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## Assessing the Availability of Timberland For Harvest in the Lake States

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Sigrid Resh

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Masters degree in Forestry

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## ASSESSING THE AVAILABILITY OF TIMBERLAND FOR HARVEST IN THE LAKE STATES

By

Sigrid Resh

### A THESIS

Submitted to Michigan State University in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Department of Forestry

#### ABSTRACT

# ASSESSING THE AVAILABILITY OF TIMBERLAND FOR HARVEST IN THE LAKE STATES

By

#### Sigrid Resh

Both public and private owners of timberland choose not to harvest timber due to various market conditions, resource conditions, management objectives, and concerns regarding the effects of harvesting. Timber supply analyses based on forest inventory data do not typically reflect these exclusions from timberland causing an overestimation of available timberland for timber production. Land managers of the Lake States' national forests, DNRs, counties, and private lands are surveyed for their expert judgment concerning current and the year 2020 availability of lands for timber harvest and factors affecting the availability. Additional information is also provided pertaining to the predictions of cover types on lands not available for harvest in the year 2020 as well as management trends on public and private forest land. Statewide summaries show that timberland available for harvest is predicted to decrease on both public and private lands. Social constraints and environmental factors are the major factors perceived to be causing the predicted decrease.

To my mom and sister, the two true constants in my life

.

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#### CHAPTER 1

#### INTRODUCTION

Timber harvesting has an important economic and ecological role in the Lake States. For instance, the Lake States' forests are a valuable source of timber for wood products industries. Timber harvesting also creates a number of employment opportunities within public and private organizations, which contribute to the welfare of the Lake States' economies. Furthermore, many wildlife species rely on openings and/or woody debris created by timber harvests to meet food and habitat requirements. Tree species such as aspen and birch also rely on harvests (i.e., clearcutting) for regeneration to replace fire, one of the natural methods of early successional species regeneration.

In the Lake States, forest land ownership ranges from federal, state, and county to forest industry, other industry, and nonindustrial private forest (NIPF). Resulting from these multiple ownerships are multiple uses of the forest land of which timber harvesting is only one. For instance, other reasons for forest ownership may include recreation, development, or preservation intentions. Therefore, forest land is not necessarily analogous to lands available for harvest. Studies of timber supply must account for probable trends in land use, especially changes in areas available and not available for harvest, which may relate to ownership.

Forest land owners choose not to harvest timber from their lands for a variety of reasons. For example, NIPF landowners may not harvest due to resource conditions, market conditions, or concerns regarding the effects of harvesting (Carpenter and Hansen, 1985). On USDA-Forest Service lands (hereafter referred to as Forest Service) hundreds of thousands of acres may be classified as "forest land not appropriate for timber production" (Federal Register, 1982, p. 43046). Other public agencies and industrial owners may have additional reasons for withholding lands from timber management such as wilderness preservation or environmental considerations such as buffer zone requirements for watershed protection. Nonetheless, timber supply analyses based on forest inventory data (e.g., the Forest Service's Forest Inventory and Analysis data) may erroneously consider many of these lands as part of the available timberland base.

The Lake States timberland ownership distribution is shown in Table 1. Timberlands are basically those lands capable of producing industrial wood; lands presently inaccessible or inoperable are included. Several information sources currently exist pertaining to forested lands available for harvest. For instance, the Forest Service's Forest Inventory and Analysis (FIA) data summaries give estimates of total forest acreage which is potentially available for harvest. However, FIA data is based principally on physical data; only limited data on lands unavailable for timber management are included. These

unavailable lands are "reserved." Reserved forest land is defined narrowly as timberland "withdrawn from utilization through statute, administrative regulation, designation, or exclusive use for Christmas tree production" (Smith and Hahn, 1986).

Table 1. Lake States timberland ownership, mid-1980s.

Ownership Class	Thousands of Acres
National Forest	5,364.5
Miscellaneous federal	376.5
State	6,807.2
County and municipal	4,700.5
Indian	840.5
Forest products industry	3,912.9
Farmer	9,914.4
Misc. private-corporation	2,623.1
Misc. private-individual	11,137.3
TOTAL	45,677.3

Source: Smith and Hahn, 1986; Hahn and Smith 1987; and Spencer et al., 1988.

Other possible information sources are national, state, and some county forests' management plans. These plans may actually give acreage breakdowns of available and unavailable lands for timber harvest as is the case for the national forests. However, usually only the rules and regulations affecting harvests from forest lands are spelled out; the actual acreage that is restricted or free from the restrictions is not presented.

Information regarding the availability of private forest land for harvest is even less available. Surveys of private landowners regarding timber harvest attitudes and intentions are plentiful. But these surveys do not reveal information on the actual acres of harvested land or lands that will be harvested.

It is clear that existing information sources fall short of supplying estimates of acreage available for harvest currently; furthermore, information on lands available for harvest in the future is also limited despite its potential usefulness. Information on future availability of lands for harvest would provide valuable information regarding timber suppliers' abilities to meet demand, as well as providing information for more appropriate management policies concerning lands that are available for timber harvest.

Due to the paucity of information on this topic, analyses will often include all timberlands (e.g., see Jakes and Smith, 1983) when this clearly overstates current conditions. As an example, only 147,000 acres of total reserved forest land are identified in the northern lower peninsula (NLP) of Michigan (Smith and Hahn, 1986), whereas the NLP's Huron-Manistee National Forests (HMNF) alone identified over 364,000 acres as not appropriate for timber management (USDA-Forest Service, 1986). In the broader context of timber supply analysis, omissions of this magnitude can greatly misdirect private and public land management policies.

The "annual growth versus annual removal" timber supply analysis may also distort the amount of timberland actually available for harvest. For example, annual removals on NIPF

ſ â h 2 i: W. à; Pr (p Na ₫V, In Sta and sta env land in the Lake States account for 58% of the net annual growth compared with 32% and 34% on national forest and state lands (Kingsley, 1993). Thus it appears that national forests and state lands have plenty of wood available for harvest. However given the examples of reserved lands above, this may not be the case. Clearly, a more comprehensive assessment is needed of forested areas where harvesting is and is not acceptable.

A recent effort was made by the Minnesota Environmental Quality Board to account for lands unavailable for harvest in an assessment of the environmental impacts of timber harvesting and management activities in Minnesota (Jaako Pöyry Consulting, Inc., 1994). In so doing, the project included all forest lands within Minnesota's boundaries, which includes all major public and private ownerships. An attempt was made to also include "ownership constraints and mitigations that reflect current and prospective management procedures and policies applied by the major forest managers" (p. iv). Estimates of actual timberland availability were made by ownership to account for timberlands that are not available for economic, environmental, and social concerns. In that effort, called a Generic Environmental Impact Statement (GEIS), using the above and additional constraints and information, they assessed the impacts of three levels of statewide harvesting scenarios from multiple economic and environmental standpoints.

Given the importance of timberland availability in supply analyses, the purpose of this study is to obtain estimates and projections of timberland available for timber harvest in the Lake States. In this context, this study will be primarily subtractive in nature in terms of determining the factors which affect the removal of land from the available timber base. Surveys of public and private forest land managers will be used to achieve the following three objectives:

- To estimate the current and future acreage of public and private lands available for timber harvest in the Lake States,
- (2) To determine the factors affecting the availability of lands for timber production on both public and private lands in the Lake States, and
- (3) To produce results that will be used in the Lake States Timber Supply (LASTISA) Model to improve estimates of timber supply in the Lake States.

The LASTISA Model is an analysis tool being developed to model regional timber supply and demand in the Lake States. The regions for the model are predefined FIA survey units. Therefore, the data analysis for this study involves aggregating public and private data within these survey units by state and ownership. Figure 1 shows the names and locations of the survey units for the Lake States--Michigan, Minnesota, and Wisconsin. For the purposes of the LASTISA Model, the aggregated data are in percent terms to be used as





exogenous variables for different scenarios of timber supply and demand.

This thesis is organized as follows. In Chapter 2 literature is reviewed pertaining to forest land and timberland area and ownership changes throughout the United States and within the Lake States. Literature is also reviewed pertaining to alternate uses of and other factors affecting public and private forest lands available for timber production. Chapter 3 consists of a description of the list frame selection as well as the survey methods and questionnaire design used in this study, followed by a detailed description of the data analysis procedures. In Chapter 4 the results are presented and discussed, grouped by the questions asked in the questionnaire. Finally, Chapter 5 consists of conclusions based on the major findings with recommendations for future research.

#### CHAPTER 2

## LITERATURE REVIEW

Relevant literature is subdivided into three major headings: forested land definitions and changes in area, factors affecting public timberland timber production, and factors affecting private timberland timber production. The first section delineates some definitions used for forested land and provides general area trends in the Lake States' forests. The second and third sections provide insights into the specific uses of and factors affecting timberland on public and private land, respectively, creating possible conflicts with timber production.

### Forested Land Definitions and Changes in Area

Though they sound similar enough, forest land and timberland are not synonymous. In Forest Service publications, forest land is the broader category of land with trees relative to timberland. Forest land is defined as "Land at least 10 percent stocked by forest trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated" (Waddell et al., 1989, p. 3). Timberland, on the other hand, is more narrowly defined as "Forest land that is producing or capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation" (Ibid., p. 9).

Although these terms do have official definitions, ambiguity pervades due to the gray area that exists between industrial and nonindustrial wood. This gray area appears to be growing as the methods for wood utilization improve. All lands including nonstocked and low sites are included in this study; however, some of these lands will not be considered timberland available for harvest. With the official definition in mind, available timberland is still the area of principal interest in this study, because lands available for timber harvest for the wood products industries are the point of concern. Technically, timberland may inadvertently describe lands that are not or can not be used for timber production and is thus overly inclusive from the standpoint of timber products.

Historical data reflect fluctuations in commercial timberland area in the United States. Initially and lasting until the 1920s, timberland area decreased as settlement and cropland clearing took place. Then, a trend of increasing timberland area occurred until the 1960s; as deserted croplands, especially in the South, converted back to forest land. However, the latest national trend has been a decrease in timberland area again as a result of multiple forces such as urban development, cropland clearing, withdrawals for parks and wilderness, second home and recreational use and so on. This trend is expected to continue with predicted decreases projected to 2030 in National Forest and NIPF timberlands in Michigan, Minnesota, and Wisconsin and

ć C i t a t re ех St Ca de Pla inc tin dec exp. qia] harv increases in industrial timberlands in those states (Wall, 1981). These findings are supported by another study of timberland area projections in the North Central region of the U.S., which include the Lake States (Haynes, 1990).

Conversely, according to the most recent, preliminary 1993 FIA data results from Michigan, there has been a net increase in timberland. This trend is mostly due to old agriculture land conversion to forest land. However, the opposing effect of development has somewhat dampened the increase (Vasievich, 1994).

In the Lake States, timberland has declined by about three million acres over the past twenty years (Plantinga et al., 1989). Both Michigan and Minnesota showed declines in timberland area, while Wisconsin showed an increase; however, reserved timberland increased in all three states. Thev expect the rate of timberland decline to decrease in the Lake States in the future as the agricultural sector reaches capacity, new highway construction decreases, relative declines in rural development and agricultural expansion take place, and the population growth rate declines. Higher income levels and greater percentage of total land covered by timberland were significantly negatively correlated with declines in timberland acreage; however, these factors only explained a small portion of the changes in timberland. As a qualifier, these timberland changes refer only to potentially harvestable timberland and do not account for the factors

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addressed in this study, which may inhibit timber production from timberland.

Within the timberland classification some major shifts in ownership took place in the United States between 1952 and 1977. Most notably timberland on farms decreased by 56.8 million acres (-33%) while other NIPF ownership increased by 39.5 million acres (+31%). Other major ownership changes were a 9.4 million acre (16%) increase in industry ownership and a 7.9 million acre (6%) decrease in public timberland ownership. However, changes within the Lake States were not so prominent. Only Michigan and Wisconsin showed a decrease in farm timberland, while only Wisconsin showed an increase in other NIPF ownership (Plantinga and Buongiorno, 1990). These reallocations of timberland ownership across the U.S. further support the need, from a timber availability perspective, to understand the ownership goals and characteristics of each ownership class in terms of the designation of their land towards timber production.

## Factors Affecting Public Timberland Timber Production

Michigan's, Minnesota's, and Wisconsin's public timberland area is 6.3, 7.3, and 4.5 million acres, respectively (Waddell et al., 1989). There are numerous reasons for removing lands from this available timber base. On public lands (i.e., federal, state, and county), other forest land uses may mitigate against timber management. Table 2 provides a list of the many factors affecting public

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timberland use. On federal lands, for example, there is an increased emphasis on management for biodiversity. A key element of this effort will focus on restoration of old growth forests. In some cases, timber harvesting (e.g., thirnings) will be used to hasten restoration. However, final harvests will seldom be prescribed. This will significantly reduce acreage available for timber management.

**Policy and Ecological Factors:** Recreation sites Semi-primitive Recreation Opportunity Spectrum classification Wilderness areas Endangered species habitat Wildlife emphasis areas Cultural resource sites Special interest areas Research natural areas Old growth and wetlands areas Subsurface and surface resource sites Watershed management areas Areas near roads and rights-of-way Kirtland's Warbler management areas<sup>a</sup> Economic Factors: Accessibility (i.e., areas lacking rights-of-way Timber markets and demand Stand quality

<sup>a</sup> this issue is only a concern on Michigan public lands

Source: USDA-Forest Service, 1986; Jaako Pöyry Consulting, Inc., 1992k; Michigan Department of Natural Resources, 1991.

As an example, the Land and Resource Management Plan for the Huron-Manistee National Forests contains specifications for management of forest land where harvesting would not be permitted (USDA-Forest Service, 1986). Such

Table 2.Factors affecting public lands available for timber<br/>production.

areas include: developed recreation sites (e.g., campgrounds, picnic areas, visitor information centers, and so on), wilderness areas, endangered species habitat, cultural resource sites, special interest areas, national wild and scenic study rivers areas (e.g., prohibiting road construction and waterway modification), research natural areas, and old growth and wetland areas where no silvicultural treatments are allowed.

Also identified in this plan are areas where special harvesting restrictions, such as clearcut size limits or buffers adjacent to trails or streams, may be employed. These areas include: dispersed recreation areas (e.g., hiking, skiing, and snowmobile trails), wildlife emphasis areas, Kirtland's Warbler management areas, subsurface and Surface resource sites, watershed management areas (e.g., buffer strips and shade strips), old growth and wetlands areas (i.e., with silvicultural treatments allowed), and areas near roads and rights-of-way. The Forest Service refers to these factors influencing availability as policy and ecological factors. Factors, such as accessibility (e.g., lacking rights-of-way), timber markets and demand, and stand quality, are referred to as economic factors influencing timber availability (Jaako Pöyry Consulting, Inc., 1992). Taking all these factors into account, the authors of the Minnesota GEIS assumed 64% timberland (in the technical sense) availability from the Superior and Chippewa National Forests' timberlands (Ibid.).

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Similarly, removals of land from timber production on state and county lands may occur due to increased emphasis on naturalistic and recreational values of Lake States forests. These may include buffers around water, travelways, and wetlands. For instance, the Escanaba River State Forest Comprehensive Resource Management Plan identifies several factors placing constraints on harvest levels (Michigan Department of Natural Resources, 1991). These factors include: designation of old-growth areas, influence zones (e.g., along streams or roads), timber accessibility, rate of surveying state boundaries, and considerations for threatened and endangered species. Additionally, other uses of land such as for subsurface mining sites (e.g., gas and oil wells) inhibit management of forest land for timber production; this may also be true on other public and private forest lands. For state and county timberland, the authors of the Minnesota GEIS assumed 95% availability from state land and 95% from county lands (Jaako Pöyry Consulting, Inc., 1992).

# Factors Affecting Private Timberland Timber Production

In Michigan, Minnesota, and Wisconsin, fifty-two percent of the timberland acreage is nonindustrial private forest (NIPF) which includes private individual, nonforest products corporate, and farmer ownership (Table 1). Because this is a substantial portion of all timberland, the use of this land in terms of timber production is important to the timber industry and policy planners in the Lake States. Various

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factors have been shown to relate to NIPF land availability for timber production and their tested correlations (Table 3).

Kingsley (1993) and Carpenter (1985) maintain that eventually almost all private land becomes available for timber harvest, citing reasons such as the high turnover of land ownership and the constant flux of harvesting intentions, as well as the lack of evidence that other reasons for land ownership preclude harvesting. However, this view that almost all private land becomes available has not been supported by other studies.

Several studies of NIPFs suggest there are multiple reasons for ownership of private timberland which may interfere with timber harvesting. Wildlife-related recreation (e.g., observation, hunting, and fishing), other recreation, permanent residence, farming and ranching, building second homes, satisfaction, investment, forest preservation, use of wood products for owners' needs, and mining were all specific reasons for timberland ownership other than timber growing (Yoho et al., 1957; Quinney, 1962; Stoddard, 1942; Karteris and Koelling, 1981; Ellefson et al., 1982; and Carpenter and Hansen, 1985). However, one must make the distinction between owners who do not harvest and land that is never harvested.

Though other purposes of ownership do not necessarily mean harvesting cannot take place, some studies indicate that some of those land uses do eliminate the possibility of

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Table 3.	Factors a	ffecting NIPF	land	available	for	timber	production.
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Tectors	Correlation with	Citation		
	Timber Harvesting <sup>a</sup>	Citation		
Other uses of timberland (e.g., wildlife-related recreation, other recreation, permanent residence, farming and ranching, second home, satisfaction, investment, forest preservation, use of wood for owners' needs, and mining)	No effect Negative/Positive	Kingsley (1993) Larsen and Gansner (1972); Birch and Powell (1978); Kingsley and Birch (1980); Carpenter and Hansen (1985); and Carpenter et al. (1986)		
Parcel size	No effect	Studies cited in Alig et al. (1990); Dennis (1990)		
	Positive	Schallau (1965); Plantinga et al. (1989); Harper et al. (1990); studies cited in Alig et al. (1990); Kingsley (1993); and Nelson (1993)		
Per-acre volume Absentee ownership	Positive Negative	Dennis (1989 and 1990) Quinney (1962); Schallow (1965)		
Ownership turnover	No effect Ambiguous Positive	Dennis (1989) Schallau (1965) Kingsley (1993)		
Forest management	Positive	Quinney (1962); studies cited in Alig et al. (1990); O'Hara and Reed (1991); McCurdy (1992 and 1993)		
Owner socio-demograpics: Income	Negative	Dennis (1989); studies cited in Alig et al.		
Education	Negative Positive	(1990) Dennis (1989) Studies cited in Alig et al. (1990)		
<b>Professional</b> (i.e., not retired)	Positive	Dennis (1989)		

a Positive correlations imply that increasing the factor increases likelihood of harvesting; negative correlations imply the opposite. timber harvesting (See, for example, Larsen and Gansner, 1972; Birch and Powell, 1978, and Kingsley and Birch, 1980). Carpenter and Hansen (1985) found that 26% of the nonharvesting NIPF owners surveyed in Michigan did not harvest from their land to avoid damaging wildlife recreation and the aesthetics of the scenery or due to opposition to harvesting, distrust of loggers, and fire hazard. These nonharvesting owners owned 15% of Michigan's private timberland or 1,305,000 acres.

The authors of the Minnesota GEIS assumed 91% timberland availability from small (i.e., less than or equal to 5,000 acres) NIPF timberlands using data from *The Private Forest Landowners of Minnesota--1982* (Carpenter et al., 1986). That study, which included owners of 5,000 acres or less, found that the owners of 17% (918,358 acres) of the timberland never plan to harvest timber. Furthermore, owners of 29% (266,324 acres) of this "never to be harvested" land cited reasons such as "ruin scenery, opposed to logging, saving for retirement, and legacy for heirs". These reasons potentially preclude any future harvesting from this 4% of total NIPF timberland, because they are not reasons which will be changed by assistance programs or better education.

Other reasons cited by the "never going to harvest" owners (owning 71% of the non-harvested acreage) included: biological factors (e.g., immature timber, poor quality, and low volume), market factors (e.g., no market and low prices), destroy hunting, need more information, and holding too

small. Many of these reasons may change over time or with assistance programs. Here, a distinction is made between land becoming available for timber harvest and harvesting intentions of one owner. Many owners may not intend to harvest; however, data is lacking as to how good of a predictor those intentions are over time (Turner et al., 1977 and Carpenter et al., 1986).

An additional potential interference with timber availability from private lands is the problem of forest fragmentation resulting from subdivisions of previously large, single-owner expanses of timberland. The issue of forest fragmentation is becoming increasingly salient with the continual increase of urban sprawl and parcelization of forested areas. Plantinga et al. (1989) noted population shifts from urban to rural areas in the Lake States over the past two decades, which has caused a "shift in timberland holdings from farmers to miscellaneous private owners" (p. This de-emphasizing of agricultural uses has brought 5). about "an increase in the demand for small parcels of land" (p. 5). In the opinion of the authors of the Northern Forest Lands Study (Harper et al., 1990), "every piece of unprotected lakeshore, river frontage and land adjacent to mountain areas will be subdivided, bought and built upon." County-level case studies in the study indicated that approximately 50% of the subdivisions were built on commercial timberland. This pattern could repeat itself in the Lake States.

Schallau (1965) conducted a study on fragmentation of privately owned forest properties in the northern 31 counties of Lower Michigan. He determined that between 1946 and 1962 there was a decrease in the average tract size of forest ownership especially in the more heavily forested counties. More than half of this reduction in forest tract size resulted from the subdivision of large ownerships. He further asserted that forest fragmentation may be a contributing factor in the restriction of the economic supply of timber. This assertion is supported by Kingsley (1993), who says "It's true that many tracts of NIPF land are too small for active management and harvesting" (p. 12) and Nelson (1993), who conducted a survey of hunt clubs in Michigan. In this survey, landowners were asked whether they had harvested timber from their land between 1982 and 1991. The survey resulted in 295 nonharvesting responses with a mean ownership size of 94 acres compared to 226 one or more harvesting responses with a mean size of 169 acres.

A large amount of land is needed for successful timber production, which often makes timber production economically infeasible for small NIPF owners when they try to sell their timber (Plantinga et al., 1989). There is an opportunity cost implied in the utilization of land for timber production, which, in the case of smaller tracts of land, has a comparatively lower value than other land uses. The above findings are not fully supported by Dennis (1990), who found a positive, but insignificant at the 10% level, correlation

between harvest probability and the natural logarithm of the size of the forest ownership.

Certain landowner and forest characteristics have also been shown to affect timber harvesting from NIPF timberlands. Dennis (1989 and 1990) conducted a study on the influence of forest owner demographic trends and forest characteristics on harvest behavior. Of the demographics such as income, age, education, occupation, ownership tenure, early life environment, and state residency; only income, education, and occupation showed any statistical significance. Both income and years of formal education had negative correlations, whereas being a professional versus retired showed a positive correlation with the harvest decision. He also found that per-acre volume and timber harvesting were positively correlated.

Two other ownership characteristics with ambiguous effects on timber availability are absentee ownership and forest land turnover (i.e., ownership tenure). According to Schallau (1965), between 1946 and 1962 there was an increase in acreage of absentee ownership by 45% in Northern Lower Michigan. He proposed that nonresident owners are less likely to be dependent on their timber as a source of income and are, therefore, less likely to harvest. Quinney (1962) was able to support this conjecture by his study in Michigan's Upper Peninsula. He found that resident landowners were more likely to harvest than absentee owners.

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Ownership tenure, on the other hand, has not been shown to affect timber harvest exclusively in one direction. Turnover of land ownership can be quite dynamic. For instance, Schallau (1965) noted that 45% of the privately owned forest land in Northern Lower Michigan had two identified owners in a sixteen year period. However, as mentioned earlier, Dennis (1989) found ownership tenure to be insignificantly correlated with harvest behavior. Conversely, Kingsley (1993) believes turnover actually improves the availability of timber from NIPFs by freeing previously unharvested land. However, similar reasoning could be used in the opposite direction; for instance, larger tracts of land which may have been managed for timber production could be partitioned off to some owners who are more interested in other values of the timberland.

Despite the debated effect of ownership tenure on timber harvest behavior, tenure has been hypothesized to be a variable affecting forest management decisions (Schallau, 1965 and Carpenter and Hansen, 1985). Because the return on forest management makes it a long-term investment, expected short-term ownership intentions would most likely not entail many forest management practices. Forest management, in turn, is believed to be related to the frequency of timber harvest from NIPFs. According to McCurdy (1993), "Owners most frequently practicing forestry on their woodlands had the following characteristics: sold timber from their woodlands, used timber for home use, considered long-term

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growth of timber to be a business enterprise, and participated in cost-sharing programs" (p. 16). O'Hara and Reed (1991), cited in the Minnesota GEIS (1992), also found that past users of forestry advice were more likely to harvest timber than those who had never used forestry advice.

Alig et al. (1990) reviewed research pertaining to forest management and found several variables to be significantly correlated with forest management and timber harvest likelihood. Timber prices, cost share programs, tax incentives, technical assistance, and owner income were all found in several of the reviewed articles to be significantly positively correlated with tree plantings and intermediate treatment forest management practices. Reforestation costs were significantly negatively correlated with tree plantings. The studies Alig et al. (1990) reviewed also found that some of the same variables positively correlated with forest management also affected timber harvesting decisions, such as timber prices, cost share programs, and technical assistance. These findings support the hypothesis that forest management itself may be positively correlated with timber harvesting.

Most of the above articles refer to smaller NIPF holdings. Larger NIPF holdings and forest industry timberland holdings are often assumed to be much more available. The Minnesota GEIS (1992), for instance, assumes a 98% availability from forest industry timberlands. In a study of private forested tracts of 100 or more acres conducted in Southern Illinois, 68% of the owners sold timber

from their land representing 82% of the forested acres. Of all the study owners, 77% reported an intention to sell timber in the future. Those owners who did not harvest from their land generally cited reasons such as recreation, wildlife, and aesthetics as major uses for their timberland. These have become the major woodland uses for a larger number of owners since 1977 (McCurdy, 1992 and 1993).

In summary, both private and public owners of timberland in the Lake States and elsewhere are experiencing pressures to divert their timberlands to other uses (see Tables 2 and 3). Some disagreement exists among researchers regarding which factors and to what extent they are inhibiting the use of timberland for timber production. However, despite this confusion over the causal factors, studies of forest lands across the United States do show trends of decreasing timberlands as well as shifts in ownership. These possible land use reallocations, ownership changes, and related factors point to potential changes in timber markets as a whole. As a result, these possible effects need to be quantified to provide timber supply analyses with realistic parameters on which to base the models (Alig et al., 1994).

## CHAPTER 3

#### METHODS

Changes in the availability of timberlands for harvest and associated factors potentially affecting the availability and unavailability of public and private timberland for timber production were presented in Chapter 2. No estimates of lands available for timber harvest are consistently available across all owner groups. Therefore, to determine the current estimates and future predictions of acreage available for harvest (objectives 1 and 3) and which factors are perceived to have the greatest effect on timber availability and unavailability in the Lake States (objective 2) requires the use of survey procedures and statistical analysis. This chapter describes the survey list frame, survey methods, and questionnaire development, followed by a description of the techniques for data analysis.

# Survey List Frame

Given the limitations of the present sources of land allocation information in terms of timberland availability for harvest, it was determined that the best source of information would be a survey of the public and private forest land managers. These are the people who have been and will continue to be responsible for timberland management; they are the experts. For this study, an expert is defined as an individual who is responsible for or with significant

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influence over land management of a specific area. In total, 498 experts were selected for this study.

Individuals from the following public land administrative agencies were chosen for the survey: the United State Department of Agriculture Forest Service (USDA-Forest Service), responsible for the management of the seven national forests located within the Lake States (Table 4); the Michigan, Minnesota, and Wisconsin Departments of Natural Resources (MDNR, MNDNR, and WDNR), responsible for the management of the state-administered forest lands (Table 5); and the county land management agencies within the three states (Table 6). These public management agencies are responsible for the majority of the public forest lands in the Lake States.

The experts from the public agencies were identified with the help of Dr. Larry A. Leefers, Michigan State University (MSU), and Dr. J. Michael Vasievich, USDA-Forest Service North Central Forest Experiment Station. The experts selected from the seven national forests consisted of the "management team" members and the forest planners for a total of 80 individuals. The experts within the MDNR consisted of the regional, district, and area foresters, the forest planners, and the regional, district, and area wildlife biologists for a total of 76 individuals. Within the MNDNR, the experts consisted of the regional and area foresters, forest planners, and regional wildlife biologists. The group of experts identified for the MNDNR consisted of 29

Table 4. List of national forests in the Lake States by state.

Michigan	Minnesota	Wisconsin
Hiawatha Huron-Manistee Ottawa	Chippewa Superior	Chequamegon Nicolet

Table 5. List of state forests and other state administered lands by state.

Michigan	Minnesota	Wisconsin	
AuSable State Forest (SF)	Bemidji Region	Black River SF	
Copper Country SF	Grand Rapids Region	Brule River SF	
Escanaba River SF	Brainerd Region	Flambeau River SF	
Lake Superior SF	Rochester Region	Governor Knowles SF	
Mackinaw SF	Metro Region	Northern Highland-	
Pere Marquette SF	Wildlife areas	American Legion SF	
Wildlife areas scattered	scattered	Other state lands	
throughout state	throughout state	within six districts	

Table 6. List of counties owning forest land by state.

Michigan	Min	Minnesota		Wisconsin		
Gogebic	Aikin	Koochiching	Ashland	Iron	Polk	
-	Becker	Lake	Barron	Jackson	Price	
	Beltrami	Lake of the	Bayfield	Juneau	Rusk	
	Carlton	Woods	Burnett	Langlade	Sawyer	
	Cass	Pine	Chippewa	Lincoln	Taylor	
	Clearwater	St. Louis	Clark	Marathon	Vilas	
	Cook		Douglas	Marinette	Washburn	
	Crow Wing		Eau Claire	Norman	Wood	
	Hubbard		Florence	Oconto		
	Itasca		Forest	Oneida		

individuals. This small population of experts is attributed to the present reorganization taking place within the MNDNR Division of Forestry in which 18 area and 69 field offices are being collapsed into 30 area offices (Olson, 1994). The WDNR experts included district, area, and state forest foresters, a total of 45 individuals. For the county forest lands, the county land commissioner/administrator was surveyed for every county with significant forest land ownership. The number of county land managers totaled 1, 15, and 28 for Michigan, Minnesota, and Wisconsin, respectively.

For private forest lands, experts were selected with the help of Dr. Larry A. Leefers and Dr. Karen Potter-Witter, MSU; Dr. J. Michael Vasievich; Dr. Jeff Martin, University of Wisconsin-Madison; Robin Bertsch, Michigan DNR; Tom Kroll, Minnesota DNR; and Tim O'Hara, Director of Forest Policy for Minnesota Forest Industries. These experts included service foresters from the three states' DNRs, full-time forest consultants, and procurement foresters from the largest fee land and non-fee land owners in the Lake States. For Michigan, Minnesota, and Wisconsin, this judgment sample of experts consisted of 48, 73, and 102 individuals, respectively.

### Survey Methods

"A survey is the scientific study of people--their personal characteristics and aspects of their knowledge, attitudes, and behavior" (Backstrom and Hursh-César, 1981, p.

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1). According to Lansing and Morgan (1971), survey research is a scientific tool that is "able to produce quantified, reproducible information that can be used to test hypotheses or to provide unbiased measurement of quantities or relationships" (p. 1). Several survey means exist, such as personal interviews, telephone interviews, and mail questionnaires; all of which are suitable for different situations.

For the purpose of this study, the mail questionnaire was the most appropriate means of data collection. There were several advantages in the use of mail surveys. First, mail surveys have the advantage of being the cheapest of survey methods when large numbers of respondents must be contacted. The cost of contacting almost 500 experts from Michigan, Minnesota, and Wisconsin had to be considered. The varying locations of desired participants made personal interviews and telephone interviews extremely costly. The second advantage is the avoidance of interviewer mediation which could bias the respondents' opinions. Mail surveys are a form of self-administered questionnaire which offer the inherent property of no interviewer bias. And finally, mail surveys are most efficient for questionnaires of technical content. The types of questions asked in this study required some thought which the pressure of other survey techniques such as telephone interviews would not allow (Backstrom and Hursh-César, 1981).

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Mail questionnaires also have a number of disadvantages. First, they have low response rates which can lead to the problem of nonrespondent bias. Second, because mail questionnaires are self-administered, there is no respondent control which may result in lower quality data as compared to other survey modes. Third, junk mail is becoming increasingly problematic in today's society and surveys are a part of the problem. Fourth, mail surveys have slow return rates. And finally, mail surveys require literate respondents (Backstrom and Hursh-César, 1981).

To remove the problem of sample bias, researchers strive for random samples of survey participants; however, for this study, specific individuals were needed for their expertise. Because human judgment was used to define and select the experts for both the public and private participants, the respondent data falls under the classification of nonprobability sampling (Backstrom and Hursh-César, 1981). There are several categories of nonprobability sampling such as judgment, quota, and convenience samples; all of which are selected in a nonrandom fashion. The public and private land management experts for this study were selected using a judgment sample.

The use of expert opinion, or intuitive judgment, for decision-making and modeling has much precedence in the social and biological sciences. In forestry for instance, experts have been surveyed for their opinions regarding future wood products production (Rule and O'Laughlin, 1989),

for their knowledge of forest protection for modeling purposes (Cleaves et al., 1985), for identification of biophysical risks involved in forest investment (Catlin, 1992), and for their opinions on elk habitat quality (Schuster et al., 1985).

For this study the use of expert opinion has two major advantages. First, expert opinion is the only way to obtain the desired information because other sources are either lacking or inconsistent. Second, data can be aggregated into the specific areas of interest. The use of expert opinion also has two major weaknesses. First, cognitive biases are often a problem of expert opinion based information. Second, the only method of verification is that of comparing the actual future results with the data obtained from the experts questioned.

In defining the experts as those individuals responsible for or with significant influence over the management of a specific area, we are increasing the probability of surveying experienced, influential people with respect to the past, present, and future use of the forest land. This definition does not include all persons knowledgeable about public land management, but many who have a conscious influence over the policy directly affecting the forest lands and first-hand knowledge of these lands are included.

In addition to leaving out some potential experts, judgment samples often have the problem of human bias influencing the sample drawn (Backstrom and Hursh-César,

1981). Lansing and Morgan (1971) counter this problem showing that "Bias in a selection procedure does not necessarily lead to bias in the estimation of a relationship" (p. 60). Due to this nonprobability of participant selection, according to Backstrom and Hursh-César (1981), the lack of mathematical theory regarding nonrandom samples makes statistic analysis based on mathematical models invalid for population generalization. In a final defense of judgment samples, in studies such as this it would not be appropriate to rely on chance for selecting public and private managers with first-hand knowledge of and experience with land management issues (Backstrom and Hursh-César, 1981 and Lansing and Morgan, 1971).

## Survey Instrument Design

The survey was intended to elicit the forest land manager's expert opinion regarding the potential future change of timberland availability for timber production. For the purposes of this study the land base is assumed to be constant. In so doing, ownership area fluctuations are not evaluated but rather the allocations of and factors affecting a fixed area of land are evaluated. Different surveys by state and ownership were developed to capture the differing management goals and terminology of the owner groups.

The public land management experts were asked five major categories of questions related to: 1) how they expect current allocations of lands available and unavailable for

harvest to change by the year 2020, 2) what factors will be the major contributors to the predicted future changes, 3) which forest types will be most affected by the perceived changes, 4) trends in silvicultural and general forest management practices, and 5) past work experience. In addition to these five categories of questions, the private land management experts were asked to predict future land allocations on public lands within their state. Detailed descriptions of each category of questions follow.

Before the land allocation questions; state, county, and private forest managers were asked to identify on a map of their state the counties containing lands they managed and to provide the total acreage of lands they managed. The location information was needed to allow regional sorting of responses. As previously mentioned, the ultimate goal was to provide regional summaries of the data by state according to the survey unit maps provided earlier in Figure 1; therefore, the questionnaires had to provide location information in order to determine the appropriate survey unit in which to place the response. The total managed acreage was needed to provide a weight for the percent allocations provided later in the questionnaire.

Given that the objectives of this study involved timberland available and not available for timber harvest, the questionnaires included in-depth definitions of three broad categories of forest land: available for harvest, not available for harvest, and other lands. The terminology used

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to define these categories differed between the national forest surveys and all the other surveys (see questionnaires in Appendix A). The reason for this difference is because national forest lands are more clearly and consistently defined when compared to other owner groups. However, the basic premise of each definition is the following:

- (i) "Available for harvest" are lands actively managed for timber production and are now available or will be available for harvesting in the future due to forest product demands;
- (ii) "Not available for harvest" are lands withdrawn from timber harvest by law, policy, or owners' objectives; and
- (iii) "Other lands" are lands tentatively suitable for timber production but are not currently needed or used for timber harvesting but could become available or unavailable in the future.

Using these category definitions, the acreage of land managed by the various organizations was allocated on a percentage basis among the three categories by respondents.

The first questions pertaining to these definitions took the form of a table similar to Table 7. The actual tables used in the surveys to all participants are contained in the questionnaires in Appendix A. From Table 7 it can be seen that the respondents were asked to assess the current situation of their land allocations among the three categories by percent. They were then asked to estimate what they expected these percent allocation to be in the year 2020. In the last column they were asked to give a range they believed could be expected for their 2020 allocations.

According to Cleaves (1994), uncertainty is a part of all expert judgment, and the assessment of the uncertainty provides valuable information in the decision making process. Therefore an attempt was made here to provide a quantitative assessment of the uncertainty of the land managers' predictions of future land allocations. A comparison of the reported ranges encompassing the "most likely" predictions provides a simple method for evaluating the respondents' levels of uncertainties in their predictions.

Table 7. Example table from questionnaire.

Forest Land Category	CURRENT allocation (percent)	MOST LIKELY allocation in 2020 (percent)	Smallest to largest RANGE of possible allocations in 2020 (percent)
Available for Harvest			to
Not Available for Harvest			to
Other Lands			to
	100	100	

The results from the completion of the above table were quantifications of available and unavailable lands for harvest in percentage and acreage form by owner group and FIA survey unit.

The national forest survey differed slightly with respect to this question. Though the table was structured slightly differently (see Appendix A), the most important

difference was that the "current allocation" column was the "% allocation in plan" column in the national forest questionnaires. This was because each national forest's management plan contains a timber suitability land classification summary that was used to get a percentage breakdown of each national forest's acreage among the three defined categories. Thus, current allocation percentages did not have to be estimated by the respondents, and all participants within a specific national forest were given the same percent allocations on which to base their estimated 2020 allocations. As with the other public and private respondents, the national forest participants were asked for their estimate of the most likely percent allocations of land among the three categories and a probable range within which their allocations would fall.

The next question also pertaining to the previously defined three categories of land was an open-ended question involving factors perceived to have an effect on the availability of timberland for timber production. The respondents were asked for the three factors they believed to be most important in affecting lands available for timber harvest in the year 2020. Results from a question such as this identify the factors perceived as the most important factors involved in the addition or removal of timberland fr om timber productivity. Though these are perceptions of what will affect future timberland use, they are the opinions

of people who are closely associated with the management of the resource and its uses.

The third set of questions dealt with the possible changes in the distribution of forest cover types on lands not available for timber production. The aggregate forest types included: aspen-birch, jack pine, red-white pine, upland spruce/fir, oak-hickory, maple-beech-birch, lowland hardwoods, lowland conifers, and nonstocked. The respondents were presented with a table consisting of the above cover types. They then were asked to indicate whether they believed the cover type on the lands not available for harvest would increase a lot, increase a little, stay the same, decrease a little, or decrease a lot. These perceptions will help to determine what cover types are important on lands being used for purposes other than timber production. Within the LASTISA model framework, these perceptions will also assist in making future projections of available timberland by forest type.

The fourth set of questions pertained to trends in the use of specific silvicultural practices affecting the management of forests and trends in management practices in general as related to long-term timber supply and demand. Both of these were open-ended questions designed to allow the respondents to qualify or expand on the information they supplied in the previous parts of the questionnaire. The answers to these questions are also intended to assist in

developing appropriate management strategies for the LASTISA model.

The last set of questions for the public surveys was related to the individual's work experience. All respondents were asked for the title of their current position, the number of years they had been at that location, and the number years of experience in land management they have had. These questions provided an idea of the knowledge base of the survey participants.

An additional section on the private manager surveys concerned the private managers' estimates of the future availability of public timberland for timber production. Their perceptions of public land management may directly or indirectly affect management of private lands. This section consisted of a table presenting the current percent of timberland available for harvest on the national, state, and county forests for that private manager's state. The private manager was asked to complete a column of the percent of lands available for harvest in the year 2020 for the national, state, and county forests. Though those individuals may not have firsthand knowledge of specific management policies for public timberlands, they had opinions on what they see is taking place.

The surveys were developed and sent out in stages. The Forest Service was first, followed by the states' DNRs, the county owner groups, and finishing with the private forest land managers. During the development of the Forest Service

and subsequent questionnaires several revisions were made to improve the understanding of the questions. For instance, the services of the Institute for Public Policy and Social Science Research (IPPSRR), a survey consulting service at Michigan State University, were used for input into the overall layout and question format of the questionnaires. As another example, an initial consideration was whether or not to provide lists of factors affecting timberland availability. The decision was to use an open-ended question in which the respondents would provide the factors they felt were most important. The intent of this format was not to influence the respondents with predetermined factors. Other question revisions are discussed later in the chapter.

Additionally, input from reviewers from each of the surveyed organizations was obtained. The input of the reviewers served two major functions. One of the functions was to try to improve the applicability of the questionnaire to each specific owner group. The other important function of the reviewers input was an attempt to insure construct validity of the study through fulfilling the objective of consistency. This consistency is a direct result of having increased applicability of the questionnaires. The reviewers consisted of: Don Krejcarek from the Huron-Manistee National Forests; Mike Mang, Joe Jarecki, Bob Doepker, Bill Rockwell, and Dale Rabe from two divisions within the MDNR; John Olson from the MNDNR; Bob DeVillez, a service forester from the MDNR; Gerald Grossman, a Michigan consulting forester; and

Tim O'Hara, Director of Forest Policy for Minnesota Forest Industries.

After the return of the Forest Service responses, the land allocations table was revised and the cover type question was reworded to improve understanding. For the private land manager surveys, a final change was made on the cover type table. Appendix A contains copies of all federal, state, county, industry, and NIPF surveys for comparison along with letters of endorsement where applicable. In addition to these changes, small alterations were made in the terminology used in the land category definitions to improve understanding, as previously described.

Accompanying each questionnaire was a cover letter which explained the relevance and the goals of the questionnaire, contained a brief overview of the survey questions, and provided contact names and numbers if any questions arose. Several techniques were used to increase the response rate from each of the participant groups. First, where possible, a letter of endorsement from the administrator of the organization was included. Letters of endorsement included Mike Vasievich from the USDA-Forest Service North Central Forest Experiment Station, Gerald Theide and George Burgoyne from the Michigan DNR Forest Management and Wildlife Divisions, Gerald Rose from the Minnesota DNR Division of Forestry, and Charles Higgs and Tom Hauge from the Wisconsin DNR Bureau of Forestry. Second, postcard reminders were mailed on the due date of the survey. For the Forest

Service, electronic mail was used as the reminder. Third, a second mailing of the entire survey package, including cover letter and endorsement letter, was sent ten days after the postcard reminder. Finally, self-addressed, stamped envelopes were included in the survey package for easy return.

Despite these efforts nonresponse still occurred. Three methods exist for determining the severity of nonresponse bias. First, after summarizing the data of the different groups of the list frame, a sample of nonrespondents can be contacted by phone and asked a few distinguishing questions to determine if their responses would have been different from those of the survey respondents. Second, a descriptive characteristic such as job title can be compared between the respondents and nonrespondents to determine any differences. Finally, responses and descriptive characteristics can be compared between respondents who responded within the deadline and those who responded late to determine any differences. With this method, it is assumed that nonrespondents are more similar to the late respondents than the timely respondents.

For this study, a combination of the first two methods is used to determine the extent of nonresponse bias. Nonrespondents were selected at random from each of the differing owner groups surveyed; a total of 18 people. These individuals were contacted by phone and asked three questions. First, they were asked for the number of years of
land management experience they had. Second, they were asked for their prediction of the percent of the lands they managed that would be available for harvest in the year 2020. Third, they were asked for the reason for their nonresponse. The first two questions were intended to determine any difference between the respondents and nonrespondents. The third question was to get a general idea behind the reasons for the nonresponses.

# Data Analysis

The data obtained from this survey is described as nonprobabilistic in nature due to the selection methods of the participants. Given the definition of "expert" used in this study, the list frame of public and private land managers selected in this study make up a judgment sample of experts. As a result of this nonprobabilistic selection of participants, the data analysis consisted entirely of descriptive statistical procedures in order to provide meaningful summaries of the collected data.

Because of the interval nature of the percentage data collected from this survey, the arithmetic average, minimum, maximum, and standard deviation provide quantitative summaries of the data. The first category of questions relating to land allocations resulted in current percentage estimates and future "most likely" percentage projections of land available for harvest, not available for harvest, and other lands, a total of six categories.

The acreage data provided in the national forest plans for the seven national forests and provided by the respondents for the other public and industrial forest land managers were used as a weighting factor for the percentage allocation responses. This implies that the percents given by those individuals managing more acreage will carry more weight when their answers are aggregated with the other responses. For example, in Minnesota the Superior National Forest has almost twice the acreage of Chippewa National Forest, the other national forest in Minnesota. Therefore, when the responses of the individuals from these two forests were averaged and then weighted by the total acreage of each forest to be aggregated together for a statewide estimate, Superior National Forest had more influence over the aggregated percent.

Percent averages of the current and future "most likely" responses were summarized statewide by ownership to provide a broad comparison of ownership intentions for lands available for harvest, not available, and other lands. For the national forests, the current percent allocations were provided by the national forest management plans and just had to be weighted by the total acreage of each national forest in the state in question. The future "most likely" percents given by the respondents were averaged for each national forest and then weighted by the total national forest acreage to arrive at aggregated percents for the entire state.

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For the state DNRs, several administrative levels of forest and wildlife land managers (e.g., regional foresters and wildlife biologists, district foresters and wildlife biologists, and area foresters and wildlife biologists) were surveyed to achieve a broad scope of perceptions. Therefore, responses were grouped by administrative level and division, and weighted averages were obtained for each group. To arrive at a single percent for each of the six categories, the weighted averages for each group were then weighted by the number of respondents in each group and combined. Using this method, data were summarized into a single percent for each of the six categories by state. County, industrial, and NIPF land manager responses did not consist of varying administrative levels or divisions; therefore, weighted average percents were obtained for the six categories in one step.

National, state, county, industrial, and NIPF data were also summarized by state, ownership, and FIA survey units (see Figure 1) using similar methods to those described above. Summaries by FIA survey unit allowed closer inspection of intrastate differences between survey units and owner groups. Within the Lake States, large variations exist in terms of forest land density due to urbanization and ecological land types. These differences may affect the availability of lands for timber production.

The percent allocation responses from NIPF managers were summarized in a similar manner. However, the acreage used

for the weighted averages were from the updated Eastwide FIA database for the areas containing managed NIPF lands as indicated by the respondent's map in the questionnaire. It was necessary to use FIA data instead of the acres of managed NIPF lands provided by the respondents, because the managed acreage for which they are responsible only reflects a portion of the private lands in the respondents' areas. The land allocation questions for the private managers asked them to consider all NIPF lands in their area; therefore, the total NIPF land in their indicated area had to be used as the weight.

Because some NIPF respondents indicated that their managed areas spanned more than one FIA survey unit, the applicable FIA data acreage was divided into the differing FIA survey units and the respondent's data were applied to each separate FIA survey unit. As a result, the number of respondents when summed across survey units was more than the total number of NIPF responses.

In addition to the weighted averages, minimum and maximum percents for the six categories were calculated as one measure of the dispersion of the averages. The standard deviations were also calculated to give another measure of dispersion of the estimates. Finally, for comparative purposes unweighted statistics were calculated.

The smallest and largest probable allocations encompassing the "most likely" allocation for the three land categories were used to provide the respondents levels of

uncertainty in their "most likely" estimates. A weighted average of the smallest and largest probable percents was obtained in the same manner as the "most likely" weighted averages described above. Larger ranges (e.g., 30% or higher) between the smallest and largest probable percents were interpreted as a lesser degree of certainty in the respondents' "most likely" projections.

Some respondents did not complete the smallest and largest probable percent column but did provide the current and future "most likely" percents. For the data summaries containing those responses, separate calculations were made for the weighted averages using only the acreage of the respondents who supplied the smallest and largest probable data. As a result, two differing numbers of respondent were recorded--one for the respondents who provided the current and "most likely" percents and one for those who also responded with the smallest and largest probable percents. Due to this method of using partial responses inconsistencies in the survey unit data aggregations did occur. For example, for several of the land categories the "most likely" predictions did not fall within the smallest to largest probable ranges. These data inconsistencies were most likely because the incomplete responses are outliers when compared to the other responses. That is, the higher "most likely" prediction pulled the weighted average up but the lack of smallest and largest probable data encompassing that larger

"most likely" prediction resulted in a lower range that does not include the higher weighted average.

The factors resulting from the second category of questions were nominal data. Because these questions were open-ended, the responses were categorized and tallied using the judgment of the researcher. These data were summarized in a frequency table.

The third category of questions regarding cover types on lands not available for harvest is ordinal data. These data were summarized by state, ownership, and FIA survey unit into frequency tables. Future cover type trends on lands not available for harvest were examined by ownership and FIA survey units.

The fourth category of questions regarding trends in management practices is qualitative and open-ended. For the purposes of this thesis these qualitative responses were summarized in general to capture major points made by the respondents.

The category of questions regarding work experience was summarized in tabular form by state and ownership. Average years of land management experience and average number of years at the same location gave a general idea of the knowledge base of the respondents.

The additional questions asked of the private organizations about timberland available for harvest in the year 2020 on public lands allowed comparisons of public and private perceptions. The mean and standard deviations of the

private land managers' predictions of national, state, and county, if applicable, forest lands were determined to allow comparison to the statewide weighted averages of the public land managers' predictions of their lands.

The data obtained from the nonrespondents were summarized and compared with the average land management experience and weighted average "most likely" available for harvest predictions obtained from the respondents.

#### **CHAPTER 4**

### **RESULTS and DISCUSSION**

Using the analysis techniques described in Chapter 3, the following is a presentation and discussion of the survey results. First, the respondents are described, followed by a presentation and discussion of the results divided into five sections: land allocations, factors affecting land allocations, cover types on lands not available for harvest, management trends, private managers' perceptions of public land allocations. A discussion of the results is contained within each section.

The usable response rates were the following: 66% from the national forest managers; 78%, 69%, and 58% from the Michigan, Minnesota, and Wisconsin DNRs, respectively; 100%, 67% and 79% from Michigan, Minnesota, and Wisconsin county forest managers, respectively; and 50%, 50%, and 59% from Michigan, Minnesota, and Wisconsin private forest managers, respectively (see Appendix B). The overall response rate was 63%.

Respondents' average number of years at their present locations ranged from four years for the Wisconsin national forest respondents to 13 years for the Wisconsin DNR respondents and Minnesota private forest managers (Table 8). Michigan's one county forester has 17 years of experience. Average experience in land management ranged from 15 years for the Minnesota county forest managers to 22 years for

several categories of respondents. Thus, on average the level of experience of the respondents is quite high.

Table 8. Respondents' average number of years at present location and average years of land management experience by owner group and state.

	۸v	prese	umber of y ant locati	ears at on	Averag	je years ex	of land m perience	nanagement
	NF	DNR	County	Private	NF	DNR	County	Private
MI	8	11	17	13	21	21	17	22
MN	8	11	10	14	22	22	15	20
	4	14	12	11	22	22	16	18

# Land Allocations

Statewide Comparisons--The first set of questions addressed the issue of current and future percentage allocation estimates of owner groups' lands into three general land categories--available for harvest, not available for harvest, and other lands. Figures 2-7 provide a statewide comparison by owner group of the weighted average estimates of current and "most likely" proportion of lands available for harvest, not available for harvest, and other lands. Appendix C contains the data from which these graphs were created.

Gogebic county is the only county owning any significant area of forest land in Michigan. Because of this, it is not possible to report the data and still maintain respondent confidentiality. Due to too few responses, Michigan and Minnesota forest industry data are also excluded from the appendix table to guarantee respondent confidentiality.

For all public owner groups, the weighted average estimates of the lands currently available for harvest are



Figure 2. Weighted average estimate of current proportion of all land available for harvest by state and owner group.



Figure 3. Weighted average estimate of "most likely" proportion of all land available for harvest in the year 2020 by state and owner group.



Figure 4. Weighted average estimate of current proportion of all land not available for harvest by state and owner group.



Figure 5. Weighted average estimate of "most likely" proportion of all land not available for harvest in the year 2020 by state and owner group.



Figure 6. Weighted average estimate of current proportion of all other lands by state and owner group.



Figure 7. Weighted average estimate of "most likely" proportion of all other lands in the year 2020 by state and owner group.

higher than the future predictions of lands available for harvest. It is also evident for public lands that the weighted averages of the current not available for harvest estimates are all lower than the future not available for harvest predictions. The public weighted averages for the other lands category do not show any trends.

Within Minnesota, the weighted average percents of national forest, DNR, county, forest industry, and NIPF lands available for harvest are currently 40%, 56%, 84%, 81%, and 66%, respectively. This compares to the percents of 64%, 95%, 95%, 98%, and 91%, respectively, cited in the Minnesota GEIS (1992) as percents of available timberland. In the GEIS, the Boundary Waters Canoe Area (BWCA), a wilderness area in the Superior National Forest where timber harvesting is not permitted, was excluded. The inclusion of the BWCA in this study explains the lower percent of lands available for harvest on Minnesota national forest land compared with the GEIS estimates. However, the levels of availability are significantly lower in this study for all the owner groups examined. When "most likely" future allocations are considered, which is appropriate since the GEIS used their percents for future projections, the differences are even greater.

The definite downward trend in public land availability for harvesting is somewhat mitigated by the statewide private weighted average data. By the year 2020, Michigan and Wisconsin NIPF lands are predicted to decrease in harvest

availability according to NIPF land managers; whereas Minnesota NIPF lands available for harvest are not predicted to change. Lands not available for harvest are predicted to increase in both Michigan and Wisconsin but decrease in Minnesota. The other lands category is predicted to increase in Minnesota and Wisconsin but decrease in Michigan on NIPF lands.

Forest industry lands available for harvest are predicted to increase in all three states. Wisconsin forest industry land managers also predict a slight increase in the not available for harvest category, whereas in Michigan and Minnesota lands not available for harvest are predicted to decrease. The other lands category is predicted to decrease in the three states.

From this statewide summary, it appears that the general trend is a decrease of both public and NIPF private lands available for harvest, with the exception of Minnesota NIPF lands, and an increase of lands not available for harvest. Forest industry lands are expected to increase in harvest availability.

**FIA Survey Unit Comparisons**--A more focused view of trends in land availability requires a breakdown of the statewide data into the FIA survey units discussed earlier. The data tables in Appendix D provide an FIA survey unit breakdown by state and owner group of the current, future "most likely", and largest and smallest probable weighted average percents of

the three land categories--available for harvest, not available for harvest, and other lands. Due to too few responses, MN-3 county data, all Michigan and Minnesota forest industry data, and all but WI-2 of Wisconsin forest industry data were excluded from the appendix data table to guarantee respondent confidentiality. Some highlights are presented by state in the following sections; a more detailed description of an example survey unit is also provided.

Michigan--By FIA survey unit in Michigan, all owner groups are predicted to experience a decrease in lands available for timber harvest and an increase in lands not available for harvest in the year 2020 (see Tables D.1-D.3 in Appendix D). On national forest lands, the Ottawa National Forest (in FIA survey unit MI-2) currently has the largest proportion of land available for harvest at an average of 61% and is tied with the Hiawatha National Forest (MI-1) for the largest proportion of land not available harvest at 12%. Ottawa lands available for harvest are predicted to decrease by a relative 16% (i.e., the difference between the current and "most likely" estimates divided by the current estimate) to the "most likely" average of 51%, with an average smallest to largest probable range of 19%. The Huron-Manistee National Forests are predicted to have the largest relative increase of 286% in lands not available for harvest to an average of 278. The average smallest to largest probable range around the "most likely" prediction is 24%. Other lands for all

Michigan national forests are all expected to decrease with a reallocation to the not available for harvest lands.

On MDNR lands, MI-2 has the largest proportion of lands currently available for harvest at a weighted average of 81%. MI-4 has the largest proportion of lands currently not available for harvest at a weighted average of 27%. MI-1 is predicted to have the largest relative decrease in land availability of 16% to a "most likely" weighted average of 59%. The smallest to largest probable range around the 59% is 21%. Lands not available for harvest in MI-2 are predicted to have the largest relative increase of 83% to a "most likely" weighted average of 22%. The weighted average smallest to largest probable range is 20%. MDNR other lands are not predicted to change for all survey units with the exception of MI-2 where other lands are expected to increase slightly.

As before there was only one county in Michigan with any substantial portion of forest land; therefore, data cannot be reported to maintain respondent confidentiality. There were not enough Michigan forest industry responses for any FIA survey unit to report the findings and maintain respondent confidentiality.

On NIPF lands in Michigan, MI-4 currently has the largest proportion of its lands available for harvest at a weighted average of 87%. While MI-3 has the largest proportion of NIPF lands not available for harvest at a weighted average of 24%. MI-2 is predicted to decrease the

most in availability with a 14% relative decrease to a "most likely" weighted average of 68%. The weighted average smallest to largest probable range is 22%. The lands not available in MI-2 are predicted to increase the most by a relative 110% to the weighted "most likely" average 21%. The smallest to largest probable range is 22% for MI-2. There is no increasing or decreasing trend on NIPF other lands.

Minnesota--In Minnesota, unlike in Michigan, there is not a distinct trend in lands available for harvest (see Tables D.4-D.7 in Appendix D). On the other hand, lands not available for harvest are predicted to increase for all public owner groups. Of the two national forests in Minnesota, the Chippewa National Forest (MN-2) currently has the larger proportion of lands available for harvest at an average of 73%, while the Superior National Forest (MN-1) has the larger proportion of lands not available at an average of 43%. The Superior is predicted to experience a small relative increase of 3% in lands available for harvest to an average of 31%, whereas the Chippewa is predicted to experience a relative decrease of 16% in lands available for harvest to an average of 61%. The average smallest to largest probable ranges around are 20% and 25%, respectively. Both national forests are predicted to increase the proportion of lands not available for harvest--the Chippewa by the larger relative increase of 53% to a "most likely" average of 26%. The average smallest to largest range is

16%. Other lands are predicted to decrease on Superior lands and increase on Chippewa lands.

The data for the Superior National Forest requires further comment. The small current availability of land for harvest and large current unavailability is due, for the most part, to the inclusion of the BWCA wilderness area which is not available for timber production. Due to the already large restriction on lands available for harvest, it is not surprising that this land category is predicted to increase slightly, while all other public lands are predicted to decrease in availability.

All MNDNR lands are predicted to decrease the proportions of lands available for harvest and increase the proportions of lands not available for harvest. FIA survey units MN-1 and MN-4 currently have the largest proportions of land available for harvest at a weighted average of 66%. MN-4 has the largest proportion of lands not available for harvest at a weighted average of 25%. MN-3 is predicted to have the largest relative decrease of 23% in lands available for harvest to a "most likely" weighted average of 43%. The weighted average smallest to largest probable range is 18%. While MN-2 is predicted to have the largest relative increase of 107% to a "most likely" 31% in lands not available for harvest. The range of this "most likely" average is 27%. MNDNR other lands are predicted to increase in MN-1 and MN-4, decrease in MN-2 and MN-3.

The majority of county forest ownership in Minnesota is located in FIA survey units MN-1, MN-2, and MN-3; however, due too few respondents from MN-3, data cannot be presented to guarantee respondent confidentiality. In both MN-1 and MN-2, county forests are predicted to decrease the allocation of land available for harvest and increase the allocations of lands not available for harvest and other lands. MN-1 currently has the larger proportion of land available for harvest at a weighted average of 89%, while MN-2 has the larger proportion of land not available for harvest at a weighted average of 15%. MN-2 is predicted to have the larger relative decrease of 8% to a "most likely" 74% in lands available for harvest. The weighted average smallest to largest probable range is 17% around the "most likely" average. MN-1 is predicted to have the larger relative increase of 45% to a "most likely" 16% in lands not available for harvest. The smallest to largest probable range is 13%. Minnesota county other lands in MN-1 are currently at 0% and are not predicted to change. Whereas there is a predicted increase in MN-2 other lands.

There were not enough Minnesota forest industry responses for any FIA survey unit to report the findings and maintain respondent confidentiality.

As opposed to the majority of the public lands, Minnesota's NIPF lands in MN-3 and MN-4 are expected to increase in availability, and lands not available for harvest in MN-3, and MN-4 are expected to decrease. MN-1 NIPF lands

available for harvest are not expected to change, but lands not available for harvest are predicted to increase slightly. MN-2 lands available for harvest are expected to decrease by a relative 3% to a "most likely" weighted average of 65% with a smallest to largest probable range of 30%, indicating a relatively large range of certainty. MN-3 and MN-4 are predicted to increase the most by a relative weighted average of 3% in lands available for harvest, with ranges of 32% and 29%--both relatively large ranges of certainty. MN-3 is predicted to have the largest relative decrease of 13% in lands not available for harvest to the "most likely" weighted average of 14%. The smallest to largest probable range is 16%.

Wisconsin--In Wisconsin as in Michigan, all lands are predicted to experience a decrease in land available for harvest and an increase in land not available for harvest by FIA survey unit (see Tables D.8-D.12 in Appendix D). This includes the forest industry lands in WI-2. On the national forest lands, the Nicolet National Forest (WI-1) currently has the larger proportion of land available for harvest of 70%. The Chequamegon National Forest (WI-2) has the larger proportion of land not available for harvest of 22%. Nicolet land is predicted to experience the larger relative decrease in availability and increase in unavailability of 24% and 83%, respectively, to the "most likely" averages of 53% and

33%, respectively. The smallest to largest probable ranges are 24% and 25%, respectively.

On WDNR lands, WI-3 has the largest proportion of land available for harvest at a weighted average of 88%. WI-4 has the largest proportion of unavailable land at a weighted 36%. WI-5 land is predicted to experience the largest relative decrease in availability (21%) and increase in unavailability (157%) to the weighted averages of 22% and 54%, respectively. The smallest to largest weighted average probable ranges are 18% and 44% (an extremely broad certainty range), respectively. There is no trend for other lands.

Wisconsin county lands in WI-2 currently have the largest proportion of land available for harvest at a weighted average 89%. WI-3 has the largest proportion of land not available for harvest a weighted 16%. Land available for harvest in WI-2 is expected to decrease the most by a relative 7% to a weighted 83%, with a weighted average smallest to largest probable range of 19%. Land not available for harvest is expected to increase the most in both WI-1 and WI-2 by a relative 38% to the weighted averages of 18% and 11%, respectively. The weighted smallest to largest probable ranges are 20% and 13%, respectively. Other lands are not predicted to change in WI-1 and WI-3 and increase slightly on WI-2.

For Wisconsin forest industry land, only one survey unit (WI-2) had enough responses to report the numerical findings. Within this northwest survey unit, the current weighted

average allocations of lands available for harvest and not available for harvest are 99% and 1%, respectively. Available land is predicted to decrease by a relative 1% to a weighted 98%, and not available land is predicted to increase by a relative 100% to a weighted 2%. The ranges are 19% and 14%, respectively. There are no other lands.

On Wisconsin NIPF land, WI-4 and WI-5 currently have the largest proportion of lands available for harvest at the weighted averages of 77%. WI-1 has the largest proportion of land not available for harvest at a weighted 25%. WI-5 is predicted to experience to largest relative decrease in land available for harvest (12%) and not available for harvest (64%) to the weighted averages of 68% and 23%, respectively. The weighted average ranges are 19% and 13%, respectively.

Detailed Survey Unit Example--For the purposes of the LASTISA timber supply model, it is important to be able to look at the data of differing owner groups within one survey unit. Using the northern lower peninsula of Michigan (FIA survey unit MI-3) as an example, Figures 8-10 provide graphic comparisons of national forest, DNR, and NIPF owner group data. These graphs allow one to visualize the predicted trends in land allocations from the current condition to the future predictions in the year 2020 across owner groups. The smallest to largest probable ranges surrounding the future "most likely" prediction supplies a quantification of the average respondent's uncertainty in their "most likely"



Average estimates of the current proportion and future "most likely" and largest and smallest probable proportions in the year 2020 of lands available for harvest, not available for harvest, and other lands--the Huron-Manistee National Forests (FIA survey unit MI-3). Figure 8.



Weighted average estimates of the current proportion and future "most likely" and largest and smallest probable proportions in the year 2020 of lands available for harvest, not available for harvest, and other lands--Michigan DNR land (FIA survey unit MI-3). Figure 9.





prediction.

Currently, MDNR has the largest proportion of its lands available for harvest (78%), and the Huron-Manistee National Forests have the smallest proportion of their lands not available for harvest (7%). The future "most likely" weighted average allocations are predicted changes. All owner groups are predicted to decrease their lands available for harvest, MDNR by the most in absolute and relative terms. All owner groups are also predicted to increase their lands not available for harvest, Huron-Manistee by the most in both absolute and relative terms. Huron-Manistee's and MDNR's predictions had the broadest ranges of uncertainty.

Current and "Most Likely" Acreage Allocations--In tables 9-11, the current and "most likely" weighted average percents given by each owner group were applied to the total acreage that owner group manages in each FIA survey unit to arrive at current and future acreage estimates of the three land categories by owner group and survey unit. From Table 9, it is obvious that, in Michigan, NIPF owners currently have and are predicted in the year 2020 to have the largest portion of the acreage available for harvest. In terms of acreage, the MDNR is predicted to be the second largest owner of lands available for harvest. The most acreage unavailable for harvest varies between the differing owner groups depending on the survey unit. Across all owner groups in Michigan, the lands available and not available for harvest are expected

Current and "most likely" in the year 2020 acres of land available and not available for harvest in Michigan by FIA survey unit and owner group.<sup>a</sup> Table 9.

Survey		Total	Available for	Harvest Acres	Not Available for Ha	rvest Acres
Unit	Owner Group	Acres <sup>b</sup>	Current	"Wost Likely"	Current	"Wost Likely"
MI - 1	National Forest	818,700	425,724	376,602	98,244	261,984
	DNR	986,800	690,760	582,212	187,492	286,172
	NI PF	1,662,100	1,296,438	1,196,712	149,589	282,557
MI -2	National Forest	913,600	557,296	465,936	109, 632	237,536
	DNR	690, 800	559, 548	483,560	82,896	151,976
	NI PF	1,916,300	1,513,877	1,303,084	191,630	402,423
MI - 3	National Forest	936,900	515,295	459,081	65,583	252,963
	DNR	1,989,600	1,551,888	1,333,032	318, 336	537,192
	NIPP	2,663,300	1,731,145	1,571,347	639,192	745,724
MI - 4	DNR	285,000	188,100	171,000	76,950	96,900
	NI PP	2,663,300	2,317,071	2,104,007	186,431	266,330
	Total	15,526,400	11,347,142	10,046,573	2,105,975	3,521,757

reserved other forest land. The data summaries were made from the Eastwide FIA Data Base by J. Michael b These are total forest land acres consisting of timberland, reserved timberland, other forest land, and Only those FIA survey units and owner groups for which data were obtained are shown in this table. Vasievich, Economist, USDA North Central Forest Experiment Station, E. Lansing, MI. đ

most likely" in the year 2020 acres of land available and not available for harvest	y FIA survey unit and owner group. <sup>a</sup>
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Burvey		Total	Available for	Harvest Acres	Not Available for H	arvest Acres
Unit	Omer Group	Acres b	Current	"Most Likely"	Current	"Most Likely"
MN-1	National Forest	2,043,800	613,140	633,578	878,834	981,024
	DNR	1,718,800	1,134,408	1,031,280	206,256	257,820
	County	1,340,900	1,193,401	1,126,356	147,499	214,544
	AI IN	1,487,000	1,055,770	1,055,770	223,050	252,790
MN-2	National Forest	581,600	424,568	354,776	98,872	151,216
	DNR	1,626,000	585,360	552,840	243,900	504,060
	County	1,204,600	963, 680	891,404	180,690	216,828
	NI PP	2,108,900	1,412,963	1,370,785	463,958	485,047
MN-3	DNR	355,000	198,800	152,650	85,200	142,000
	NI PF	1,871,700	1,254,039	1,291,473	299,472	262,038
MN-4	DNR	82,700	54,582	45,485	20,675	23,983
	NIPF	555,900	422,484	433,602	50,031	44,472
	Total	14,976,900	9,313,195	8,939,999	2,898,437	3,535,822

reserved other forest land. The data summaries were made from the Eastwide FIA Data Base by J. Michael <sup>a</sup> Only those FIA survey units and owner groups for which data were obtained are shown in this table. <sup>b</sup> These are total forest land acres consisting of timberland, reserved timberland, other forest land, and Vasievich, Economist, USDA North Central Forest Experiment Station, E. Lansing, MI.

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Burvey		Total	Available for	Harvest Acres	Not Available for H	arvest Acres
Unit	Owner Group	Acres b	Current	"Most Likely"	Current	"Nost Likely"
MI-1	National Forest	612,100	428,470	324,413	110,178	201,993
	DNR	230,200	165,744	133,516	57,550	85,174
	County	680,400	591,948	557,928	88,452	122,472
	NIPF	1,776,900	1,030,602	977,295	444,225	479,763
WI - 2	National Forest	780,200	374,496	366, 694	171,644	241,862
	DNR	240,000	187,200	168,000	40,800	57,600
	County	1,150,300	1,023,767	954,749	92,024	126,533
	Forest Industry	539,700	534,303	528,906	5,397	10,794
	NI PF	2,608,900	1,617,518	1,513,162	600,047	704,403
MI - 3	DNR	104,600	92,048	87,864	11,506	14,644
	County	405,800	328, 698	308,408	64,928	85,218
	NI PF	2,267,600	1,609,996	1,473,940	453,520	589,576
WI - 4	DNR	56,700	33,453	30,051	20,412	23,814
	NI PF	1,869,400	1,439,438	1,308,580	317,798	448, 656
WI - 5	DNR	86,100	24,108	18,942	18,081	46,494
	NI PF	825,500	635, 635	561,340	115,570	189,865
	Total	10,934,800	7,900,660	7,320,636	1,911,727	2,539,459

reserved other forest land. The data summaries were made from the Eastwide FIA Data Base by J. Michael <sup>a</sup> Only those FIA survey units and owner groups for which data were obtained are shown in this table. <sup>b</sup> These are total forest land acres consisting of timberland, reserved timberland, other forest land, and Vasievich, Economist, USDA North Central Forest Experiment Station, E. Lansing, MI.

to decrease and increase by 1,300,569 and 1,415,782 acres, respectively.

Minnesota acreage predicted to be available for harvest has a similar ownership pattern as in Michigan (Table 10), with one exception; county land in MN-1 controls more of the available land in the year 2020. National forest and MNDNR owner groups have the most acres of lands not available for harvest, but it varies depending on the survey unit. Across all owner groups in Minnesota, the lands available and not available for harvest are expected to decrease and increase by 373,196 and 637,385 acres, respectively.

For Wisconsin, once again, NIPF land owners control the majority of the lands predicted to be available and not available for harvest in the year 2020 (see Table 11). County land ownership is predicted to control the second largest amount of land available for harvest in the year 2020, and national forests control the second largest amount of not available for harvest acreage. Across all owner groups in Wisconsin, the lands available and not available for harvest are expected to decrease and increase by 580,024 and 627,732 acres, respectively.

For comparison purposes, tables E.1-E.3 in Appendix E provide unweighted averages of current and "most likely" data by FIA survey unit, owner group, and land category. National forest data are not included in the tables, because the data are not weighted by FIA survey unit for this study. The differences between the weighted and unweighted averages are

relatively small, and they are not consistently higher or lower than each other. However, the weighted averages are still more appropriate due to the differing acres of managed land stated by the individual respondents.

Summary--In summary, all land owner groups except for the Superior National Forest, some of Minnesota NIPF lands, and industry lands in the Lake States are predicted to experience a decrease in lands available for harvest and an increase in lands not available for harvest. Although the absolute and relative differences between current and future percents vary greatly as do the smallest to largest probable ranges indicating certainty levels, the predicted trends should not be ignored. Many of the respondents of the public and private surveys as well as other researchers (see Kingsley, 1993) indicate that private lands will pick up the slack of decreased timberland availability on public lands. However, these data seem to provide contradictory evidence. The factors affecting the lands available for harvest are examined in the following section and should provide explanation for the apparent discrepancy between the numbers and the expectations.

# Factors Affecting Land Allocations

Table 12 presents the tallied responses to the survey question which pertains to factors affecting timberlands available for harvest. Each respondent could identify up to

Table 12.

Factors affecting lands available for timber harvest on the Lake States' national forests (NF), state lands (DNR), county lands (Co.), and private lands (Pvt.).

Factor	Effect		Cou	nt	
		NP	DER	<b>Co</b> .	Pvt.
		n=52	n=103	n=29	n=117
Biodiversity and Related Issues					
Biodiversity <sup>a</sup>	_p	6	15	4	7
Old growth	-	12	23	3	_
Threatened/endangered/sensitive species <sup>C</sup>	-	18	11	6	6
Wetlands	-	2	6	1	3
Environmental Issues					
Environmental protection	-	2	5	3	4
<pre>Preservation (e.g., legacy, wilderness,     semi-primitive, etc.)</pre>	-	10	5	3	10
Special interest areas (e.g., RNAs, wild and	-	6	4		1
scenic rivers, etc.)					
Zoning restrictions/regulations	-				31
Water protection/riparian corridors	-	7	5	1	8
Silvicultural Considerations					
Ecosystem management	-	9	8	2	2
Decreasing clearcutting/even-aged mgt.	-	5	9	1	
Higher quality stands/better mgt.	+	3	2	1	9
Better inventory	+	3			
Failure of regeneration/over-harvesting/					
high-grading	-		4		11
Other (e.g., multiple use mgt., longer	+/-	9	10	3	2
rotations, deer/pest/disease,					
reclassification to more/less					
restrictive standards, etc.)					
Social Constraints					
Public concerns over harvesting/					
development/urban sprawl/visual	-	11	48	10	40
Other amenity demands/shifts in mgt.	-	14	21	7	15
Recreation	-	7	14	6	10
Wildlife mgt.	+/-	2	12		3
Leased lands (e.g., oil/gas, power	-		4	1	
lines, etc.)					-
Development for second home	-				9
Agriculture	+/-				5
Ownership tenure	+	•			1
Public opinion/environmentalist pressures	+/-	2	24	6	26
Economic Issues					
Stumpage price/market fluctuations	+/-	2	4	1	34
Increased/decreased demand for wood	+/-	5	16	2	1
Budget restrictions	-	2	6	3	1
Forest fragmentation	-	2	3		29
Improving markets	+				9
Increase regulation/red tape	-				0
other (o g availability of comilla	+		c		15
other (e.g., availability of sawfills,	+/-		3		12
improved logging techniques, tax					
Structure, etc.)			10		<del></del>
other (e.g., reduced roads, single-use mgt.,	-	5	13	2	6
more narvesting on private causing less					

<sup>a</sup> One individual thought the desire for diversity would increase harvesting.

b A "-" indicates a negative effect on lands available for harvest, and a "+"
indicates a positive effect.

<sup>C</sup> One individual thought TES would not change harvesting allocations.

three factors. This table is a compilation of data; there is no double counting, and columns, if totaled, should not add up to equal any specific number. Subcategories, such as recreation, wildlife management, and so on, exist because some individual respondents supplied more specific factors than other respondents.

Several factors listed in the table could either increase the lands available for harvest, indicated by a "+", or decrease them, indicated by a "-", depending on the situation and the respondent's interpretation. For instance, wildlife management often involves some harvesting to maintain or create openings; however, it was also viewed as a detriment to timber management by many of the respondents.

The three public land owner groups--national forest, state, and county--do not appear to differ dramatically in their opinions regarding the factors affecting timberland availability on their lands. Biodiversity and related issues and social constraints categories were tallied as the top three most frequently stated factors affecting availability. Most of these factors were believed by the respondents to be causing a decrease in availability.

Specifically, the three most often cited factors affecting lands available for harvest on national forests were: threatened, endangered, or sensitive species (TES); other amenity demands in general; and old growth reserves. On state lands, the three most often cited factors included: public concerns over harvesting/development/urban

sprawl/visual, old growth, and other amenities. For county lands the three most often cited factors included: public concerns over harvesting/development/urban sprawl/visual; other amenity demands in general; and TES, recreation, and public opinion/environmentalist pressures all tied for third place. When the subcategories of other amenities (i.e., recreation, wildlife management, leased lands, development for second home, and agriculture) are tallied together, other amenities becomes the number one most often cited factor affecting lands available for harvest on all public lands.

Responses from private land managers were quite different. Social constraint factors were still frequently cited, but economic issues were also frequently cited, followed by environmental protection factors. Specifically, the top three most frequently cited factors affecting private land availability included: public concerns over harvesting/development/urban sprawl/visual, stumpage price, and zoning restrictions/regulations.

In summary, the most often cited factors by the differing owner groups indicate that there is a difference between factors believed to be affecting public and private land availability. It appears that private land available for harvest, though restricted somewhat by social and environmental concerns, is far more market oriented than public land availability. The frequency of stumpage price cited by managers of private lands indicate that private land owners are more likely to respond with increased harvesting

if stumpage were to increase than would public land owners. However, the negative effects of public concerns over harvesting and zoning restrictions/regulations most likely will dampen any stumpage price effects.

The factors predicted to be affecting public land availability are all negative in their effects. Biodiversity concerns, environmental issues, and other amenity demands are all factors that are listed as extremely influential on public lands. These factors are also relatively permanent features of our society given continued environmental degradation and population growth. Therefore, unlike on private lands, there does not seem to be much possibility of increasing the availability of lands for timber harvest.

Both the public and private land availability factors are entirely consistent with the land availability trends on public and private lands discussed in the previous section on land allocations. The predicted decrease in public lands available for harvest is substantiated by the factors believed to be affecting public lands. The social constraints and environmental factors cited as influential on public lands are negative factors in terms of the availability of lands for harvest.

Similarly, the predicted factors affecting private lands also support the predicted private land allocation trends. The positive effect of higher stumpage prices on lands available for harvest is reflected in the predicted increase in the availability of forest industry land. However, the
trends on NIPF lands are mixed, which reflects the negative influence of the social and environmental factors also believed to be affecting private land availability. Forest industry land owners would be less influenced by public concerns over harvesting and zoning restrictions/regulations than NIPF land owners. However, some NIPF land may be less influenced by these negative factors (i.e., survey units MN-3 and MN-4 NIPF land) and more influenced by the positive stumpage factor, hence the predicted increase in these lands availability. The prevailing force will determine whether there will be an increase or decrease in the availability of private lands.

## Cover Types on Lands Not Available for Harvest

Tables 13-15 provide a general summary of cover type trends on lands not available for harvest by state, owner group, and survey unit. Appendix F contains the cover type frequency tables used to create the summary tables provided here. For this data set, an increasing trend is considered if a majority of the responses occurred in the "increase a little" and/or "increase a lot" categories, and a decreasing trend is considered if the majority of the responses occurred in the "decrease a little" and/or "decrease a lot" categories. A "no change" trend is considered if a majority of the responses fell in the "stay the same" category.

Although for almost half of the data there was little consensus within survey units or by owner groups about an

increase, decrease, or no change of many of the cover types, a few possible trends are revealed. In Michigan (Table 13), red-white pine, maple-beech-birch, lowland hardwoods, and lowland conifers are predicted by a majority of the respondents to increase by the year 2020 on lands not available for harvest. Upland spruce-fir and oak-hickory are predicted not to change by a majority of the respondents.

Table 13. Cover type trends on Michigan lands not available for harvest by owner group and FIA survey unit.

	Nati (	onal F NF) Lai	orest nd		DNR	Land			Privat	e Land	
Cover type	MI-1 n=8	MI-2 n=7	MI-3 n=12	MI-1 n=10	MI-2 n=8	MI-3 n=24	MI-4 n=13	MI-1 n=8	MI-2 n=9	MI-3 n=14	MI-4 n=4
Aspen-birch	_a	-	-	tp	с	+	-		D0	-	-
Jackpine					0		0				-
Red-white pine			+		+	+		+		+	+
Upland spruce- fir	0	0				0	0	0		0	+
Oak-hickory	0	0		0	0		+		0		
Maple-beech- birch	0		+	+	+	+			+	+	+
Lowland hardwoods				0			+		+	+	+
Lowland conifers	+	+		+			0	+	+		+
Nonstocked	+		-	0					-		

<sup>a</sup> A "-" means there is a predicted decrease of that cover type.

<sup>b</sup> A "+" means there is a predicted increase of that cover type.

<sup>C</sup> A blank indicates there was no discernible trend.

<sup>d</sup> A "0" means there is a predicted no change of that cover type.

In Minnesota (Table 14), oak-hickory and maple-beechbirch cover types are predicted to increase or stay the same. Upland spruce-fir, lowland hardwoods, lowland conifers, and nonstocked are predicted not to change by the year 2020. . The other cover types varied too much in their direction of predicted change by owner group and survey unit to provide a statewide generalization.

	NF I	and		DNR 1	Land		County	/ Land		Privat	e Land	
Cover type	MN-1	MN-2	MN-1	MN-2	MN-3	MN-4	MN-1	MN-2	MN-1	MN-2	MN-3	MN-4
	n=4	n=9	n=3	n=6			n=3	n=6	n=13	n=19	n=16	<u>n=/</u>
Aspen-birch	_a	-	b	+c	+		0d	0				
Jackpine					0		0	+				
Red-white pine		+		+			-	+				0
Upland spruce-fir		0	0	0	0		0	0		0	0	0
Oak-hickory		+	0	0	0	+	0	+			+	
Maple-beech- birch	+	+	0	0	+		0	0				+
Lowland hardwoods	0	+	+	0	0	0	0	0				0
Lowland conifers		+	0	0	0	0	0	0		0	0	0
Nonstocked	0	0	0	0	0	+	0	0				

Table 14. Cover type trends on Minnesota lands not available for harvest by owner group and FIA survey unit.

<sup>a</sup> A "-" means there is a predicted increase of that cover type.

<sup>b</sup> A blank indicates there was no discernible trend.

<sup>C</sup> A "+" means there is a predicted decrease of that cover type.

<sup>d</sup> A "0" means there is a predicted no change of that cover type.

In Wisconsin (Table 15), the majority of the respondents predicted statewide increases in oak-hickory and maple-beechbirch cover types by the year 2020. An increase or no change was predicted for red-white pine, upland spruce-fir, and lowland hardwoods. And, jackpine, lowland conifers, and nonstocked are predicted not to change.

Several possible explanations exist for the variability of the ownership data for the same cover types within the same survey units. First, the survey unit scale might have been too broad to capture the variability of the cover types within them. As a result any distinguishable trends for each specific cover type would be lost when aggregated at the survey unit level. Second, the respondents might not be able to predict what the cover types will be on lands not available for harvest in the year 2020. The specificity and

	NF 1	Land		D	NR La	nd		Cou	inty I	and		Priv	<i>r</i> ate I	and	
Cover type	WI-1	WI-2	WI-1	WI-2	WI-3	WI-4	WI-5	WI-1	WI-2	WI-3	WI-1	WI-2	WI-3	WI-4	WI-5
	n=5	n=7	n=3	n=9	n=4	n=4	_n=5	n=6	<u>n=9</u>	n=5	n=15	n=20	n=16	n=20	n=12
Aspen-birch	_a	-	-	+p	с					+					
Jackpine	0d	-	-			0	0			0					0
Red-white pine	0	+	+	+			+			0		0	0		
Upland spruce-fir	0	0		+	0	0	0	0	0	0		+	+	0	0
Oak-hickory				+						+			+		+
Maple-beech- birch	+	+	+	+	+		+			0		+		+	+
Lowland hardwoods	0	0	0	0	0		+		+	+	+		+	+	
Lowland conifers	0	0	0	0	0	0	+	0		0		0		0	
Nonstocked	0	0		0		+		0	0	0				-	

Table 15. Cover type trends on Wisconsin lands not available for harvest by owner group and FIA survey unit.

<sup>a</sup> A "-" means there is a predicted increase of that cover type.

<sup>b</sup> A "+" means there is a predicted decrease of that cover type.

<sup>C</sup> A blank indicates there was no discernible trend.

<sup>d</sup> A \*0\* means there is a predicted no change of that cover type.

complexity of the question may be beyond any expert's best guess. A third explanation may be that the question itself is poorly worded or was misunderstood, resulting in inaccurate responses. Despite the attempts to clarify the question, several respondents commented on its difficulty and lack of clarity. Finally, there could be no trends in cover types on lands not available for harvest, which could mean the results are quite correct in their lack of pattern.

#### Management Trends

The last set of questions asked of both public and private land managers dealt with the emergent forest management trends. The most commonly discussed forest management trend on both public and private lands is that of decreasing clearcutting and even-aged management practices due to public disapproval. Many comments are made pertaining to the detrimental effects this will have on early successional and intolerant species such as aspen, birch, and oak. In this same light, harvesting techniques such as single-tree selection, group selection, and shelterwood, and some block cutting will be relied upon more heavily, and therefore need to be perfected for the species for which they are most appropriate.

Concerns over the deer overpopulation problem are discussed with regards to the regeneration problem of white birch and lowland conifer species such as cedar and hemlock. The majority of the views are that these species should be protected until the regeneration problem is solved. Other species and specific problems are discussed as well. For instance, oak needs to be regenerated according to some respondents due to the lack of regeneration caused by improper harvesting techniques (i.e., high-grading and/or single-tree selection in hardwood stands) especially on private lands.

Concern is expressed over the logging technique of whole tree harvesting. This is viewed as seriously detrimental to the health of the forest ecosystem in terms of nutrient cycling. The individuals who raised this issue felt this would become more of a problem in the future as it becomes more cost effective to use whole trees in the wood industry.

Several other general silvicultural trends are discussed. First, the increasing use of buffers along roads,

waterways, and around residences will cause a succession of those forest types to mature hardwoods and pine. Second, there is a movement away from tree planting towards natural regeneration of desired species. Third, rotation lengths are increasing which is affecting the annual harvested yields.

Many respondents mention the need to educate the public on the necessity of these practices to regenerate the early successional species. However, the largest concern pertaining to education is the need for proper forest management in general. Too much mismanagement is taking place on private lands which is decreasing the potential yields on private forest. Forestry assistance is needed to increase public awareness of better management techniques (i.e., differing harvest techniques are appropriate for differing species on differing sites), especially as timber values increase causing an increase of private owners' desires to harvest.

# Private Land Managers' Perceptions of Public Land Allocations

Table 16 presents the results of the additional question asked of private land managers regarding their perceptions of the availability of timberland on public lands in the year 2020. The private land managers' average predictions of public lands available for harvest in 2020 are all lower than those of the public agency land managers. For Minnesota lands, the difference is very small. National forest lands are predicted to experience the largest relative decrease;

Table 16. Comparison of private land managers' average predictions of public lands available for harvest in the year 2020 to the public land managers' weighted average predictions of the same areas by state and owner group.

State	Public Owner Group	Current Available	Public Respondents' Predictions	Private Respondents' Predictions
Michigan	National Forest Land	56	49	34 (14.1) <sup>a</sup>
	DNR Land	75	65	60 (14.6)
Minnesota	National Forest Land	40	38	36 (14.0)
	DNR Land	56	47	46 (12.2)
	County Land	84	76	75 (12.3)
Wisconsin	National Forest Land	58	50	36 (14.7)
	DNR Land	66	59	51 (14.1)
	County Land	87	81	73 (14.1)

<sup>a</sup> the standard deviations are provided in parentheses

It is not surprising that the estimates of public land availability are more optimistic towards public sector timber harvest availability than the private estimates. Many public land managers' jobs still consist of overseeing timber cruising and timber sales preparations. In essence, predicting the decrease of harvestable areas on public lands may be equivalent to predicting the ends of their jobs as they know them.

On the other hand, private managers' perceptions may be overly pessimistic. The common belief by many managers is that decreased timber production from public lands means increased timber production on private lands. However, this belief is not backed by the data discussed in the previous section. Public lands are predicted to decrease in availability for timber production but so are NIPF lands. In summary, public and private land managers both agree that public lands available for harvest will decrease in the future. Private land managers predict a larger decrease for most of the public lands. However, the reasons behind these lower predictions are not clear since the rationale for these specific projections were not solicited.

#### Nonrespondents

In total, eighteen nonrespondents from the various public owner groups were contacted by phone. They were asked three questions: the first pertaining to their years of land management experience, the second pertaining to their percent prediction of lands they manage that will be available for harvest in the year 2020, and the third pertaining to their reason for nonresponse. The following is a brief discussion of their responses to these three questions.

The years of land management experience of the nonrespondents did not noticeably differ from those of the respondents for those owner groups. When asked for the 2020 prediction, many of the nonrespondents were reticent about supplying a prediction. Their response to this question was often related to their reason for nonresponse. They did not feel that they had enough background information or knowledge to provide reasonable predictions to complete the questionnaire or answer the question over the phone. When the nonrespondents did supply a percent prediction of 2020 availability, their responses were not noticeably different

from the averages discussed previously for each of the owner groups. The nonrespondents that were willing to make the predictions stated almost exclusively that the reason for not responding to the questionnaire was due to lack of time. C p a fa f re Fi 0. av Mi no fo ₫Ų (t ġ. de in 18 5¥ Wi

#### **CHAPTER 5**

#### CONCLUSIONS

The main objectives of this study were to estimate the current and future (year 2020) availability of public and private lands for timber harvest in the Lake States in both acreage and percent terms and to determine the perceived factors affecting this availability. Highlights of the major findings are presented below and are followed by recommendations for future research.

## <u>Findings</u>

A statewide aggregation of the land allocation data by owner group revealed a predicted decrease in all lands available for harvest, except all forest industry land and Minnesota NIPF land, and a predicted increase in all lands not available for harvest except Michigan and Minnesota forest industry lands. The predicted decreases in lands available for harvest ranged from an 11% absolute decrease (the difference between the current and "most likely" future average percents) on Michigan DNR land to a 2% absolute decrease on Minnesota national forest land. The predicted increases in lands not available for harvest ranged from an 18% absolute increase on Michigan national forest land to a 5% absolute increase on Minnesota national forest lands, Wisconsin county land, and Wisconsin NIPF land.

ļ ac 67 re al ac im ar ana sho har lar Mor res due lan gro for sur the area env fact C0.71 Posi Based on respondents' "most likely" estimates, total acreage available for harvest will decrease to 64%, 60%, and 67% of total acreage for Michigan, Minnesota, and Wisconsin, respectively. This is a reduction from current estimates for all owner groups surveyed of 73%, 62%, and 72% of total acreage for Michigan, Minnesota, and Wisconsin. It is important to note that the current and predicted percentages are considerably lower than those used in one contemporary analysis, the Minnesota GEIS.

A comparison of acreage predictions across owner groups shows that predicted increases in acres not available for harvest are more than the predicted decreases in acres of lands available for harvest. This means that proportionately more of the land base in the year 2020 is predicted to be restricted from timber harvest than is currently estimated due to the partial allocation of the other lands category to land not available for harvest.

Broken down by FIA survey units, all lands of the owner groups surveyed in the Lake States, with the exception of forest industry lands and Minnesota NIPF lands in two FIA survey units, are still predicted to experience a decrease in the land area available for harvest and an increase in land area not available for harvest. On public lands, social and environmental factors are predicted as the most important factors causing the decreased availability. However, countervailing factors of stumpage price, with an expected positive effect on land availability, and social and

e a a е ( i tl lá s: a] ar fc ha in ha an ava a j Πâι lov tур str 0a; for low environmental factors, both with expected negative effects, are believed to be most important in determining the availability of private lands.

Based on the land allocation data analysis results, the effects of stumpage price prevail on forest industry lands (i.e., land available for timber harvesting is predicted to increase and price is the most commonly noted positive factor that would lead to this outcome). However, only on the NIPF lands of the two southern FIA survey units in Minnesota is stumpage price still the prevailing force. Otherwise, for all other NIPF lands, the social and environmental factors are the dominant forces removing lands from being available for harvest.

For cover types on Michigan lands not available for harvest, the strongest trends were as follows: a predicted increase for red-white pine, maple-beech-birch, and lowland hardwoods and conifers and "no change" for upland spruce-fir and oak hickory. For cover types on Minnesota lands not available for harvest, the strongest trends were as follows: a predicted increase or "no change" for oak-hickory and maple-beech-birch and "no change" for upland spruce-fir, lowland hardwoods and conifers, and nonstocked. For cover types on Wisconsin lands not available for harvest, the strongest trends were as follows: a predicted increase for oak-hickory and maple-beech-birch; an increase or "no change" for spruce-fir and lowland hardwoods; and "no change" for lowland conifers and nonstocked.

The predicted increase of maple-beech-birch and lowland hardwoods and conifers on lands not available for harvest could be a result of the biodiversity movement (i.e., for old growth and wetlands). The allocation of forested areas for future old growth and wetlands preservation would result in an increase of more tolerant forests such as maple-beechbirch and more lowland species in many areas in the Lake States. However, the lack of any definite trends in many of the other cover types in this study leaves the results of this portion of the study somewhat questionable.

The most dominant forest management trend indicated by a major portion of the respondents is a shift from clearcutting to a multitude of uneven-aged harvesting techniques. According to the public and private forest managers, this shift is due to an overwhelmingly negative public reaction to the aesthetics of a clearcut site. As a result of the decreased clearcutting, aspen and other early successional species are predicted to decrease, and longer-lived, more tolerant species such as maple are predicted to increase.

The respondents predict that there will likely be a decrease in the availability of lands for harvest in the Lake States by the year 2020. However, whether this will lead to a timber supply problem within the Lake States is the next logical question to be answered. This research provides possible starting points for supply-demand analyses to follow. Specifically, the results of this study are intended to be used as exogenous variables in the LASTISA timber

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supply and demand model to address this question. However, the results themselves should prove valuable for public and private managers by providing estimates of area limitations on lands available for timber production currently and in the year 2020. These estimates can provide the basis for examining the roles different owners play in timber supply. Hence, Lake States' forest management plans and goals can be adjusted to account for these estimates.

Three potential applications of the overall Lake States timber supply and demand model come to mind. First, national forests will likely begin their plan revisions within the next few years. This research effort can provide a broader context for their more detailed analyses. Second, there are some sub-state, regional multi-ownership planning efforts underway and information from this research should be useful in that context as well. Finally, Michigan's Statewide Forest Resources Plan is over 10 years old. The LASTISA framework with its fairly comprehensive coverage of owner groups and survey units should prove helpful in updating the plan.

There are several shortcomings of this research. First of all, the only way the data can be verified is to wait until the year 2020 and compare the predictions. The lack of any other consistent data source for actual land availability for timber harvest means there is no source for comparison.

Second, as with the use of any judgment, expert or not, perceptual biases and uncertainty exist which can lead to

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inaccurate results (Cleaves, 1987 and 1994 and Cleaves et al., 1985). Several techniques can be used to minimize and/or evaluate the biases and uncertainty, some of which were incorporated into this study (e.g., mixture of openended and more highly structured questions in survey and the attempt to quantify the respondent's uncertainty). However, more in-depth corrective procedures are suggested in the literature (see Cleaves, 1987).

Third, recent societal and/or land management trends may have biased the respondents' perceptions. Further biases in this study may also have resulted from using only forestry land experts. Inclusion of other experts is discussed in the next section.

A final possible drawback of this study is the questionnaire design itself. Despite the attempts to clarify questions by the use of reviewers, some questions were more difficult than others (i.e., smallest to largest probable ranges and cover type table). The questions were left unanswered or at times with negative comments on the difficulty or clarity of the question. It is probable that some individuals who answered these questions misinterpreted them and, therefore, provided incorrect responses.

Nevertheless, this study has several strengths. First, the usable response rates were quite good. All the usable response rates were 50% or higher, and most were above 60%. Second, diverse opinions were obtained, reflecting state, region, and owner group differences. Third, the results,

both quantitative and qualitative, were fairly consistent within owner groups and statewide. For example, county lands available for harvest were consistently, proportionately higher than state ownership's, which were higher than the proportion of national forest lands available for harvest. Finally, the results of this study will provide a basis for timber supply model scenarios by incorporating restrictions on lands available for harvest for more realistic estimates of timber supply.

#### Future Research

Several opportunities exist for future research relating to this study. First, within the Lake States several groups of possible public and private land management experts were left out of this study. Surveys of land management experts working within miscellaneous federal owner groups such as the Bureau of Land Management, land managers of Native American lands, and other public and private forest land managers (e.g., Soil Conservation Service, National Park Service, military lands, utilities, county planners, environmental organizations, etc.) would help to complete the perceptions of the land availability picture.

Second, a predictive model for determining individual's predictions could possibly be developed based on the position (i.e., forester or wildlife biologist), work experience, owner group (e.g., federal, state, county, etc.), acreage of managed land, and so on. This approach could also be used to

S p t a d 18 N de a, nc Re de na CO look at a range of future projections to determine with whom and where the broadest ranges occurred.

Third, a study conducted by Harper et al. (1990) indicated that areas in New England near mountains and lakes are being developed rapidly for subdivisions which is including a major portion of commercial timberland. A similar situation could be taking place within the Lake States requiring research to determine the extent of the problem if it exists. This may involve a sampling strategy that utilizes GIS-based buffers to identify zones for analysis.

A final possibility for future research involves determining what factors (see Tables 2, 3, and 10) do remove lands from the available for harvest land base, especially on NIPF lands, and how permanent the removals are. This study dealt with opinions about factors affecting land availability, but the actual effects and their permanence are not determined.

Clearly, non-timber demands on forests are increasing. Research can assist in assessing the implications of those demands on the sustainability of timber production in the narrow sense and on the vitality of our forests in a broader context.

APPENDICES

APPENDIX A

QUESTIONNAIRES

# Appendix A.1. National forest letter of endorsement and questionnaires.



United States Forest Department of Service Agriculture North Central Forest Experiment Station 1407 S. Harrison Road, Suite 220 East Lansing, MI 48823-5290 517-355-7740 FAX: 517-355-5121

Reply to: 4800

Date: April 11, 1994

Subject: Timber Supply/Demand Study Information Request

To: Management Teams-National Forests in Michigan, Wisconsin, Minnesota

Enclosed is a copy of a letter from Dr. Larry Leefers and a brief survey on timberland availability for harvest in the Lake States region. This effort is part of a study of long-term regional timber supply being conducted collaboratively by our research unit and several faculty members and graduate students at Michigan State University. Other parts of this study involve developing estimates of timber supply and demand based on forest inventory data and historical harvest patterns. These component studies are part of the Lake States Forest Resources Assessment. We believe the resulting timber supply/demand information and models will be particularly helpful for future forest plan revisions in the region.

We would greatly appreciate your assistance in completing and returning the survey. Please be assured that all responses will be held confidential and used only in aggregate form. Call me if you have questions.

mile Vanevil

J. MICHAEL VASIEVICH Project Leader

Enclosure



Caring for the Land and Serving People

#### PART 1

The forest plan data for the Hiawatha National Forest were aggregated into three categories as follows:

- Available for Harvest (458,350 acres)—These are lands actively managed for timber and/or are available for timber harvest to meet projected future demands. On national forests, they are <u>lands suitable</u> for timber production and are often identified by Land Suitability Class (LSC) 500 in your forest's database.
- Not Available for Harvest (108,034 acres)—These are reserved lands and are not available for harvest in the future. On national forests, they are lands not suited for timber production; they are often identified by LSC's 100, 200, 300, 700, 800, and 900. Examples include areas of water, nonforested lands, lands not physically suitable, wilderness, etc.
- Other Lands (313,216 acres) These are <u>lands tentatively suitable for timber production</u>. These lands may in the future become Available or Not Available for Timber Harvest. On national forests, they are often identified by LSC 600.

These three categories sum to the total acreage of 879,600 owned by the Hiawatha National Forest. The chart below shows the distribution of these categories as a percentage of the total area.



We are interested in obtaining your opinion about the ways the allocation of land in these three categories may change by the year 2020. Please complete the table below for each category by filling in its smallest probable allocation by the year 2020, its largest probable allocation by the year 2020, and its most likely allocation by the year 2020.

Category	% Allocation in Plan	SMALLEST Probable % Allocation in 2020	LARGEST Probable % Allocation in 2020	MOST LIKELY % Allocation in 2020
Available for Harvest	52.1			
Not Available for Harvest	12.3			
Other Lands	35.6			
Total	100.0			100.0

#### PART 2

We would also like to know which factors you feel are affecting the allocations of national forest land. These factors may play a role individually or cumulatively in changing the availability of public lands for timber harvesting.

In PART 1, you identified a change from the current lands Available for Harvest to your "most likely" future estimate. What 3 factors do you think are most important in causing this change? Be as specific as possible and indicate how each factor will affect availability.

#1		 
#2		
#3		

#### PART 3

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We are also concerned about possible changes in the distribution of cover types by the year 2020. The table below is broken down by cover type aggregates. Referring to the PART 1 "forest plan" allocation and your "most likely" allocation of lands Not Available for Harvest, please write the symbol corresponding with whether you believe the cover type will:

Cover Type

Not Available for Harvest

increase a lot	Aspen-birch
increase a little	Jack pine
stay the same	Red-white pine
decrease a little	Upland spruce-fir
decrease a lot	Oak-hickory
	Maple-beech-birch
	Lowland hardwoods
	Lowland conifers
	Nonstocked

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, etc.) that you think will affect management of your forest in the future? Please relate the trends in these practices to cover types, if appropriate. If you have other comments on public or private management trends relative to long-term timber supply or demand, please share them with us.

## PART 4

Finally, we are interested in obtaining some personal information regarding your work experience.

- 1. What is your current position (e.g., district ranger)?
- 2. How many years have you been at this location?

3. How many years of professional land management experience do you have?

Thank you for your participation! Please return this questionnaire in the envelope provided.

## PART 1

The forest plan data for the Ottawa National Forest were aggregated into three categories as follows:

- Available for Harvest (562,000 acres)--These are lands actively managed for timber and/or are available for timber harvest to meet projected future demands. On national forests, they are <u>lands suitable</u> for timber production and are often identified by Land Suitability Class (LSC) 500 in your forest's database.
- Not Available for Harvest (109,200 acres)--These are reserved lands and are not available for harvest in the future. On national forests, they are lands not suited for timber production; they are often identified by LSC's 100, 200, 300, 700, 800, and 900. Examples include areas of water, nonforested lands, lands not physically suitable, wilderness, etc.
- Other Lands (254,800 acres) These are <u>lands tentatively suitable for timber production</u>. These lands may in the future become Available or Not Available for Timber Harvest. On national forests, they are often identified by LSC 600.

These three categories sum to the total acreage of 926,000 owned by the Ottawa National Forest. The chart below shows the distribution of these categories as a percentage of the total area.



We are interested in obtaining your opinion about the ways the allocation of land in these three categories may change by the year 2020. Please complete the table below for each category by filling in its smallest probable allocation by the year 2020, its largest probable allocation by the year 2020, and its most likely allocation by the year 2020.

Category	% Allocation in Plan	SMALLEST Probable % Allocation in 2020	LARGEST Probable % Allocation in 2020	MOST LIKELY % Allocation in 2020
Available for Harvest	60.7			
Not Available for Harvest	11.8			
Other Lands	27.5			
Total	100.0			100.0

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Appendix A.1 (cont'd).
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# PART 2

We would also like to know which factors you feel are affecting the allocations of national forest land. These factors may play a role individually or cumulatively in changing the availability of public lands for timber harvesting.

In PART 1, you identified a change from the current lands Available for Harvest to your "most likely" future estimate. What 3 factors do you think are most important in causing this change? Be as specific as possible and indicate how each factor will affect availability.

#1		
#2		
#3		

# PART 3

We are also concerned about possible changes in the distribution of cover types by the year 2020. The table below is broken down by cover type aggregates. Referring to the PART 1 "forest plan" allocation and your "most likely" allocation of lands Not Available for Harvest, please write the symbol corresponding with whether you believe the cover type will:

++	increase a lot
+	increase a little
0	stay the same
-	decrease a little

decrease a lot - -

Cover Type	Not Available for Harvest
Aspen-birch	
Jack pine	
Red-white pine	
Upland spruce-fir	
Oak-hickory	
Maple-beech-birch	
Lowland hardwoods	
Lowland conifers	
Nonstocked	

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, etc.) that you think will affect management of your forest in the future? Please relate the trends in these practices to cover types, if appropriate. If you have other comments on public or private management trends relative to long-term timber supply or demand, please share them with us.

# PART 4

Finally, we are interested in obtaining some personal information regarding your work experience.

1. What is your current position (e.g., district ranger)?

2. How many years have you been at this location?

3. How many years of professional land management experience do you have?

Thank you for your participation! Please return this questionnaire in the envelope provided.

## PART 1

The forest plan data for the Huron-Manistee National Forests were aggregated into three categories as follows:

- Available for Harvest (518,015 acres)--These are lands actively managed for timber and/or are available for timber harvest to meet projected future demands. On national forests, they are <u>lands suitable</u> for timber production and are often identified by Land Suitability Class (LSC) 500 in your forest's database.
- Not Available for Harvest (67,740 acres)-These are reserved lands and are not available for harvest in the future. On national forests, they are <u>lands not suited for timber production</u>; they are often identified by LSC's 100, 200, 300, 700, 800, and 900. Examples include areas of water, nonforested lands, lands not physically suitable, wilderness, etc.
- Other Lands (364,284 acres) These are <u>lands tentatively suitable for timber production</u>. These lands may in the future become Available or Not Available for Timber Harvest. On national forests, they are often identified by LSC 600.

These three categories sum to the total acreage of 950,039 owned by the Huron-Manistee National Forests. The chart below shows the distribution of these categories as a percentage of the total area.



We are interested in obtaining your opinion about the ways the allocation of land in these three categories may change by the year 2020. Please complete the table below for each category by filling in its smallest probable allocation by the year 2020, its largest probable allocation by the year 2020, and its most likely allocation by the year 2020.

Category	% Allocation in Plan	SMALLEST Probable % Allocation in 2020	LARGEST Probable % Allocation in 2020	MOST LIKELY % Allocation in 2020
Available for Harvest	54.5			
Not Available for Harvest	7.1			
Other Lands	38.3			
Total	100.0			100.0

#### PART 2

We would also like to know which factors you feel are affecting the allocations of national forest land. These factors may play a role individually or cumulatively in changing the availability of public lands for timber harvesting.

In PART 1, you identified a change from the current lands Available for Harvest to your "most likely" future estimate. What 3 factors do you think are most important in causing this change? Be as specific as possible and indicate how each factor will affect availability.

#1	 	
		_
#2		
#3		

# PART 3

We are also concerned about possible changes in the distribution of cover types by the year 2020. The table below is broken down by cover type aggregates. Referring to the PART 1 "forest plan" allocation and your "most likely" allocation of lands Not Available for Harvest, please write the symbol corresponding with whether you believe the cover type will:

- ++ increase a lot
- + increase a little
- 0 stay the same
- decrease a little
- -- decrease a lot

Cover Type	Not Available for Harvest
Aspen-birch	
Jack pine	
Red-white pine	
Upland spruce-fir	
Oak-hickory	
Maple-beech-birch	
Lowland hardwoods	
Lowland conifers	
Nonstocked	

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, etc.) that you think will affect management of your forest in the future? Please relate the trends in these practices to cover types, if appropriate. If you have other comments on public or private management trends relative to long-term timber supply or demand, please share them with us.

## PART 4

Finally, we are interested in obtaining some personal information regarding your work experience.

1. What is your current position (e.g., district ranger)?

2. How many years have you been at this location?

3. How many years of professional land management experience do you have?

Thank you for your participation! Please return this questionnaire in the envelope provided.

## PART 1

The forest plan data for the Nicolet National Forest were aggregated into three categories as follows:

- Available for Harvest (457,055 acres)--These are lands actively managed for timber and/or are available for timber harvest to meet projected future demands. On national forests, they are <u>lands suitable</u> for timber production and are often identified by Land Suitability Class (LSC) 500 in your forest's database.
- Not Available for Harvest (118,851 acres)--These are reserved lands and are not available for harvest in the future. On national forests, they are lands not suited for timber production; they are often identified by LSC's 100, 200, 300, 700, 800, and 900. Examples include areas of water, nonforested lands, lands not physically suitable, wilderness, etc.
- Other Lands (78,858 acres) These are <u>lands tentatively suitable for timber production</u>. These lands may in the future become Available or Not Available for Timber Harvest. On national forests, they are often identified by LSC 600.

These three categories sum to the total acreage of 654,764 owned by the Nicolet National Forest. The chart below shows the distribution of these categories as a percentage of the total area.



We are interested in obtaining your opinion about the ways the allocation of land in these three categories may change by the year 2020. Please complete the table below for each category by filling in its smallest probable allocation by the year 2020, its largest probable allocation by the year 2020, and its most likely allocation by the year 2020.

Category	% Allocation in Plan	SMALLEST Probable % Allocation in 2020	LARGEST Probable % Allocation in 2020	MOST LIKELY % Allocation in 2020
Available for Harvest	69.8			
Not Available for Harvest	18.2			
Other Lands	12.0			
Total	100.0			100.0
## PART 2

We would also like to know which factors you feel are affecting the allocations of national forest land. These factors may play a role individually or cumulatively in changing the availability of public lands for timber harvesting.

In PART 1, you identified a change from the current lands Available for Harvest to your "most likely" future estimate. What 3 factors do you think are most important in causing this change? Be as specific as possible and indicate how each factor will affect availability.

#1	
#2	
#3	

## PART 3

We are also concerned about possible changes in the distribution of cover types by the year 2020. The table below is broken down by cover type aggregates. Referring to the PART 1 "forest plan" allocation and your "most likely" allocation of lands Not Available for Harvest, please write the symbol corresponding with whether you believe the cover type will:

- ++ increase a lot
- + increase a little
- 0 stay the same
- decrease a little
- -- decrease a lot

Cover Type	Not Available for Harvest
Aspen-birch	
Jack pine	
Red-white pine	
Upland spruce-fir	
Oak-hickory	
Maple-beech-birch	
Lowland hardwoods	
Lowland conifers	
Nonstocked	

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, etc.) that you think will affect management of your forest in the future? Please relate the trends in these practices to cover types, if appropriate. If you have other comments on public or private management trends relative to long-term timber supply or demand, please share them with us.

PART 4

Finally, we are interested in obtaining some personal information regarding your work experience.

1. What is your current position (e.g., district ranger)?

2. How many years have you been at this location?

3. How many years of professional land management experience do you have?

Thank you for your participation! Please return this questionnaire in the envelope provided.

## PART 1

The forest plan data for the Chequamegon National Forest were aggregated into three categories as follows:

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- Available for Harvest (406,665 acres)--These are lands actively managed for timber and/or are available for timber harvest to meet projected future demands. On national forests, they are <u>lands suitable</u> for timber production and are often identified by Land Suitability Class (LSC) 500 in your forest's database.
- Not Available for Harvest (181,235 acres)--These are reserved lands and are not available for harvest in the future. On national forests, they are lands not suited for timber production; they are often identified by LSC's 100, 200, 300, 700, 800, and 900. Examples include areas of water, nonforested lands, lands not physically suitable, wilderness, etc.
- Other Lands (256,704 acres) These are <u>lands tentatively suitable for timber production</u>. These lands may in the future become Available or Not Available for Timber Harvest. On national forests, they are often identified by LSC 600.

These three categories sum to the total acreage of 844,604 owned by Chequamegon National Forest. The chart below shows the distribution of these categories as a percentage of the total area.



We are interested in obtaining your opinion about the ways the allocation of land in these three categories may change by the year 2020. Please complete the table below for each category by filling in its smallest probable allocation by the year 2020, its largest probable allocation by the year 2020, and its most likely allocation by the year 2020.

Category	% Allocation in Plan	SMALLEST Probable % Allocation in 2020	LARGEST Probable % Allocation in 2020	MOST LIKELY % Allocation in 2020
Available for Harvest	48.1			
Not Available for Harvest	21.5			
Other Lands	30.4			
Total	100.0			100.0

## PART 2

We would also like to know which factors you feel are affecting the allocations of national forest land. These factors may play a role individually or cumulatively in changing the availability of public lands for timber harvesting.

In PART 1, you identified a change from the current lands Available for Harvest to your "most likely" future estimate. What 3 factors do you think are most important in causing this change? Be as specific as possible and indicate how each factor will affect availability.

#1			 	
#2			 	
	· · · · · · · · · · · · · · · · · · ·			
#3				
		·····	 <u></u>	

# PART 3

We are also concerned about possible changes in the distribution of cover types by the year 2020. The table below is broken down by cover type aggregates. Referring to the PART 1 "forest plan" allocation and your "most likely" allocation of lands Not Available for Harvest, please write the symbol corresponding with whether you believe the cover type will:

- ++ increase a lot
- + increase a little
- 0 stay the same
- decrease a little
- -- decrease a lot

Cover Type	Not Available for Harvest
Aspen-birch	
Jack pine	
Red-white pine	
Upland spruce-fir	
Oak-hickory	
Maple-beech-birch	
Lowland hardwoods	
Lowland conifers	
Nonstocked	

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, etc.) that you think will affect management of your forest in the future? Please relate the trends in these practices to cover types, if appropriate. If you have other comments on public or private management trends relative to long-term timber supply or demand, please share them with us.

## PART 4

Finally, we are interested in obtaining some personal information regarding your work experience.

1. What is your current position (e.g., district ranger)?

2. How many years have you been at this location?

3. How many years of professional land management experience do you have?

Thank you for your participation! Please return this questionnaire in the envelope provided.

## PART 1

The forest plan data for the Superior National Forest were aggregated into three categories as follows:

- Available for Harvest (645,035 acres)--These are lands actively managed for timber and/or are available for timber harvest to meet projected future demands. On national forests, they are <u>lands suitable</u> for timber production and are often identified by Land Suitability Class (LSC) 500 in your forest's database.
- Not Available for Harvest (924,260 acres)-These are reserved lands and are not available for harvest in the future. On national forests, they are lands not suited for timber production; they are often identified by LSC's 100, 200, 300, 700, 800, and 900. Examples include areas of water, nonforested lands, lands not physically suitable, wilderness, etc.
- Other Lands (565,697 acres) These are <u>lands tentatively suitable for timber production</u>. These lands may in the future become Available or Not Available for Timber Harvest. On national forests, they are often identified by LSC 600.

These three categories sum to the total acreage of 2,134,992 owned by the Superior National Forest. The chart below shows the distribution of these categories as a percentage of the total area.



We are interested in obtaining your opinion about the ways the allocation of land in these three categories may change by the year 2020. Please complete the table below for each category by filling in its smallest probable allocation by the year 2020, its largest probable allocation by the year 2020, and its most likely allocation by the year 2020.

Category	% Allocation in Plan	SMALLEST Probable % Allocation in 2020	LARGEST Probable % Allocation in 2020	MOST LIKELY % Allocation in 2020
Available for Harvest	30.2			
Not Available for Harvest	43.3			
Other Lands	26.5			
Total	100.0			100.0

## PART 2

We would also like to know which factors you feel are affecting the allocations of national forest land. These factors may play a role individually or cumulatively in changing the availability of public lands for timber harvesting.

In PART 1, you identified a change from the current lands Available for Harvest to your "most likely" future estimate. What 3 factors do you think are most important in causing this change? Be as specific as possible and indicate how each factor will affect availability.

#1	······································	
#2		
#3	·····	

# PART 3

We are also concerned about possible changes in the distribution of cover types by the year 2020. The table below is broken down by cover type aggregates. Referring to the PART 1 "forest plan" allocation and your "most likely" allocation of lands Not Available for Harvest, please write the symbol corresponding with whether you believe the cover type will:

++	increase a lot
+ .	increase a little
0	stay the same
-	decrease a little
	decrease a lot

Cover Type	Not Available for Harvest
Aspen-birch	
Jack pine	
Red-white pine	
Upland spruce-fir	
Oak-hickory	
Maple-beech-birch	
Lowland hardwoods	
Lowland conifers	
Nonstocked	

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, etc.) that you think will affect management of your forest in the future? Please relate the trends in these practices to cover types, if appropriate. If you have other comments on public or private management trends relative to long-term timber supply or demand, please share them with us.

## PART 4

Finally, we are interested in obtaining some personal information regarding your work experience.

1. What is your current position (e.g., district ranger)?

2. How many years have you been at this location?

3. How many years of professional land management experience do you have?

Thank you for your participation! Please return this questionnaire in the envelope provided.

The forest plan data for the Chippewa National Forest were aggregated into three categories as follows:

- Available for Harvest (479,032 acres)--These are lands actively managed for timber and/or are available for timber harvest to meet projected future demands. On national forests, they are <u>lands suitable</u> for timber production and are often identified by Land Suitability Class (LSC) 500 in your forest's database.
- Not Available for Harvest (108,903 acres)--These are reserved lands and are not available for harvest in the future. On national forests, they are lands not suited for timber production; they are often identified by LSC's 100, 200, 300, 700, 800, and 900. Examples include areas of water, nonforested lands, lands not physically suitable, wilderness, etc.
- Other Lands (73,226 acres) These are <u>lands tentatively suitable for timber production</u>. These lands may in the future become Available or Not Available for Timber Harvest. On national forests, they are often identified by LSC 600.

These three categories sum to the total acreage of 661,161 owned by the Chippewa National Forest. The chart below shows the distribution of these categories as a percentage of the total area.



We are interested in obtaining your opinion about the ways the allocation of land in these three categories may change by the year 2020. Please complete the table below for each category by filling in its smallest probable allocation by the year 2020, its largest probable allocation by the year 2020, and its most likely allocation by the year 2020.

Category	% Allocation in Plan	SMALLEST Probable % Allocation in 2020	LARGEST Probable % Allocation in 2020	MOST LIKELY % Allocation in 2020
Available for Harvest	72.5			
Not Available for Harvest	16.5			
Other Lands	11.1			
Total	100.0			100.0

## PART 2

We would also like to know which factors you feel are affecting the allocations of national forest land. These factors may play a role individually or cumulatively in changing the availability of public lands for timber harvesting.

In PART 1, you identified a change from the current lands Available for Harvest to your "most likely" future estimate. What 3 factors do you think are most important in causing this change? Be as specific as possible and indicate how each factor will affect availability.

#1	
#2	
#3	

# PART 3

We are also concerned about possible changes in the distribution of cover types by the year 2020. The table below is broken down by cover type aggregates. Referring to the PART 1 "forest plan" allocation and your "most likely" allocation of lands Not Available for Harvest, please write the symbol corresponding with whether you believe the cover type will:

2

++	increase	8	lot	
				٠

- + increase a little
- 0 stay the same
- decrease a little
- -- decrease a lot

Cover Type	Not Available for Harvest
Aspen-birch	
Jack pine	
Red-white pine	
Upland spruce-fir	
Oak-hickory	
Maple-beech-birch	
Lowland hardwoods	
Lowland conifers	
Nonstocked	

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, etc.) that you think will affect management of your forest in the future? Please relate the trends in these practices to cover types, if appropriate. If you have other comments on public or private management trends relative to long-term timber supply or demand, please share them with us.

# PART 4

Finally, we are interested in obtaining some personal information regarding your work experience.

1. What is your current position (e.g., district ranger)?

2. How many years have you been at this location?

3. How many years of professional land management experience do you have?

Thank you for your participation! Please return this questionnaire in the envelope provided.

Appendix A.2. Michigan DNR letter of endorsement and questionaire.

# MICHIGAN DEPARTMENT OF NATURAL RESOURCES

# INTEROFFICE COMMUNICATION

May 18, 1994

- TO: Forest Management and Wildlife Division Participants
- FROM: Gerald J. Thiede, Chief, Forest Management Division George Burgoyne, Chief, Wildlife Division

# SUBJECT: TIMBERLAND AVAILABILITY SURVEY

We want to encourage you to complete the enclosed questionnaire. It was developed by Larry Leefers (MSU), Sigrid Resh (MSU), and Mike Vasievich (USDA-Forest Service) with feedback from our Divisions' Lansing and field staffs. Your responses should reflect your <u>personal views</u> about the direction of state forest management.

Survey results will be used as part of a timber supply and demand analysis for the Lake States. Your expert opinions will help define the current and future timberland base used in the analysis and factors affecting land use changes (e.g., allocations for old growth, creation of buffers, etc). By combining your views with others in the public and private sectors, these researchers will help us examine the roles of federal, state, county, and private lands in forest management.

Thank you for assisting on this project.

Girig consider 37 3.

GJT:GB:wbs enclosure



Timberland Availability Assessment

## PART 1

We are interested in obtaining some personal information regarding your work experience.

- 1. What is the title of your current position (e.g., area forester)?
- 2. How many years have you been at this location?
- 3. How many years of professional land management experience do you have?

## PART 2

This part of the questionnaire is to determine the location and acreage of forest land for which your office is responsible.

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What is the total forest area your office manages (as reflected on the map above)?

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Appendix A.2 (cont'd).

#### PART 3

For this study, we are considering three broad categories of forest land as follows:

- Available for harvest: These lands are actively managed for timber production and are now available or will be available for timber harvesting in the future to meet forest product demands. These lands are not restricted from harvesting and represent the active timber production base. In some cases, these lands may include old growth and buffers where silvicultural treatments are allowed, or other areas of partial harvests.
- Not Available for Harvest: These lands are withdrawn from timber harvest by law or policy. They are not currently available for harvest, and you expect them to be unavailable in the future for physical, biological, or social reasons. They may be officially designated or otherwise considered to be unacceptable for timber harvesting operations. Timber harvesting on these lands is considered to be an incompatible land use. Some examples may include areas of water, nonforested lands and maintained openings, natural areas, buffers, state natural and wild river corridors, old growth reserves and wetlands where silvicultural treatments are not allowed, roads, leased lands (e.g., oil and gas well sites), and areas where harvesting is physically limited (i.e., inaccessible or inoperable sites).
- Other Lands: These lands are tentatively suitable for timber production but are not currently needed or used for timber harvesting. These lands may be considered to be available or unavailable in the future, but they are not now officially or unofficially designated as active timber lands needed to meet timber program goals or included in any special reserve category. In some cases, these lands are not in the active timberland base because of pending studies or environmental assessments, or have not been specifically classified in forest plans. Some of these areas may be less efficient due to uneconomic tract size, low stocking or other factors, but they may become available if the economic conditions change.

#### Please complete the table below.

**Column A:** Using the above descriptions as a guide, please provide us with your best estimate of the current allocation of the area of forest land you answered in PART 2. Write your estimates as a percent in Column A in the table below. The percentages you specify for the three categories in Column A must sum to 100 percent.

**Column B:** We are interested in your opinion about how the distribution of land in the three categories may change by the year 2020. Please give us your best estimate of the future "most likely" allocations for each of the three categories in Column B. The percentages you specify for the three categories in Column B must also sum to 100 percent.

Column C: We are also interested in your estimate of the range that might reasonably be expected for each of the three categories in the year 2020. Please enter your estimate of the smallest and largest possible percents for each category in Column C. This range should bracket your answer in Column B. Please note that the largest percent in Available for Harvest plus the smallest percents in the two remaining categories must not exceed 100 percent (e.g., if the maximum available were 90%, then the sum of the smallest percents of the remaining categories must be 10% or less).

	Column A	Column B	Column C
Forest Land Category	CURRENT allocation (percent)	MOST LIKELY allocation in 2020 (percent)	Smallest to largest RANGE of possible allocations in 2020 (percent)
Available For Harvest			to
Not Available for Harvest			to
Other Lands			to
	100	100	

## PART 4

We would also like to know which factors you feel are affecting the allocations of your forest land. These factors may play a role individually or cumulatively in changing the area "most likely" to be Available for Harvest. What 3 factors do you think are most important in causing this change or in maintaining the current allocation? Be as specific as possible and indicate how each factor will affect availability.

#1			
#2			
#3			

## PART 5

We are also concerned about possible changes in the distribution of cover types on lands not available for timber production. An increase in a cover type may occur, for example, because more lands with this cover type are becoming unavailable for harvest. Conversely, a decrease in a cover type may occur, for example, because more lands with this cover type are becoming available for timber production. The table below is broken down by cover type aggregates. Referring to your current allocation estimates from PART 3 and your "most likely" allocation of lands to the Not Available for Harvest category, please write the symbol corresponding with whether you believe the cover type will:

+ + Increase a loc	l
--------------------	---

- + increase a little
- 0 stay the same
- decrease a little<sup>2</sup>
- -- decrease a lot

Cover Type	Not Available for Harvest
Aspen-birch	
Jack pine	
Red-white pine	
Upland spruce-fir	
Oak-hickory	
Maple-beech-birch	
Lowland hardwoods	
Lowland conifers	
Nonstocked	

 $<sup>\</sup>frac{1}{2}$  "Increase" means lands would be put into the Not Available for Harvest category.

<sup>&</sup>lt;sup>2</sup> "Decrease" means lands would be taken out of the Not Available for Harvest category.

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, and other treatments that affect yields, species, and timing of harvests) that you think will affect management of state forests in the future? Please relate the trends in these practices to cover types, if appropriate.

If you have other comments on public or private management trends relative to long-term timber availability or demand, please share them with us.

Thank you for your participation! Please return this questionnaire in the envelope provided.

# Appendix A.3. Minnesota DNR letter of endorsement and questionnaires.



Michigan State University (MSU) and the U.S. Forest Service (USFS) are studying trends in the availability of timberlands for harvest. Timberland availability is one factor that will influence future timber supply.

I encourage you to complete and return the enclosed questionnaire. It was developed by Larry Leefers (MSU), Sigrid Resh (MSU), and Mike Vasievich (USFS). Your responses should reflect your <u>personal views</u> about trends in the classification and management of state forest lands.

Survey results will be used as part of a timber supply and demand analysis for the Lake States. Your expert opinion will help define the current and future timberland availability based on land classification changes (e.g., allocation for old growth, creation of buffers, etc.). By combining your views with those of other public and private sector land managers, these researchers will help us examine the roles of federal, state, county, and private lands in forest management.

Thank you for assisting on this project.

# **Timberland** Availability Assessment

#### PART 1

We are interested in obtaining some personal information regarding your work experience.

1. What is the title of the position you held prior to reorganization (e.g., area forester)?

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2. How many years had you been in that position? \_\_\_\_\_

3. How many years of professional land management experience do you have?

## PART 2

This part of the questionnaire is to determine the location and acreage of forest land for which your office is responsible.



What is the total acreage of state-administered forest land your office managed (as reflected on the map above)? Include all state-administered forested lands regardless of administrative designation (e.g., state forest, state park, state wildlife area). acres of state land

#### PART 3

For this study, we are considering three broad categories of forest land as follows:

- Available for Harvest: These lands are actively managed for timber production and are now available or will be available for timber harvesting in the future to meet forest product demands. These lands are not restricted from harvesting and represent the active timber production base. In some cases, these lands may include old growth and buffers where silvicultural treatments are allowed, or other areas of partial harvests.
- Not Available for Harvest: These lands are withdrawn from timber harvest by law or policy. They are not currently available for harvest, and you expect them to be unavailable in the future for physical, biological, or social reasons. They may be officially designated or otherwise considered to be unacceptable for timber harvesting operations. Timber harvesting on these lands is considered to be an incompatible land use. Some examples may include areas of water, nonforested lands and maintained openings, natural areas, buffers, state natural and wild river corridors, old growth reserves and wetlands where silvicultural treatments are not allowed, roads, leased lands (e.g., oil and gas well sites).
- Other Lands: These lands are tentatively suitable for timber production but are not currently needed or used for timber harvesting. These lands may be considered to be available or unavailable in the future, but they are not now officially or unofficially designated as active timber lands needed to meet timber program goals or included in any special reserve category. In some cases, these lands are not in the active timberland base because of pending studies or environmental assessments, or have not been specifically classified in forest plans. Some of these areas may be less efficient due to uneconomic tract size, low stocking or other factors, but they may become available if the economic conditions change.

#### Please complete the table below.

**Column A:** Using the above descriptions as a guide, please provide us with your best estimate of the current allocation of the area of forest land you answered in PART 2. Write your estimates as a percent in Column A in the table below. The percentages you specify for the three categories in Column A must sum to 100 percent.

**Column B:** We are interested in your opinion about how the distribution of land in the three categories may change by the year 2020. Please give us your best estimate of the future "most likely" allocations for each of the three categories in Column B. The percentages you specify for the three categories in Column B must also sum to 100 percent.

**Column C:** We are also interested in your estimate of the range that might reasonably be expected for each of the three categories in the year 2020. Please enter your estimate of the smallest and largest possible percents for each category in Column C. This range should bracket your answer in Column B. Please note that the largest percent in Available for Harvest plus the smallest percents in the two remaining categories must not exceed 100 percent (e.g., if the maximum available were 90%, then the sum of the smallest percents of the remaining categories must be 10% or less).

	Column A	Column B	Column C
Forest Land Category	CURRENT allocation (percent)	MOST LIKELY allocation in 2020 (percent)	Smallest to largest RANGE of possible allocations in 2020 (percent)
Available For Harvest			to
Not Available for Harvest			to
Other Lands			to
	100	100	

#### Please complete this table for the forest lands in your area prior to reorganization.

## PART 4

We would also like to know which factors you feel are affecting the allocations of your forest land. These factors may play a role individually or cumulatively in changing the area "most likely" to be Available for Harvest. What 3 factors do you think are most important in causing this change or in maintaining the current allocation? Be as specific as possible and indicate how each factor will affect availability.

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## PART 5

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We are also concerned about possible changes in the distribution of cover types on lands not available for timber production. An increase in a cover type may occur, for example, because more lands with this cover type are becoming unavailable for harvest. Conversely, a decrease in a cover type may occur, for example, because more lands with this cover type are becoming available for timber production. The table below is broken down by cover type aggregates. Referring to your current allocation estimates from PART 3 and your "most likely" allocation of lands to the Not Available for Harvest category, please write the symbol corresponding with whether you believe the cover type will:

increase a lot <sup>1</sup>	Cover Type	Not Available for Harvest
increase a little	Aspen-birch	
stay the same	Jack pine	
decrease a little <sup>2</sup>	Red-white pine	
decrease a lot	Upland spruce-fir	
	Oak-hickory	
	Maple-beech-birch	
	Lowland hardwoods	
	Lowland conifers	
	Nonstocked	

<sup>&</sup>lt;sup>1</sup> "Increase" means lands would be put into the Not Available for Harvest category.

<sup>&</sup>lt;sup>2</sup> "Decrease" means lands would be taken out of the Not Available for Harvest category.

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, and other treatments that affect yields, species, and timing of harvests) that you think will affect management of state forests in the future? Please relate the trends in these practices to cover types, if appropriate.

If you have other comments on public or private management trends relative to long-term timber availability or demand, please share them with us.

Thank you for your participation! Please return this questionnaire in the envelope provided.

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# Timberland Availability Assessment

## PART 1

We are interested in obtaining some personal information regarding your work experience.

1. What is the title of your current position?

2. How many years have you been at this location?

3. How many years of professional land management experience do you have?

## PART 2

This part of the questionnaire is to determine the location and acreage of forest land for which your office is responsible.



What is the total acreage of state-administered forest land your office manages (as reflected on the map above)? Include all state-administered forested land regardless of administrative designation (e.g., stateforest, state park, state wildlife area).

1

\_\_\_\_\_acres of state land

## PART 3

For this study, we are considering three broad categories of forest land as follows:

- Available for Harvest: These lands are actively managed for timber production and are now available or will be available for timber harvesting in the future to meet forest product demands. These lands are not restricted from harvesting and represent the active timber production base. In some cases, these lands may include old growth and buffers where silvicultural treatments are allowed, or other areas of partial harvests.
- Not Available for Harvest: These lands are withdrawn from timber harvest by law or policy. They are not currently available for harvest, and you expect them to be unavailable in the future for physical, biological, or social reasons. They may be officially designated or otherwise considered to be unacceptable for timber harvesting operations. Timber harvesting on these lands is considered to be an incompatible land use. Some examples may include areas of water, nonforested lands and maintained openings, natural areas, buffers, state natural and wild river corridors, old growth reserves and wetlands where silvicultural treatments are not allowed, roads, leased lands (e.g., oil and gas well sites).
- Other Lands: These lands are tentatively suitable for timber production but are not currently needed or used for timber harvesting. These lands may be considered to be available or unavailable in the future, but they are not now officially or unofficially designated as active timber lands needed to meet timber program goals or included in any special reserve category. In some cases, these lands are not in the active timberland base because of pending studies or environmental assessments, or have not been specifically classified in forest plans. Some of these areas may be less efficient due to uneconomic tract size, low stocking or other factors, but they may become available if the economic conditions change.

## Please complete the table below.

**Column A:** Using the above descriptions as a guide, please provide us with your best estimate of the current allocation of the area of forest land you answered in PART 2. Write your estimates as a percent in Column A in the table below. The percentages you specify for the three categories in Column A must sum to 100 percent.

Column B: We are interested in your opinion about how the distribution of land in the three categories may change by the year 2020. Please give us your best estimate of the future "most likely" allocations for each of the three categories in Column B. The percentages you specify for the three categories in Column B must also sum to 100 percent.

Column C: We are also interested in your estimate of the range that might reasonably be expected for each of the three categories in the year 2020. Please enter your estimate of the smallest and largest possible percents for each category in Column C. This range should bracket your answer in Column B. Please note that the largest percent in Available for Harvest plus the smallest percents in the two remaining categories must not exceed 100 percent (e.g., if the maximum available were 90%, then the sum of the smallest percents of the remaining categories must be 10% or less).

	Column A	Column B	Column C
Forest Land Category	CURRENT allocation (percent)	MOST LIKELY allocation in 2020 (percent)	Smallest to largest RANGE of possible allocations in 2020 (percent)
Available For Harvest			to
Not Available for Harvest			to
Other Lands			to
	100	100	

## PART 4

We would also like to know which factors you feel are affecting the allocations of your forest land. These factors may play a role individually or cumulatively in changing the area "most likely" to be Available for Harvest. What 3 factors do you think are most important in causing this change or in maintaining the current allocation? Be as specific as possible and indicate how each factor will affect availability.

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# PART 5

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We are also concerned about possible changes in the distribution of cover types on lands not available for timber production. An increase in a cover type may occur, for example, because more lands with this cover type are becoming unavailable for harvest. Conversely, a decrease in a cover type may occur, for example, because more lands with this cover type are becoming available for timber production. The table below is broken down by cover type aggregates. Referring to your current allocation estimates from PART 3 and your "most likely" allocation of lands to the Not Available for Harvest category, please write the symbol corresponding with whether you believe the cover type will:

increase a lot <sup>1</sup>	Cover Type	Not Available for Harvest
increase a little	Aspen-birch	
stay the same	Jack pine	
decrease a little <sup>2</sup>	Red-white pine	
decrease a lot	Upland spruce-fir	
	Oak-hickory	
	Maple-beech-birch	
	Lowland hardwoods	
	Lowland conifers	
	Nonstocked	

<sup>&</sup>lt;sup>1</sup> "Increase" means lands would be put into the Not Available for Harvest category.

<sup>&</sup>lt;sup>2</sup> "Decrease" means lands would be taken out of the Not Available for Harvest category.

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, and other treatments that affect yields, species, and timing of harvests) that you think will affect management of state forests in the future? Please relate the trends in these practices to cover types, if appropriate.

If you have other comments on public or private management trends relative to long-term timber availability or demand, please share them with us.

Thank you for your participation! Please return this questionnaire in the envelope provided.

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# Appendix A.4. Wisconsin DNR letter of endorsement and questionnaire.

## **CORRESPONDENCE/MEMORANDUM** -

State of Wisconsin

DATE: June 10, 1994

TO: Forestry and Wildlife Participants

FROM: Charlie Higgs, Director, Bureau of Forestry Charlie Tom Hauge, Director, Bureau of Wildlife Management

SUBJECT: TIMBERLAND AVAILABILITY SURVEY

We want to encourage you to complete the enclosed questionnaire. It was developed by Larry Leefers and Sigrid Resh from Michigan State University and Mike Vasievich with the USDA Forest Service. Your responses should reflect your <u>personal views</u> about the direction of Wisconsin forest management.

Survey results will be used as part of a timber supply and demand analysis for the Lake States. Your expert opinions will help define the current and future timberland base used in the analysis and factors affecting land use changes (eg. allocations for old growth, creation of buffers, etc.). By combining your views with others in the public and private sectors, these researchers will help us examine the roles of federal, state, county and private lands in forest management.

Thank you for assisting on this project.

Enclosures





## PART 1

We are interested in obtaining some personal information regarding your work experience.

1. What is the title of your current position (e.g., area forester)?

2. How many years have you been at this location?

3. How many years of professional land management experience do you have?

## PART 2

This part of the questionnaire is to determine the location and acreage of forest land for which your office is responsible.

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What is the total forest area your office manages (as reflected on the map above)?

acres of state land

## PART 3

For this study, we are considering three broad categories of forest land as follows:

- Available for Harvest: These lands are actively managed for timber production and are now available or will be available for timber harvesting in the future to meet forest product demands. These lands are not restricted from harvesting and represent the active timber production base. In some cases, these lands may include old growth and buffers where silvicultural treatments are allowed, or other areas of partial harvests.
- Not Available for Harvest: These lands are withdrawn from timber harvest by law or policy. They are not currently available for harvest, and you expect them to be unavailable in the future for physical, biological, or social reasons. They may be officially designated or otherwise considered to be unacceptable for timber harvesting operations. Timber harvesting on these lands is considered to be an incompatible land use. Some examples may include areas of water, nonforested lands and maintained openings, natural areas, buffers, state natural and wild river corridors, old growth reserves and wetlands where silvicultural treatments are not allowed, roads, leased lands (e.g., oil and gas well sites), and areas where harvesting is physically limited (i.e., inaccessible or inoperable sites).
- Other Lands: These lands are tentatively suitable for timber production but are not currently needed or used for timber harvesting. These lands may be considered to be available or unavailable in the future, but they are not now officially or unofficially designated as active timber lands needed to meet timber program goals or included in any special reserve category. In some cases, these lands are not in the active timberland base because of pending studies or environmental assessments, or have not been specifically classified in forest plans. Some of these areas may be less efficient due to uneconomic tract size, low stocking or other factors, but they may become available if the economic conditions change.

#### Please complete the table below.

**Column A:** Using the above descriptions as a guide, please provide us with your best estimate of the current allocation of the area of forest land you answered in PART 2. Write your estimates as a percent in Column A in the table below. The percentages you specify for the three categories in Column A must sum to 100 percent.

**Column B:** We are interested in your opinion about how the distribution of land in the three categories may change by the year 2020. Please give us your best estimate of the future "most likely" allocations for each of the three categories in Column B. The percentages you specify for the three categories in Column B must also sum to 100 percent.

Column C: We are also interested in your estimate of the range that might reasonably be expected for each of the three categories in the year 2020. Please enter your estimate of the smallest and largest possible percents for each category in Column C. This range should bracket your answer in Column B. Please note that the largest percent in Available for Harvest plus the smallest percents in the two remaining categories must not exceed 100 percent (e.g., if the maximum available were 90%, then the sum of the smallest percents of the remaining categories must be 10% or less).

	Column A	Column B	Column C
Forest Land Category	CURRENT allocation (percent)	MOST LIKELY allocation in 2020 (percent)	Smallest to largest RANGE of possible allocations in 2020 (percent)
Available for Harvest			to
Not Available for Harvest			to
Other Lands			to
	100	100	

## PART 4

We would also like to know which factors you feel are affecting the future allocations of your forest land. These factors may play a role individually or cumulatively in changing the area "most likely" to be **Available for Harvest**. What **3 factors** do you think are most important in causing this change or in maintaining the current allocation? Be as specific as possible and indicate how each factor will affect availability.

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# PART 5

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We are also concerned about possible changes in the distribution of cover types on lands not available for timber production. An increase in a cover type may occur, for example, because more lands with this cover type are becoming unavailable for harvest. Conversely, a decrease in a cover type may occur, for example, because more lands with this cover type are becoming available for timber production. The table below is broken down by cover type aggregates. Referring to your current allocation estimates from PART 3 and your "most likely" allocation of lands to the Not Available for Harvest category, please write the symbol corresponding with whether you believe the cover type will:

increase a lot <sup>1</sup>	Cover Type	Not Available for Harvest
increase a little	Aspen-birch	
stay the same	Jack pine	
decrease a little <sup>2</sup>	Red-white pine	
decrease a lot	Upland spruce-fir	
	Oak-hickory	
	Maple-beech-birch	
	Lowland hardwoods	
	Lowland conifers	
	Nonstocked	

<sup>&</sup>lt;sup>1</sup> "Increase" means lands would be put into the Not Available for Harvest category.

<sup>&</sup>lt;sup>2</sup> "Decrease" means lands would be taken out of the Not Available for Harvest category.

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, and other treatments that affect yields, species, and timing of harvests) that you think will affect management of state forests in the future? Please relate the trends in these practices to cover types, if appropriate.

If you have other comments on public or private management trends relative to long-term timber availability or demand, please share them with us.

Thank you for your participation! Please return this questionnaire in the envelope provided.

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Appendix A.5. Minnesota county questionnaire.

# **Timberland** Availability Assessment

## PART 1

We are interested in obtaining some personal information regarding your work experience.

- 1. What is the title of your current position?
- 2. How many years have you been at this location?
- 3. How many years of professional land management experience do you have?

## PART 2

This part of the questionnaire is to determine the location and acreage of forest land for which your office is responsible.



What is the total forest area your office manages (as reflected on the map above)? acres of county land

### PART 3

For this study, we are considering three broad categories of forest land as follows:

- Available for harvest: These lands are actively managed for timber production and are now available or will be available for timber harvesting in the future to meet forest product demands. These lands are not restricted from harvesting and represent the active timber production base. In some cases, these lands may include old growth and buffers where silvicultural treatments are allowed, or other areas of partial harvests.
- Not Available for Harvest: These lands are withdrawn from timber harvest by law or policy. They are not currently available for harvest, and you expect them to be unavailable in the future for physical, biological, or social reasons. They may be officially designated or otherwise considered to be unacceptable for timber harvesting operations. Timber harvesting on these lands is considered to be an incompatible land use. Some examples may include areas of water, nonforested lands and maintained openings, natural areas, buffers, natural and wild river corridors, old growth reserves and wetlands where silvicultural treatments are not allowed, roads, leased lands (e.g., oil and gas well sites), and areas where harvesting is physically limited (i.e., inaccessible or inoperable sites).
- Other Lands: These lands are tentatively suitable for timber production but are not currently needed or used for timber harvesting. These lands may be considered to be available or unavailable in the future, but they are not now officially or unofficially designated as active timber lands needed to meet timber program goals or included in any special reserve category. In some cases, these lands are not in the active timberland base because of pending studies or environmental assessments, or have not been specifically classified in forest plans. Some of these areas may be less efficient due to uneconomic tract size, low stocking or other factors, but they may become available if the economic conditions change.

#### Please complete the table below.

**Column A:** Using the above descriptions as a guide, please provide us with your best estimate of the current allocation of the area of forest land you answered in PART 2. Write your estimates as a percent in Column A in the table below. The percentages you specify for the three categories in Column A must sum to 100 percent.

**Column B:** We are interested in your opinion about how the distribution of land in the three categories may change by the year 2020. Please give us your best estimate of the future "most likely" allocations for each of the three categories in Column B. The percentages you specify for the three categories in Column B must also sum to 100 percent.

Column C: We are also interested in your estimate of the range that might reasonably be expected for each of the three categories in the year 2020. Please enter your estimate of the smallest and largest possible percents for each category in Column C. This range should bracket your answer in Column B. Please note that the largest percent in Available for Harvest plus the smallest percents in the two remaining categories must not exceed 100 percent (e.g., if the maximum available were 90%, then the sum of the smallest percents of the remaining categories must be 10% or less).

	Column A	Column B	Column C
Forest Land Category	CURRENT allocation (percent)	MOST LIKELY allocation in 2020 (percent)	Smallest to largest RANGE of possible allocations in 2020 (percent)
Available For Harvest			to
Not Available for Harvest			to
Other Lands			to
	100	100	

## PART 4

We would also like to know which factors you feel are affecting the allocations of your forest land. These factors may play a role individually or cumulatively in changing the area "most likely" to be Available for Harvest. What 3 factors do you think are most important in causing this change or in maintaining the current allocation? Be as specific as possible and indicate how each factor will affect availability.

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#1	 	
#2		
#3		

## PART 5

We are also concerned about possible changes in the distribution of cover types on lands not available for timber production. An increase in a cover type may occur, for example, because more lands with this cover type are becoming unavailable for harvest. Conversely, a decrease in a cover type may occur, for example, because more lands with this cover type are becoming available for timber production. The table below is broken down by cover type aggregates. Referring to your current allocation estimates from PART 3 and your "most likely" allocation of lands to the Not Available for Harvest category, please write the symbol corresponding with whether you believe the cover type will:

++	increase a lot <sup>1</sup>	Cover Type	Not Available for Harvest
+	increase a little	Aspen-birch	
0	stay the same	Jack pine	
•	decrease a little <sup>2</sup>	Red-white pine	
• •	decrease a lot	Upland spruce-fir	
·		Oak-hickory	
		Maple-beech-birch	
		Lowiand hardwoods	
		Lowland conifers	
		Nonstocked	

<sup>&</sup>lt;sup>1</sup> "Increase" means lands would be put into the Not Available for Harvest category.

3

<sup>&</sup>lt;sup>2</sup> "Decrease" means lands would be taken out of the Not Available for Harvest category.

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, and other treatments that affect yields, species, and timing of harvests) that you think will affect management of county forests in the future? Please relate the trends in these practices to cover types, if appropriate.

If you have other comments on public or private management trends relative to long-term timber availability or demand, please share them with us.

Thank you for your participation! Please return this questionnaire in the envelope provided.

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Appendix A.6. Wisconsin county questionnaire.

# Timberland Availability Assessment



## PART 1

We are interested in obtaining some personal information regarding your work experience.

1. What is the title of your current position? \_\_\_\_

2. How many years have you been at this location?

3. How many years of professional land management experience do you have?

## PART 2

This part of the questionnaire is to determine the location and acreage of forest land for which your office is responsible.



What is the total forest area your office manages (as reflected on the map above)? acres of county land

## PART 3

For this study, we are considering three broad categories of forest land as follows:

- Available for Harvest: These lands are actively managed for timber production and are now available or will be available for timber harvesting in the future to meet forest product demands. These lands are not restricted from harvesting and represent the active timber production base. In some cases, these lands may include old growth and buffers where silvicultural treatments are allowed, or other areas of partial harvests.
- Not Available for Harvest: These lands are withdrawn from timber harvest by law or policy. They are not currently available for harvest; and you expect them to be unavailable in the future for physical, biological, or social reasons. They may be officially designated or otherwise considered to be unacceptable for timber harvesting operations. Timber harvesting on these lands is considered to be an incompatible land use. Some examples may include areas of water, nonforested lands and maintained openings, natural areas, buffers, natural and wild river corridors, old growth reserves and wetlands where silvicultural treatments are not allowed, roads, leased lands (e.g., oil and gas well sites), and areas where harvesting is physically limited (i.e., inaccessible or inoperable sites).
- Other Lands: These lands are tentatively suitable for timber production but are not currently needed or used for timber harvesting. These lands may be considered to be available or unavailable in the future, but they are not now officially or unofficially designated as active timber lands needed to meet timber program goals or included in any special reserve category. In some cases, these lands are not in the active timberland base because of pending studies or environmental assessments, or have not been specifically classified in forest plans. Some of these areas may be less efficient due to uneconomic tract size, low stocking or other factors, but they may become available if the economic conditions change.

#### Please complete the table below.

Column A: Using the above descriptions as a guide, please provide us with your best estimate of the current allocation of the area of forest land you answered in PART 2. Write your estimates as a percent in Column A in the table below. The percentages you specify for the three categories in Column A must sum to 100 percent.

**Column B:** We are interested in your opinion about how the distribution of land in the three categories may change by the year 2020. Please give us your best estimate of the future "most likely" allocations for each of the three categories in Column B. The percentages you specify for the three categories in Column B must also sum to 100 percent.

**Column C:** We are also interested in your estimate of the range that might reasonably be expected for each of the three categories in the year 2020. Please enter your estimate of the smallest and largest possible percents for each category in Column C. This range should bracket your answer in Column B. Please note that the largest percent in Available for Harvest plus the smallest percents in the two remaining categories must not exceed 100 percent (e.g., if the maximum available were 90%, then the sum of the smallest percents of the remaining categories must be 10% or less).

	Column A	Column B	Column C
Forest Land Category	CURRENT allocation (percent)	MOST LIKELY allocation in 2020 (percent)	Smallest to largest RANGE of possible allocations in 2020 (percent)
Available for Harvest			to
Not Available for Harvest			to
Other Lands			to
	100	100	
# PART 4

We would also like to know which factors you feel are affecting the allocations of your forest land. These factors may play a role individually or cumulatively in changing the area "most likely" to be Available for Harvest. What 3 factors do you think are most important in causing this change or in maintaining the current allocation? Be as specific as possible and indicate how each factor will affect availability.

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#3		

## PART 5

We are also concerned about possible changes in the distribution of cover types on lands not available for timber production. An increase in a cover type may occur, for example, because more lands with this cover type are becoming unavailable for harvest. Conversely, a decrease in a cover type may occur, for example, because more lands with this cover type are becoming available for timber production. The table below is broken down by cover type aggregates. Referring to your current allocation estimates from PART 3 and your "most likely" allocation of lands to the Not Available for Harvest category, please write the symbol corresponding with whether you believe the cover type will:

++	increase a lot <sup>1</sup>	Cover Type	Not Available for Harvest
+	increase a little	Aspen-birch	
0	stay the same	Jack pine	-
-	decrease a little <sup>2</sup>	Red-white pine	
	decrease a lot	Upland spruce-fir	
		Oak-hickory	
•		Maple-beech-birch	
		Lowland hardwoods	
		Lowland conifers	
		Nonstocked	

<sup>&</sup>lt;sup>1</sup> "Increase" means lands would be put into the Not Available for Harvest category.

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<sup>&</sup>lt;sup>2</sup> "Decrease" means lands would be taken out of the Not Available for Harvest category.

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, and other treatments that affect yields, species, and timing of harvests) that you think will affect management of county forests in the future? Please relate the trends in these practices to cover types, if appropriate.

If you have other comments on public or private management trends relative to long-term timber availability or demand, please share them with us.

Thank you for your participation! Please return this questionnaire in the envelope provided.

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# Appendix A.7. Michigan forest industry and NIPF questionnaires.

# Forest Industry Fee and Leased Lands





# **PART 1-BACKGROUND INFORMATION**

We are interested in obtaining some personal information regarding your work experience.

- 1. What is the title of your current position?
- 2. How many years have you been at this location?
- 3. How many years of professional land management experience do you have?

## PART 2-LOCATION OF LANDS

This part of the questionnaire is to determine the location and acreage of forest industry fee and leased lands which you manage.



What is the total area you or your company manage(s) in your state (as indicated on the map above)? acres of forest industry fee and leased lands

## PART 3-DEFINITIONS USED IN QUESTIONNAIRE and LAND ALLOCATIONS

For this study, we are considering three broad categories of forest land as follows:

- Available for Harvest: These lands are actively managed for timber production and are now available or will be available for timber harvesting in the future to meet forest product demands. These lands are not restricted from harvesting and represent the active timber production base. In some cases, these lands may include buffers or other areas where partial harvests are allowed.
- Not Available for Harvest: These lands are withdrawn from timber harvest by law, policy, or development. They are not currently available for harvest, and you expect them to be unavailable in the future for physical, biological, or social reasons. They may be designated or otherwise considered to be unacceptable for timber harvesting operations. Timber harvesting on these lands is considered to be an incompatible land use. Some examples may include areas of water, nonforested lands and maintained openings, buffers, wetlands where silvicultural treatments are not allowed, roads, oil and gas well sites, easements, and areas where harvesting is physically limited (i.e., inaccessible or inoperable sites).
- Other Lands: These lands are tentatively suitable for timber production but are not currently needed or used for timber harvesting. These lands may be considered to be available or unavailable in the future, but they are not now designated as active timber lands needed to meet timber program goals or included in any special reserve category. Some of these areas may be less efficient due to uneconomic tract size, low stocking or other factors, but they may become available in the future if the economic conditions change.

#### Please complete the table below for forest industry fee and leased land you manage.

Column A: Using the above descriptions as a guide, please provide us with your best estimate of the current allocation of the area of forest land you answered in part 2. Write your estimates as a percent in Column A in the table below. The percentages you specify for the three categories in Column A must sum to 100 percent.

Column B: How do you believe the distribution of land in the three categories may change by the year 2020? Please give us your best estimate of the future "most likely" allocations for each of the three categories in Column B. The percentages you specify for the three categories in Column B must also sum to 100 percent.

Column C: Please enter your estimate of the smallest and largest possible percents for each category in Column C. This range should bracket your answer in Column B. Please note that the largest percent in Available for Harvest plus the smallest percents in the two remaining categories must not exceed 100 percent (e.g., if the maximum available were 90%, then the sum of the smallest percents of the remaining categories must be 10% or less).

Industry Fee and Leased Lands	Column A	Column B	Column C
Forest Land Category	CURRENT allocation (percent)	MOST LIKELY allocation in 2020 (percent)	Smallest to largest RANGE of possible allocations in 2020 (percent)
Available for Harvest			to
Not Available for Harvest			to
Other Lands			to
	100	100	

## **PART 4--FACTORS AFFECTING LAND ALLOCATIONS**

Which factors you feel are affecting the future allocations of <u>forest industry</u> land you manage? These factors may play a role individually or cumulatively in changing the area "most likely" to be Available for Harvest. What 3 factors do you think are most important in causing this change or in maintaining the current allocation? Be as specific as possible and indicate how each factor will affect availability.

#1	 	 	
#2			
#3			

## PART 5-COVER TYPE DISTRIBUTIONS

How do you believe the future distribution of cover types may change on <u>lands not available for timber</u> <u>production</u>? An increase in a cover type may occur, for example, because more lands with this cover type are becoming unavailable for harvest. Conversely, a decrease in a cover type may occur, for example, because more lands with this cover type are becoming available for timber production. The table below is broken down by cover type aggregates. Referring to your current allocation estimates from PART 3 and your "most likely" allocation of lands to the Not Available for Harvest category, please circle the number corresponding with whether you believe the cover type will increase a lot, increase a little, stay the same, decrease a little, or decrease a lot.

Cover Type		Not Av	ailable for	Harvest	
	increase a lot <sup>1</sup>	increase a little	stay the same	decrease a little <sup>2</sup>	decrease a lot
Aspen-birch	1	2	3	4	5
Jack pine	1	2	3	4	5
Red-white pine	1	2	3	4	5
Upland spruce-fir	1	2	3	4	5
Oak-hickory	1	2	3	4	5
Maple-beech-birch	1	2	3	4	5
Lowland hardwoods	1	2	3	4	5
Lowland conifers	1	2	3	4	5
Nonstocked	1	2	3	4	5

<sup>&</sup>lt;sup>1</sup> "Increase" means lands would be put into the Not Available for Harvest category.

<sup>&</sup>lt;sup>2</sup> "Decrease" means lands would be taken out of the Not Available for Harvest category.

## PART 6-MANAGEMENT TRENDS

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, and other treatments that affect yields, species, and timing of harvests) that you think will affect management of private forest land in the future? Please relate the trends in these practices to cover types, if appropriate.

If you have other comments on private or public management trends relative to long-term timber availability or demand, please share them with us.

#### PART 7-PUBLIC LAND ALLOCATIONS

We would also like to have your opinion about the future availability of **public lands** for timber production. The table below has the average statewide, current Available for Harvest percents from national and state administered forest lands based on results we have <u>compiled to date</u>. Allocations vary by region. Please complete the "FUTURE Available for Harvest allocation in 2020" column for each public land ownership with your best judgment as to what percent of these public lands will be Available for Harvest in the year 2020.

Public Lands in Michigan	CURRENT Available for Harvest allocation (percent)	FUTURE Available for Harvest allocation in 2020 (percent)
National forests	56%	
State forests	75%	

Thank you for your participation! Please return this questionnaire in the postage-paid envelope provided.

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Appendix A.7 (cont'd).

# Consulting/Landowner-Assistance/Procurement/Service Foresters



# Timberland Availability Assessment

## PART 1-BACKGROUND INFORMATION

We are interested in obtaining some personal information regarding your work experience.

- 1. What is the title of your current position?
- 2. How many years have you been at this location?
- 3. How many years of professional land management experience do you have?

## PART 2-LOCATION OF LANDS

This part of the questionnaire is to determine the location and acreage of private forest lands on which you provide technical forestry services or from which you procure timber.



What is the total area for which you or your company provide(s) technical services or from which you procure timber in your state (as indicated on the map above)?

\_\_\_\_\_acres of forest industry fee and leased lands

\_\_\_\_acres of other private lands

#### PART 3-DEFINITIONS USED IN QUESTIONNAIRE and LAND ALLOCATIONS

Nonindustrial Private Forests (NIPF): For the purposes of this study, this is an ownership class of private lands, including farmer owned forest lands, that are not owned or leased by forest industry.

For this study, we are considering three broad categories of forest land as follows:

- Available for Harvest: These lands are actively managed for timber production and are now available or will be available for timber harvesting in the future to meet forest product demands. These lands are not restricted from harvesting and represent the active timber production base. In some cases, these lands may include buffers or other areas where partial harvests are allowed.
- Not Available for Harvest: These lands are withdrawn from timber harvest by law, policy, or development. They are not currently available for harvest, and you expect them to be unavailable in the future for physical, biological, or social reasons. They may be designated or otherwise considered to be unacceptable for timber harvesting operations. Timber harvesting on these lands is considered to be an incompatible land use. Some examples may include areas of water, nonforested lands and maintained openings, buffers, wetlands where silvicultural treatments are not allowed, roads, oil and gas well sites, easements, and areas where harvesting is physically limited (i.e., inaccessible or inoperable sites).
- Other Lands: These lands are tentatively suitable for timber production but are not currently needed or used for timber harvesting. These lands may be considered to be available or unavailable in the future, but they are not now designated as active timber lands needed to meet timber program goals or included in any special reserve category. Some of these areas may be less efficient due to uneconomic tract size, low stocking or other factors, but they may become available in the future if the economic conditions change.

#### Please complete the table below for all nonindustrial private forest (NIPF) land in your area on the map.

Column A: Using the above descriptions as a guide and based on you knowledge of NIPF lands in your area of the state, please provide estimates of how you would currently categorize <u>all NIPF</u> lands (i.e., private lands that are managed for timber production or not) in Column A. Write your estimates as a percent in Column A in the table below. The percentages you specify for the three categories in Column A must sum to 100 percent.

Column B: How do you believe the distribution of land in the three categories may change by the year 2020? Please give us your best estimate of the future "most likely" allocations for each of the three categories in Column B. The percentages you specify for the three categories in Column B must also sum to 100 percent.

Column C: Please enter your estimate of the smallest and largest possible percents for each category in Column C. This range should bracket your answer in Column B. Please note that the largest percent in Available for Harvest plus the smallest percents in the two remaining categories must not exceed 100 percent (e.g., if the maximum available were 90%, then the sum of the smallest percents of the remaining categories must be 10% or less).

Nonindustrial Private Forest Lands	Column A	Column B	Column C
Forest Land Category	CURRENT allocation (percent)	MOST LIKELY allocation in 2020 (percent)	Smallest to largest RANGE of possible allocations in 2020 (percent)
Available for Harvest			to
Not Available for Harvest			to
Other Lands			to
	100	100	

# PART 4--FACTORS AFFECTING LAND ALLOCATIONS

Which factors you feel are affecting the future allocations of <u>NIPF</u> land? These factors may play a role individually or cumulatively in changing the area "most likely" to be **Available for Harvest**. What 3 factors do you think are most important in causing this change or in maintaining the current allocation? Be as specific as possible and indicate how each factor will affect availability.

#1	······································	 	
#2		 	
#3			

## **PART 5--COVER TYPE DISTRIBUTIONS**

How do you believe the future distribution of cover types may change on <u>lands not available for timber</u> <u>production</u>? An increase in a cover type may occur, for example, because more lands with this cover type are becoming unavailable for harvest. Conversely, a decrease in a cover type may occur, for example, because more lands with this cover type are becoming available for timber production. The table below is broken down by cover type aggregates. Referring to your current allocation estimates from PART 3 and your "most likely" allocation of lands to the Not Available for Harvest category, please circle the number corresponding with whether you believe the cover type will increase a lot, increase a little, stay the same, decrease a little, or decrease a lot.

Cover Type	Not Available for Harvest					
	increase a lot <sup>1</sup>	increase a little	stay the same	decrease a little <sup>2</sup>	decrease a lot	
Aspen-birch	1	2	3	4	5	
Jack pine	1	2	3	4	5	
Red-white pine	1	2	3	4	5	
Upland spruce-fir	1	2	3	4	5	
Oak-hickory	1	2	3	4	5	
Maple-beech-birch	1	2	3	4	5	
Lowland hardwoods	1	2	3	4	5	
Lowland conifers	1	2	3	. 4	5	
Nonstocked	1	2	3	4	5	

<sup>&</sup>lt;sup>1</sup> "Increase" means lands would be put into the Not Available for Harvest category.

<sup>&</sup>lt;sup>2</sup> "Decrease" means lands would be taken out of the Not Available for Harvest category.

# PART 6-MANAGEMENT TRENDS

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, and other treatments that affect yields, species, and timing of harvests) that you think will affect management of private forest land in the future? Please relate the trends in these practices to cover types, if appropriate.

If you have other comments on private or public management trends relative to long-term timber availability or demand, please share them with us.

#### PART 7-PUBLIC LAND ALLOCATIONS

We would also like to have your opinion about the future availability of public lands for timber production. The table below has the average statewide, current Available for Harvest percents from national and state administered forest lands based on results we have <u>compiled to date</u>. Allocations vary by region. Please complete the "FUTURE Available for Harvest allocation in 2020" column for each public land ownership with your best judgment as to what percent of these public lands will be Available for Harvest in the year 2020.

Public Lands in Michigan	CURRENT Available for Harvest allocation (percent)	FUTURE Available for Harvest allocation in 2020 (percent)
National forests	56%	
State forests	75%	

Thank you for your participation! Please return this questionnaire in the postage-paid envelope provided.

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# Appendix A.8. Minnesota forest industry and NIPF questionnaires.

# Forest Industry Fee and Leased Lands



## Timberland Availability Assessment

## PART 1-BACKGROUND INFORMATION

We are interested in obtaining some personal information regarding your work experience.

- 1. What is the title of your current position?
- 2. How many years have you been at this location?
- 3. How many years of professional land management experience do you have?

## PART 2-LOCATION OF LANDS

This part of the questionnaire is to determine the location and acreage of forest industry fee and leased lands which you manage.



What is the total area you or your company manage(s) in your state (as indicated on the map above)? acres of forest industry fee and leased lands

## PART 3-DEFINITIONS USED IN QUESTIONNAIRE and LAND ALLOCATIONS For this study, we are considering three broad categories of forest land as follows:

- Available for Harvest: These lands are actively managed for timber production and are now available or will be available for timber harvesting in the future to meet forest product demands. These lands are not restricted from harvesting and represent the active timber production base. In some cases, these lands may include buffers or other areas where partial harvests are allowed.
- Not Available for Harvest: These lands are withdrawn from timber harvest by law, policy, or development. They are not currently available for harvest, and you expect them to be unavailable in the future for physical, biological, or social reasons. They may be designated or otherwise considered to be unacceptable for timber harvesting operations. Timber harvesting on these lands is considered to be an incompatible land use. Some examples may include areas of water, nonforested lands and maintained openings, buffers, wetlands where silvicultural treatments are not allowed, roads, oil and gas well sites, easements, and areas where harvesting is physically limited (i.e., inaccessible or inoperable sites).
- Other Lands: These lands are tentatively suitable for timber production but are not currently needed or used for timber harvesting. These lands may be considered to be available or unavailable in the future, but they are not now designated as active timber lands needed to meet timber program goals or included in any special reserve category. Some of these areas may be less efficient due to uneconomic tract size, low stocking or other factors, but they may become available in the future if the economic conditions change.

#### Please complete the table below for forest industry fee and leased land you manage.

**Column A:** Using the above descriptions as a guide, please provide us with your best estimate of the current allocation of the area of forest land you answered in part 2. Write your estimates as a percent in Column A in the table below. The percentages you specify for the three categories in Column A must sum to 100 percent.

**Column B:** How do you believe the distribution of land in the three categories may change by the year 2020? Please give us your best estimate of the future "most likely" allocations for each of the three categories in Column B. The percentages you specify for the three categories in Column B must also sum to 100 percent.

Column C: Please enter your estimate of the smallest and largest possible percents for each category in Column C. This range should bracket your answer in Column B. Please note that the largest percent in Available for Harvest plus the smallest percents in the two remaining categories must not exceed 100 percent (e.g., if the maximum available were 90%, then the sum of the smallest percents of the remaining categories must be 10% or less).

Industry Fee and Leased Lands	Column A	Column B	Column C
Forest Land Category	CURRENT allocation (percent)	MOST LIKELY allocation in 2020 (percent)	Smallest to largest RANGE of possible allocations in 2020 (percent)
Available for Harvest			to
Not Available for Harvest			to
Other Lands			to
	100	100	

# **PART 4--FACTORS AFFECTING LAND ALLOCATIONS**

Which factors you feel are affecting the future allocations of <u>forest industry</u> land you manage? These factors may play a role individually or cumulatively in changing the area "most likely" to be Available for Harvest. What 3 factors do you think are most important in causing this change or in maintaining the current allocation? Be as specific as possible and indicate how each factor will affect availability.

#1		
#2		
#3	 	

#### **PART 5-COVER TYPE DISTRIBUTIONS**

How do you believe the future distribution of cover types may change on <u>lands not available for timber</u> <u>production</u>? An increase in a cover type may occur, for example, because more lands with this cover type are becoming unavailable for harvest. Conversely, a decrease in a cover type may occur, for example, because more lands with this cover type are becoming available for timber production. The table below is broken down by cover type aggregates. Referring to your current allocation estimates from PART 3 and your "most likely" allocation of lands to the Not Available for Harvest category, please circle the number corresponding with whether you believe the cover type will increase a lot, increase a little, stay the same, decrease a little, or decrease a lot.

Cover Type	Not Available for Harvest				
	increase a lot <sup>1</sup>	increase a little	stay the same	decrease a little <sup>2</sup>	decrease a lot
Aspen-birch	1	2	3	4	5
Jack pine	1	2	3	4	5
Red-white pine	1	2	3	4	5
Upland spruce-fir	1	2	3	4	5
Oak-hickory	1	2	3	4	5
Maple-beech-birch	1	2	3	4	5
Lowland hardwoods	1	2	3	4	5
Lowland conifers	1	2	3	4	5
Nonstocked	1	2	3	4	5

<sup>&</sup>lt;sup>1</sup> "Increase" means lands would be put into the Not Available for Harvest category.

<sup>&</sup>lt;sup>2</sup> "Decrease" means lands would be taken out of the Not Available for Harvest category.

## PART 6-MANAGEMENT TRENDS

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, and other treatments that affect yields, species, and timing of harvests) that you think will affect management of private forest land in the future? Please relate the trends in these practices to cover types, if appropriate.

If you have other comments on private or public management trends relative to long-term timber availability or demand, please share them with us.

#### PART 7-PUBLIC LAND ALLOCATIONS

We would also like to have your opinion about the future availability of **public lands** for timber production. The table below has the average statewide, current Available for Harvest percents from national, state, and county administered forest lands based on results we have <u>compiled to date</u>. Allocations vary by region. Please complete the "FUTURE Available for Harvest allocation in 2020" column for each public land ownership with your best judgment as to what percent of these public lands will be Available for Harvest in the year 2020.

Public Lands in Minnesota	CURRENT Available for Harvest allocation (percent)	FUTURE Available for Harvest allocation in 2020 (percent)
National forests	55%	
State forests	56%	
County forests	85%	

Thank you for your participation! Please return this questionnaire in the postage-paid envelope provided.

## Consulting/Landowner-Assistance/Procurement/Service Foresters



# Timberland Availability Assessment

#### **PART 1-BACKGROUND INFORMATION**

We are interested in obtaining some personal information regarding your work experience.

1. What is the title of your current position?

2. How many years have you been at this location?

3. How many years of professional land management experience do you have?

## PART 2-LOCATION OF LANDS

This part of the questionnaire is to determine the location and acreage of private forest lands on which you provide technical forestry services or from which you procure timber.



What is the total area for which you or your company provide(s) technical services or from which you procure timber in your state (as indicated on the map above)?

\_\_\_\_acres of forest industry fee and leased lands

\_\_\_\_\_acres of other private lands

#### PART 3-DEFINITIONS USED IN QUESTIONNAIRE and LAND ALLOCATIONS

Nonindustrial Private Forests (NIPF): For the purposes of this study, this is an ownership class of private lands, including farmer owned forest lands, that are not owned or leased by forest industry.

For this study, we are considering three broad categories of forest land as follows:

- Available for Harvest: These lands are actively managed for timber production and are now available or will be available for timber harvesting in the future to meet forest product demands. These lands are not restricted from harvesting and represent the active timber production base. In some cases, these lands may include buffers or other areas where partial harvests are allowed.
- Not Available for Harvest: These lands are withdrawn from timber harvest by law, policy, or development. They are not currently available for harvest, and you expect them to be unavailable in the future for physical, biological, or social reasons. They may be designated or otherwise considered to be unacceptable for timber harvesting operations. Timber harvesting on these lands is considered to be an incompatible land use. Some examples may include areas of water, nonforested lands and maintained openings, buffers, wetlands where silvicultural treatments are not allowed, roads, oil and gas well sites, easements, and areas where harvesting is physically limited (i.e., inaccessible or inoperable sites).
- Other Lands: These lands are tentatively suitable for timber production but are not currently needed or used for timber harvesting. These lands may be considered to be available or unavailable in the future, but they are not now designated as active timber lands needed to meet timber program goals or included in any special reserve category. Some of these areas may be less efficient due to uneconomic tract size, low stocking or other factors, but they may become available in the future if the economic conditions change.

#### Please complete the table below for all nonindustrial private forest (NIPF) land in your area on the map.

Column A: Using the above descriptions as a guide and based on you knowledge of NIPF lands in your area of the state, please provide estimates of how you would currently categorize <u>all NIPF</u> lands (i.e., private lands that are managed for timber production or not) in Column A. Write your estimates as a percent in Column A in the table below. The percentages you specify for the three categories in Column A must sum to 100 percent.

**Column B:** How do you believe the distribution of land in the three categories may change by the year 2020? Please give us your best estimate of the future "most likely" allocations for each of the three categories in Column B. The percentages you specify for the three categories in Column B must also sum to 100 percent.

Column C: Please enter your estimate of the smallest and largest possible percents for each category in Column C. This range should bracket your answer in Column B. Please note that the largest percent in Available for Harvest plus the smallest percents in the two remaining categories must not exceed 100 percent (e.g., if the maximum available were 90%, then the sum of the smallest percents of the remaining categories must be 10% or less).

Nonindustrial Private Forest Lands	Column A	Column B	Column C
Forest Land Category	CURRENT allocation (percent)	MOST LIKELY allocation in 2020 (percent)	Smallest to largest RANGE of possible allocations in 2020 (percent)
Available for Harvest			to
Not Available for Harvest			to
Other Lands			to
	100	100	

## **PART 4--FACTORS AFFECTING LAND ALLOCATIONS**

Which factors you feel are affecting the future allocations of <u>NIPF</u> land? These factors may play a role individually or cumulatively in changing the area "most likely" to be Available for Harvest. What 3 factors do you think are most important in causing this change or in maintaining the current allocation? Be as specific as possible and indicate how each factor will affect availability.

#1	 	
#2		
#3		

## PART 5-COVER TYPE DISTRIBUTIONS

How do you believe the future distribution of cover types may change on <u>lands not available for timber</u> <u>production</u>? An increase in a cover type may occur, for example, because more lands with this cover type are becoming unavailable for harvest. Conversely, a decrease in a cover type may occur, for example, because more lands with this cover type are becoming available for timber production. The table below is broken down by cover type aggregates. Referring to your current allocation estimates from PART 3 and your "most likely" allocation of lands to the Not Available for Harvest category, please circle the number corresponding with whether you believe the cover type will increase a lot, increase a little, stay the same, decrease a little, or decrease a lot.

Cover Type	Not Available for Harvest				
	increase a lot <sup>1</sup>	increase a little	stay the same	decrease a little <sup>2</sup>	decrease a lot
Aspen-birch	1	2	3	4	5
Jack pine	1	2	3	4	5
Red-white pine	1	2	3	4	5
Upland spruce-fir	1	2	3	4	5
Oak-hickory	1	2	3	4	5
Maple-beech-birch	1	2	3	4	5
Lowland hardwoods	1	2	3	4	5
Lowland conifers	1	2	3	4	5
Nonstocked	1	2	3	4	5

<sup>&</sup>lt;sup>1</sup> "Increase" means lands would be put into the Not Available for Harvest category.

<sup>&</sup>lt;sup>2</sup> "Decrease" means lands would be taken out of the Not Available for Harvest category.

#### **PART 6--MANAGEMENT TRENDS**

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, and other treatments that affect yields, species, and timing of harvests) that you think will affect management of private forest land in the future? Please relate the trends in these practices to cover types, if appropriate.

If you have other comments on private or public management trends relative to long-term timber availability or demand, please share them with us.

#### PART 7-PUBLIC LAND ALLOCATIONS

We would also like to have your opinion about the future availability of **public lands** for timber production. The table below has the average statewide, current Available for Harvest percents from national, state, and county administered forest lands based on results we have <u>compiled to date</u>. Allocations vary by region. Please complete the "FUTURE Available for Harvest allocation in 2020" column for each public land ownership with your best judgment as to what percent of these public lands will be Available for Harvest in the year 2020.

Public Lands in Minnesota	CURRENT Available for Harvest allocation (percent)	FUTURE Available for Harvest allocation in 2020 (percent)
National forests	55%	
State forests	56%	
County forests	85%	

Thank you for your participation! Please return this questionnaire in the postage-paid envelope provided.

# Appendix A.9. Wisconsin forest industry and NIPF questionnaires.

# Forest Industry Fee and Leased Lands



## PART 1-BACKGROUND INFORMATION

We are interested in obtaining some personal information regarding your work experience.

- 1. What is the title of your current position?
- 2. How many years have you been at this location?
- 3. How many years of professional land management experience do you have?

## PART 2-LOCATION OF LANDS

This part of the questionnaire is to determine the location and acreage of forest industry fee and leased lands which you manage.



What is the total area you or your company manage(s) in your state (as indicated on the map above)? \_\_\_\_\_\_acres of forest industry fee and leased lands



#### PART 3-DEFINITIONS USED IN QUESTIONNAIRE and LAND ALLOCATIONS For this study, we are considering three broad categories of forest land as follows:

- Available for Harvest: These lands are actively managed for timber production and are now available or will be available for timber harvesting in the future to meet forest product demands. These lands are not restricted from harvesting and represent the active timber production base. In some cases, these lands may include buffers or other areas where partial harvests are allowed.
- Not Available for Harvest: These lands are withdrawn from timber harvest by law, policy, or development. They are not currently available for harvest, and you expect them to be unavailable in the future for physical, biological, or social reasons. They may be designated or otherwise considered to be unacceptable for timber harvesting operations. Timber harvesting on these lands is considered to be an incompatible land use. Some examples may include areas of water, nonforested lands and maintained openings, buffers, wetlands where silvicultural treatments are not allowed, roads, oil and gas well sites, easements, and areas where harvesting is physically limited (i.e., inaccessible or inoperable sites).
- Other Lands: These lands are tentatively suitable for timber production but are not currently needed or used for timber harvesting. These lands may be considered to be available or unavailable in the future, but they are not now designated as active timber lands needed to meet timber program goals or included in any special reserve category. Some of these areas may be less efficient due to uneconomic tract size, low stocking or other factors, but they may become available in the future if the economic conditions change.

#### Please complete the table below for forest industry fee and leased land you manage.

**Column A:** Using the above descriptions as a guide, please provide us with your best estimate of the current allocation of the area of forest land you answered in part 2. Write your estimates as a percent in Column A in the table below. The percentages you specify for the three categories in Column A must sum to 100 percent.

**Column B:** How do you believe the distribution of land in the three categories may change by the year 2020? Please give us your best estimate of the future "most likely" allocations for each of the three categories in Column B. The percentages you specify for the three categories in Column B must also sum to 100 percent.

Column C: Please enter your estimate of the smallest and largest possible percents for each category in Column C. This range should bracket your answer in Column B. Please note that the largest percent in Available for Harvest plus the smallest percents in the two remaining categories must not exceed 100 percent (e.g., if the maximum available were 90%, then the sum of the smallest percents of the remaining categories must be 10% or less).

Industry Fee and Leased Lands	Column A	Column B	Column C
Forest Land Category	CURRENT allocation (percent)	MOST LIKELY allocation in 2020 (percent)	Smallest to largest RANGE of possible allocations in 2020 (percent)
Available for Harvest			to
Not Available for Harvest			to
Other Lands			to
	100	100	

# PART 4-FACTORS AFFECTING LAND ALLOCATIONS

Which factors you feel are affecting the future allocations of <u>forest industry</u> land you manage? These factors may play a role individually or cumulatively in changing the area "most likely" to be **Available for Harvest**. What **3 factors** do you think are most important in causing this change or in maintaining the current allocation? Be as specific as possible and indicate how each factor will affect availability.

#1	<u></u>	 	
<b>4</b> 7			
#2		 	
#3		 	

## PART 5-COVER TYPE DISTRIBUTIONS

How do you believe the future distribution of cover types may change on <u>lands not available for timber</u> <u>production</u>? An increase in a cover type may occur, for example, because more lands with this cover type are becoming unavailable for harvest. Conversely, a decrease in a cover type may occur, for example, because more lands with this cover type are becoming available for timber production. The table below is broken down by cover type aggregates. Referring to your current allocation estimates from PART 3 and your "most likely" allocation of lands to the Not Available for Harvest category, please circle the number corresponding with whether you believe the cover type will increase a lot, increase a little, stay the same, decrease a little, or decrease a lot.

Cover Type	Not Available for Harvest				
	increase a lot <sup>1</sup>	increase a little	stay the same	decrease a little <sup>2</sup>	decrease a lot
Aspen-birch	1	2	3	4	5
Jack pine	1	2	3	4	5
Red-white pine	1	2	3	4	5
Upland spruce-fir	1	2	3	4	5
Oak-hickory	1	2	3	4	5
Maple-beech-birch	1	2	3	4	5
Lowland hardwoods	1	2	3	4	5
Lowland conifers	1	2	3	4	5
Nonstocked	1	2	3	4	5

<sup>&</sup>lt;sup>1</sup> "Increase" means lands would be put into the Not Available for Harvest category.

<sup>&</sup>lt;sup>2</sup> "Decrease" means lands would be taken out of the Not Available for Harvest category.

## PART 6-MANAGEMENT TRENDS

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, and other treatments that affect yields, species, and timing of harvests) that you think will affect management of private forest land in the future? Please relate the trends in these practices to cover types, if appropriate.

If you have other comments on private or public management trends relative to long-term timber availability or demand, please share them with us.

#### PART 7--PUBLIC LAND ALLOCATIONS

We would also like to have your opinion about the future availability of **public lands** for timber production. The table below has the average statewide, current Available for Harvest percents from national, state, and county administered forest lands based on results we have <u>compiled to date</u>. Allocations vary by region. Please complete the "FUTURE Available for Harvest allocation in 2020" column for each public land ownership with your best judgment as to what percent of these public lands will be Available for Harvest in the year 2020.

Public Lands in Wisconsin	CURRENT Available for Harvest allocation (percent)	FUTURE Available for Harvest allocation in 2020 (percent)
National forests	58%	
State forests	67%	
County forests	85%	

Thank you for your participation! Please return this questionnaire in the postage-paid envelope provided.

# Consulting/Landowner-Assistance/Procurement/Service Foresters



# Timberland Availability Assessment

#### **PART 1-BACKGROUND INFORMATION**

We are interested in obtaining some personal information regarding you: work experience.

1. What is the title of your current position?

2. How many years have you been at this location?

3. How many years of professional land management experience do you have?

#### PART 2-LOCATION OF LANDS

This part of the questionnaire is to determine the location and acreage of private forest lands on which you provide technical forestry services or from which you procure timber.



What is the total area for which you or your company provide(s) technical services or from which you procure timber in your state (as indicated on the map above)?

\_\_\_\_\_acres of forest industry fee and leased lands

\_\_\_\_acres of other private lands

## PART 3-DEFINITIONS USED IN QUESTIONNAIRE and LAND ALLOCATIONS

Nonindustrial Private Forests (NIPF): For the purposes of this study, this is an ownership class of private lands, including farmer owned forest lands, that are not owned or leased by forest industry.

For this study, we are considering three broad categories of forest land as follows:

- Available for Harvest: These lands are actively managed for timber production and are now available or will be available for timber harvesting in the future to meet forest product demands. These lands are not restricted from harvesting and represent the active timber production base. In some cases, these lands may include buffers or other areas where partial harvests are allowed.
- Not Available for Harvest: These lands are withdrawn from timber harvest by law, policy, or development. They are not currently available for harvest, and you expect them to be unavailable in the future for physical, biological, or social reasons. They may be designated or otherwise considered to be unacceptable for timber harvesting operations. Timber harvesting on these lands is considered to be an incompatible land use. Some examples may include areas of water, nonforested lands and maintained openings, buffers, wetlands where silvicultural treatments are not allowed, roads, oil and gas well sites, easements, and areas where harvesting is physically limited (i.e., inaccessible or inoperable sites).
- Other Lands: These lands are tentatively suitable for timber production but are not currently needed or used for timber harvesting. These lands may be considered to be available or unavailable in the future, but they are not now designated as active timber lands needed to meet timber program goals or included in any special reserve category. Some of these areas may be less efficient due to uneconomic tract size, low stocking or other factors, but they may become available in the future if the economic conditions change.

#### Please complete the table below for all nonindustrial private forest (NIPF) land in your area on the map.

Column A: Using the above descriptions as a guide and based on you knowledge of NIPF lands in your area of the state, please provide estimates of how you would currently categorize <u>all NIPF</u> lands (i.e., private lands that are managed for timber production or not) in Column A. Write your estimates as a percent in Column A in the table below. The percentages you specify for the three categories in Column A must sum to 100 percent.

**Column B:** How do you believe the distribution of land in the three categories may change by the year 2020? Please give us your best estimate of the future "most likely" allocations for each of the three categories in Column B. The percentages you specify for the three categories in Column B must also sum to 100 percent.

Column C: Please enter your estimate of the smallest and largest possible percents for each category in Column C. This range should bracket your answer in Column B. Please note that the largest percent in Available for Harvest plus the smallest percents in the two remaining categories must not exceed 100 percent (e.g., if the maximum available were 90%, then the sum of the smallest percents of the remaining categories must be 10% or less).

Nonindustrial Private Forest Lands	Column A	Column B	Column C
Forest Land Category	CURRENT allocation (percent)	MOST LIKELY allocation in 2020 (percent)	Smallest to largest RANGE of possible allocations in 2020 (percent)
Available for Harvest			to
Not Available for Harvest	)		to
Other Lands			to
	100	100	

# **PART 4--FACTORS AFFECTING LAND ALLOCATIONS**

Which factors you feel are affecting the future allocations of <u>NIPF</u> land? These factors may play a role individually or cumulatively in changing the area "most likely" to be Available for Harvest. What 3 factors do you think are most important in causing this change or in maintaining the current allocation? Be as specific as possible and indicate how each factor will affect availability.

#1	 	 	
#2			
			_
#3			

## PART 5-COVER TYPE DISTRIBUTIONS

How do you believe the future distribution of cover types may change on <u>lands not available for timber</u> <u>production</u>? An increase in a cover type may occur, for example, because more lands with this cover type are becoming unavailable for harvest. Conversely, a decrease in a cover type may occur, for example, because more lands with this cover type are becoming available for timber production. The table below is broken down by cover type aggregates. Referring to your current allocation estimates from PART 3 and your "most likely" allocation of lands to the Not Available for Harvest category, please circle the number corresponding with whether you believe the cover type will increase a lot, increase a little, stay the same, decrease a little, or decrease a lot.

Cover Type		Not Av	ailable for l	Harvest	
	increase a lot <sup>1</sup>	increase a little	stay the same	decrease a little <sup>2</sup>	decrease a lot
Aspen-birch	1	2	3	4	5
Jack pine	1	2	3	4	5
Red-white pine	1	2	3	4	5
Upland spruce-fir	1	2	3	4	5
Oak-hickory	1	2	3	4	5
Maple-beech-birch	1	2	3	4	5
Lowland hardwoods	1	2	3	4	5
Lowland conifers	1	2	3	4	5
Nonstocked	1	2	3	4	5

<sup>&</sup>lt;sup>1</sup> "Increase" means lands would be put into the Not Available for Harvest category.

<sup>&</sup>lt;sup>2</sup> "Decrease" means lands would be taken out of the Not Available for Harvest category.

#### **PART 6-MANAGEMENT TRENDS**

Are there any trends in the use of specific silvicultural practices (e.g., clearcutting, single-tree selection, and other treatments that affect yields, species, and timing of harvests) that you think will affect management of private forest land in the future? Please relate the trends in these practices to cover types, if appropriate.

If you have other comments on private or public management trends relative to long-term timber availability or demand, please share them with us.

#### PART 7-PUBLIC LAND ALLOCATIONS

We would also like to have your opinion about the future availability of public lands for timber production. The table below has the average statewide, current Available for Harvest percents from national, state, and county administered forest lands based on results we have <u>compiled to date</u>. Allocations vary by region. Please complete the "FUTURE Available for Harvest allocation in 2020" column for each public land ownership with your best judgment as to what percent of these public lands will be Available for Harvest in the year 2020.

Public Lands in Wisconsin	CURRENT Available for Harvest allocation (percent)	FUTURE Available for Harvest allocation in 2020 (percent)
National forests	58%	
State forests	67%	
County forests	85%	

Thank you for your participation! Please return this questionnaire in the postage-paid envelope provided.

APPENDIX B

QUESTIONNAIRE RESPONSE DATA

	¥	Number of Question	•	Usable	
Owner Group	Mailed	Deliverable	Returned	Usable	Response Rate
National Forest	80	80	55	53	66%
MDNR	76	76	63	59	78%
MINDINR	29	29	20	20	69%
WDNR	45	45	27	26	58%
Michigan County	1	1	1	1	100%
Minnesota Counties	15	15	12	10	67%
Wisconsin Counties	28	28	22	22	79%
Michigan Private	48	48	30	24	50%
<b>Min</b> nesota Private	74	70	39	35	50%
Wisconsin Private	102	102	61	60	59%

Table B.1. Number of questionnaires mailed, deliverable, returned, and usable and corresponding usable response rates.

The questionnaire was deliverable if the potential respondent was located at the listed address or could be located.

The fisted address of course be recently.
A questionnaire was deemed usable under two circumstances: (1) if the current and "most likely" allocation columns of the land allocation table correctly summed to 100 percent, and/or (2) if factor(s) affecting land allocations were provided by the respondents.

The usable response rate is the number of usable questionnaires divided by the deliverable questionnaires.

APPENDIX C

STATEWIDE DATA SUMMARIES

		Current	"Nost Likely"	Current	"Nost Likely"	Current	"Nost Likely"
State	Omer Group	Available.	Available	Not Available	Not Available	Other Lands	Other Lends
Michigan	National Forest Land (n=27)	56	49	10	28	34	23
	<b>DNR Land</b> $(n=56)$	75	65	17	26	8	8
	County Land						
	Forest Industry Land						
	NIPF Land (n=21)	11	64	18	24	11	12
Minnesota	National Forest Land (n=13)	40	38	31	5.4	23	19
	DNR Land (n=18)	56	47	20	31	24	22
	County Land (n=10)	84	76	13	19	e	S
	Forest Industry Land						
	NIPF Land (n=31)	66	66	19	20	14	14
Wisconsin	<pre>National Forest Land (n=12)</pre>	58	50	20	32	22	19
	DNR Land $(n=26)$	66	59	21	33	13	8
	County Land (n=20)	87	81	11	16	7	e
	Forest Industry Land (n=6)	06	91	7	80	7	0
	NIPF Land $(n=53)$	68	62	21	26	11	12

Table C.1. Weighted average estimates of current and "most likely" in 2020 proportions of lands available for harvest, not available for harvest, and other lands by state and owner group.

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APPENDIX D

# WEIGHTED AVERAGE DATA TABLES BY FIA SURVEY UNIT

				Largest	Smallest	
			Current	Probable	Probable	"Most Likely"
MI-1	Available	average	52	58	37	46
Hiawatha NF		s.d.	0.0	5.6	5.4	3.9
n=8		min.	52	50	30	40
		max.	52	65	45	52
	Not Available	averag <b>e</b>	12	38	17	32
		s.d.	0.0	18.1	11.5	14.7
		min.	12	12	12	12
		max.	12	60	45	55
	Other Lands	average	36	37	9	23
		s.d.	0.0	16.8	11.7	14.8
		min.	36	0	0	0
		max.	36	50	28	36
MI-2	Available	average	61	60	41	51
Ottawa NF		s.d.	0.0	10.7	16.0	12.5
n=7		min.	61	40	10	30
		max.	61	76	55	70
	Not Available	average	12	30	17	26
		s.d.	0.0	10.4	3.6	11.6
		min.	12	15	10	15
		max.	12	50	20	50
	Other Lands	average	28	29	15	23
		s.d.	0.0	7.3	6.5	8.4
		min.	28	20	10	9
		max.	28	40	25	35
MI-3	Available	average	55	59	36	49
Huron-Manistee NF		s.d.	0.0	10.0	19.6	11.2
n=12		min.	55	50	0	30
		max.	55	80	65	70
	Not Available	average	7	43	15	27
		s.d.	0.0	31.8	13.0	18.0
		min.	7	12	7	9
		max.	7	100	50	60
	Other Lands	average	38	40	19	24
		s.d.	0.0	27.1	16.3	15.1
		min.	38	0	0	0
		max.	38	100	38	40

Table D.1. Average estimates of the current proportion and future "most likely" and largest and smallest probable proportions in the year 2020 of the three land categories by FIA survey unit--Michigan national forest land.

Table D.2. Weighted average estimates of the current proportion and future "most likely" and largest and smallest probable proportions in the year 2020 of the three land categories by FIA survey unit--MDNR land.

				Largest	Smallest	
			Current	Probable	Probable	"Most Likely"
MI-1	Available	wgtd. ave.	70	69	48	59
n=11		min.	51	50	25	44
		max.	90	90	80	84
	Not Available	wgtd. ave.	19	39	21	29
		min.	7	15	7	10
		max.	34	70	40	55
	Other Lands	wgtd. ave.	10	15	7	10
		min.	0	0	0	0
		max.	25	40	20	25
MI-2	Available	wgtd. ave.	81	80	60	70
n=8		min.	70	50	5	20
		max.	90	95	75	90
	Not Available	wgtd. ave.	12	33	13	22
		min.	5	10	5	5
		max.	18	80	20	55
	Other Lands	wgtd. ave.	6	12	4	8
		min.	0	5	0	0
		max.	12	25	10	25
MI-3	Available	wgtd. ave.	78	76	52	67
n=22		min.	60	50	0	50
		max.	96	90	80	
	Not Available	wgtd. ave.	16	45	20	27
		min.	2	20	9	10
		max.	32	100	40	49
	Other Lands	wgtd. ave.	6	10	4	6
		min.	0	0	0	0
		max.	26	26	16	26
MI-4	Available	wgtd. ave.	66	66	47	60
n=14		min.	25	25	0	15
		max.	100	100	80	95
	Not Available	wgtd. ave.	27	47	30	34
		min.	0	10	0	3
		max.	75	100	75	75
	Other Lands	wgtd. ave.	9	14	7	9
		min.	0	0	0	0
		ma <b>x</b> .	40	60	40	40

Table D.3. Weighted average estimates of the current proportion and future "most likely" and largest and smallest probable proportions in the year 2020 of the three land categories by FIA survey unit--Michigan NIPF land.

				Largest	Smallest	
			Current	Probable	Probable	"Most Likely"
MI-1	Available	wgtd. ave.	78	86	75	72
n=6,4		min.	60	70	50	40
		max.	90	95	90	95
	Not Available	wgtd. ave.	9	18	8	17
		min.	5	10	4	5
		max.	10	40	20	
	Other Lands	wgtd. ave.	13	17	7	11
		min.	0	0	0	0
		max.	30	50	20	30
MI-2	Available	wgtd. ave.	79	84	62	68
n=7,6		min.	60	70	40	50
		max.	95	95	90	95
	Not Available	wgtd. ave.	10	34	15	21
		min.	5	10	4	5
		max.	30	70	40	40
	Other Lands	wgtd. ave.	11	8	6	11
		min.	0	0	0	0
		max.	20	10	10	20
MI-3	Available	wgtd. ave.	65	70	53	59
n=14,11		min.	30	30	20	15
		max.	90	95	90	95
	Not Available	wgtd. ave.	24	35	16	28
		min.	5	10	5	5
		max.	65	60	45	85
	Other Lands	wgtd. ave.	11	18	8	13
		min.	0	0	0	0
		max.	40	50	20	40
MI-4	Available	wgtd. ave.	87	88	55	79
n=3		min.	75	80	50	75
		max.	90	90	70	80
	Not Available	wgtd. ave.	7	27	5	10
		min.	5	15	5	10
		max.	25	30	10	15
	Other Lands	wgtd. ave.	5	34	6	10
		min.	0	10	5	5
		max.	10	40	10	15

a The first number represents the number of respondents who provided the current and "most likely" percents; the second number represents the number of respondents who also provided largest and smallest probable percents.

Table D.4. Average estimates of the current proportion and future "most likely" and largest and smallest probable proportions in the year 2020 of the three land categories by FIA survey unit--Minnesota national forest land.

				Largest	Smallest	
			Current	Probable	Probable	"Most Likely"
MN-1	Available	average	30	36	16	31
Superior NF		s.d.	0.0	7.4	11.8	4.8
n=4		min.	30	30	. 0	25
		max.	30	45	25	35
	Not Available	average	43	66	44	48
		s.d.	0.0	24.1	1.1	2.8
		min.	43	44	43	44
		max.	43	100	45	50
	Other Lands	average	27	24	12	21
		s.d.	0.0	6.5	10.9	4.7
		min.	27	15	0	15
		max.	27	30	27	27
MN-2	Available	average	73	71	46	61
Chippewa NF		<b>s</b> .d.	0.0	1.3	18.5	5.7
n=9		min.	73	70	0	50
		max.	73	73	63	68
	Not Available	average	17	35	19	26
		s.d.	0.0	25.4	4.0	10.3
		min.	17	20	16	18
		max.	17	100	27	50
	Other Lands	average	11	17	8	13
		s.d.	0.0	5.8	4.3	7.6
		min.	11	10	0	0
		max.	11	25	12	25

Table D.5. Weighted average estimates of the current proportion and future "most likely" and largest and smallest probable proportions in the year 2020 of the three land categories by FIA survey unit--MNDNR land.

				Largest	Smallest	
			Current	Probable	Probable	"Most Likely"
MN-1	Available	wgtd. ave.	66	66	48	60
n=3		min.	50	50	45	48
		max.	80	80	50	70
	Not Available	wgtd. ave.	12	25	13	15
		min.	2	10	2	7
		max.	18	40	18	20
	Other Lands	wgtd. ave.	22	29	19	25
		min.	2	20	2	10
		max.	36	36	36	36
MN-2	Available	wgtd. ave.	36	35	27	34
n=4		min.	3	2	1	2
		max.	95	90	60	90
	Not Available	wgtd. ave.	15	43	16	31
		min.	1	5	1	3
		max.	35	52	35	39
(	Other Lands	wgtd. ave.	49	50	26	34
		min.	0	0	0	0
		max.	62	64	59	59
MN-3	Available	wgtd. ave.	56	55	37	43
n=6,5		min.	10	10	5	0
		max.	89	70	65	65
	Not Available	wgtd. ave.	24	47	26	40
		min.	10	35	15	20
		max.	52	100	50	100
	Other Lands	wgtd. ave.	20	17	13	17
		min.	0	0	0	0
		max.	50	30	50	50
MN - 4	Available	wgtd. ave.	66	67	43	55
n=5		min.	0	10	0	0
		max.	85	85	60	60
	Not Available	wgtd. ave.	25	45	23	29
		min.	5	10	5	10
		max.	90	100	50	90
	Other Lands	wgtd. ave.	10	17	4	16
		min.	0	0	0	0
		max.	27	30	10	30

<sup>a</sup> The first number represents the number of respondents who provided the current and "most likely" percents; the second number represents the number of respondents who also provided largest and smallest probable percents.
Table D.6. Weighted average estimates of the current proportion and future "most likely" and largest and smallest probable proportions in the year 2020 of the three land categories by FIA survey unit--Minnesota county land.

				Largest	Smallest	
			Current	Probable	Probable	Most Likely
MN-1	Available	wgtd. ave.	89	84	70	84
n=3		s.d.	8.7	7.8	0.0	11.4
		min.	82	82	70	77
		max.	98	93	70	98
	Not Available	wgtd. ave.	11	29	16	16
		s.d.	8.7	3.5	7.8	11.0
		min.	2	25	7	2
		max.	18	30	18	23
	Other Lands	wgtd. ave.	0	1	0	0
		s.d.	0.0	3.5	0.0	1.2
		min.	0	0	0	0
		max.	0	5	0	2
MN - 2	Available	wgtd. ave.	80	83	66	74
n=6		s.d.	8.6	6.1	17.4	12.0
		min.	65	75	40	60
		max.	88	90	85	
	Not Available	wgtd. ave.	15	27	14	18
		s.d.	7.9	15.6	8.4	8.7
		min.	2	5	1	4
		max.	25	50	25	25
	Other Lands	wgtd. ave.	5	10	4	8
		s.d.	4.6	9.8	5.7	6.3
		min.	0	0	0	0
		max.	10	25	15	15
MN-3 a	Available	wgtd. ave.				
		s.d.				
		min.				
		max.				
	Not Available	wgtd. ave.				
		s.d.				
		min.				
		max.				
	Other Lands	wgtd. ave.				
		s.d.				
		min.				
		max.				

 $^{\rm a}\,{}_{\rm MN-3}$  had too few responses to guarantee respondent confidentiality.

Table D.7. Weighted average estimates of the current proportion and future "most likely" and largest and smallest probable proportions in the year 2020 of the three land categories by FIA survey unit--Minnesota NIPF land.

				Largest	Smallest	
			Current	Probable	Probable	"Most Likely"
MN-1	Available	wgtd. ave.	71	84	45	71
n=12,10		min.	70	80	50	65
		max.	45	60	20	40
	Not Available	wgtd. ave.	15	24	10	17
		min.	10	20	5	15
		max.	45	55	35	50
	Other Lands	wgtd. ave.	14	31	4	12
		min.	20	30	10	20
		max.	10	15	5	10
MN-2	Available	wgtd. ave.	67	77	47	65
n=18,17		min.	50	55	35	40
		max.	85	95	50	85
	Not Available	wgtd. ave.	22	33	15	23
		min.	40	0	0	20
		max.	5	25	1	5
	Other Lands	wgtd. ave.	11	18	4	12
		min.	10	0	0	40
		max.	10	30	1	10
MN - 3	Available	wgtd. ave.	67	81	• 49	69
n=17,14		min.	40	35	20	30
		max.	85	95	80	90
	Not Available	wgtd. ave.	16	24	8	14
		min.	2	10	1	4
		max.	45	75	45	60
	Other Lands	wgtd. ave.	17	28	4	17
		min.	0	0	0	0
		max.	30	35	10	40
MN-4	Available	wgtd. ave.	76	87	58	78
n=7 .		min.	30	20	10	20
		max.	75	100	0	75
	Not Available	wgtd. ave.	9	19	3	8
		min.	50	70	50	60
		max.	0	0	0	0
	Other Lands	wgtd. ave.	15	25	4	14
		min.	20	30	10	20
		max.	25	100	0	25

The first number represents the number of respondents who provided the current and "most likely" percents; the second number represents the number of respondents who also provided largest and smallest probable percents.

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Table D.8. Average estimates of the current proportion and future "most likely" and largest and smallest probable proportions in the year 2020 of the three land categories by FIA survey unit--Wisconsin national forest land.

				Largest	Smallest	
			Current	Probable	Probable	Most Likely
WI-1	Available	average	70	64	40	53
Nicolet NF		s.d.	0.0	10.8	13.2	10.5
n=5		min.	70	50	20	35
		max.	70	80	53	60
	Not Available	average	18	51	26	33
		s.d.	0.0	20.4	7.8	12.2
		min.	18	27	20	22
		max.	18	80	38	53
	Other Lands	average	12	15	10	14
		s.d.	0.0	4.2	6.3	4.6
		min.	12	10	0	10
		max.	12	21	17	21
WI-2	Available	average	48	62	31	47
Chequamegon NF		s.d.	0.0	9.6	16.4	15.6
n=7		min.	48	50	0	25
	• <u> </u>	max.	48	71	50	70
	Not Available	average	22	40	19	31
		s.d.	0.0	21.0	8.3	14.8
		min.	22	10	0	5
		max.	22	70	25	45
	Other Lands	average	30	35	15	22
		s.d.	0.0	10.9	12.6	12.5
		min.	30	20	0	0
		max.	30	55	30	35

Table D.9. Weighted average estimates of the current proportion and future "most likely" and largest and smallest probable proportions in the year 2020 of the three land categories by FIA survey unit--WDNR land.

					Largest	Smallest	
				Current	Probable	Probable	"Most Likely"
WI-1	Available	wgtd.	ave.	72	72	32	58
n=4		min.		50	50	0	50
		max.		100	100	50	90
	Not Available	wgtd.	ave.	25	63	25	37
		min.		0	40	0	10
		max.		50	100	50	50
	Other Lands	wgtd.	ave.	3	5	3	5
		min.		0	0	0	0
		max.		10	20	6	10
WI-2	Available	wgtd.	ave.	78	79	58	70
n=9		min.		30	50	0	40
		max.		98	98	90	94
	Not Available	wgtd.	ave.	17	42	16	24
		min.		2	4	2	3
		max.		50	100	40	50
	Other Lands	wgtd.	ave.	5	24	5	6
		min.		0	0	0	0
<del></del>		max.		20	100	10	13
WI-3	Available	wgta.	ave.	88	85	/4	84
n=4		min.		76	/6	65	75
	Not Ausilable	max.		95	95	90	93
	NOT AVAILADIE	wgta.	ave.	11	25	12	14
		min.		3	ים אר	2	4
	Other Lands	watd	21/0	22		22	
	Other Lands	wycu.	ave.		5	1	1
		may			10	0	0
WT - A	Available	wat d	210	59			53
n-4	Available	min	ave.	40	45	30	35
11-3		may		80	100	80	80
	Not Available	watd	ave	36	46	34	42
	not marradic	min	<b>u</b>	10	10	0	10
		max.		55	70	55	63
	Other Lands	watd.	ave.	4	6	0	4
		min.		0	0	0	- 0
		max.		10	10	0	10
WI-5	Available	watd.	ave.	28	32	14	22
n=5		min.		5	5	0	2
		max.		89	90	60	79
	Not Available	watd.	ave.	21	84	43	54
		min.		5	35	5	15
		max.		30	100	60	78
	Other Lands	wgtd.	ave.	51	31	11	23
		min.		6	10	0	6
		max.		75	40	25	40

Table D.10. Weighted average estimates of the current proportion and future "most likely" and largest and smallest probable proportions in the year 2020 of the three land categories by FIA survey unit--Wisconsin county land.

			_		Largest	Smallest	
				Current	Probable	Probable	•Most Likely•
WI-1	Available	wgtd.	ave.	87	88	68	82
n=6		s.d.		6.6	6.5	32.3	8.9
		min.		80	80	0	75
		max.		100	100	85	100
	Not Available	wgtd.	ave.	13	32	12	18
		s.d.		6.6	32.3	6.5	8.6
		min.		0	15	0	0
		max.		20	100	20	25
	Other Lands	wgtd.	ave.	0	2	0	0
		s.d.		0.0	4.0	0.8	0.8
		min.		0	0	0	0
		max.		0	10	2	2
WI-2	Available	wgtd.	ave.	89	84	65	83
n=10,7 ª	,	s.d.		9.3	9.2	11.2	11.7
		min.		72	72	50	60
		max.		100	100	75	100
	Not Available	wgtd.	ave.	8	22	9	11
		s.d.		8.2	8.3	9.0	8.8
		min.		0	10	0	0
		max.		27	32	27	29
	Other Lands	wgtd.	ave.	3	8	2	5
		s.d.		5.1	13.0	3.7	9.0
		min.		0	1	0	0
		max.		15	40	10	
WI-3	Available	wgtd.	ave.	81	82	65	76
n=5		s.d.		2.8	4.2	32.2	8.5
		min.		78	78	0	60
		max.		84	89	77	80
	Not Available	wgtd.	ave.	16	31	16	21
		s.d.		6.6	33.6	6.3	9.2
		min.		6	18	6	17
		max.		22	100	22	40
	Other Lands	wgtd.	ave.	2	8	2	2
		s.d.		4.4	21.2	2.3	4.4
		min.		0	0	0	0
		max.		10	50	5	10

<sup>a</sup> The first number represents the number of respondents who provided the current and "most likely" percents; the second number represents the number of respondents who also provided largest and smallest probable percents.

Table D.11. Weighted average estimates of the current proportion and future "most likely" and largest and smallest probable proportions in the year 2020 of the three land categories by FIA survey unit--Wisconsin forest industry land.

					Largest	Smallest	
				Current	Probable	Probable	Most_Likely
WI-1 a	Available	wgtd.	ave.				
		min.					
		max.					
	Not Available	wgtd.	ave.				
		min.					
		max.					
	Other Lands	wgtd.	ave.				
		min.					
		max.					
WI-2	Available	wgtd.	ave.	99	99	80	98
n=3,2		min.		90	85	65	75
		max.		100	100	90	100
	Not Available	wgtd.	ave.	1	20	6	2
		min.		0	10	0	0
		max.		10	35	15	25
	Other Lands	wgtd.	ave.	0	0	0	0
		min.		0	0	0	0
		max.		0	0	0	0

<sup>a</sup> WI-1 had too few responses to guarantee respondent confidentiality.
<sup>b</sup> The first number represents the number of respondents who provided the current and "most likely" percents; the second number represents the number of respondents who also provided largest and smallest probable

percents.

Table D.12. Weighted average estimates of the current proportion and future "most likely" and largest and smallest probable proportions in the year 2020 of the three land categories by FIA survey unit--Wisconsin NIPF land.

					Largest	Smallest	
				Current	Probable	Probable	•Most Likely•
WI-1	Available	wgtd.	ave.	58	66	46	55
n=13,11		min.		50	60	30	45
		max.		40	55	35	45
	Not Available	wgtd.	ave.	25	38	21	27
		min.		40	80	40	55
		max.		40	45	30	40
	Other Lands	wgtd.	ave.	18	19	17	18
		min.		10	0	0	0
<del></del>		max.		20	20	10	15
WI-2	Available	wgtd.	ave.	62	65	46	58
n=20,17		min.		75	75	65	65
		max.		60	60	40	50
	Not Available	wgtd.	ave.	23	38	21	27
		min.		12	20	12	20
		max.		15	50	10	40
	Other Lands	wgtd.	ave.	15	14	11	15
		min.		13	15	13	15
		max.		25	25	0	10
WI-3	Available	wgtd.	ave.	71	72	53	65
n=17,15		min.		33	40	30	35
		max.		95	95	80	85
	Not Available	wgta.	ave.	20	37	19	26
		min.		0	20	3	10
	Other I ande	max.		60	12	40	40
	Other Lands	wgta.	ave.	9	12	8	10
		min.		47	50	40	45
WT - A	Available	watd	21/0	77		§7	70
n = 10 17	Available	min	ave.	70	, o 65	45	55
11-19,17		may		89	90	75	90
	Not Available	ward	ave	17	37	17	24
	Not Available	min	uve.	20	40	20	30
		max		11	100	10	10
•	Other Lands	watd.	ave.	6	9	5	6
		min.		10	25	5	15
		max.		0	0	0	0
WI-5	Available	watd.	ave.	77	78	59	68
n=12.10		min.		65	65	40	60
		max.		70	65	45	60
	Not Available	watd.	ave.	14	28	15	23
		min.		25	40	15	30
		max.		20	40	20	25
	Other Lands	wgtd.	ave.	8	13	9	9
		min.		10	10	5	10
_		max.		10	25	10	15

a The first number represents the number of respondents who provided the current and "most likely" percents; the second number represents the number of respondents who also provided largest and smallest probable percents.

APPENDIX E

## UNWEIGHTED AVERAGE DATA TABLES BY FIA SURVEY UNIT

Owner Group	FIA Survey Unit	Land Category	Current	"Nost Likely"
National Forest Land				
MDNR Land	MI-1 (n=11)	Available	72	62
		Not Available	18	26
		Other Lands	10	10
	MI-2 (n=8)	Available	81	70
		Not Available	12	22
		Other Lands	7	
	MI-3 (n=22)	Available	78	67
		Not Available	16	26
		Other Lands	6	7
	MI-4 (n=14)	Available	61	56
		Not Available	26	32
		Other Lands	13	12
County Land	)		<u> </u>	· · · · · · · · · · · · · · · · · · ·
NIPF Land	MI - 1 (n = 6)	Available	75	67
		Not Available	9	19
		Other Lands	16	14
	MI-2 (n=7)	Available	79	73
		Not Available	11	19
		Other Lands	10	9
	MI-3 (n=14)	Available	63	54
		Not Available	25	33
	······	Other Lands	13	13
	MI-4 (n=4)	Available	81	79
		Not Available	14	13
		Other Lands	5	9

Table E.1. Unweighted average current estimates and "most likely" in the year 2020 predictions of Michigan lands by FIA survey unit and land category.

 $_{\rm b}$  National Forest data are not weighted; see Appendix D for averages.

Michigan county and forest industry land had too few responses to guarantee respondent confidentiality.

Owner Group	FIA Survey Unit	Land Category	Current	"Most Likely"
National Forest Land				
MNDNR Land	MN-1 (n=3)	Available	65	59
		Not Available	11	14
		Other Lands	24	26
	MN-2 (n=4)	Available	53	51
		Not Available	. 11	22
		Other Lands	36	27
	MN-3 (n=17)	Available	54	37
		Not Available	28	47
		Other Lands	18	17
	MN - 4 (n=7)	Available	42	40
		Not Available	48	48
		Other Lands	9	12
County Land	MN-1  (n=3)	Available	92	85
		Not Available	8	14
		Other Lands	0	1
	MN-2 (n=6)	Available	80	73
		Not Available	16	19
		Other Lands	5	8
Forest Industry Land	<b>,</b>			
NIPF Land	MN-1 (n=12)	Available	67	67
		Not Available	19	19
		Other Lands	15	14
	MN-2 (n=18)	Available	64	59
		Not Available	25	28
		Other Lands	12	12
	MN-3 (n=17)	Available	63	59
		Not Available	21	25
		Other Lands	16	16
	MN-4 (n=7)	Available	68	64
		Not Available	7	13
		Other Lands	25	23

Table E.2. Unweighted average current estimates and "most likely" in the year 2020 predictions of Minnesota lands by FIA survey unit and land category.

a

b National Forest data are not weighted; see Appendix D for averages.

Minnesota forest industry land had too few responses to guarantee respondent confidentiality.

Owner Group	FIA Survey Unit	Land Category	Current	"Most Likely"
National Forest Land				
WDNR Land	WI-1 (n=4)	Available	71	60
		Not Available	25	35
	<u> </u>	Other Lands	4	5
	WI-2 (n=9)	Available	76	70
		Not Available	20	25
		Other Lands	4	5
	WI-3 (n=4)	Available	88	85
		Not Available	11	14
		Other Lands	1	2
	WI-4 (n=4)	Available	62	55
		Not Available	34	40
		Other Lands	4	6
	WI-5 (n=5)	Available	45	36
		Not Available	20	44
	·	Other Lands	35	20
County Land	WI-1 (n=6)	Available	89	84
		Not Available	11	16
		Other Lands	0	0
	WI-2 (n=10)	Available	89	81
		Not Available	7	12
	<u></u>	Other Lands	5	7
	WI-3 (n=5)	Available	81	73
		Not Available	16	24
		Other Lands	3	3
Forest Industry Land	WI-2 (n=3)	Available	97	88
		Not Available	3	12
· · · · · · · · · · · · · · · · · · ·		Other Lands	00	0
NIPF Land	WI-1 (n=13)	Available	58	54
		Not Available	26	32
		Other Lands	16	14
	WI-2 (n=20)	Available	66	60
		Not Available	19	26
		Other Lands	15	14
	WI-3 (n=17)	Available	68	61
		Not Available	19	25
		Other Lands	13	13
	WI-4 (n=19)	Available	79	73
		Not Available	16	22
		Other Lands	5	
	WI-5 (n=12)	Available	72	61
		Not Available	15	26
		Other Lands	12	13

Table E.3. Unweighted average current estimates and "most likely" in the year 2020 predictions of Wisconsin lands by FIA survey unit and land category.

a National Forest data are not weighted; see Appendix D for averages. APPENDIX F

## COVER TYPE FREQUENCY TABLES BY FIA SURVEY UNIT

		,				
1 - TW	Cover types	Increase a lot	Increase a little	stay the same	Decrease a little	Decrease a lot
Hiawatha NF	Aspen-birch		1	1	4	2
n=8	Jack pine	2		2	4	
	Red-white pine		4	£	1	
	Upland spruce-fir		ε	2		
	Oak-hickory	1	1	2	1	
	Maple-beech-birch		1	5	1	
	Lowland hardwoods		S	7	7	1
	Lowland conifers	2	e	1	2	
	Nonstocked	2	С	1		
MI - 2	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
Ottawa NF	Aspen-birch	1	-1		2	3
n=7	Jack pine		2	1	2	1
	Red-white pine		1	£	2	1
	Upland spruce-fir		2	4	1	
	Oak-hickory	1		9		
	Maple-beech-birch	1	2	1	m	
	Lowland hardwoods		£	2	1	1
	Lowland conifers	1	e	2	1	
	Nonstocked	1	2	3	1	
MI - 3	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
Huron-Manistee NF	Aspen-birch	3	1		9	2
n=12	Jack pine		4	£	m	2
	Red-white pine	1	7		£	1
	Upland spruce-fir		5	9	1	
	Oak-hickory		4	4	2	2
	Maple-beech-birch	1	9	m	1	
	Lowland hardwoods	1	4	5	2	
	Lowland conifers	1	4	2	2	
	Nonstocked		5	2	4	

Frequency table of cover types in the year 2020 from the not available for harvest land category--Michigan national forest land by FIA survey unit. Table F.1.

1-IN	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
<b>n=1</b> 0	Aspen-birch	2	4	1	2	-
	Jack pine	2	£	4	1	
	Red-white pine	1	4	ſ	2	
	Upland spruce-fir		4	4	2	
	Oak-hickory	2		7		
	Maple-beech-birch	2	9	1	1	
	Lowland hardwoods	1	4	S		
	Lowland conifers	e	4	2	1	
	Nonstocked		2	8		
MI-2	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=8	Aspen-birch	1	2	1	2	5
	Jack pine		1	7		
	Red-white pine		5	2	1	
	Upland spruce-fir		2	4	1	1
	Oak-hickory		2	S	1	
	Maple-beech-birch		5	2	1	
	Lowland hardwoods	1		S	1	
	Lowland conifers	1	~	1	e	1
l	Nonstocked		1	4	3	
MI-3	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=24	Aspen-birch	5	12		£	4
	Jack pine		7	12	£	2
	Red-white pine	4	5	7	£	1
	Upland spruce-fir		4	14	4	
	Oak-hickory	2	7	7	9	1
	Maple-beech-birch	1	6	8	1	1
	Lowland hardwoods	1	10	10	2	
	Lowland conifers	1	6	10	£	1
	Nonstocked		6	1	5	1
MI-4	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=13	Aspen-birch	1	1	•	4	e
	Jack pine		1	80	e	
	Red-white pine	1	2	5	-	1
	Upland spruce-fir			10		1
	Oak-hickory	1	9	£	1	2
	Maple-beech-birch		£	S	2	
	Lowland hardwoods	7	5	9		
	Lowland conifers	1	2	10		
	Nonstocked		0	9	4	

Table F.2. Frequency table of cover types in the year 2020 from the not available for harvest land category---MDNR land by FIA survey unit.

1-1M	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=8	Aspen-birch	1	2	-	1	
	Jack pine	1	2	£	1	
	Red-white pine		S	1	2	
	Upland spruce-fir		£	•		
	Oak-hickory	2	1	£		
	Maple-beech-birch	2	2	2	1	1
	Lowland hardwoods	1	2	£	2	
	Lowland conifers	1	-	2	1	
	Nonstocked		2	2	4	
MI-2	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=9	Aspen-birch		1	Ś	2	1
	Jack pine		ſ	4	2	
	Red-white pine	1	£	2	2	1
	Upland spruce-fir		4	4	1	
	Oak-hickory	1	1	4	1	
	Maple-beech-birch	2	£	2	2	
	Lowland hardwoods	2	4	2	1	
	Lowland conifers	2	S	1	1	
	Nonstocked		2	1	5	
MI-3	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=14	Aspen-birch		7	2	ſ	4
	Jack pine		1	5	4	7
	Red-white pine	4	4	2	£	
	Upland spruce-fir		ſ	9	2	
	Oak-hickory	1	£	4	1	2
	Maple-beech-birch	4	80		1	1
	Lowland hardwoods	2	9	4	2	
	Lowland conifers		2	9	-	1
	Nonstocked	1	2	7	3	1
MI-4	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=4	Aspen-birch			1		2
	Jack pine			1	1	1
	Red-white pine	1	1		1	
	Upland spruce-fir		2	1		
	Oak-hickory	1		1		7
	Maple-beech-birch	1	£			
	Lowland hardwoods	1	£			
	Lowland conifers		2		1	
	Nonstocked		1	2		1

Table F.3. Frequency table of cover types in the year 2020 from the not available for harvest land category---Michigan private land by FIA survey unit.

MN - 1	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
Superior NF	Aspen-birch	1			4	
n=4	Jack pine		1	1	1	1
	Red-white pine	1	1	1	1	
	Upland spruce-fir		1	7	1	
	0ak-hickory					
	Maple-beech-birch		1			
	Lowland hardwoods					
	Lowland conifers			2	1	1
	Nonstocked			4		
MN-2	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
Chippewa NF	Aspen-birch	1		1	1	2
n=9	Jack pine		£	4	2	
	Red-white pine	2	4	1	1	1
	Upland spruce-fir		£	9		
	0ak-hickory		9	2	1	
	Maple-beech-birch	1	5	1	1	
	Lowland hardwoods		2	9	1	
	Lowland conifers	2	£	4		
	Nonstocked		1	8		

land categoryMinnesota	
from the not available for harvest	
Frequency table of covertypes in the year 2020	national forest land by FIA survey unit.
Table F.4.	

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Decrease a lot Decrease a lot Decrease a lot Decrease Decrease a little Decrease a little Decrease a little little Decrease Stay the same Stay the same same same Stay the the Stay Increase a little Increase a little Increase a little Increase a little Increase a lot Increase a lot lot Increase a lot Increase Upland spruce-fir Maple-beech-birch Lowland hardwoods Upland spruce-fir Maple-beech-birch Lowland hardwoods Maple-beech-birch Lowland hardwoods Upland spruce-fir Maple-beech-birch Lowland hardwoods Upland spruce-fir Lowland conifers Lowland conifers Lowland conifers Lowland conifers Red-white pine Red-white pine Red-white pine Red-white pine Cover types Aspen-birch Oak-hickory Oak-hickory Oak-hickory Oak-hickory Cover types Aspen-birch Aspen-birch Cover types Aspen-birch Cover types Nonstocked Nonstocked Nonstocked Nonstocked Jack pine Jack pine Jack pine Jack pine Ц-Л **n=**6 n-N N-N MN-4 n=5 n=5 n=3

Frequency table of cover types in the year 2020 from the not available for harvest land category--MNDNR land by FIA survey unit.

Table F.5.

Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lo
Aspen-birch			2	1	
Jack pine			2	1	
Red-white pine			1	2	
Upland spruce-f	ir	1	2		
Oak-hickory			m		
Maple-beech-bir	ch		m		
Lowland hardwoo	ds	1	2		
Lowland conifer	6	1	2		
Nonstocked			3		
Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lo
Aspen-birch		1	4	-	
Jack pine	1	£	2		
Red-white pine	£	2	1		
Upland spruce-f	ir	2	4		
Oak-hickory		£	2		
Maple-beech-bir	ch	1	с		
Lowland hardwoo	ds	1	4	1	
Lowland conifer	Ø		S		
Nonstocked			3	1	
Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lo
Aspen-birch					
Jack pine					
Red-white pine					
Upland spruce-f.	ir				
Oak-hickory					
Maple-beech-bir	ch				
Lowland hardwoo	ds				
Lowland conifer	S				
Nonstockad					

Frequency table of cover types in the year 2020 from the not available for harvest land category--Minnesota county land by FIA survey unit. Table F.6.

a MN-3 had too few responses to guarantee respondent confidentiality.

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Table F.7. Frequency table of cover types in the year 2020 from the not available for harvest land category--Minnesota private land by FIA survey unit.

T-NW	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=13	Aspen-birch		•	•	m	7
	Jack pine		ſ	2	£	2
	Red-white pine	1	4	4	£	1
	Upland spruce-fir		2	2	9	
	Oak-hickory		e	5	7	
	Maple-beech-birch	1	1	2	£	1
	Lowland hardwoods		4	5	4	
	Lowland conifers		3	6	3	
	Nonstocked	1	1	4	4	1
MN-2	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=19	Aspen-birch	1	-	8	3	£
	Jack pine	2	5	5	9	1
	Red-white pine	2	9	5	4	2
	Upland spruce-fir		3	13	£	
	Oak-hickory		8	7	Ē	
	Maple-beech-birch	1	2	7	2	
	Lowland hardwoods	1	8	2	9	
	Lowland conifers		7	12		
	Nonstocked	2	3	7	5	2
MN-3	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=16	Aspen-birch		9	4	4	1
	Jack pine		e	2	2	
	Red-white pine		2	5	2	1
	Upland spruce-fir		1	6	4	
	Oak-hickory	1	10	7	ſ	
	Maple-beech-birch	2	4	4	£	1
	Lowland hardwoods		5	7	e	1
	Lowland conifers		-	6	2	
	Nonstocked	-	m	2	С	1
MN-4	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=7	Aspen-birch		7	2	7	1
	Jack pine		1	e	2	
	Red-white pine		1	4		1
	Upland spruce-fir			3	2	
	Oak-hickory		£	1	e	
	Maple-beech-birch	2	2	1	1	
	Lowland hardwoods		1	9		
	Lowland conifers			ŝ	1	
	Nonstocked		1	3	1	1

MI - 1	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
Nicolet NF	Aspen-birch	1		1	1	2
n=5	Jack pine			ε	2	
	Red-white pine		2	£		
	Upland spruce-fir		1	4		
	Oak-hi ckory		1	2	1	
	Maple-beech-birch	£		1	1	
	Lowland hardwoods	1		£	1	
	Lowland conifers			£	2	
	Nonstocked		1	4		
WI - 2	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
Chequamegon NF	<b>Aspen-birch</b>		1		2	4
n=7	Jack pine			1	9	
	Red-white pine	1	9			
	Upland spruce-fir		1	9		
	Oak-hickory		£	7	2	
	Maple-beech-birch	7	2			
	Lowland hardwoods		1	9		
	Lowland conifers			7		
	Nonstocked			4	7	1

land categoryWisconsin	
Frequency table of cover types in the year 2020 from the not available for harvest	national forest land by FIA survey unit.
Table F.8.	

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MI - 1	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=3	Aspen-birch			1		2
	Jack pine			1	2	
	Red-white pine	1	-1	1		
	Upland spruce-fir		-1	1	1	
	Oak-hickory		2		1	
	Maple-beech-birch	2	-1			
	Lowland hardwoods			2		
	Lowland conifers			2		
	Nonstocked			1	1	
WI-2	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=9	<b>A</b> spen-birch	1	9	1	1	
	Jack pine	1	£	1	£	
	Red-white pine	2	3	2	1	1
	Upland spruce-fir		5	2	1	
	Oak-hickory		1	£	2	
	Maple-beech-birch	1	e	m		
	Lowland hardwoods		1	9	1	
	Lowland conifers		1	5	1	
	Nonstocked			4	С	
WI-3	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=4	Aspen-birch	1				7
	Jack pine	2	-1	1		
	Red-white pine	1	1	1	1	
	Upland spruce-fir			e		
	Oak-hickory		-1	1		1
	Maple-beech-birch	1	1	1		
	Lowland hardwoods			e		1
	Lowland conifers			ε	1	
	Nonstocked		1	1	1	

Frequency table of cover types in the year 2020 from the not available for harvest land category--WDNR land by FIA survey unit. Table F.9.

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(cont
<b>F</b> .9
Table

WI - 4	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=4	Aspen-birch		2	2		
	Jack pine		1	ſ		
	Red-white pine		2	1	1	
	Upland spruce-fir			2	1	
	Oak-hickory	1	1	1		1
	Maple-beech-birch	1	1	7	1	
	Lowland hardwoods		5			
	Lowland conifers			2	1	
	Nonstocked		3	1		
WI-5	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=5	Aspen-birch		2	1	2	
	Jack pine			2		
	Red-white pine			1	1	
	Upland spruce-fir			2		
	Oak-hickory	1	1	1	2	
	Maple-beech-birch		5			
	Lowland hardwoods		£			
	Lowland conifers		£	1	1	
	Nonstocked		-	2	<b></b>	

the not available for harvest land category	
2020 from	
Frequency table of cover types in the year	Wisconsin county land by FIA survey unit.
Table F.10.	

n=6	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
,	Aspen-birch	1	2	1	1	1
	Jack pine		2	2	1	1
	Red-white pine		£	ſ		
	Upland spruce-fir	1	1	4		
	Oak-hickory	1	2	£		
	Maple-beech-birch		£	2	1	
	Lowland hardwoods	1	1	2	2	
	Lowland conifers		1	4	1	
	Nonstocked		1	2		
WI - 2	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=9	Aspen-birch	1	3	£	1	1
	Jack pine		e	£	1	1
	Red-white pine		4	£	1	1
	Upland spruce-fir		ε	2	1	
	Oak-hickory		£	2	1	1
	Maple-beech-birch		£	2	2	1
	Lowland hardwoods		9	2	1	
	Lowland conifers		4	Υ	2	
	Nonstocked		1	8		
WI - 3	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=5	Aspen-birch	1	4			
	Jack pine		-1	4		
	Red-white pine	1		4		
	Upland spruce-fir			5		
	Oak-hickory		2			
	Maple-beech-birch	1	-1	æ		
	Lowland hardwoods		e	2		
	Lowland conifers		2	e		
	Nonstocked			4	-1	

MI-1	Cover types	Increase a lot	Increase a li	ttle S	tay the same	Decrease a lit	tle	Decrease a lo	يد ا
n=15	Aspen-birch			9			4		m
	Jack pine			2	Ŧ		9		H
	Red-white pine	2		S	u,		2		
	Upland spruce-fir	1		S	(-		2		
	Oak-hickory	2		2	Ð		4		
	Maple-beech-birch	2		2			ß		
	Lowland hardwoods	2		9	Ð		1		
	Lowland conifers	£		'n			2		
	Nonstocked			2	4		4		- 1
WI-2	Cover types	Increase a lot	Increase a li	ttle SI	tay the same	Decrease a lit	tle	Decrease a lo	ير ا
n=20	Aspen-birch			e	w		m		ഹ
	Jack pine			4			6		
	Red-white pine	2		9	10		1		
	Upland spruce-fir	-1		8	u				
	Oak-hickory	£		2	,		4		7
	Maple-beech-birch	2		7	"		n		
	Lowland hardwoods			6	Ð		2		ч
	Lowland conifers	1		S	10		1		ч
	Nonstocked			4	2		2		
6-IW	Cover types	Increase a lot	Increase a li	ttle SI	tay the same	Decrease a lit	tle	Decrease a lo	يد ا
n=16	Aspen-birch			4	4		4		m
	Jack pine	1		٣	4		ഹ		7
	Red-white pine	-1		S	ŭ				
	Upland spruce-fir	1		7					
	Oak-hickory	9		7			2		
	Maple-beech-birch	2		4	-		1		н
	Lowland hardwoods			6	u		2		
	Lowland conifers	2		m			ო		
	Nonstocked	-1		m			m		2
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Table F.11. Frequency table of cover types in the year 2020 from the not available for harvest land category--Wisconsin private land by FIA survey unit.

WI - 4	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=20	Aspen-birch		3	9	<b>1</b>	9
	Jack pine		2	8	2	4
	Red-white pine	2	ß	9	£	1
	Upland spruce-fir	1	2	12		
	Oak-hickory	4	4	£	4	5
	Maple-beech-birch	9	L	2		
	Lowland hardwoods	1	11	<b>.</b>	2	
	Lowland conifers		4	6	2	
	Nonstocked		2	5	6	3
8-IW	Cover types	Increase a lot	Increase a little	Stay the same	Decrease a little	Decrease a lot
n=12	Aspen-birch		3	4	3	
	Jack pine		1	2	2	
	Red-white pine		1	4	4	
	Upland spruce-fir	1	1	2	1	
	Oak-hickory	7	1	3		
	Maple-beech-birch	£	9	1		
	Lowland hardwoods		5	2	4	
	Lowland conifers	1	2	4	2	
	Nonstocked	1	1	4	3	1

Table F.11 (cont'd).

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