales. The checking appraiser checks the same plot and sample trees used by the original appraiser. A 10 percent variance is allowed between the first and the second appraisal.
- Scales are cross-checked with the cruise to compare volumes. A ± 10 percent variance is allowed.

Payments:

- Bid deposit equal to 10 percent of the appraised value required of all potential bidders.
- Performance bond equal to 20 percent of the sale price required prior to issuing the permit.
- Advance payment equal to 10 percent of the sale price required prior to harvesting and applied against first harvest bill.
- Remainder paid as scaled.

Permit Duration:

- Maximum sale duration five years. Average length three years.
- Each logger is eligible for two one-year extensions.
- Price adjusted at the time of extension by the prime rate. In addition, the logger must pay for lost growth.

Harvesting Requirements:

- No special requirements.

Default:

- Stand resold. Previous purchaser must pay difference between the old price and new price plus sale administration costs.

Sale Method:
- 50 percent of all sales auctioned using sealed bid.
- 50 percent of all sales negotiated bid with selected companies.
- No informal sales.

Scale:
- All wood harvested scaled by buyer.
- Department of Natural Resources does periodic check scales.

Cruise:
- Variable plot sample allowing 10 percent degree of error for softwoods and 15 percent for hardwoods. Every sawlog is marked and every 10th pulpwood tree.
- All cruises are done in four man crews.

Stumpage Prices:
- No established base price. Price set by the bid and adjusted by inflation factors throughout the permit duration.
- Price guide factors not applied.

Appraisal Accuracy:
- Cruise cross-checked with scale results.
- Degree of variance allowed determined by species. For example, Maine allows a 40 percent over run on pine and a 20 percent over run on spruce.

Payments:
- Performance bond equal to 20 percent of the stand's market value.
- Payment made as harvested using a withholding agreement.

Permit Duration:
- Time limit set by sale according to stand size and difficulty to harvest.
- Average sale duration seven years.

Extensions:
- Extensions may be granted for up to three years if the harvester can demonstrate a "good faith" effort to comply with marketing schedule.
- Prices adjusted to reflect current market values.
- 60 percent of all active permits granted a one-year extension.

Harvesting Requirements:
- Stand divided into cutting tracts for harvest.
- Loggers may be required to remove timber only during certain seasons depending on the sale site.

Default:
- State awarded liquidated damages. Generally such damages are equal to the sale value of the standing timber.
- Any party defaulting will be denied further state harvesting permits for up to five years.

Sale Method:

- 99 percent of all timber sold in Minnesota is sold at public auction using a sealed bid method.
- About 55 percent of all timber sold in Minnesota is reserved for auction sale to small loggers under the Federal Set Aside Program.
- One percent of all timber is sold informally. Such sales are generally only salvage sales or previous defaults. Informal sales may only be issued when there is no evidence of potential competition.

Scale:

- 100 percent sold as appraised sales.

Cruise:

- Rely on 100 percent tallies and variations of the point sample method. Specifications as to when each is to be used are delineated in the Forest Service Handbook.
- All cruise methods must be designed to allow for a maximum five percent error rate.

Stumpage Prices:

- Base stumpage prices are derived using a transaction evidence method. The price is based on adjusted sales prices received over a five year period.
- Base stumpage prices for each national forest are issued quarterly.
- Base stumpage prices may not be altered by field personnel.
- The Forest Service is still using a residual value method in the western United States.
- Price guide factors allow for road construction costs, logging costs, hauling costs, road maintenance costs, and contractual costs which exceed average costs. Formulas for establishing adjustments based on average costs are provided by the regional office.

Appraisal Accuracy:

- Check appraisals conducted on 15 percent of all sale stands.
- Computerized review of all appraisals.
- Degree of difference allowed between the original appraisal and any check is ± five percent.

Payments:

- Bid bond equal to $200-$300 required as a pre-requisite to all bidding.
- Performance bond required before the permit may be issued. Amount varies by sale size and operator.
- Payment made by cutting tract.

Permit Duration:

- Maximum sale duration established by statute is 10 years. Average sale duration in Minnesota has been four years with a maximum of seven years.

Extensions:

- Generally, purchaser must demonstrate an effort to meet the provisions of the cutting plan and 75 percent of the timber must have been harvested before an extension will be granted. Extensions granted on 10-15 percent of permits scheduled to expire.
- U.S. Director of Forestry has established a special extension provision to run from April 1981 - April 1982. Because of the present timber economy all loggers are eligible for an automatic one-year extension.

Harvest Requirements:

- All loggers are required to prepare a cutting plan for their sale tract. The plan includes a harvest schedule set up by cutting tract.

Default:

- Subject to resale. The original buyer must pay the administrative costs and any difference between the original purchase price and the new purchase price.

Sale Method:

- 75 percent of all Minnesota timber is reserved for sale to Indian loggers. The remaining 10-15 percent is sold informally.
- 10 percent of all timber sold in Minnesota is sold at public auction using a sealed bid method.
- Informal sales are limited to $10,000. They are used only when there is one interested buyer. Loggers are allowed only one informal permit per year.

Scale:

- 10 percent of all timber is sold as appraised; used primarily on high value timber and small sales.
- 90 percent of all sales are scaled. Majority of wood is subject to regular scale on the reservation, 20 percent of the timber harvested is consumer scaled.

Cruise:

- 100 percent tally on all sold as appraised sales.
- Cruise type on scaled sales not specified. The method chosen is designed to allow a maximum five percent error rate.

Stumpage Prices:

- BIA stumpage prices based on current state prices in each of their state offices. In Minnesota they use the DNR base stumpage prices and price guide factors.

Appraisal Accuracy:

- Verify appraisal results with scale results. A ± 10 percent variation is allowed.
- Reappraisals done on a few sold as appraised sales.

Payments:

- Bid deposit required as a pre-requisite to bidding. 20 percent of appraised value if value is less than $10,000, 10 percent if appraised value is between $10,000 and $100,000.
- Performance bond ranging from 10-20 percent of the sale value required prior to sale. Remainder due at close of sale if sale scaled.

Permit Duration:

- Maximum duration informal sales two years.
- Maximum duration on auction sales varies according to stand size. Average sale length three to five years.

Extensions:

- Loggers may apply for and receive a one-year extension. Each logger is eligible for more than one extension.
- Stumpage prices subject to a six percent adjustment when an extension is issued.
- 60 percent of all sales scheduled for completion in 1980 received extensions.

Harvest Requirements:

- Cutting plans may be requested at the discretion of the local forester.

Default:

- No measures for addressing default problems.

Sale Method:	• 96 percent of all timber on O&C[1] lands and 70 percent of all timber on public domain lands sold at public auction using a sealed bid method. • All sales over 250 MBF (500 cords) must be sold at auction. BLM has a set aside auction program to insure a share of the timber goes to small operators. • Remaining timber is sold informally. The sale must be less than 250 MBF and there can be only one interested buyer. BLM must justify all informal sales to Congress in a semiannual report.
Scale:	• All sales are sold as appraised. • Scales are sometimes used to verify appraisal accuracy.
Cruise:	• Three primary methods of cruising: (1) 100 percent tally: used on high value stands. (2) Point sample: used on second generation stands of the same age, species and product type; designed to a five percent error rate. (3) 3P cruise: used on all other stands; designed to a five percent error rate.
Stumpage Prices:	• Base stumpage price set using a residual value method based on processing costs reduced 10 percent for profit. • The BLM is conducting some preliminary research on a transaction evidence method in Eugene, Oregon. The transaction price is based on an adjusted two year sales average.. If successful BLM may switch to the transaction method. • Average processing costs are incorporated in the base stumpage price calculation. Prices may be adjusted by prescribed mathematical formulas to reflect processing costs above the average.
Appraisal Accuracy:	• 20 percent of all appraisals are checked against a check scale adjusted for unused timber. • Each district manages its own check cruise program. • Allowable deviation from the check scale or check cruise is ± five percent.
Payments:	• Bid bond equal to 10 percent of the appraised value required as a prerequisite to bidding. • Performance bond equal to 20 percent of the sale value required before the permit will be issued. • Payment is made by cutting tract.
Permit Duration:	• Maximum limit three years.
Extensions:	• Only granted when harvest is frustrated by "an act of God." • Standing timber is reappraised when extension requested and bid price adjusted to reflect new prices.
Harvest Requirements:	• All loggers are required to adhere to a cutting plan designed jointly by the BLM and the logger.
Default:	• Subject to resale. Original buyer must pay resale costs and any differences in sale costs.

[1] O & C lands refer to the revested Oregon and California Railroad and reconveyed Coos Bay Wagon Road grant lands. These lands are managed for timber production under the provisions of 43 USC §1181.

STUDIES OF THE PROGRAM EVALUATION DIVISION

Final reports and staff papers from the following studies can be obtained from the Program Evaluation Division, 122 Veterans Service Building, Saint Paul, Minnesota 55155, 612/296-8315.

1977

1. Regulation and Control of Human Service Facilities
2. Minnesota Housing Finance Agency
3. Federal Aids Coordination

1978

4. Unemployment Compensation
5. State Board of Investment: Investment Performance
6. Department of Revenue: Assessment/Sales Ratio Studies
7. Department of Personnel

1979

8. State-sponsored Chemical Dependency Programs
9. Minnesota's Agricultural Commodities Promotion Councils
10. Liquor Control
11. Department of Public Service
12. Department of Economic Security, Preliminary Report
13. Nursing Home Rates
14. Department of Personnel, Follow-up Study

1980

15. Board of Electricity
16. Twin Cities Metropolitan Transit Commission
17. Information Services Bureau
18. Department of Economic Security
19. Statewide Bicycle Registration Program
20. State Arts Board: Individual Artists Grants Program

1981

21. Department of Human Rights
22. Hospital Regulation
23. Department of Public Welfare's Regulation of Residential Facilities for the Mentally Ill
24. State Designer Selection Board
25. Corporate Income Tax Processing
26. Computer Support for Tax Processing

27. State-sponsored Chemical Dependency Programs, Follow-up Study
28. Construction Cost Overrun at the Minnesota Correctional Facility - Oak Park Heights
29. Individual Income Tax Processing and Auditing
30. State Office Space Management and Leasing

1982

31. Procurement Set-Asides
32. State Timber Sales

In Progress

33. Fire Inspections of Residential Facilities for the Disabled
34. State Mineral Leasing
35. State Purchasing
36. Department of Education Information System
37. Post-Secondary Vocational Education
38. Direct Property Tax Relief Programs