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Forests and regional development

**Economic impacts of woodland use for recreation
and timber in Wisconsin**

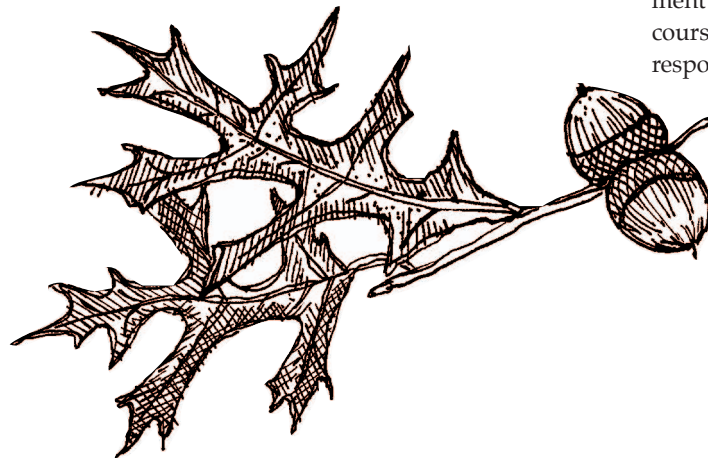


Dave Marcouiller and Terry Mace

Acknowledgements

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*Cover photo: Amnicon Falls, Wisconsin.
Courtesy of Wisconsin Department of Tourism*

Executive summary

Forests provide the basis for much of the economic activity that takes place in rural Wisconsin. This is particularly true in the northern and central parts of the state where tourism and forestry provide mainstays to local economies.

In the past, local residents, interested stakeholder groups and industry representatives have disagreed on the best use of forest resources. Traditionally, many have viewed the simultaneous use of forests for extraction and recreation as being mutually exclusive. In this report, we put forward evidence that supports a more compatible coexistence.

The objective of this research was to develop measures that assist in understanding the ability of Wisconsin's forests to support multiple uses. Specifically, we set out to quantify characteristics of two primary uses of our forests:

1. recreation; and
2. timber production.

These characteristics include the extent, importance, performance and compatibility of uses. In addition, we developed estimates of the regional economic impacts of forest land use for recreation and timber in five substate regions of Wisconsin.

This research has followed a three-phase design that included: 1) recreational use surveys; 2) analysis of timber inventory data; and 3) regional economic modeling using input-output analysis.

The recreational use survey employed an instrument that allowed estimation of recreational use by type and location, land ownership, expenditure patterns, user conflicts and demographic characteristics. The 1996 Wisconsin timber inventory analysis developed economic value estimates of average annual removals and assessed regional forest growth-to-removal ratios to provide a snapshot of wood-products based forest use.

The final phase of the research developed economic models used to estimate impacts of forest use (both timber and recreational use) on regional economic characteristics including employment, income and other components of value added.

Results suggest that forests do indeed provide the basis for much of the economic activity of rural regions. The average annual value of timber removals was approximately \$200 million. Timber production provided a partial basis for primary, secondary and reconstituted wood products sector activity that accounted for approximately 6% of Wisconsin's 1994 gross state product (roughly \$15 billion of \$242 billion). The bulk of timber production appears to occur on nonindustrial private forest lands with a surprising amount of saw-timber value being realized in the southwestern part of the state.

On an annual basis, forest-based recreationists spent approximately \$2.5 billion locally within Wisconsin communities. This provided a significant portion of the receipts of tourism-sensitive sectors in Wisconsin. These sectors accounted for another 6% of 1994 gross state product (roughly \$14 billion of \$242 billion).



Wisconsin Department of Tourism

FORESTS AND REGIONAL DEVELOPMENT

The use of forest land for recreation had interesting differences depending on the land's owner. A surprising amount of forest-based recreation took place on privately owned lands, both industrial private and nonindustrial private lands. Also, there were interesting differences in use of lands by the various types of recreational use.

Clearly, "quiet" recreationists relied heavily on state-owned public lands while hunters focused their use on nonindustrial private forest lands. Motorized use was more difficult to characterize and had the highest levels of use on unidentifiable ownerships (motorized recreationists were generally less aware of whose land they were on).

In general, results of this study suggest that timber production and recreational use of forests were relatively compatible. This was more apt to be the case with hunters and motorized recreationists than with the broad category of "quiet" forest recreationists. Furthermore, recreationists generally felt that balanced use (for both timber and recreation) was an important component of local economic conditions for communities in forested regions and that forest land uses should account for these localized effects on rural populations.

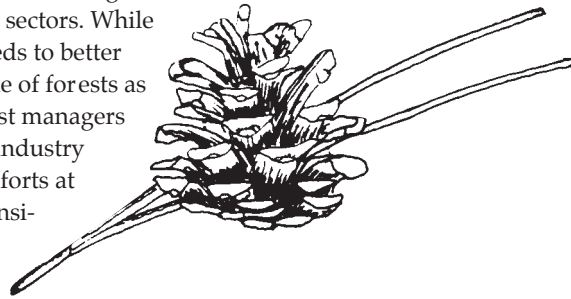
Forest-based activities have a dramatic effect on the viability of regional households in both rural forested regions and in regions where wood-based manufacturing is prevalent. The employee compensation (wages paid to workers) portion of value added accounted for approximately 25% of total wood-products output and 35% of tourism-sensitive output. Average jobs in tourism-sensitive sectors earned almost \$11,000 per year while wood-based industries paid approximately \$36,800 per year. These figures are compared to average statewide earnings per job across all sectors of almost \$25,000 per year.

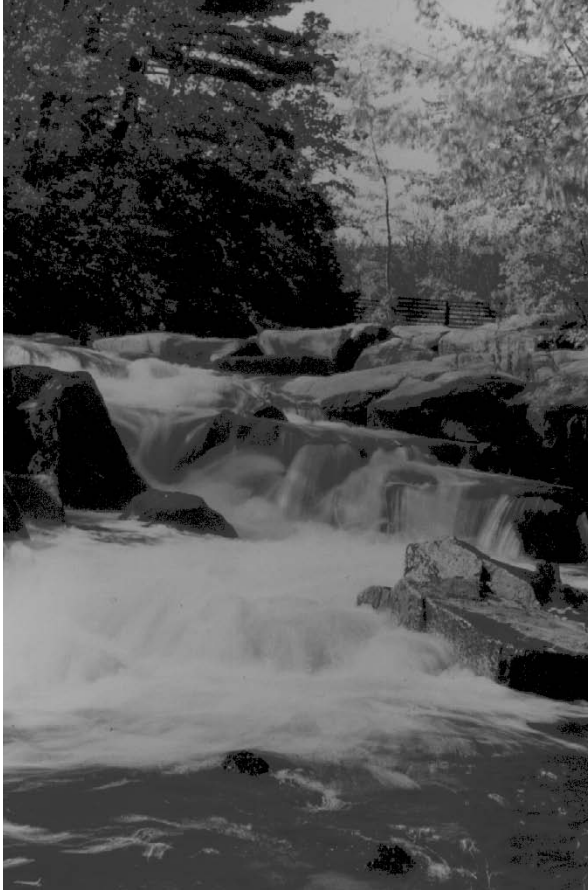
Although more work is required to fully understand the links between forests and community development, there are clear implications of this research for both development policy and forest management policy.

Development of rural forested regions benefits from a clear understanding of the tourism and forestry sectors. While the tourism industry needs to better recognize the latent value of forests as a basis for demand, forest managers and the forest products industry need to continue their efforts at managing forests in a sensitive and scientifically sound manner that more fully accounts for both timber *and* nontimber values.

This research was conducted as a collaborative effort of the Wisconsin Department of Natural Resources Bureau of Forestry and the University of Wisconsin–Madison/Extension. Funding was provided by the USDA Forest Service.

In this document, we identify many opportunities in which a better understanding of resource use by various stakeholder groups could be developed through concerted educational programming. In addition to public land management agencies, this educational programming need presents a primary challenge to outreach specialists and county-based faculty of the University of Wisconsin–Extension and other involved organizations such as the Great Lakes Forest Alliance, the Wisconsin Environmental Initiative and Trees for Tomorrow.





Contents

The changing face of Wisconsin's rural forested regions	2
Focus of this report	3
Impacts of forest-based activities on local economies	3
Compatibility of forest uses	4
Objectives of the research	6
Regions assessed, data collected and methods used	7
Results of the research project	10
The variety of people and resources found in Wisconsin	10
Timber and wood processing	11
Forest-based recreation	14
Regional economic impacts	18
Compatibility of forest uses	24
Importance and performance of forest management	33
Summary and policy implications	35
References	37
Appendix A: Extensions of results and further analysis	39
Appendix B: Sample survey	41

Figures

- Figure 1.** Compatibility of alternative forest uses (from Clawson 1974), p. 5.
- Figure 2.** Regional delineations used in this study, p. 7.
- Figure 3.** Annual growth-to-removals ratios for the State of Wisconsin by ownership and species group (1996), p. 12.
- Figure 4.** Softwood growth-to-removals ratios by substate Wisconsin regions (1996), p. 12
- Figure 5.** Hardwood growth-to-removals ratios by substate Wisconsin regions (1996), p. 12
- Figure 6.** Type of land used by forest recreationists, p. 15.
- Figure 7.** Economic impacts of wood processing industries in Wisconsin, p. 21.
- Figure 8.** Economic impacts of primary and secondary wood processing by Wisconsin region, p. 22.
- Figure 9.** Economic impacts of tourism sectors in Wisconsin, p. 23.
- Figure 10.** Economic impacts of tourism by Wisconsin region, p. 24.
- Figure 11.** Respondents' awareness of previous timber harvesting activities on forest land where recreational activity takes place, p. 25.
- Figure 12.** Respondents' degree of conflict about large openings on forest land where recreational activity takes place, p. 26.

- Figure 13.** Respondents' attitudes on compatibility of small forest openings and recreational activity, p. 26.
- Figure 14.** Respondents' attitudes on whether intermittent forest clearings have important wildlife habitat benefits, p. 26.
- Figure 15.** Respondents' perceptions of whether timber harvesting has major impacts on the water quality characteristics of forest lands, p. 27.
- Figure 16.** Respondent's attitudes on whether forest-based recreation is generally compatible with timber harvesting activities, p. 27.
- Figure 17.** Respondents' attitudes on whether producing timber is a legitimate use of forested land, p. 27.
- Figure 18.** Respondents' attitudes on whether other people encountered while recreating do not generally bother individual forest recreationists, p. 28.
- Figure 19.** Respondents' attitudes on whether an individual's use of forests for recreation does not impact others' recreational use, p. 28.
- Figure 20.** Respondents' attitudes on whether increased road densities have compromised individual recreational experiences, p. 29.
- Figure 21.** Respondents' attitudes on whether forests have exceeded their capacity to produce high quality recreational experiences, p. 29.

- Figure 22.** Recreationists' attitudes toward user fees to pay for forest-based recreational development, p. 30.
- Figure 23.** Respondents' attitudes about whether private forest land owners should be allowed to manage the land and its resources without regulation, p. 30.
- Figure 24.** Respondents' attitudes on whether use of private land should be based on what the owner wants rather than restricted by zoning, p. 31.
- Figure 25.** Respondents' attitudes about whether land use regulation should be locally determined, p. 31.
- Figure 26.** Respondents' attitudes on the importance of good paying jobs in rural forested regions, p. 31.
- Figure 27.** Level of importance respondents placed on alternative local development strategies, p. 32.
- Figure 28.** Importance-performance measures for quiet recreationists, p. 31.
- Figure 29.** Importance-performance measures for motorized users, p. 33.
- Figure 30.** Importance-performance measures for hunters, p. 33.

Tables

- Table 1.** Comparison of residence between survey respondents and non-respondents, p. 8.
- Table 2.** Selected characteristics of sub-state Wisconsin regions, p. 10.
- Table 3.** Wisconsin timber stumpage prices, p. 13.
- Table 4.** Value of annual timber removals in millions of 1996 dollars, p. 13.
- Table 5.** Annual household expenditure patterns by region in 1996 dollars, p. 16.
- Table 6.** Global and local expenditures of forest recreationists in millions of 1996 dollars, p. 17.
- Table 7.** Selected economic characteristics by economic sector (State of Wisconsin, 1994), p. 19.
- Table 8.** Industry output by region in Wisconsin, 1994, p. 20.



Forests and regional development

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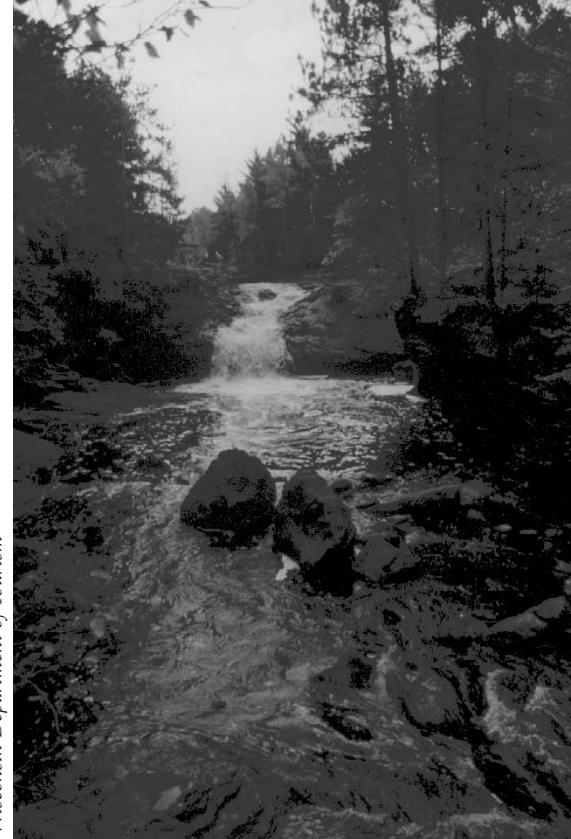
The changing face of Wisconsin's rural forested regions

Over the latter half of this century, rural forested regions in the Upper Great Lakes States have experienced dramatic change in their economic, social and environmental conditions. Development of infrastructure and general increases in both leisure time and disposable income have intensified the demand for forest-based recreation. This, coupled with an increased sensitivity toward environmental issues, has allowed many individuals and groups to be both more aware of and willing to challenge traditional land management activities. This general shift in attitudes and behaviors has led to a relative decline in the regional importance of traditional timber-based land uses and a relative increase in the regional importance of recreation and other non-market uses.

At the same time, public policy that addresses the management of natural resources has progressed through a rather dramatic paradigm shift. Take, for example, the management policies of the USDA Forest Service, which controls more than 88 million acres of U.S. forest land—roughly 20% of the total commercial forest land in the United States. Timber production was the primary driver of forest management policy during the early and middle part of the century.

However, since the Monongahela and Bitterroot controversies of the late 1960s and early 1970s,¹ policies of the USDA Forest Service have made a steady transition away from an even-aged timber production focus to more fully incorporating multiple uses and, recently, ecosystem-based approaches to land management. Extractive land management activities are now highly scrutinized for their spatial disturbance patterns and their compatibility with recreation and other non-market uses. In short, public lands in remote resource-dependent rural regions are increasingly being managed for non-extractive uses and non-timber values.

Wisconsin Department of Tourism



Defacto results of these policy shifts have had dramatic effects on the manner in which regional households generate income. The value of returns and their respective ownership patterns have changed as the economic mix of industries active in local regions has changed. From the perspective of regional economic activities, this shift is characterized by a relative decline in manufacturing activity and relative increases in service and retail sectors. The latter, in part, represent what many term the “tourism industry.”

Northern Wisconsin's tourism industry depends on forest and water resources. The manner in which forests and watersheds are managed helps determine the value of natural amenities to tourism.

¹ The Monongahela National Forest is located in West Virginia and the Bitterroot National Forest is located in Idaho and Montana. Both controversies occurred during the mid- to late 1960s and were the result of increased use of even-aged management coupled with user-activist concern over the apparent environmental degradation resulting from clearcutting. A good historical account of this and other federal forest policy controversies can be found in Robinson (1975).

Focus of this report

There is a general perception that timber production and recreational use of forest resources are somehow mutually exclusive; specifically, that forest planners and community development practitioners must recognize a trade-off between the two and plan accordingly. If recreational use and its link to tourism development requires pristine forest conditions and the wood products industry requires fiber generated through intermittent harvesting activities, what is to be done? Do we trade off wood products for tourism, or are there interrelationships such that, when understood, combined and nurtured, there might develop a complementary association?

Arguments for the latter are often cast aside by an over-simplistic approach that tends to support partisan viewpoints on either side of the political spectrum. A good example of this are the policy analysis reports bearing titles such as "Recreation or Timber: Which Brings More Economic Benefit?" used to support the Federal Resources Planning Act (RPA) (Schallau, Maki, and McKillop, 1995). Regional analysis often pits the two alternative forest uses against each other and fails to address the core issues of compatibility between uses. The simple point that we focus on here is that a certain level of land use compatibility could serve as an important driver of local economic policy prescriptions.

Contemporary regional analysis needs to address the important issues of compatibility between tourism, the timber industry and local benefits to assist with public policy in resource-dependent regions. One important analysis lies in the ability to describe and predict regional impacts of changing resource use on rural economic well-being. In these rural resource-dependent regions, natural resources provide important raw materials for a variety of regional wood products manufacturing activities in addition to the demands for service and retail activities created by recreational use.

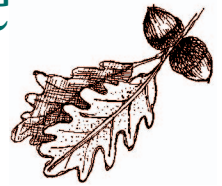
The effectiveness of policies that address natural resources from a regional perspective is typically analyzed using aggregate economic measures that include the total number of jobs created or the total impact on value added. The contributions of natural resources to regional development, however, are becoming increasingly more complex.

Impacts of forest-based activities on local economies

Shifts in resource use from market to non-market activities have important impacts on the links between regional economies and the manner in which income is generated and distributed to regional households. If we view the application of forest management as lying along a spectrum that varies from

The techniques used for regional analysis have enormous potential to assist with public policy, but remain limited due to an overriding importance placed on market-based economic centrism and financial flows. Much of our understanding of these more remote regions is masked by an apparent myopic focus on such phenomena as agglomeration and central places, thus

As natural resources are managed in different ways, the flow of non-market goods is altered, thus changing the impact on the regional economy.



extensive (lower levels of human input) to intensive (heavier reliance on the application of silvicultural treatments), we realize there are significant differential combinations of market and non-market outputs. As natural resources are managed in different ways, the flow of non-market goods is altered, thus changing the impact on the regional economy. These complexities are simply not well understood or accounted for within our current framework for modeling the economic problem.

basing analysis and results on the fundamental aspects of regional proximity to population centers and the impacts these centers have on peripheral regions.

While these linkages between regions are important for accurate modeling, the aspects of regional dependence detract from the unique attributes of rural resource-dependent regions. In fact, it is these unique attributes that help describe the very essence of activities taking place in these regions. The careful assessment of these attributes is required to more fully analyze regional aspects of public policy in resource-dependent regions.

Those who have developed the theoretical basis for regional analysis have had some success in characterizing the important issues of rural resource-dependent regions. As a matter of fact, some of the important spatial economic theories have roots in work that focused on describing the attributes of remote resource-dependent regions.



Take for example the pioneering work on export-base theory developed by North (1955) and Tiebout (1956) in which early arguments on stages of regional growth are set out. Using the historical experience of rural resource-dependent regions, both North and Tiebout argue a key basis for export-base theory, that of the benefits associated with specialized attention to exporting resources that are endowed to the region.

Other geographers and economists have spent a great deal of effort in the translation of regional economic theories and techniques to the analysis of environmental issues (Isaard 1972; Miller and Blair 1985, Chapter 7), recreation (Clawson and Knetsch 1966, Part IV; English and Bergstrom 1994) and tourism (Smith 1987 and 1993). There is, however, an increasing need to improve the focus on unique attributes of rural resource-dependent regions.

Previous work to develop a more integrated approach to resource-dependency that is based on compatibility of land uses is limited. The literature on combined influences of tourism and forestry is simply not well developed. On one hand, we have a growing literature on community stability and natural resource dependence (Byron 1978; Machlis and Force 1988; Overdeest and Green 1995) and a fair amount of literature on the tourism values of forests (Brown 1987; Walsh, Ward, and Olienyk 1989; Ribe 1990; Bostedt and Mattsson 1995).

On the other hand, the integration of the two alternative forest uses since the underlying conceptual work of Marion Clawson and Jack Knetsch (Clawson and Knetsch 1966; Clawson 1974) has not been accomplished. Although there does exist a limited literature on land use compatibility and the collaborative relationships that exist between forestry and tourism (*ibid*; Chappelle 1995; Hacker and Andrews 1995), its incorporation into management planning and regional policy analysis still remains in its infancy stage.

Compatibility of forest uses

An important aspect of the effort reported here assesses the compatibility of alternative forest uses. Specifically, we were interested in recreationists' perceptions about use compatibility in three general areas: 1) recreation with timber production; 2) intra-recreational user conflicts; and 3) the appropriateness of forests to serve local development needs. The conceptual framework for assessing land use compatibility has roots dating back to the work of Marion Clawson during the late 1960s and early 1970s (Clawson 1974). One particularly interesting aspect of Clawson's work is his comprehensive assessment of forest use compatibilities, an outline of which can be found in figure 1.

In this figure, Clawson attempts to qualitatively assess the compatibility of alternative forest uses. While certain uses are clearly compatible (such as aesthetics and wilderness or water

quality and wildlife production), others are completely incompatible (wood production and wilderness use). Perhaps more importantly, Clawson observes that many uses are compatible if certain controls are applied (wood production and wildlife or wood production and recreational use).

Thus, Clawson has identified the basis for management interaction—management should be applied to control uses so that relative compatibility is maximized. Compatibility of land uses has provided an important goal behind contemporary forest management policy and provides ample challenge for today's forest land managers.

One vexing problem of forest land managers deals with a general inability to evaluate management effectiveness in anything but an ex-poste and ad hoc fashion. Often, forest managers are those held responsible for producing the vast array of basic resources to support every imaginable forest use. This is particularly true for those employed by public agencies. Rarely, however, are managers allowed to objectively assess how well they perform this challenge. Performance measures used to assess effectiveness of this comprehensive provision, all too often, are reactive and deteriorate into an assessment of the level and extent of stakeholder complaints.

Figure 1. Degree of compatibility among various forest uses.

Primary use	Maintain attractive environment	Provide recreation opportunity	Wilderness	Wildlife	Natural watershed	General conservation	Wood production and harvest
Maintain attractive environment	X	Moderately compatible, intensity dependent	Not inimical to wilderness	Compatible to most; less so to others	Fully compatible	Fully compatible	Limited compatibility; often affects extent
Provide recreation opportunity	Moderately compatible; intensity dependent	X	Incompatible; would destroy wilderness character	Incompatible for some; others more tolerant	Moderately compatible; intensity dependent	Moderately compatible; intensity dependent	Limited compatibility. Timing and intensity dependent
Wilderness	Fully Completely compatible	incompatible; intolerant of intensive use	X	Highly compatible to most; less so to others	Fully Fully compatible	compatible	Completely incompatible; precludes all harvest
Wildlife	Generally Limited compatible	compatibility; intensity dependent	Mostly compatible; some require vegetative manipulation	X	Generally Fully compatible	Generally fully compatible	limits volume and conditions of harvest
Natural watershed	Fully compatible	Moderate ; compatibility may require intensity limits	Not inimical to wilderness	Generally compatible	X	Fully compatible	Moderate compatibility; restricts but does not prohibit
General conservation	Fully compatible	Moderately compatible; intensity harvest dependent	Not inimical to wilderness	Generally compatible	Fully compatible	X	Compatible; requires modification in method
Wood production/ harvest	Compatible Moderately if harvest method strictly controlled	compatible	Completely incompatible; would destroy wilderness	Compatible Compatible if harvest method fully controlled	Compatible Compatible if harvest method fully controlled	if harvest method fully controlled	X

From Clawson (1974)

Timber production and forest-based recreation can be generally compatible land uses. Key to compatibility are issues such as silvicultural methods, appropriate timing of harvesting activities and thoughtful natural resource interpretation programs.

Another important aspect of this research effort attempts to provide a more comprehensive assessment of forest management effectiveness. We do this using a tool that has gained prominence among marketing researchers and is referred to as Importance-Performance Analysis (IPA). IPA was initially advanced by John Martilla and John James as an easily applied technique for measuring importance and performance of attributes as a tool to further the development of effective marketing programs (Martilla and James 1977). Their efforts were initiated due to the general lack of applicability and practical significance of marketing research findings. They wanted IPA to be easy to implement and generate results that were easy to understand.

Objectives of the research

In this report, we intend to shed some light on these issues with specific reference to the forest resources of Wisconsin. Our applied research initiative set out to address three primary objectives that included:

1. Developing a method that estimates the economic impacts of forest-based recreational use in five sub-state regions that is replicable for other regions.
2. Quantifying the regional economic impacts of forest land use for timber production using the same initial regional specification and developing impact profiles of forward-linked regional industries.
3. Outlining attributes of forest land use compatibility and developing measures of management effectiveness.

Funded by the USDA Forest Service, this initiative helps provide perspective and data for forest management and recreation planning by agencies of the State of Wisconsin as well as other units of government.

Furthermore, there are clearly identified areas of this research that would benefit from the development of educational programming to improve understanding of resource use by various stakeholder groups. This type of educational programming need presents a primary challenge to outreach specialists and locally based staff of the University of Wisconsin–Extension, the Wisconsin Department of Natural Resources, and other involved organizations such as the Great Lakes Forest Alliance, the Wisconsin Environmental Initiative and Trees for Tomorrow.

Given the increasing demands placed on forest resources, policy-makers require more meaningful analysis that associates regional benefits with policy responses. There is a continuing need to closely scrutinize complex land use interactions and regional impacts to develop policy responses that attain regional development goals. This research addresses interactions and impacts of forest land use for both recreation and timber.

This report is organized by main topics. First, we outline the methods used and then we present the empirical results. Finally, we end with a discussion of conclusions and policy implications that speak to the future conservation of forest resources in Wisconsin and throughout the Lake States.



Wisconsin Department of Natural Resources

Regions assessed, data collected and methods used

This study is based on data that is specific to numerous regional delineations within Wisconsin. In this section, we outline the procedures we used to collect and analyze the data for five sub-state regions. These regions (shown in figure 2) follow timber inventory units as specified by the USDA Forest Service and serve as a basis for resource planning within an assortment of public agencies.

We also conducted an aggregate statewide analysis using data specific to the state. It is important to point out that regional delineations matter to issues of economic impact estimation. Economic structure dictates the level of economic transactions taking place



Figure 2. Regional delineations used in this study.

within the region. The larger the region, the more regional economic transactions are captured within it. Future work will focus on alternative regional delineations for more specific impact analysis.

Analysis of timber inventory. All timber volumes were based on the 1996 USDA Forest Service inventory for Wisconsin. This Forest Inventory and Analysis (FIA) database contains a wealth of information about forest growing stock, its growth and removal status and specific characteristics of change over time. The data are specific to 26 species groups and contain height, diameter, volume and stand density characteristics. Furthermore, these data are specific to eight separate ownership categories which allow differentiation between public and private land tenancy groups.

Of particular interest to this report are data on annual removals from growing stock. Based on information provided by state-level natural resources agencies (from *Timber Product Output* reports as reported in Hackett and Whipple 1997), these data represent an average amount of timber harvesting activity that has taken place since the previous timber inventory which, for Wisconsin, was done in 1983. We used an August, 1997 release of the data in compact disc format. Minor adjustments to inventory figures explain small discrepancies between our data and the data published in the Wisconsin Forest Inventory as reported in Schmidt (1997).

The value of timber depends on both species and product class. Removals from growing stock by species are directly reported for sawtimber, while pulpwood volumes are inferred through the difference between total removals from growing stock and removals of sawtimber from growing stock. For the calculation of pulpwood volumes, an adjustment of six board feet per cubic foot was made in converting units from board foot to cubic foot measures. As a general rule-of-thumb, this conversion accounts for volume loss between product categories. Removals are reported by ownership category.

Removals by species and product class are applied to fourth quarter 1996 price data found in *Timber Mart North* (Banzhaf 1996). These regularly published price data are specific to species within three sub-state Wisconsin regions. While the regions are not directly consistent with the five timber inventory regions, they do provide a general accounting for different timber markets across the state. Product class differentiation at the stumpage price level is limited to sawtimber and pulpwood. Price-quantity calculations are done at the most disaggregate species and product class possible. For reporting purposes, these species totals are summed to product class totals by region and by ownership category.

Assessment of recreational use.

In addition to timber, forests also provide the “raw material” for a significant amount of recreational use. To assess this form of forest use, we conducted a three-phased survey of forest-based recreational users: two waves of mail surveys targeting forest-based recreationists and one comprehensive random telephone survey of Wisconsin households.

Our intent was to develop data specific to those who recreate primarily within forested settings. It goes without saying that this is a specific form of tourism engaged in by people that are interested in outdoor experiences.

For the purpose of our data collection and analysis, we were primarily interested in three basic types of forest-based recreationists. These groups included:

1. **“quiet” recreationists** (hikers, bikers, campers and birdwatchers);
2. **hunters** (animal and bird hunters);
3. **motorized recreationists** (snowmobilers and ATV users).

Two waves of mail surveys used the same survey instrument. This six-page instrument (sample found in Appendix B) was designed and pretested to elicit responses regarding household forest recreational use patterns, recreation-related expenditures, attitudes about land use compatibility, perceptions of resource management attributes, development options and demographic characteristics.

The first wave of mail surveys targeted a random sample of hunters (from four separate hunter categories) and snowmobilers. It was administered between December 1995 and May 1996. The sample was randomly drawn from license holders as maintained by the Wisconsin Department of Natural Resources. One limitation of this sample was that snowmobilers included only those who licensed their machines in Wisconsin. On the other hand, all hunters who hunted in Wisconsin during 1996, regardless of their place of origin, were required to license their activity with the state.

The second wave of mail surveys targeted warm weather forest recreationists. The samples were randomly selected from state and county campground registers, interpretive centers, trail users and a set of Wisconsin all-terrain vehicle (ATV) license holders. One important limitation of this wave of samples concerns the difficulty encountered in developing user population lists from which to draw samples. The ownership of resource-

based recreational activity used by sample populations was more heavily focused on state and county properties. Although several user lists of privately owned resources were used, there remains some bias toward use of publicly owned resources.

The mail surveys were administered using a modified Dillman technique. Initial mailings were followed up with a postcard reminder after 10 days. If there was still no response after three weeks, another full packet of materials was sent to the participant. This generated about 700 usable responses from the first wave and roughly 500 from the second for an overall response rate of 54%. The residences of nonrespondents were assessed for urban, suburban and rural origins to determine possible bias. This was done using the original mailing label address. For this post-test, urban areas were defined as addresses from cities with populations greater than 10,000. Suburban was defined as close to urban areas and based on a population of 5,000. All other addresses were classified as rural.

Results of this non-response assessment are summarized in table 1 and include generally encouraging results. This is particularly true for those defined as "rural" non-respondents. Rural samples were roughly equal among respondents and non-respondents (about 56% of both sub-samples.)

The response disparities between urban and suburban were significant. In their defense, however, the discrepancies could easily be explained by the manner in which we defined suburban and urban residences ex-poste. It is likely that many of our respondents could have confused urban with suburban because our strict definition was not provided up-front. Given the encouraging match for "rural" defined subjects in the non-response check, we are satisfied that the sample of respondents represents a non-biased sample of forest-based recreationists provided our initial sampling regime was sound. No further non-response bias or contact with non-respondents was done.

The third phase of recreational use assessment relied on a statewide telephone survey of all Wisconsin households. This telephone survey was conducted by the Wisconsin Survey Research Lab (WSRL) as part of their routine *Wisconsin Opinions* work. It was conducted between January and March of 1997 and entailed approximately two minutes of discussion with each respondent on a range of questions that elicited participation rates for several categories of forest-based recreation.

Summary data on recreational use by type (quiet users, hunters and motorized users) thus allowed an expansion of survey results to the statewide population of households.

Impact analysis and regional economic characteristics.

Analysis of regional economic structure and the impact of forest use was conducted using IMPLAN Pro 95/NT and 1994 county-level data developed by the Minnesota IMPLAN Group (1997). This software and data, originally developed from the IMPLAN efforts of the USDA Forest Service, is a commonly used modeling package designed to assess economic impacts. At its core is an input-output structure that comprehensively accounts for inter-industry transactions, components of regional value added, production characteristics, final demands and regional linkages (imports and exports).

This structure is available at a detailed sectoral level (528 sectors) and is constrained by the extent of economic activity taking place at the county level. For the sub-state regional analyses, counties were combined to correspond with the regional delineations outlined above. These analyses were conducted to determine patterns of economic impact. Since the activities assessed are current uses embedded within regional economic characteristics, the absolute values generated result from relatively small hypothetical modeling shocks and are of less

Table 1. Comparison of residence between survey respondents and survey non-respondents (non-response bias check).

Residence	Respondents		Non-respondents	
	# samples	percent	# samples	percent
Urban	217	16.1%	385	32.0%
Suburban	376	27.9	135	11.2
Rural	757	56.1	682	56.7
Total	1,350	100.1%	1,202	99.9%

interest/importance as compared to the general patterns of economic impacts. For interested readers, a complete discussion of input-output analysis and its inherent limitations is contained in Deller, Sumathi and Marcouiller (1993).

Compatibility and importance-performance analysis. In his early work, Clawson laid out a comprehensive set of compatibility issues (presented earlier in figure 1). Given time and resource constraints, our work was limited to looking at use measures from the standpoint of forest-based recreationists. From this vantage point, both intra-use compatibility (recreational user conflicts) and inter-use compatibility (recreation versus timber production) could be assessed. Our efforts to assess compatibility took the form of detailed Likert scale responses to standardized statements posed to forest recreationists. These statements focused on compatibility with forest management activities, other recreationists and land use regulations.

Furthermore, a set of importance/performance criteria were posed that generated information on management effectiveness as perceived by forest recreationists using a method referred to as importance-performance analysis (IPA). IPA identifies salient qualitative features and asks respondents to rate product attributes in terms of importance and performance (Fletcher, Kaiser, and Groger 1992; Hammitt, Bixler, and Noe 1996). Importance measures the level of importance

attached to an attribute by a respondent on a Likert-type, 1–5 scale. Performance measures the respondent's level of satisfaction with the provision of that same attribute on the same 1–5 scale. Using a combined importance and performance measure is valuable because of the need for an indication of satisfaction that stems from one's expectations and judgment of performance (Propst and Lime 1982; Mengak, et al. 1986)

Uysal and Howard (1991) indicate that IPA involves five steps that include:

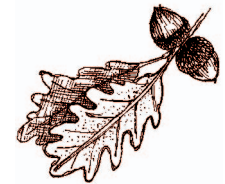
1. development of attributes;
2. administration of a survey to measure the product or service;
3. estimation of perceived importance and performance of each attribute through the calculation of the mean importance value and the mean performance value;
4. plotting of intersect of mean importance and performance values for each attribute on a two dimensional grid; and
5. assessment of attributes based on grid location.

Our work followed this five-step procedure.

Ritchie (1987) indicates that IPA is an evaluative tool to complement policy decisions at the decision level. Evans and Chon (1989) used IPA to interpret two different tourism destinations to solve problems and resolve tourism issues. Specific to forest-based recreation, Hollenhorst and Olson (1992) and Hollenhorst, Olson and Fortney (1992) employed an importance-performance analysis of the recreation features of an eastern national forest. They believe recreation planners can use these IPA results in formulation of a new information program as part of forest management.

Our ongoing analysis is currently extending the IPA results toward development of causal models that help explain attributes that fall into the quadrant requiring management attention (high importance, low performance). Thus, IPA results can aid forest managers by identifying, in a comprehensive fashion, those long-standing issues of consumer dissatisfaction. Results of this ongoing analysis can be found in Marcouiller (1998).

IPA results can aid forest managers by identifying, in a comprehensive fashion, long-standing issues of consumer dissatisfaction.



Results of the research project

The variety of people and resources found in Wisconsin

The regions of Wisconsin differ dramatically in many respects. A set of summary statistics for each region are contained in table 2. For instance, the southeastern part of the state is heavily populated and contains the urban areas of Milwaukee, Madison and the Fox River Valley. This contrasts sharply with the northeastern part of the state that calls the town of Rhinelander (population 8,000) its largest urban center.

Perhaps more to the point of this report, though, is that the natural resource base upon which both the forest and tourism industry rest varies greatly within Wisconsin. The southwestern portion of the state contains hardwood forests dissected by fabulous freshwater trout streams while the northwestern and northeastern parts of the state contain countless lakes and streams set within vast aspen and pine forests. Certainly, we would expect the character and extent of both forestry

and tourism to be quite different depending on where in Wisconsin we focus our attention.

What follows is a brief description of each region that is intended to provide context to the data and results contained in the rest of the report.

Fourteen counties comprise southwest Wisconsin in a geomorphological region known as the "driftless" area. This is the region of Wisconsin left untouched by the last set of glaciers that covered the rest of Wisconsin 12,000 years ago. Today, this portion of Wisconsin is characterized by steep hillsides and bluffs and remains a heavily agricultural region dominated by dairy production. The largest urban center is LaCrosse (population roughly 50,000.)

Economically, the region is heavily influenced by both the Twin City metropolitan area of Minnesota (population roughly 2.5 million) to the northwest and Madison (metropolitan population roughly 300,000) to the east. Much of the region remains rural in character. Agriculture constitutes more than 60% of the land area in the region and approximately 30% of the land value.²

Forests make up another 23% of the region's area and 5% of the land value. These forests are predominantly hardwood with oak, maple and ash making up the leading forest types. Water resources in the region are characterized by limestone cut streams fed by freshwater spring creeks. There are several well-known recreational destinations in the southwest that include the Kickapoo River Valley (canoeing and trout angling), several state parks and portions of several state-owned bike trails. In addition to rural transportation networks and several scenic corridors (such as state Highway 35 along the Mississippi River), the region contains the east-west transportation route of Interstate 90 and portions of Interstate 94.

Northwest Wisconsin, a 12-county region, represents a primary playground for the Twin Cities vacationer and recreational homeowner. The major urban centers of this region of more than 250,000 residents include Superior (population roughly 35,000), Ashland (population roughly 10,000) and Spooner (population roughly 3,000).

In addition to the Twin Cities, the region is influenced by Duluth (population roughly 100,000) to the Northwest and Eau Claire/Chippewa Falls (population roughly 80,000) to the southeast. The major transportation corridor is the newly updated state Highway 53 that runs north/south from Eau Claire to Superior. Tourism and forest products provide the mainstay of the regional economy, both resting on a dynamic natural resource base.

The forests and lakes of the region help support much of the regional business activity that produces both high quality manufactured goods as well as quality service and retail goods. The predominant forest type within the region includes pine (both red and jack pine), oak and aspen. The numerous lakes play host to the increasingly valuable lakeshore property, owned and used by over 30,000 recreational homeowners and their families (Marcouiller, et al. 1996). Hayward is a common tourist destination with numerous public and private attractions drawing thousands of vacationers into the area for brief periods of time.

The northeastern portion of the state is perhaps Wisconsin's little known natural secret. Sparsely populated, this region is dominated by both water and forest resources. The timber industry represents an important economic engine for the region and, when combined with tourism, makes up a large part of this resource-dependent

Table 2. Selected characteristics of sub-state Wisconsin regions.

Characteristic	NW	NE	Central	SW	SE	State totals
Population (1994)	254,000	233,900	612,600	472,300	3,509,800	5,081,700
Number of households (1994)	133,034	132,620	230,524	166,340	1,254,956	1,915,921
Household income (1994 \$)	\$31,091	\$29,003	\$48,163	\$51,451	\$62,580	\$55,391
Land area (square miles)	12,396	8,907	11,145	9,592	12,279	54,314

² As identified by the Wisconsin Department of Revenue, Division of State and Local Finance 1994 acreage and real equalized value figures.

economy. While lakes make up the primary draw for visitors to this region, the rivers and waterfalls of Marinette County represent one of the unique components of northeastern Wisconsin. Much of the demand for recreation in this region originates from the Fox River Valley, located roughly 50 miles to the south. The Fox River Valley also contains one of the largest concentrations of paper making machines anywhere in the world, thus providing an important demand for the pulpwood of northeastern Wisconsin. Most of the land acreage in the northeast is forested.

In addition to the Fox River Valley, central Wisconsin represents one of the nation's key sources of paper products. The 13 counties found in the middle of the state are economically diverse and contain large utilities and manufacturing operations that draw water from the Wisconsin River. Also, this region is home to numerous large insurance providers.

Land use in central Wisconsin varies from very intensive agricultural operations (potatoes are a primary row crop) to plantation forests. Recreational use that occurs in central Wisconsin is diverse. Much recreation is close to either side of the Wisconsin River. Also, some of the best examples of publicly provided forest recreation can be found in Jackson County where roughly 60% of the land is owned and managed by public agencies that include both the county forestry department and the Wisconsin DNR.

Finally, more than half of the state's population resides in southeastern Wisconsin. In addition to a robust heavy manufacturing industry that produces high quality automobiles and motorcycles, it is among the nation's primary sources of toilet and facial tissue. In general, the timber used by these mills is not grown in southeastern Wisconsin but originates in other parts of the Lakes States forested region.

Plentiful water, feeder service industries and an industrious labor force provide the reasons to why papermaking has flourished in the Fox River Valley. This is not to say that the economy of southeastern Wisconsin is based solely on manufacturing. Tourism is another important component of this region. From Door County in the north, to the many touring opportunities present along Lake Michigan, leisure opportunities abound. Another key recreational resource that exists in the region is found in the Kettle Moraine which extends through the middle part of southeastern Wisconsin.

Trees represent an important commodity throughout Wisconsin. Timber provides the raw material for wood processing industries and a host of secondary economic benefits. Sensitive handling, producing this renewable raw material can be compatible with recreational activities such as hunting, camping, hiking and snowmobiling.

Timber and wood processing

The forests of Wisconsin have undergone dramatic change during the past 100 years. Commonly referred to as the cutover region, much of northern Wisconsin forest land was harvested during the late 1800s and early 1900s for use as residential construction material for cities in the middle part of North America.³ Also during this period, there was a failed attempt to turn forest land into agricultural land. This failure was largely the result of short growing seasons and soils that were not well-suited to annual cropping. Remnants of this period are easy to spot throughout the forested region of northern Wisconsin. Three-fourths of

a century of natural regrowth, particularly given improved knowledge and implementation of silvicultural practices and land use controls, have restored much of this regions' forests to an excellent condition. Currently, there is a significant excess of forest growth when compared to the amount removed each year.

An increasingly important aspect of contemporary resource policy deals with the notion of resource sustainability. Although rather ill-defined, this idea basically speaks to the ability of humans to manage a resource base such that the resources themselves are not depleted over the long-term.⁴



Wisconsin Department of Natural Resources

³ Excellent references on this period of state history can be found in Mahafey and Bassuk (1978) and an original report written by the National Resource Committee (NRC 1939.)

⁴ To be sure, there is more to sustainability than this simple statement. Many have been focusing on measures of sustainability but there has been little agreement over conceptual bases, standardized measures or evaluative criteria. The interested reader is referred to Linehan and Gross (1997) for further discussion.

Figure 3. Annual growth-to-removal ratios for Wisconsin by ownership and species group (1996).

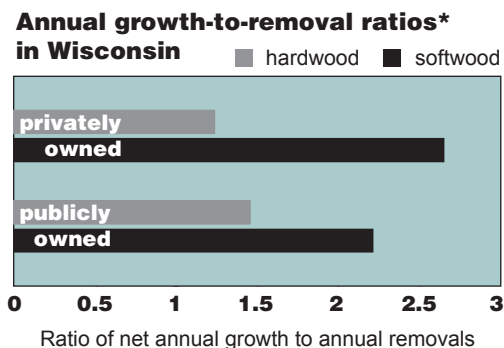


Figure 4. Hardwood growth-to-removal ratios by substate Wisconsin regions (1996).

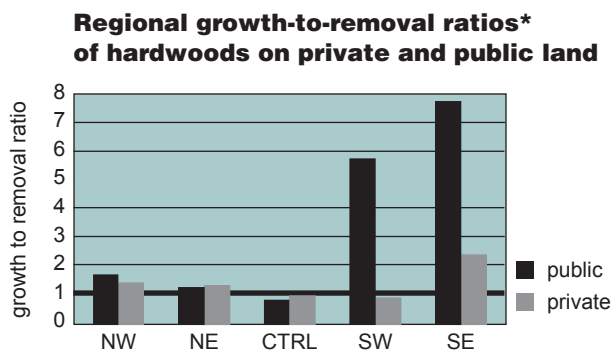
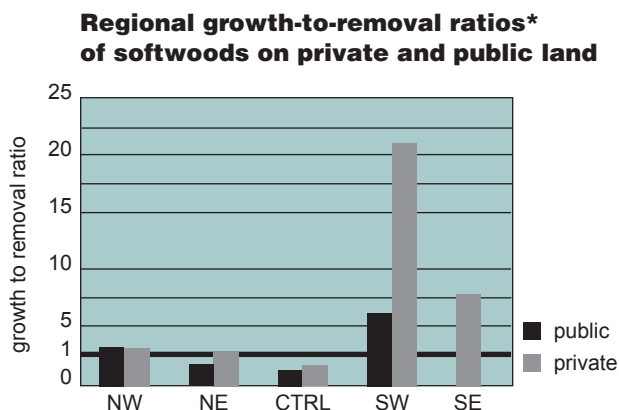


Figure 5. Softwood growth-to-removal ratios by substate Wisconsin regions (1996).



*A number greater than 1 means growth was greater than removal. Base data in millions of cubic feet.

With specific reference to forestry, there has been growing interest in incorporating more than simple measures of resource flow (harvests) within analysis that addresses the contribution of resources to regional economic growth. Key to these arguments is the time-frame of analysis. Simple flow measures of resource use could generate very different results depending upon whether the analysis was short- or long-term. Regions that deplete resource stocks faster than they grow could reasonably expect higher short-term economic stimulus at the expense of long-term sustainability.

Many have argued for a more “green” accounting structure that integrates the level and quality of resource stocks into regional economic models (Norgaard, 1989; Repetto, et al. 1989). At this point, there remains a need for standardized methods to incorporate stock characteristics into market-based, often static, models of regional economic activity.

For the purposes of this report, we will focus on a rather straightforward assessment of the level of resource stocks in the Lake States. One measure of forest sustainability can be inferred through a commonly used ratio of net annual forest growth to annual removals. This measures the relative direction of growing stock levels—ratios under 1 indicate a declining resource base; ratios over 1 indicate an expanding resource base.⁵

For the state as a whole, forest growing stocks are in a state of expansion (summary found in figure 3). This is particularly true for softwoods where there is more than twice as much forest growth as removal. Hardwood growing stocks on private lands exhibit the lowest growth-to-removal ratio at just above 1.2 which still indicates an expanding resource in aggregate.

Among Wisconsin regions, figures 4 (hardwoods) and 5 (softwoods) summarize growth-to-removals ratios by broad categories of land ownership. As can be seen from these figures, the regions are also experiencing a time when, with few exceptions, overall growing stocks are expanding. In general, hardwood forest resource stocks are experiencing the heaviest pressure. Softwood stocks in the central region are being harvested faster than they are regrowing on both ownership categories. This is also the case for privately owned hardwood resources in the southwestern part of the state.

These data provide the context for assessing the value of current forest growing stocks. Forest value discussed in the next section focuses on market-based flows. What follows are estimates developed on the basis of annual removals. Given the scope of our work, we necessarily focus on direct use values associated with timber.

⁵ Certainly, there are many imperfections with the use of growth-to-removals ratios. Some of the primary difficulties relate to aggregation (spatial, by species, by age class, etc.). Simple growth-to-removals ratios do not speak to forest stand biodiversity, age/species structure and other important attributes of forest stand structure. We use this measure here because of its straightforward metric, overall ability to infer change in growing stock levels and availability of standardized data across the regions under examination.

The use value of timber removed from Wisconsin forests depends on three characteristics. These include: 1) species; 2) size or product class; and 3) harvest costs.

These combined characteristics determine the market value of timber. The first has to do with the species, or type of tree harvested. Two basic types of trees found in Wisconsin are hardwoods and softwoods. Examples of hardwood tree species in Wisconsin that are relatively more valuable include the red and white oaks, hard maple, various ashes and walnut. Examples of relatively lower valued hardwoods include aspen,

birch and soft maples. The differences in value among various types of softwoods is not as dramatic as with hardwoods. Common softwood species in Wisconsin include red, white and jack pines, spruce, balsam fir, hemlock and larch.

Within any given species group, there are two basic product classes that dictate both value and end use. Sawtimber is the most valuable product class and accounts for veneer and dimensional uses. Pulpwood is a lower-valued timber product class used in reconstituted wood products such as oriented strand-board, waferboard and pulp/paper products.

The final criterion for timber value relates to the cost and accessibility of harvest. This criterion relates to the people's ability to access, harvest and market roundwood timber products. Also, this characteristic of timber stands reflects the relative distance between the forest stand where trees grow and the destination of final delivery. Typically, timber that is closest to the mill will command higher prices than timber that is located in very remote areas. This is due to the relatively

higher transportation costs that apply to a generally lower value to volume ratio product. Regions across Wisconsin will differ in average prices due to supply/demand conditions locally. These supply/demand conditions are basically the result of differences in these three characteristics of timber value. Prices used to calculate timber values are found in table 3 and are taken from the annual reporting efforts summarized in *Timber Mart North*.

Table 3. Wisconsin timber stumpage prices.

Species group	Sawtimber (\$/MBF)			Pulpwood (\$/cord)		
	R1	R2	R3	R1	R2	R3
Red/white pine	\$77.93	\$149.55	\$106.49	\$27.49	\$23.99	\$30.03
Jack pine	\$50.00	\$76.63	\$65.41	\$29.12	\$21.28	\$30.98
Spruce	\$40.00	\$87.79	\$105.33	\$17.83	\$21.27	\$16.76
Other softwood	\$60.50	\$60.50	\$60.50	\$18.00	\$22.50	\$14.56
White oak	\$227.45	\$245.66	\$172.88	\$9.10	\$19.98	\$7.81
Red oak	\$322.55	\$432.80	\$390.45	\$9.10	\$19.98	\$7.81
Birch (yellow/white)	\$50.00	\$159.53	\$182.34	\$14.20	\$20.43	\$11.15
Hard maple	\$200.00	\$433.50	\$379.01	\$14.83	\$18.47	\$10.98
Soft maple	\$125.00	\$175.91	\$158.39	\$14.83	\$18.47	\$10.98
Beech	\$153.60	\$156.23	\$151.87	\$14.83	\$18.47	\$10.98
Ash	\$200.00	\$178.22	\$170.99	\$14.83	\$18.47	\$10.98
Basswood	\$225.00	\$187.89	\$168.04	\$9.63	\$12.00	\$8.21
Aspen	\$53.66	\$54.02	\$53.58	\$15.88	\$19.31	\$17.82
Other hardwood	\$120.00	\$98.15	\$96.26	\$14.83	\$18.47	\$10.98

* All prices are taken from *Timber Mart North* (George Banzhaf and Company), Vol 2, No. 4 for the fourth quarter of 1996. R1 prices were used for southeastern and southwestern Wisconsin. R2 prices were used for northeastern Wisconsin and R3 prices were used for northwestern and central Wisconsin.

Table 4. Value of Wisconsin annual timber removals in millions of 1996 dollars* (MM\$).

Ownership type & product class	Regions					
	NW MM\$	NE MM\$	CTRL MM\$	SW MM\$	SE MM\$	TOTAL MM\$
Public forests, federal						
Sawtimber	3.063	10.829	0.459	0	0	14.351
Pulpwood	2.216	2.426	0.380	0	0.059	5.081
Public forests, state						
Sawtimber	0.974	0.648	1.539	0.548	0	3.709
Pulpwood	0.225	0.406	0.528	0.009	0	1.168
Public forests, county						
Sawtimber	3.707	1.666	2.376	0.004	0	7.753
Pulpwood	1.829	2.436	1.715	0.060	0	6.040
Private forests, industrial						
Sawtimber	2.760	8.481	0.195	0	0	11.436
Pulpwood	1.435	1.500	0.144	0	0	3.079
Private forests, non-industrial						
Sawtimber	11.754	18.828	50.226	51.208	8.369	140.385
Pulpwood	4.847	4.457	5.239	1.745	0.701	16.989
TOTAL Stumpage Value	32.811	51.679	62.803	53.574	9.129	209.001

*As identified in the 1996 USDA Forest Service Forest Inventory and Analysis database on annual average removals occurring during the previous inventory period. Sawtimber volumes originally reported in board foot units and growing stock volumes originally reported in cubic feet were converted to common scales for value calculations using prices reported for the fourth quarter of 1996 in *Timber Mart North*.

This lone hiker at the Hardies Creek Experimental Forest is taking advantage of one of the many recreational opportunities afforded to Wisconsin residents by an abundant forest resource base.



Across Wisconsin, there is a wide range of forest management activity and harvested intensity. The stumpage value⁶ of timber harvested in Wisconsin during 1996 is outlined in table 4. This is shown by product class, land ownership and region. As can be seen from the table, there was roughly \$210 million worth of timber harvested during 1996, the bulk (roughly 81%) of which originated from privately owned forest lands.

More specifically, most (91% of the privately owned timber) harvest value took place on lands owned by non-industrial private forest (NIPF) land owners. Of the harvest value originating from publicly owned forest lands, federal lands (namely lands managed by the USDA Forest Service) accounted for roughly 50%, county-owned timber harvests made up about 36% and state lands accounted for 14%.

Regional differences were also an interesting feature of removals. Most of the timber stumpage value in Wisconsin during 1996 was removed from lands located in the central and southwestern parts of the state. Certainly, this speaks to the simple fact that value reflects species type and product class. While the forests of the northern part of the state produced the highest volumes, much of what was harvested in the north was of relatively lower value. A good example simply compares the value of aspen and birch (two of the important species in the north) with the value of walnut and oak (two of the important species in the southwest).

Forest-based recreation

Forest-based recreation occurs in various forms that differ in their level of user conflict, impact patterns and alternative development needs. For our purposes, we have grouped forest-based recreation activities into three primary types that include

1. **quiet** (hiking, biking, camping and birdwatching);
2. **hunting** (animal and bird hunting); and
3. **motorized** (snowmobiling and ATV use).

Realizing that significant overlap in activities occurs, our grouping of the survey respondents into these three categories was done by their specified primary activity. As will be noted throughout the discussion of recreational results, there were many significant differences⁷ that were observed and explained by primary type of recreational use. Although we realize that other groupings could be constructed with our sample, the significance of differences provides encouragement that our initial categorization was reasonable.

Recreational use of forests takes place throughout Wisconsin based on specific opportunities that vary by sub-state region. More importantly, however, are differences in recreational opportunity by land ownership group. Ownership

⁶ Stumpage value refers to the pre-harvest value of standing timber and represents the value of timber to the landowner. It is important to emphasize that Table 4 reports timber harvest in value terms, not volumes harvested. Although there is some correlation between value and volume, value measures also reflect species, product class and relative access cost. While this value reflects demand conditions in local markets, it should also reflect supply of timber, or production costs of producing stumpage. The supply of timber reflects costs of growing trees (silvicultural practices) and management costs associated with holding land, forest protection, recreational development and sale preparation/administration.

⁷ Where appropriate, we provide results of inferential statistical tests that allow us to make statements about the underlying differences among broad categories of forest-based recreational user groups.

of forest lands is a primary determinant of both the extent of and access to recreational opportunities. Common categories begin by separating public from private forest land ownerships. Public ownership groups important in Wisconsin include federal lands (for example, the Nicolet/Chequamegon National Forest managed by the USDA Forest Service), state lands (such as our network of state parks and forests managed by the Wisconsin Department of Natural Resources), county lands and city/municipal lands. Private lands are typically broken down into industrial lands (Tenneco Packaging Corporation, Connor Forest Industries, etc.) and nonindustrial land owners. Indeed, recreational use by land ownership provided one of our primary research interests and represented one

of the first questions we asked respondents to the recreational use mail survey.

Results confirm our notion that recreational use differs by land ownership group. The percentage of time spent recreating broken down into specific land ownership groups is summarized in figure 6. It is interesting to note that while hunters focused their recreational use on nonindustrial private forest lands, quiet recreationists were much more apt to recreate on state lands.

In addition to the standard ownership categories found in figure 6 (same as those listed above), we allowed respondents who were unsure of whose land they were recreating on to specify broad categories of public and private ownership. Our assumption was that

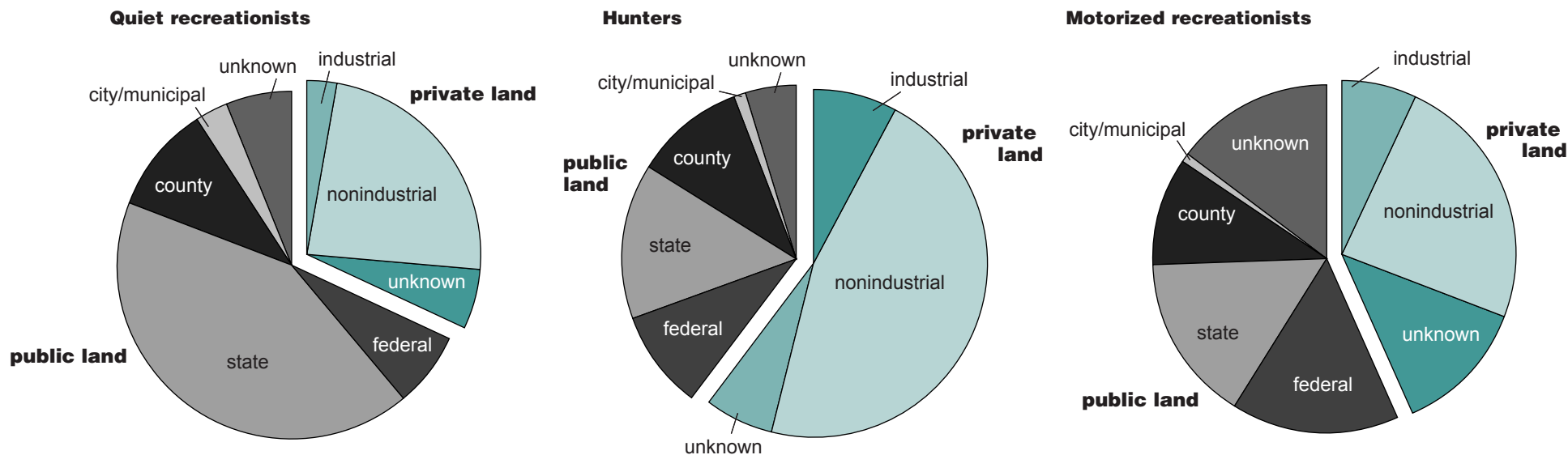
even though recreationists may not know the specific landowner, they would be able to distinguish between public and private lands.

Responses to the unspecified public and private categories are denoted in figure 6 as unknown. An interesting aspect of responses to this category was that motorized users were generally more apt to be unaware of whose land they were recreating on than were hunters and quiet users. One could speculate that this speaks to the generally longer recreational travel distances of motorized users.

The economic importance of forest-based recreation. The value of forest-based recreation to regional economies focuses on the additional demand for local businesses

that occurs when people from outside the region visit with the expressed intent of undertaking forest-based recreation. The dollars they spend provide additional opportunities for local businesses. Regional economists commonly refer to this type of additional demand source for local goods and services as being included within the region's export base. The specific development interest in drawing these people into a region is that they bring with them new dollars that wouldn't be drawn to the region were it not for their visit. Our need ultimately deals with estimating the economic impacts of forest-based recreation to local communities. Before we can estimate impacts, however, it is first necessary to focus on identifying the expenditure pattern of households that participate

Figure 6. Type of land used by forest recreationists.



in forest-based recreational activities.

Household expenditures provided a basis for expansion to regional and statewide estimates. Individual household expenditure patterns by user group are summarized in table 5. It is important to note that total expenditures for recreation are of less interest to local development because only a small portion actually end up in local regions of interest. We took care to develop and implement a procedure that would allow an estimation of the portion of total expenditures that occurred in close proximity to the recreational locale, specified as within 25 miles from the actual recreational activity. In this manner, we were able to estimate regionally based recreational expenditures.

As expected in most spending categories, results confirm that only a portion of total expenditures occur in close proximity to the recreational locale. This is particularly true for motorized recreational users who, in aggregate, spend only about 26% of their total purchases in local regions where they partake in recreational activities.

Overall, motorized recreationists have the highest total spending but the lowest portion of local spending. This would appear reasonable given the high costs associated with purchases for recreational equipment that are, most probably, occurring close to their place of residence.

Table 5. Annual household expenditure patterns by region in 1996 dollars.

	Recreational user group & expenditure category	Total spending	Total local* spending	Spending by Wisconsin forest region				
				NW	NE	Central	SW	SE
Quiet users (n = 364)	Entrance or user fees	77.78	52.57	8.39	11.68	9.17	10.45	12.88
	Licenses	38.79	24.55	4.45	11.71	3.37	2.69	2.34
	Groceries/liquor	183.91	102.69	21.76	31.53	18.65	13.81	16.94
	Restaurants/drinks	123.55	94.15	18.84	33.26	15.84	11.52	14.69
	Casinos/gambling	52.83	15.07	3.88	4.96	2.91	1.62	1.70
	Gas, auto service	171.27	83.60	17.13	24.73	17.71	11.88	12.16
	Overnight accommodations	80.01	42.88	8.56	12.21	6.59	7.43	8.09
	Recreation (amusements)	49.12	29.80	5.16	6.54	6.79	4.80	6.51
	Recreational equipment	583.29	279.80	53.55	106.74	84.83	8.12	26.56
	Other retail	54.63	30.58	6.16	7.03	6.55	4.20	6.64
	Property taxes on 2 nd home	153.35	126.64	20.42	53.11	25.46	1.38	26.26
Total	1,568.53	882.33	168.30	303.49	197.87	77.90	134.77	
Hunters (n = 609)	Entrance or user fees	32.90	23.74	4.04	6.54	5.39	3.17	4.60
	Licenses	89.68	52.93	10.48	11.36	8.61	15.39	7.08
	Groceries/liquor	261.05	165.44	37.18	38.76	43.37	10.84	35.29
	Restaurants/drinks	181.87	122.67	31.67	40.27	23.08	9.23	18.42
	Casinos/gambling	49.95	23.72	5.06	9.23	3.75	2.32	3.37
	Gas, auto service	240.15	133.74	33.27	36.70	27.26	13.45	23.05
	Overnight accommodations	82.60	51.22	11.51	12.68	11.20	6.65	9.18
	Recreation (amusements)	60.27	29.39	6.06	9.78	5.48	2.71	5.35
	Recreational equipment	1,346.51	690.29	300.52	200.74	81.81	33.30	73.94
	Other retail	51.78	34.00	8.80	9.06	4.60	4.46	7.08
	Property taxes on 2 nd home	250.39	166.02	44.23	68.18	26.41	11.38	15.82
Total	2,647.16	1,493.16	492.82	443.30	240.95	112.91	203.18	
Motorized users (n = 203)	Entrance or user fees	51.87	18.64	6.35	6.18	1.86	0.90	3.35
	Licenses	120.26	34.77	20.66	8.65	2.92	1.06	1.48
	Groceries/liquor	449.61	148.75	46.48	67.61	15.73	7.00	11.93
	Restaurants/drinks	522.64	195.04	60.80	93.70	17.42	6.94	16.18
	Casinos/gambling	80.78	33.51	9.38	15.01	4.81	1.65	2.66
	Gas, auto service	615.66	190.38	71.41	77.80	22.80	7.43	10.94
	Overnight accommodations	325.73	104.53	26.71	46.56	16.38	4.03	10.85
	Recreation (amusements)	122.50	39.29	13.69	15.87	4.59	1.49	3.65
	Recreational equipment	5,654.68	1306.99	538.19	455.47	182.06	81.06	50.22
	Other retail	338.97	64.20	34.60	16.58	6.07	2.19	4.76
	Property taxes on 2 nd homes	380.13	154.62	43.27	94.67	7.83	1.18	7.66
Total	8,662.82	2290.71	871.52	898.12	282.48	114.93	123.67	

*Local defined as spending within 25 miles of recreational activity

Results also suggest that among statewide forest recreationists, local spending is highest in the northeastern and northwestern regions of the state. This is not surprising given the prominence of these regions with respect to forest-based recreational opportunities.⁸ This is particularly true for hunters and motorized recreationists. Quiet users focused their local spending in the northeast and central regions of Wisconsin, again reflecting the various types of forest-based recreational opportunities present across the Wisconsin landscape.

Individual household expenditure patterns by recreational user type are useful for distinguishing characteristics of local economic interactions. However, they have limited use in determining overall economic impacts unless expanded to some larger representative population.

This expansion can be done in numerous ways, each with its own set of assumptions and caveats. For our work, we chose to expand sample data to statewide populations using responses to a series of questions in a statewide telephone survey conducted by the Wisconsin Survey Research Laboratory. Our primary interest in undertaking this aspect of the survey effort was to determine some defensible estimate of participation rate by

user type. Roughly two-thirds of all respondents identified their primary forest-based recreational use with quiet activities. In just over 20% of respondent households, at least one household member took part in some form of hunting experience during 1996. Finally, roughly 12% of the respondents indicated that their primary forest-based recreational activity was some form of motorized vehicle use.⁹

These participation rates are then applied to the total population of recreating households to derive a meaningful expansion factor. This expansion factor combined with individual household expenditures thus allows an estimate of statewide spending. Also, applying this information to local spending and regional use patterns allows an estimate of total regional spending by category. These estimates for global (total spending) and local

(defined to be within 25 miles of the recreational locale) expenditures are outlined in table 6.

These results suggest that Wisconsin households spent over \$5.5 billion per year on goods and services associated with forest-based recreation during 1996. Of this total spending, roughly \$2.5 billion are spent in local regions within close proximity to the recreational site.

Table 6. Global and local expenditures of forest recreationists in millions of 1996 dollars * (MM\$).

Participation rate & spending category	—Quiet users—		—Hunters—		Motorized users		—All users—	
	Total global MM\$	Total local MM\$	Total global MM\$	Total local MM\$	Total global MM\$	Total local MM\$	Total global MM\$	Total local MM\$
Participation rate (%)	66.4%	66.4%	21.3%	21.3%	12.3%	12.3%	100.0%	100.0%
Entrance/user fees	\$106.782	\$72.175	\$14.514	\$10.472	\$13.229	\$4.753	\$134.525	\$87.400
Licenses	53.253	33.705	39.551	23.341	30.669	8.866	123.473	65.912
Groceries/liquor	252.499	140.989	115.128	72.960	114.661	37.935	482.288	251.884
Restaurants/drinks	169.626	129.261	80.208	54.101	133.285	49.741	383.119	233.103
Casinos/gambling	72.527	20.684	22.029	10.462	20.602	8.547	115.158	39.693
Gas, auto service	235.137	114.777	105.910	58.981	157.007	48.551	498.054	222.309
Overnight accommodations	109.840	58.864	36.427	22.588	83.068	26.657	229.335	108.109
Amusements	67.435	40.914	26.579	12.962	31.240	10.019	125.254	63.895
Recreational equipment	800.807	384.144	593.835	304.433	1,442.078	333.315	2,836.720	1,021.892
Other retail	75.005	41.980	22.838	14.994	86.446	16.373	184.289	73.347
Property taxes	210.538	173.860	110.429	73.219	96.942	39.431	417.909	286.510
TOTAL	2,153.449	1,211.353	1,167.448	658.513	2,209.227	584.188	5,530.124	2,454.054

*Global spending defined as total spending regardless of origin. Local spending defined as spending within 25 miles of recreational activity. Both totals used household expenditure patterns of forest recreationists applied to participation rates generated through statewide household opinion surveys using a 1994 estimated number of statewide households.

⁸ It is important to note that our interests were more focused on estimating the extent of spending locally than in origins of recreationists. Regional values summarized in table 5 reflect this fact and do not account for non-local spending in the region of interest. For instance, if people from Milwaukee snowmobile in northeastern Wisconsin, only the portion of spending in the northeast region is identified in the table. The spending that occurs in their place of residence (Milwaukee) is not accounted for by region but would be included in the aggregate total household spending category.

⁹ Certainly, there was ample opportunity for overlap in responses to questions that assessed type of forest-based recreational use. Care was taken to assess individual responses and multiple responses to alleviate the possibility of double-counting. Time limitations precluded further elaboration of use characteristics. Also, given this telephone survey was a statewide sample with no data collected on location of recreational use, we were unable to develop specific data on regional use. Regional inferences were developed from mail survey data (local spending data).

While household expenditure patterns indicate that quiet users spent the least amount per household in 1996, their total spending is the highest of the three user groups. This is due to the overall high rates of Wisconsin households that undertake quiet forest-based recreational activities and their relatively high proportion of total expenditures spent locally.

Global spending was about double local spending for quiet users and hunters. Not surprisingly given the high values of recreational equipment and the location of these purchases, motorized recreational users had global expenditures that were roughly four times local spending.

Regional economic impacts

Estimating the economic impacts of forest use raises a complex set of issues that are only partially addressed through traditional means. The reasons for this are many. Two primary difficulties specific to forest resources include the simple facts that: 1) forests provide the raw physical material for a substantial amount of economic activity but they are not the sole input into the production process; and 2) many of the values we associate with forests are of a non-market nature.

The first problem speaks to relatively weak data supporting a link between raw material supply and final product. For example, a pulp and paper mill represents a very complex production

process. These mills typically require a certain proportion of virgin fiber (fiber that has never been recycled) in their furnish (the pulpy material that is transformed into paper products.) Thus, they require a certain amount of timber that can be ground up into their base material. This base raw material is then combined with other elements, such as labor and capital equipment, to produce paper. Only a small fraction of the inputs into a pulp mill are roundwood (or timber) based. To what degree do pulp and paper mills rely upon local raw material supplies? Where do these raw materials originate? How well-equipped (and able) are firms to substitute capital for raw materials? These are the difficult questions that remain unsupported by empirical data.

We can make assumptions (many of which are implied through the use of input-output analysis); but they are not easy to support without better empirical evidence. For this reason, we perform analysis with the intent of identifying impact patterns, not necessarily absolute impact values. What happens to regional economic activity if we increase wood processing by a small amount driven by some outside change in demand? How will other regional businesses be affected by the increased use of inputs created by this increased wood processing output? These are the questions around which this section develops results.

The same set of limiting complexities also holds true for recreational use of forests. Such opportunities provided by forests are combined with a host of other tourism production inputs (such as cultural amenities and tourism infrastructure) to generate visitors' overall recreational experience and provide the demand structure for the regional tourism industry.

We can identify the expenditures of forest-based recreational users but we have to assume that this spending occurs because of the forest-based recreational opportunities present. Certainly, other attributes play a role in determining the motivation of visitors to a region. While we can conceptually understand the importance of forests as a physical input into tourism demand, the quantitative linkages are sketchy at best. For this reason, again, our analysis provides impact patterns of local business activity affected by visitor spending, not necessarily absolute impact values.

It is also fair, at this point, to bring up the set of issues that reflect non-market economic values. These are values held by people that are not traded in any real market and thus, have no observable price structure. Given the fact that many of the resources upon which non-market values are based are common-pool (publicly owned), assessment of regional market-based economic values provides only one aspect of total economic value. Examples of values not assessed in this effort include ecosys-

tem function value (the value associated with healthy environments), existence value (the value of the simple existence of a resource), and other non-use resource values.

Below we discuss regional economic elements often thought of as tied to forests. We first outline the gross characteristics of industrial sectors closely aligned with forests—both wood products as well as tourism industries. This is initially discussed from the perspective of output, or aggregate regional economic activity by sector.

We also summarize economic characteristics relevant to households in the region—namely employee compensation and the number of jobs by sector—to provide a context for the relative extent of these related economic activities by region.

We then use inter-industry analysis (also referred to as input-output analysis) to assess the impacts of gross measures of resource activity. These are hypothetical shocks to a static system that are intended to provide a basis for understanding how industrial sectors that are linked to forests affect regional economic activity. In this set of results, we are, again, less interested in the absolute values of change. We are more interested in impact patterns of industrial activity. This allows us to stay away from making heroic and explicit raw material supply and material reliance assumptions.

The extent of economic activity associated with forests.

Across Wisconsin, forest activities have a direct impact on two basic economic sectors. These include sectors that are wood-products based and those that are sensitive to tourism demand. Various economic characteristics by these broad-level economic sectors are summarized in table 7.

The wood-based sectors are relatively straightforward. Resource services include the growth of trees, the annual output of which is reflected in the stumpage value of removals. Primary wood processing begins with timber harvesting (logging) and includes sawmills and other primary log processors. Secondary wood processing includes the value-added sectors of turning dimensional timber into final use products such as wooden cabinets or furniture. Finally, reconstituted wood products include those industries that reconstitute wood fibers into final products, examples of which include fiberboard manufacturing and the pulp/paper industries.

The “tourism industry” is not as easy to separate and identify. It is important to note that a separate standard industry classification does not exist for this set of businesses. The key reason is that businesses that service tourists are the same businesses that service local demands.¹⁰ The industries included in this analysis are, however, generally those considered to be sensitive to tourism demands. These include firms

involved in transportation activities, retail firms such as restaurants and gift shops and service establishments such as hotels, motels and recreational/ amusement firms.

Wood-based and tourism-sensitive sectors, indeed, made up a large portion of the Wisconsin economy in 1994. As shown in table 7, roughly 12% of the Gross State Product and 18% of

the jobs in Wisconsin are somehow tied to either wood-based industries or tourism-sensitive sectors.

Within wood-based sectors, reconstituted wood products (specifically pulp and paper) dominate with over 10 billion dollars of annual output and just over 50,000 total jobs across Wisconsin. Indeed, Wisconsin is a national leader in the production of

tissue products. Timber production (resource services) and primary wood processing are dwarfed when compared to this highly capital intensive set of industries.

With respect to tourism sensitive sectors, the tourism retail sectors dominate with almost \$10 billion of output and roughly 350,000 jobs. To be sure, the jobs in tourism retail firms are not

Table 7. Selected economic characteristics by economic sector (State of Wisconsin, 1994).

Economic sector	Industry output (MM\$)	Employee compensation (MM\$)	Employment (# of jobs)	Type II output multiplier
Wood-based sectors:				
1. Resource services	\$209.001	\$34.303	3,152	2.02
2. Primary wood processing	956.862	152.635	7,346	1.95
3. Secondary wood processing	3,412.918	954.960	37,925	2.18
4. Reconstituted wood products	10,346.688	2,510.890	50,895	1.91
Subtotal	14,925.469	3,652.788	99,318	
Tourism sensitive sectors:				
1. Tourist transport	1,364.252	391.437	27,215	2.19
2. Tourism retail	9,622.395	3,581.742	346,804	2.22
3. Tourism services	2,764.316	876.312	73,240	2.26
Subtotal	13,750.963	4,849.491	447,259	
Other sectors				
1. Agriculture	5,618.567	615.906	122,232	1.95
2. Non-wood manufacturing	77,618.883	20,143.600	527,567	2.27
3. Construction	16,414.734	5,104.309	182,381	2.21
4. Food/textiles manufacturing	19,848.891	2,612.204	77,624	2.20
5. Wholesale trade	12,401.688	4,564.509	134,956	2.16
6. Non-tourism retail	6,504.211	3,173.574	184,464	2.10
7. Finance, insurance, real estate	31,033.379	4,761.316	186,785	1.80
8. Non-tourism personal services	8,816.709	3,257.196	237,089	2.20
9. Professional services	35,580.676	23,466.416	870,857	2.35
Subtotal	213,837.740	67,699.030	2,523,955	
Total (all sectors)	242,514.170	76,201.309	3,070,532	

¹⁰ The portion of business receipts attributable to tourists has been shown to vary from 10%–90% in related research. Readers interested in specification of which sectors are most sensitive to tourism and the extent to which they are sensitive are referred to results reported in Leatherman and Marcouiller, 1996.

the same types of jobs offered by the reconstituted wood products sector. In general, tourism retail jobs are more apt to be seasonal, part-time and pay relatively lower wages than manufacturing jobs.

The last column of table 7 reports a Type II multiplier for each industry.¹¹ This multiplier basically relates the total impact of one unit of output by the specific industry on overall regional economic activity. So, for example, a one-unit change in resource services output can be expected to create a 2.02 unit "rippling effect" throughout other industries and regional transactions that are closely tied to resource services. This type of multiplier includes the direct effect of change (the 1-unit shock) plus indirect effects (intermediate purchase demands of other industries) and induced effects (the household consumption effect due to increased incomes). A full description of input-output analysis is beyond the scope of this report; interested readers are referred to numerous sources (Deller et al, 1993; Miller and Blair, 1985; Otto and Johnson, 1993; to name a few).

As shown in table 7, the Type II multipliers for Wisconsin among wood-based and tourism sensitive sectors are modest and range from 1.80 to 2.35. Given the somewhat larger interindustry links required to produce tourism-sensitive industry output, these multipliers are slightly higher for the output

of firms in this category.

An interesting perspective of the variety found within Wisconsin is suggested by the summary of regional characteristics found in table 8. While wood-based sectors and tourism make up roughly 12% of the Gross State Product, different regions across Wisconsin rely on these two sectors to

varying degrees. For example, even though much of the reconstituted wood products sector (papermaking) is focused in the southeastern region, the wood products and tourism-sensitive sectors output account for only about 10% of this region's output. In northeast Wisconsin, on the other hand, almost 30% of the regional output is

somehow tied to these two sectors. Indeed, the central and northern parts of the state are much more reliant upon wood products and tourism sensitive firms for regional economic activity when compared to the southeastern portion of the state.

Table 8. Industry output by region in Wisconsin, 1994 in millions of dollars (MM\$).

Economic sector	Total industry output				
	NW (MM\$)	NE (MM\$)	Central (MM\$)	SW (MM\$)	SE (MM\$)
Wood-based sectors					
1. Resource services	32.810	72.222	178.886	81.665	138.768
2. Primary wood processing	196.184	323.583	171.581	182.778	82.733
3. Secondary wood processing	547.588	419.013	969.547	294.300	1,182.468
4. Reconstituted wood products	238.989	775.902	2,313.849	73.252	6,944.695
Subtotal	1,015.570	1,590.720	3,633.863	631.995	8,348.664
Tourism sensitive sectors					
1. Tourist transport	25.369	47.118	77.415	49.98	1,164.367
2. Tourism retail	361.193	348.477	1,028.154	956.643	6,927.926
3. Tourism services	216.313	177.177	213.253	263.982	1,918.370
Subtotal	602.875	572.772	1,318.822	1,270.605	10,010.663
Other sectors					
1. Agriculture	424.842	308.489	1,123.237	1,369.111	2,432.693
2. Non-wood manufacturing	2,204.169	1,603.014	5,933.796	4,966.701	62,914.984
3. Construction	684.112	591.047	1,689.818	1,319.914	12,129.841
4. Food/textiles manufacturing	944.444	350.559	2,375.629	1,676.231	14,581.000
5. Wholesale trade	424.837	355.123	1,449.853	905.023	9,266.848
6. Non-tourism retail	270.101	277.383	886.974	590.356	4,479.394
7. Finance, insurance, real estate	870.544	829.462	2,950.976	1,928.780	24,640.632
8. Non-tourism personal services	146.735	154.795	685.987	463.001	7,366.188
9. Professional services	1,250.283	1,093.315	3,891.533	2,731.987	26,829.830
Subtotal	7,220.066	5,563.187	20,987.803	15,951.104	164,641.410
Total (All sectors)	8,838.511	7,726.679	25,940.488	17,853.704	183,000.737

¹¹ It is somewhat deceiving to list these for all industries since they represent change that would be expected to occur to individual industries, holding all other industries constant. Policy analyses that rely on these types of multipliers typically assess individual sectors of interest or a limited number of combined sectors. The ability to interpret their combined (or total) influence across all sectors is limited.

The multiplier effects of industries associated with forest use.

Activities in an individual industry can be expected to affect more than the individual industry. Indeed, industries are linked through the obvious purchases of goods and services to less obvious connections associated with competition for limited labor pools and capital supplies.

Input-output analysis is one technique that allows us to capture the more obvious relationships associated with interindustry purchases. When combined and assessed in a round-by-round fashion, these are referred to as “indirect” effects. Furthermore, input-output allows us to capture the effect of increased household consumption that results from larger incomes generated from additional economic activity. These types of impacts, when again assessed in a round-by-round fashion, are referred to as “induced” effects.

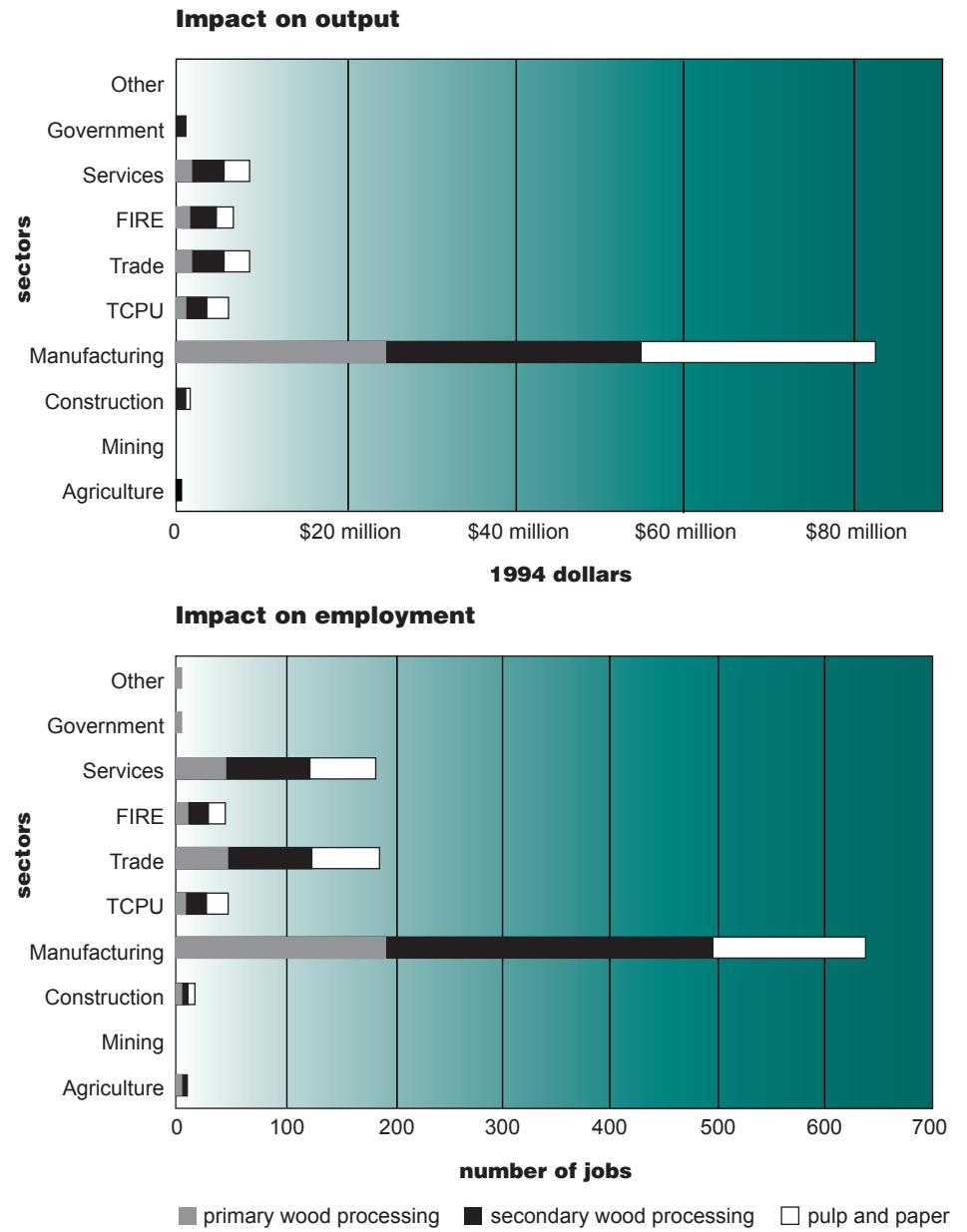
What follows are a set of input-output model results. First, we look at the impact patterns of wood processing industries and then we turn our attention to tourism-sensitive sectors. For each of these two industry sectors, two sets of models are presented. The first is a single statewide model intended to identify general impact patterns among the range of industrial sectors present in Wisconsin. The second looks at regional models that assess aggregate economic characteristics within each of the five substate units within Wisconsin.

Wood processing industries have impacts that are highly focused within other manufacturing industries. This is understandable given the fact that wood processing is very much a manufacturing industry itself. The economic impacts of wood processing statewide are summarized in figure 7. These impacts are based on a hypothetical \$25 million increase in final demands for each of the three wood processing sub-sectors: primary, secondary and reconstituted (pulp and paper). To reiterate, we are primarily interested in the patterns of impact, not necessarily the absolute values of the impact. Any modest change in final demand for these three industries will generate similar patterns of impact.

As can be seen from figure 7, wood processing industries have the greatest impact within other manufacturing industries. Also interesting to note are the differences in impacts when assessing output measures versus employment.

Other important non-manufacturing sectors include services and trade with smaller impacts felt within finance, insurance and real estate (FIRE) and transportation/utilities (TCPU). Finally, it is interesting to note that the results suggest little in the way of distinguishing differences in impacts associated among any of the three sub-sectors within wood processing.

Figure 7. Economic impacts of wood processing industries in Wisconsin.*

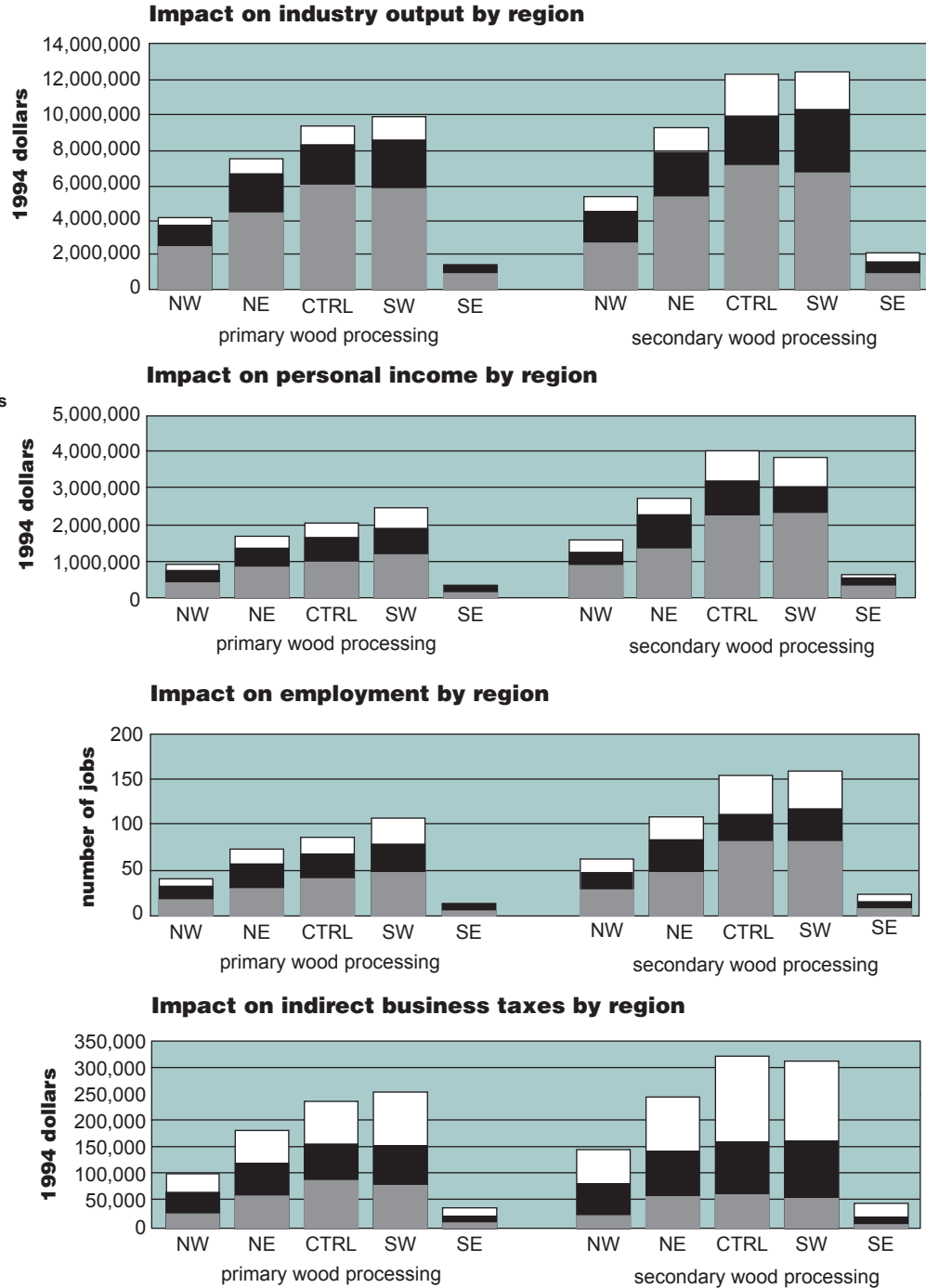


*Statewide impacts based on a \$25 million increase in final demand for each of the three wood processing industries. Indirect and induced impacts calculated using a type II multiplier. FIRE = Finance, Insurance and Real Estate. TCPU = Transportation, Communications and Public Utilities.

Figure 8. Economic impacts of primary and secondary wood processing by Wisconsin region.*

■ direct effect
 ■ indirect effect
 □ induced effect

*Regional impacts based on a \$25 million final demand shock to primary and secondary wood processing industries based upon distribution of saw-timber values by region. Indirect and induced impacts calculated using type II multipliers.



The regional models were assessed for changes in primary and secondary wood processing industries. This was done because of the relatively greater importance of roundwood volumes present within each of the regions. Reconstituted wood products (such as pulp and paper) are not assessed by region because of the more mobile aspects of fiber (pulpwood) supply.¹²

Specifically, the regional analysis uses a hypothetical \$25 million statewide increase in final demand for primary and secondary wood processing allocated to regions based upon available sawtimber supplies. This regional analysis assumes that primary and secondary wood processing relies more on local supplies of sawtimber. A summary of impacts by regions is found in figure 8.

Characteristics of interest to regional economic impact (in addition to output measures) include income (in dollars—personal income and indirect business taxes) and employment (total number of jobs) measures. As shown in figure 8, the central and southwestern regions of the state have the highest sawtimber values. This is reflected in

¹² A good example of this reasoning can be witnessed by the presence of pulp and paper industries in a region that does not contain large volumes of pulpwood. Specifically, the Fox River Valley, located in the southeast, does not rely as heavily on local supplies of pulpwood. Much of the pulpwood processed in the southeast originates from outside of the southeast region. For this reason, we limit analysis of the reconstituted wood products industry to a statewide assessment. Our regional analysis focuses on primary and secondary wood processing with the assumption that these industries rely more on local roundwood supplies compared to pulp and paper industries.

the impact patterns and should not be construed as indicating the presence (or absence) of actual processing firms. Rather, this reflects the relative value of sawtimber by region.

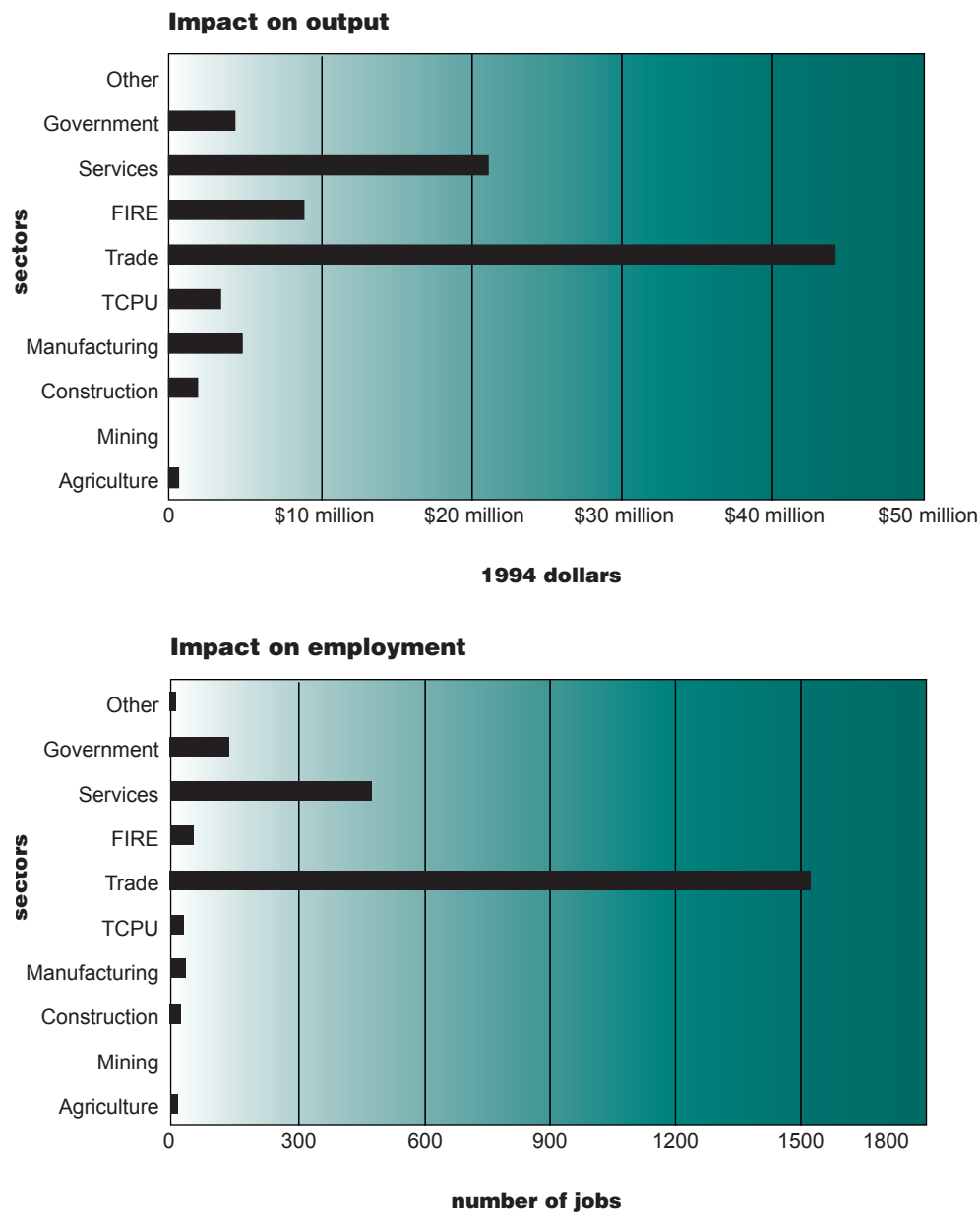
Interestingly, the general patterns of impact suggest higher indirect and induced impacts from secondary wood processors across all regions. This is, most probably, due to the higher value-added characteristics of secondary wood processors.

In effect, primary wood processors produce final output in more of a “raw” form compared to secondary wood processors. Certainly, additional analyses can more closely specify regional attributes that reflect location of manufacturing firms and will remain as an important future research topic.

The economic impact patterns of tourism sectors statewide are summarized in figure 9. The statewide impact patterns are based on a hypothetical increase in final demand of 125,000 households and their respective recreational use expenditure patterns. Specifically, these expenditure patterns are weighted according to the participation rates by user type (see table 5 by quiet, hunter and motorized recreational users). Indeed, our interest was in identifying broad patterns of economic impact—certainly we wouldn’t expect an increase of this magnitude occurring any time soon. We interpret these results as reflecting the current impact of forest-based recreational use.

Once again, the absolute values of impact are of less importance than the impact patterns. These suggest that the activities of tourism-sensitive sectors provide a broader range of influence across sectors as compared to wood processing industries. This is understandable given the nature of tourism-sensitive industries. Indeed, these industries are primarily composed of retail and service firms with relatively higher impacts felt by the finance, insurance and real estate sector (FIRE) and other retail and service industries.

Figure 9. Economic impacts of tourism sectors in Wisconsin.*

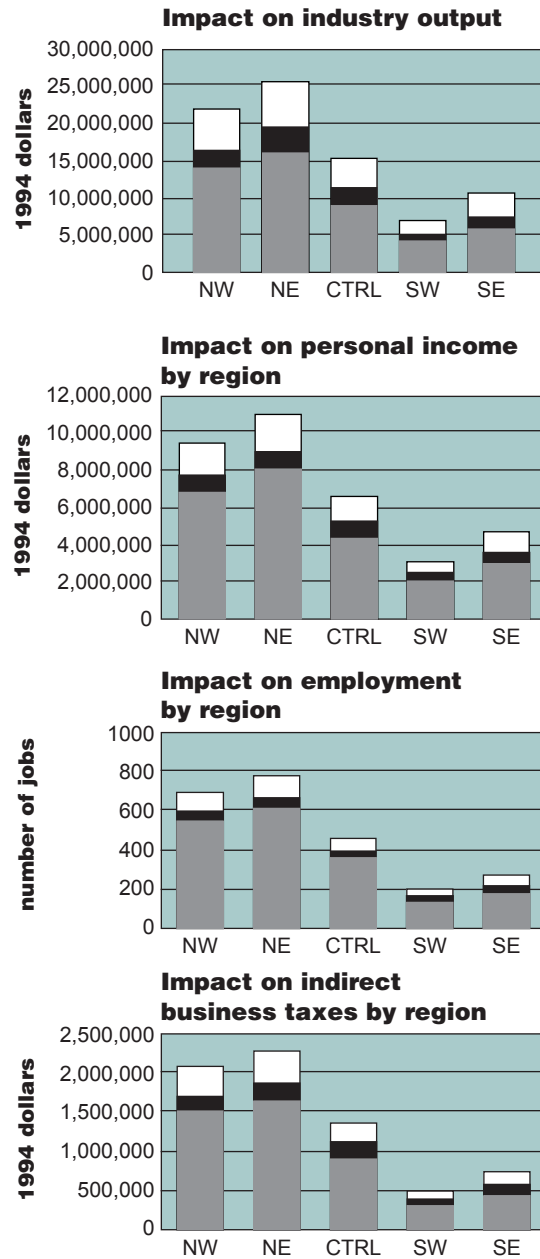


*Statewide impacts based upon a \$52.4 million increase in household spending for tourism sectors in Wisconsin. Indirect and induced impacts calculated using type II multipliers.

Figure 10. Economic impacts of tourism by Wisconsin region.*

■ direct effect
 ■ indirect effect
 □ induced effect

*Regional impacts based upon a \$52.4 million final demand shock to tourism sectors based upon distribution of spending values by region. Indirect and induced impacts calculated using type II multipliers.



The regional analysis of tourism impacts reflects the relative extent of recreational use within substate Wisconsin regions. A summary of tourism impacts by region is found in figure 10. For this set of models, the hypothetical demand shock consisted of an increase in final demand driven by recreational expenditures distributed among regions based upon regional spending patterns (again, see table 5). Results suggest that recreational use pressure of forests is highest in the northeast and northwest regions of the state.

From an economic development perspective, both wood products and tourism sectors are clearly important to regional households in maintaining and improving their ability to survive and thrive. Significantly, wood products and tourism-sensitive sectors affect a different range of other economic sectors. When combined, diversity in regional economic structures is enhanced, thus providing a wider array of opportunities than if pursued individually.

The challenge for forest managers and tourism industry professionals is to find the means to coexist in a compatible fashion. There are numerous additional analyses that remain for future research that more closely identify the reliance of wood processing and tourism industries on regional forest resources. Our intent with the previous set of impact models was to develop a better understanding of impact patterns that result from the increased activities of these two broad

sectors that rely upon forests as the basic raw material ingredient. Clearly, we have considerable additional research to perform that will more closely tie forest use with regional economic activity. The ability to develop defensible empirical estimates of the link between forests and community development provides ample challenge for future work.

Compatibility of forest uses

Given the casual observation that the production of timber and provision of forest-based recreational opportunities serve as primary raw materials for the manufacturing (wood processing) and retail/service (tourism) sectors in forested regions of Wisconsin, an important challenge for forest managers and recreation planners is to manage forest lands such that compatible alternative uses are maximized.

Our interest now turns to uncovering evidence on the compatibility that exists among various uses. This includes both overall (or inter-use) compatibility (for example, relationships between extractive uses for timber with recreational use) as well as compatibility within uses (or intra-use). Examples of the latter include the perceptions held by recreational user groups for alternative forms of recreation. These recreational user conflicts provide a significant difficulty for recreation planners.

This section outlines responses to a set of Likert scale questions of our survey respondents' perception, or level of agreement, with a given statement.¹³ What follows are responses to this set of survey questions (see sample survey in Appendix A.)

First we deal with the intra-use compatibility issues associated with timber production and recreation and then we look at recreational user conflicts. The section concludes with a summary of responses to the recreational user's perception of land use regulations that help direct forest use.

Land management activities.

Much of our interest in this research deals with how forest recreationists viewed forest management activity. As expected, the three groups assessed in this study responded to statements regarding land management activities

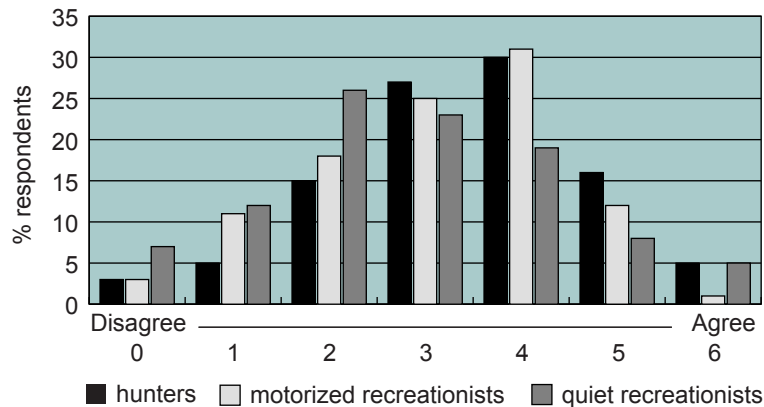
in very different ways. What follows are the survey results to a set of Likert scale questions designed to elicit responses to several issues relevant to forest management.

Forests are a dynamic and ever-changing natural resource. Forest managers attempt to manipulate forest growing stocks to attain some expected outcome. Our interest in this regard deals with the fact that awareness of this dynamic nature of forest growth has an impact on people's reactions to forest management activities.

Important to a person's perception of forest management is the amount of information available on the history of forest activity. A summary of respondents' awareness of previous timber harvesting activities on forest land where their recreational activity takes place is found in figure 11.

Figure 11. Survey respondents' awareness of previous timber harvesting activities on forest land where recreational activity takes place.

Possess awareness of timber harvesting activities



A commercial thinning operation at the Crystal Lake campground on the Northern Highlands/American Legion State forest. Production of timber and recreational use of the same forest lands can be accomplished through sensitive land management practices.

As shown in the figure 11, response to this survey item differed by recreational user group. Those who classified their primary activity as "quiet" were more apt to disagree with this statement when compared to both "hunters" and "motorized" recreational users. This supports the notion that hunters may be more likely to recognize wildlife habitat differences and make the connection with previous harvesting activities. Responses of motorized users were found to be more neutral than either quiet users or hunters.

As forest management intends to manipulate the growth of forests, openings in the forest canopy allow sunlight to penetrate to lower levels and reach vegetation on the forest floor. In addition to affecting biological forest growth, these openings have an impact on the values and benefits that recreationists derive from forest land. In an effort to capture these alternative bene-

fits, we posed a series of statements about forest openings and asked respondents about their level of agreement. The first statement assessed recreationists' perceptions of large openings in the forest where their recreational activity takes place. Responses to this statement are summarized in figure 12 on the next page. In general, respondents were apt to disagree with the statement that they were *not* bothered by encountering large openings on forest land where recreational activities take place. Albeit ambiguously defined, the mention of "large" openings in the forest are negatively perceived. This is particularly true for those recreationists who classify themselves as "quiet" users. Perhaps not surprising given their use of forests as a backdrop to a more intense recreational experience, motorized users were the least negative about this statement.

¹³ Comparisons of means among user groups were tested using inferential statistical tests (analysis of variation). Where differences among user groups are statistically significant at the $p < .05$ level, we report responses of all three user categories. Where there were not statistically significant differences at the $p < .05$ level, we report within response population means.

Figure 12. Respondents' sensitivity to large openings on forest land where recreational activity takes place.

Not bothered by large openings

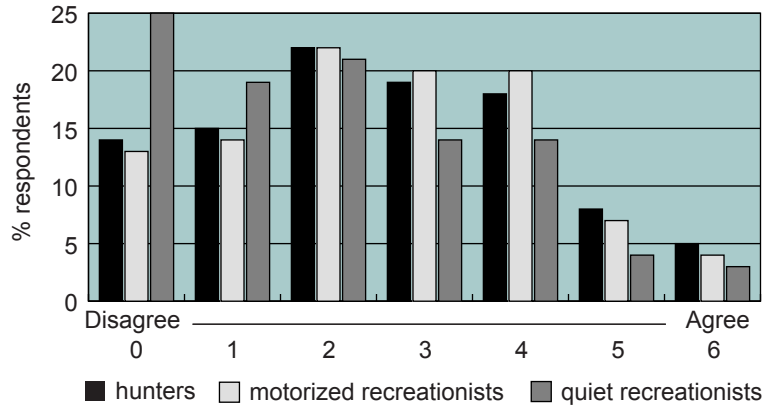
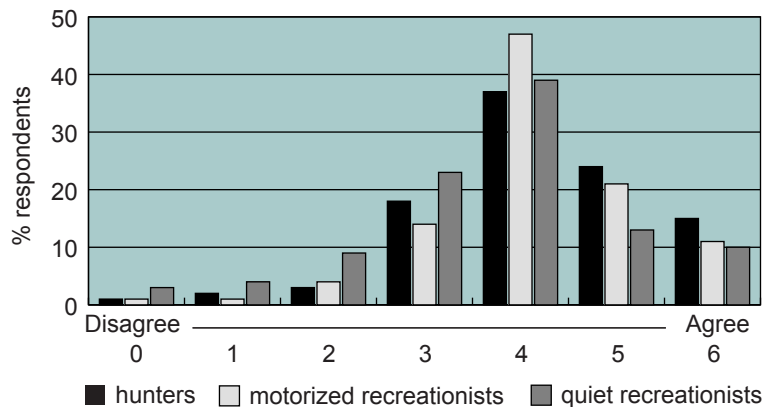


Figure 13. Respondents' attitudes on compatibility of small forest openings and removal of timber where recreational activity takes place.

Small forests openings are compatible



Small forest openings, on the other hand, were generally viewed in a positive fashion. This is true even when we specifically identify their creation as a result of timber production. Responses to this statement are summarized in figure 13.

Once again, hunters and motorized users were more likely to agree with this statement compared to those recreationists who classified their primary use within "quiet" categories. This generally positive result is encouraging for the potential of conservatively applied even-aged silvicultural practices to mix with simultaneous use of these forest resources for recreation.

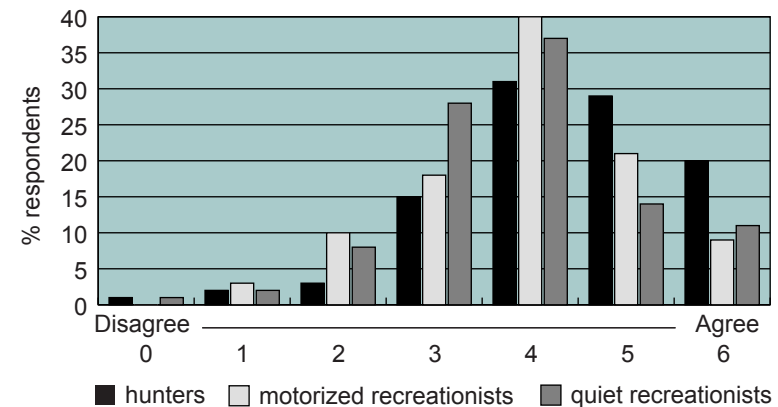
This type of encouragement is also suggested by respondents' perception of the benefit that small, intermittent clearings have for the production of wildlife. A summary of responses to this statement are contained in figure 14.

The respondents generally agreed that intermittent forest clearings have important wildlife benefits. Not surprisingly, hunters generally approved of this statement more than either motorized or quiet recreational users. This could be due to the inextricably resource-based nature of hunting as a recreational pursuit.

To be sure, forest-based recreationists exhibit skepticism about timber harvesting; much of this focuses on the appearance of on-site environmental effects. For instance, respondents generally agreed with the statement that timber harvesting has major impacts on the water quality characteristics of forest lands (a summary of responses is contained in figure 15). The level of agreement was relatively higher for quiet recreationists and lower for motorized users. This is possibly due to differences in the level of environmen-

Figure 14. Respondents' perceptions of whether intermittent forest clearings have important wildlife habitat benefits.

Clearings have wildlife benefits



tal sensitivity among forest-based recreationist groups.

Certainly, one would expect that different harvesting regimes would elicit quite different responses from these groups. Results reported are assumed to refer to a respondent's longstanding and overall impression of timber harvesting activities.

An overall description of the recreational users' perceived compatibility between extractive land use and forest-based recreation is summarized in figure 16. Once again, in general, respondents agreed with the statement that forest-based recreation is generally compatible with timber harvesting activities. This is particularly the case for hunters and motorized users. Quiet recreationists, however, were less enthusiastic (closer to neutral) in their agreement. Once again, it appears that this group has a heightened sense of

environmental protection or sensitivity with respect to extractive forest uses.

It is interesting to note that a perception of incompatibility does not disparage any given forest use but could lead to conclusions that uses be further segregated, or separated from one another. In support of this perspective, a less than enthusiastic quiet recreationists' response to a statement about compatibility between recreation and timber harvesting is followed by a much more enthusiastic agreement to the statement that timber production and harvest is a legitimate use of forested lands. Responses to such a statement are summarized in figure 17. Once again, hunters exhibited relatively higher levels of agreement to this statement, followed by motorized users and quiet recreationists.

Figure 15. Respondents' attitudes on whether timber harvesting has major impacts on the water quality

Harvesting affects water quality

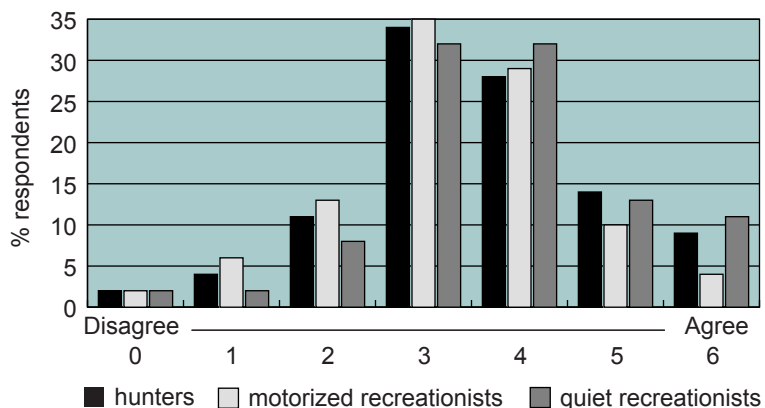


Figure 16. Respondents' attitudes on whether forest-based recreation is generally compatible with timber harvesting activities.

Recreation is compatible with timber harvest

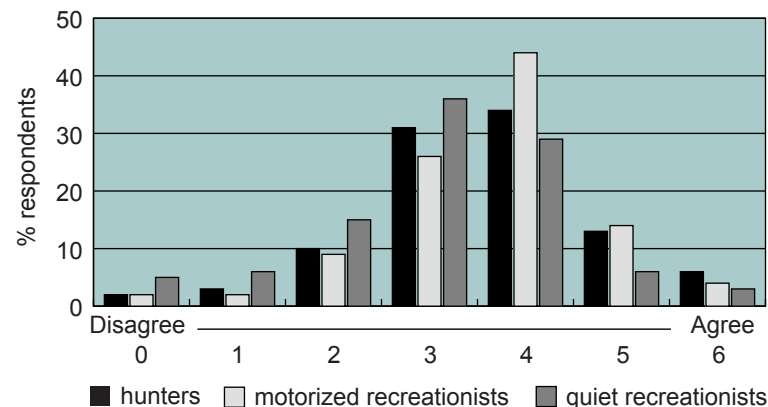


Figure 17. Respondents' attitudes on whether producing timber is a legitimate use of forested land.

Timber is a legitimate forest use

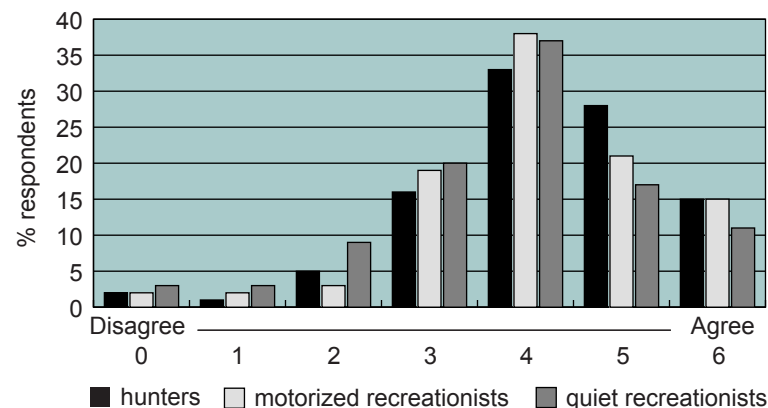


Figure 18. Respondents' attitudes on whether other people encountered while recreating generally bother forest recreationists.

Not bothered by other recreationists

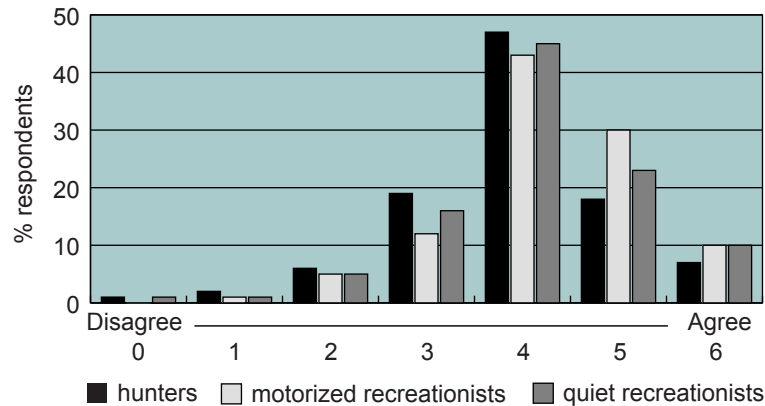
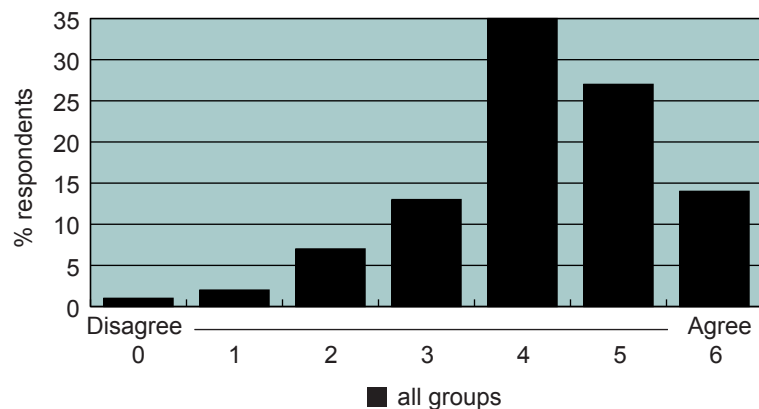


Figure 19. Respondents' attitudes on whether their own use of forests for recreation impacts other people's recreational use.

Own use does not impact others' recreational use



Certainly, wide variation exists in the dataset for each of these measures of forest land use compatibility. Implicit within this variation, however, are measures of aggregate central tendency that lend themselves to interpretation as democratic measures of user perception. Indeed, it will continue to be a difficult task to objectively weigh the special interests that voice their opinions at either side of the response spectrum. We hope, however, that the measures and responses reported here will provide perspective to management planning in assessment of various forest land uses and their potential compatibility.

Recreational user conflicts. One of the primary difficulties in recreation planning is the inevitable conflicts that are generated among recreational users. While some recreational uses are rather benign (such as hiking, cross-country skiing, bird watching), others are, to some, patently offensive. For example, cross-country skiers may have a negative attitude toward high speed snowmobilers; people who don't drink may object to alcohol consumption by other recreationists. Some recreational pursuits actually pose a physical danger to others (such as the danger deer hunters might pose to hikers).

In general, recreational user conflicts are specific to particular recreational activities. Recreation planners' understanding of this spectrum of compatible uses will allow them to minimize intra-recreational use conflicts by incorporat-

ing specific management strategies into land use planning. Strategies that can act to minimize intra-recreational user conflicts include segregation of uses,¹⁴ identification and implementation of carrying capacity and licensing/regulation.

A specific portion of the survey instrument assessed forest recreational user conflict. Overall, there was agreement with the statement that other recreational users are not bothersome. Responses to this statement are summarized in figure 18.

Rather surprisingly, hunters appeared to have the most negative response to this item (although still generally compatible overall) and felt that other recreational users bothered them. Perhaps this is due to the simple fact that hunting poses specific dangers to other humans present during the hunt. Quiet users were surprisingly tolerant of other recreational users, in general.

While the response to encountering others suggests a general level of tolerance toward alternative recreational users, we also queried forest recreationists for their perception of their own impact on others. A summary of these responses can be found in figure 19. Once again, respondents among all categories generally agreed with the statement that their own use of forests for recreation does not have an impact on other people's recreation use. For this statement, there were no statistically significant differences in the mean responses among user groups.

¹⁴ Segregation of recreational uses is an effective means of limiting recreational use conflicts. In Wisconsin, a good example of this can be found in Jackson County. Implemented by the Jackson County Forestry and Parks Department, specific areas have been set up for motorized recreational use, quiet use and timber harvesting/management.

A hallmark of Wisconsin’s transportation policy during the past 50 years has been an emphasis on quality infrastructure at all levels. This includes an emphasis on developing road networks in even the most remote locations. Wisconsin units of government (state, county and local) rank as unique among states in the nation for their historical investments in rural roads. Today, these rural roads provide the “benefit” of relatively easy access to very remote locations for the transport of goods and services.

Another important “benefit” of these rural roads is that they allow recreational activities in remote forested locations. This is true throughout the state and particularly in the forested, northern portions of the state. While this general statement would appear benign on the surface, some have voiced concern that increased road densities have compromised these areas for recreation use because they limit forests’ capacity to provide a “wilderness” experience. Overall, we found a mixture of evidence to support this concern. A summary of survey responses to such a query is found in figure 20. While wide variation to this statement exists, once again, on average, hunters were more apt to disagree with this perspective while quiet users were generally neutral.

The general quality of forests as a resource for recreational use is dependent on the pressure put on them for timber production and recreation. The ability of forests to continue to provide quality recreational opportunities can be inferred from the level of optimism (or pessimism) current users have with respect to whether forests have exceeded their capacity to provide recreational opportunities. A summary of responses to this statement can be found in figure 21.

On average, respondents from all user groups disagreed with the statement that forests have exceeded their capacity to produce high quality recreational opportunities. This reflects the overall condition of Wisconsin’s forests and can be explained by the simple fact that our state has a vast expanse of forest resources relative to the population base.

Increasingly, public funds for recreational development are being closely scrutinized. Budget constraints of public agencies have limited the development of additional recreational opportunities and, in some cases, not allowed adequate maintenance of current facilities.

Some argue that additional revenues for public recreational facilities should be generated from the users themselves. For traditional public goods, increased user fees represent a regressive form of generating additional public revenues.

Figure 20. Respondents’ attitudes on whether increased road densities have compromised individual recreational experiences.

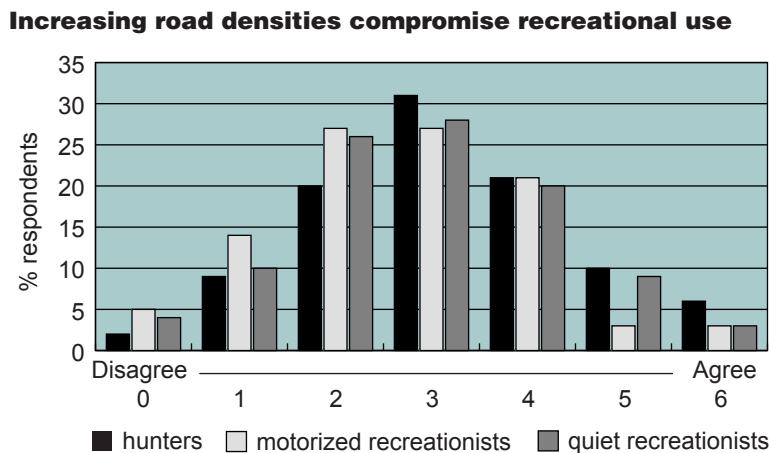
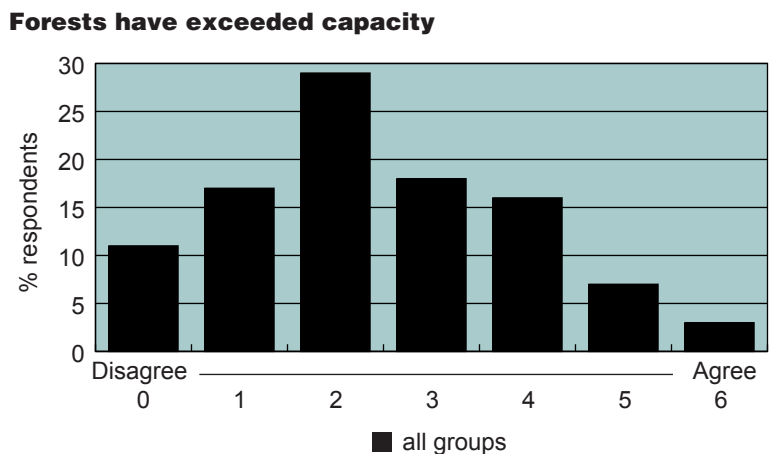


Figure 21. Respondents’ attitudes on whether the forests of Wisconsin have exceeded their capacity to produce high quality recreational experiences.



Forest-based recreational users' perceptions of increased user fees are mixed. Responses to this question are summarized in figure 22. Results suggest that while there is overall support for user fees, some are vehemently opposed to this type of funding mechanism. Interestingly, quiet users are generally more supportive of user fees while hunters and motorized users are generally more mixed. Perhaps this points to the current (or perceived) level of user fees for these types of recreational uses. While hunters and motorized recreational users are required to obtain licenses and are more subject to resource regulation, quiet users may not have experienced this level of government interaction. On the other hand, park entrance fees and the state forests' and parks' automobile stickers are examples of user fees that affect quiet

users. Perhaps these findings suggest that quiet users would accept higher user fees imposed on their recreational activities. To be sure, further research is needed to more fully identify demand structures for recreation and to assess general questions related to the equity of resource access and use.

Land use and regulation. The final broad area of land use compatibility deals with forest-based recreationists' perceptions of alternative land uses and the subsequent regulation of these uses. This segues into issues concerning forests and their importance to the viability of rural regions. Important questions deal with the role public lands have in providing wood products and recreational opportunities versus lands owned by private individuals or corporations.

Much of the forest land in Wisconsin is privately owned. How much regulation should be imposed on the land management activities of private forest landowners? Survey responses to the statement that private forest landowners should be allowed to manage the land and its resources without regulation are summarized in figure 23.

As expected, results suggest a very mixed set of responses. Overall, quiet recreationists were more apt to disagree with this statement while motorized recreational users were more apt to agree. Somewhat surprisingly, responses from hunters were very mixed. These results do not lead to clear consensus on this issue.

There does exist a general understanding that property rights to manage forest lands begin with the owner of the land. A summary of responses to

the statement that the use of private lands should be based on what the owner wants, rather than on zoning constraints, is found in figure 24. Once again, clear consensus among recreational user groups does not exist one way or the other. It appears that hunters are more apt to agree with the statement while quiet users are more apt to disagree. The overriding neutral aspect of these responses, however, precludes any clear policy prescription.

Recreational users reveal a stronger feeling that land use should be locally determined. A summary of responses to the statement that land use regulation should be locally determined are found in figure 25. In general, recreational user groups are more apt to agree with this statement although hunters are more mixed in their perceptions.

Figure 22. Recreationists' attitudes towards user fees to pay for forest-based recreational development.

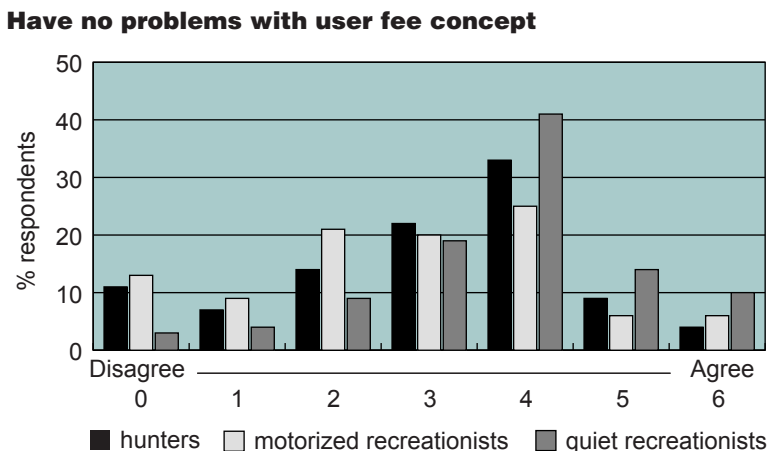
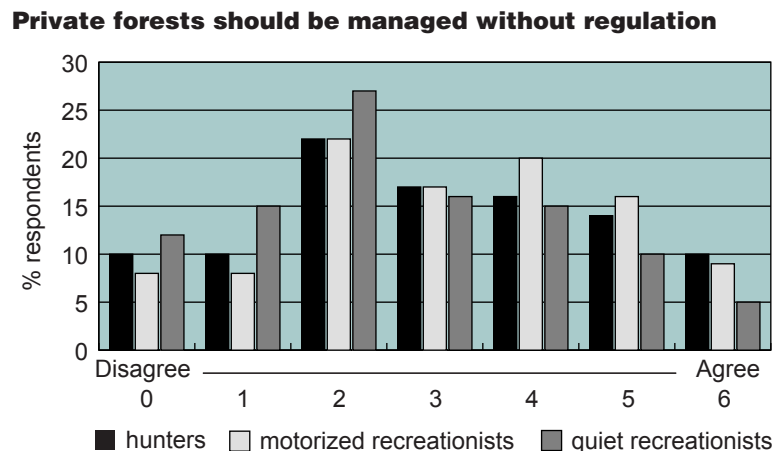


Figure 23. Respondents' attitudes on whether private owners of forest lands should be allowed to manage the land and its resources without regulation.



Land use regulation is a thorny public policy issue and has been the rallying cry for both conservative property rights advocates and environmentalists alike. Our results point out that clear consensus on these issues is elusive. Further research in this area can more clearly identify the determinants of user perceptions with respect to land use regulation.

Local economic development efforts. One of the issues that gets to the core of local development interests with respect to forest use deals with recreationists' attitudes toward the regions in which they recreate. Development theory would suggest that attitudes toward local economic activity are determined, in large part, by how dependent individuals are on local activities for their household income. Certainly, visitors who reside outside the local regions are less

dependent on local economic activity for their household income needs. Much of the dichotomy in attitudes toward local land use would logically result from the simple fact that outsiders view forest use from a recreational perspective while locals view forests from the perspective of income generation.

Our survey instrument was designed to elicit responses to this central issue of economic dependency. Although limited by the fact that recreational users served as a sample population, we found some surprising results that could be interpreted as evidence that outsiders are more sensitive to local needs than theory would lead us to believe.

In general, forest-based recreationists appear to understand the need to develop economic activities in local regions where they recreate. A

summary of responses to the statement that good paying jobs are important to and exist in rural forested regions are found in figure 26. Results suggest general agreement with this statement among all types of recreational users.

Figure 24. Respondents' attitudes on whether use of private land should be based on what the owner wants rather than restricted by zoning.

Private land use should be determined by owner

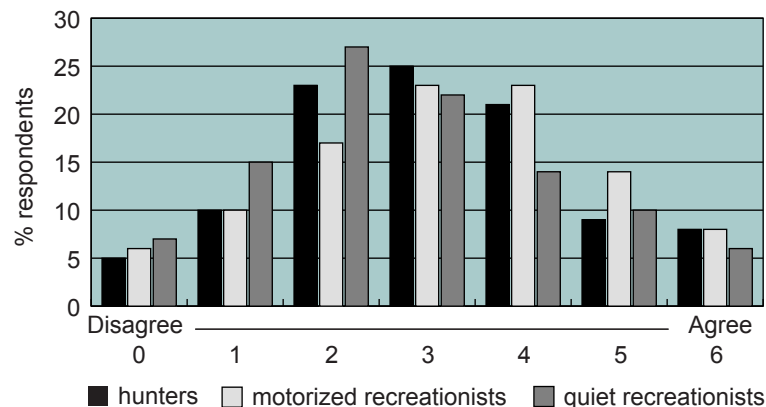


Figure 25. Respondents' attitudes on whether land use regulation should be locally determined.

Land use should be determined locally

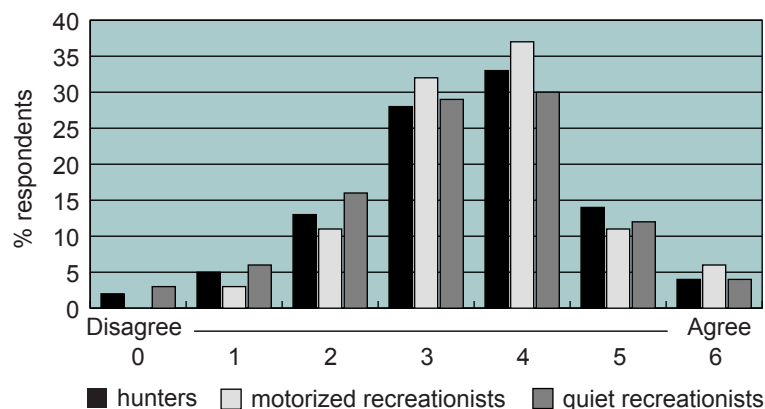
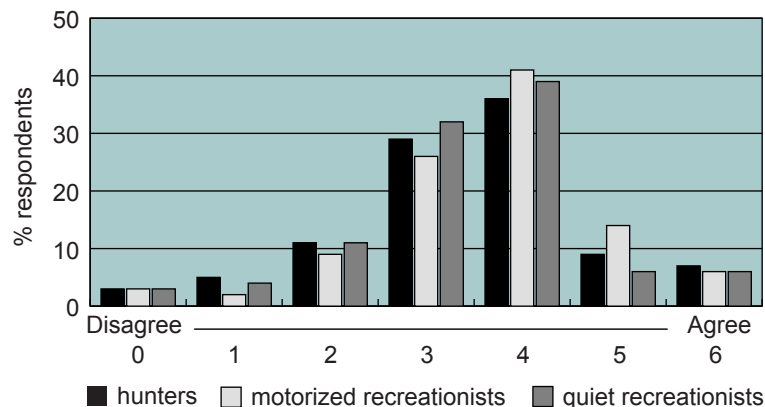


Figure 26. Respondents' attitudes on whether it is important that good paying jobs exist in rural forested regions.

Good paying jobs are important





Wisconsin Department of Natural Resources

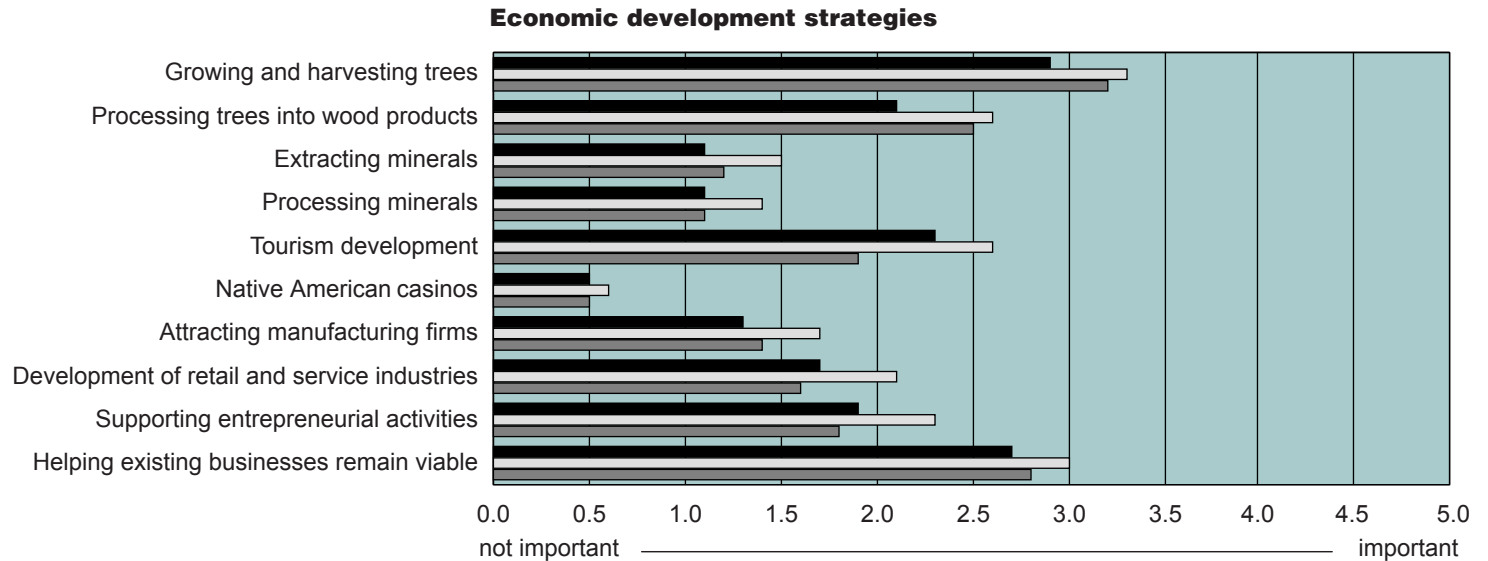
Timber harvested from forests provides the raw material for a major part of northwoods economy. In general, forest-based recreationists recognize the need for local jobs in forested regions and support development strategies that include growing, harvesting and processing timber products.

Although, in aggregate, forest-based recreationists agreed that economic activities in rural forested regions are needed to help sustain local household incomes, the types of economic activities vary widely. The broad strategies that are appropriate for rural development range from the standard development activities of industrial (or manufacturing) recruitment, development of retail/service industries, and support for entrepreneurial activities to those strategies specific to rural forested regions. In rural forested regions, the specific activities that are prominent include general development of tourism industries to wood-based industrial sectors. Also, the growing presence of Indian gaming facilities has the ability to provide additional revenue sources for local residents in rural forested regions.

Our survey instrument provided a range of development strategies and queried respondents about their perception of each strategy as a means of improving the quality of life in rural forested regions. A summary of responses to this question are found in figure 27. Respondents were asked to rank each strategy by their perception of the relative level of importance. In general, recreational users felt that important strategies for improving local conditions included the growing and harvesting of trees and strategies that help existing businesses remain viable. Of less importance were strategies that target wood processing industries and general tourism development. Respondents were much less interested in Native American casino development, mining and the processing of minerals, and the general attraction of manufacturing firms as important strategies for rural community quality of life.

Figure 27. Level of importance respondents placed on alternative local development strategies.

- quiet recreationists
- motorized recreationists
- hunters



Importance and performance of forest management

It is often the case that forest managers lack information on how user groups perceive their management activities. Importance-performance analysis is a marketing technique that attempts to provide managers with this type of information. This section summarizes the data collected from importance-performance analysis (IPA). For the IPA, we again split the dataset into the three self-selected groups of forest-based recreationists: quiet, hunters and motorized users. Aggregate mean scores for each of the 18 attributes were plotted into one of the four quadrants, with conclusions derived by noting where attributes scores were found on the two-dimensional IPA grid. This

procedure was repeated for each of the three recreation groups: hunters, motorized and quiet users. A two-dimensional IPA grid was created for each.

The two-dimensional grids are created based on the grand mean for importance and performance responses. The grand importance mean was obtained by dividing the total number of importance responses into the sum of the importance responses. The grand satisfaction mean was obtained by dividing the total number of satisfaction responses into the sum of the satisfaction responses. These importance-performance grids are summarized in figures 28, 29 and 30 for quiet users, motorized users and hunters respectively.

Figure 28. Importance-performance measures for quiet users.

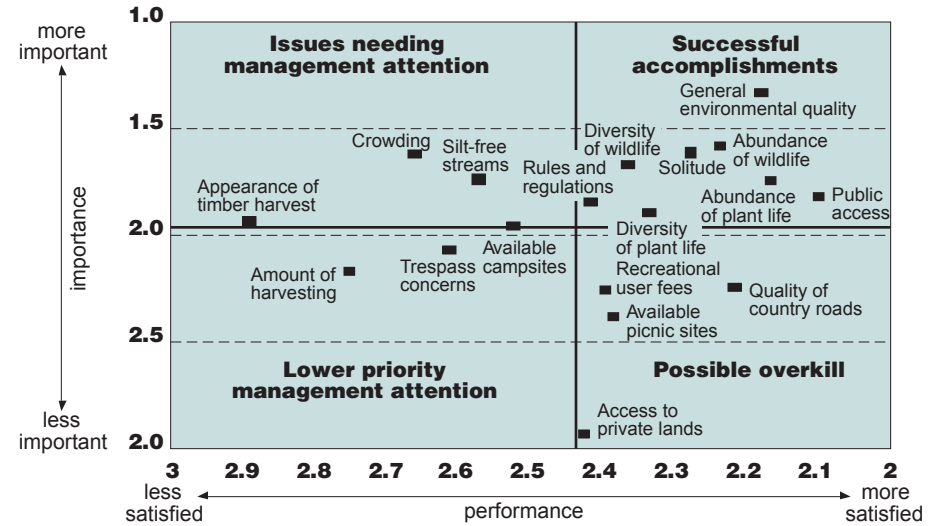


Figure 29. Importance-performance measures for motorized users.

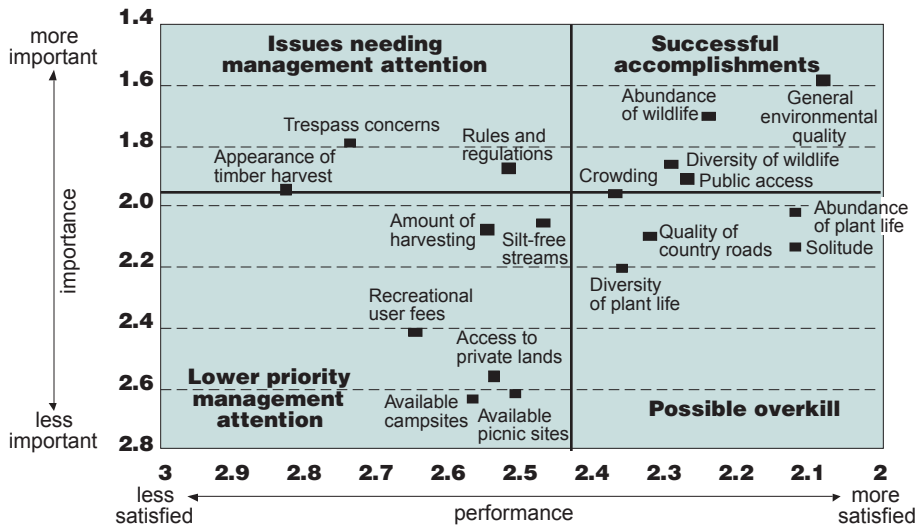
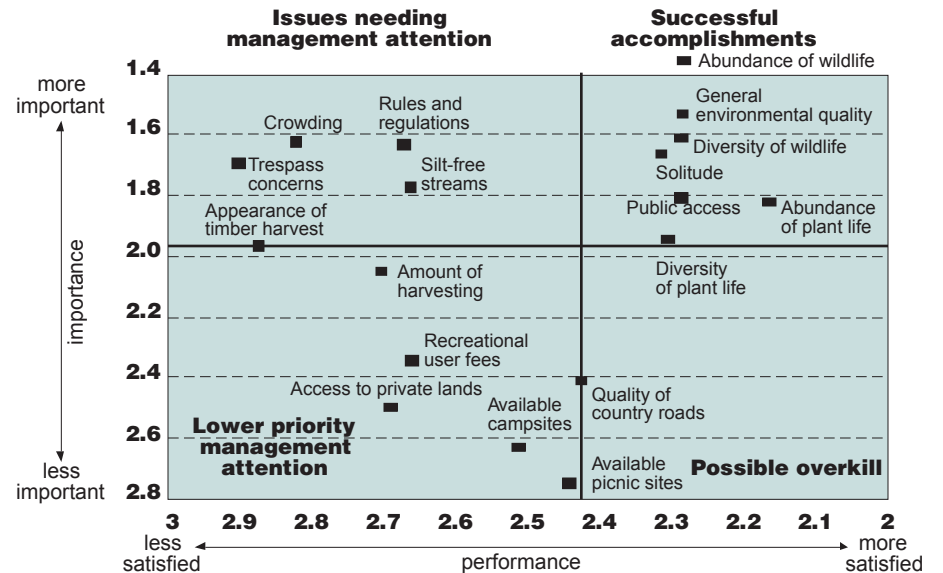


Figure 30. Importance-performance measures for hunters.



Of primary interest to forest management are attributes that are deemed important and that also exhibit responses with low satisfaction levels. These are attributes forest managers can target for improvement.

Attributes that fell into the "Issues Needing Management Attention" quadrant differed by user group. Quiet users felt that the appearance of timber harvest, crowding, silt-free streams and campsite availability needed better management. For motorized users, the appearance of timber harvest, trespass issues and rules and regulations were of primary concern. Attributes that concerned hunters included trespass, crowding, rules and regulations and silt-free streams.

Since each type of recreationist response identified the appearance of timber harvest as a concern, management should be aware that this is an important issue associated with a significant level of dissatisfaction. Rules and regulations, trespass concerns and crowding should also indicate to managers that these areas need improvement.

Managers warrant compliments for several attributes that fell within the quadrant characterized by high importance and high levels of satisfaction. General environmental quality, the quantity and quality of wildlife and availability of solitude were attributes characterized as "Successful Accomplishments" by each user group. This means that each group was generally satisfied with the manner in which management provided these important attributes.



Wisconsin Department of Natural Resources

Recreational use pressures have created significant increases in demand for land throughout the Lake States. The parcelization of land for recreational uses diminishes the land's ability to produce timber resources because of economies of scale.

One of the primary conclusions we can draw from the IPA results is the need for more study of the attributes falling into the Issues Needing Management Attention quadrant. The goal of this ongoing research is to determine causal relationships behind attributes that require further attention by forest managers. We are trying to develop results that will more clearly specify the determinants of these attributes. By differentiating the attributes along demographic characteristics and other control variables, we should be able to draw more accurate conclusions about the attributes themselves.

While IPA pioneers Martilla and James wanted IPA to be easily understood, the call for actions based on the results often lack clarity. While results are displayed on a two-dimensional action grid, the connection to specific policy objectives for management of natural resources may be unclear. Other limitations include the site specificity of attribute lists, even in seemingly similar areas.

While the procedure of IPA may be generalized, the attributes and results are not. Attributes within each of the quadrants will require additional study before corrective action should be introduced. Ongoing research will more clearly identify determinants of dissatisfaction with criteria deemed important to forest-based recreational opportunities.

Summary and policy implications

The research reported in this publication provides a more complete picture of the market-based values of forests throughout Wisconsin.

We focused on two of the primary market-based links that are key to community development impacts. These links are: 1) timber production to wood processing; and 2) recreational use of forests to regional tourism. Both of these forest uses provide value-added opportunities and represent equally important directions in forest use.

More importantly, however, both also rely upon the health, productivity and management of the same raw material—Wisconsin's forest and natural resource base. Results of this research suggest that forests provide a foundation for much of the economic activity of this rural region.

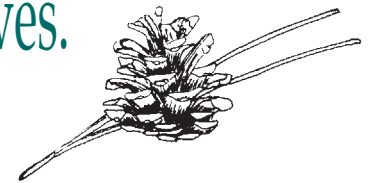
Timber and wood processing. The average annual value of timber removals statewide during the past decade was just over \$200 million. Timber production in the region provided raw material inputs into the primary, secondary and reconstituted wood product sectors. During 1994, these sectors made up approximately 6 percent of the state's gross output (roughly \$15 billion of \$242 billion). The majority of timber removals take place on nonindustrial private forest lands with a surprising amount of saw-timber value being realized in the southwestern part of the state.

Forest-based recreation and tourism. Recreation is another important driver of regional economic activity. On an annual basis, forest-based recreationists spent approximately \$2.5 billion locally within Wisconsin communities. This spending provided a significant portion of the receipts of tourism-sensitive businesses throughout communities in Wisconsin. In total, these businesses accounted for another 6 percent of the state's gross output (roughly \$14 billion of \$242 billion). The use of forest land for recreation had interesting differences by ownership type. A surprising amount of forest-based recreation took place on privately owned lands, both industrial and nonindustrial. Also, there were interesting differences in use of lands by the various types of recreational user. Clearly, quiet recreationists relied heavily on state-owned public lands while hunters focused their use on nonindustrial private forest lands. Motorized use was more difficult to characterize and had the highest levels of use on unidentifiable ownerships (motorized recreationists were generally less aware of whose land they were on).

Household income. Forest-based activities affect the ability of households in this region to generate income. The employee compensation (for example, wages paid to workers) portion of value added accounted for approximately 25 percent of total wood-products output and 35 percent of tourism-sensitive output. Average jobs in tourism-sensitive businesses throughout the state earned almost \$11,000 per year while wood-based industries paid approximately \$36,800 per year. These figures are compared to average statewide earnings per job across all sectors of almost \$25,000 per year.

We realize that people and households in rural resource-dependent regions of Wisconsin have traditionally relied upon the natural resource base for economic sustenance. Indeed, it is this level of economic dependence (or reliance) that, in large part, helps us understand why people view forest resources throughout Wisconsin from different positions, ideologies and values.

We firmly believe that there are more compatibilities than incompatibilities among forest use alternatives.



Compatibility of alternative forest uses. In general, results of this study suggest that timber production and recreational use of forests were generally compatible land uses. This was more likely to be true for hunters and motorized recreationists than with the broad category of “quiet” forest recreationists.

Furthermore, forest-based recreationists generally felt that balanced use (for both timber and recreation) was an important component of local economic conditions for communities in this region and that forest land managers should account for these localized effects on rural populations in decision-making.

Our intent was to identify the relative compatibility of alternative forest uses. Indeed, we firmly believe that there are more compatibilities among forest use alternatives than incompatibilities. This runs counter to much traditional thought, both among academics and policymakers.

The key to more integrative solutions lies within both parochial ideologies. Those who view timber as predominant need to realize the simple reality of people-centered forest management that is sensitive to more than just timber production. Conversely, proponents of nature-based tourism need to realize and internalize the dynamic nature of forest growth, the benefits of scientifically sound silvicultural techniques and the need to interpret the “working” forest resource. Open communication and dialogue as to the implementation of these suggestions is required and remains a critical future planning need.

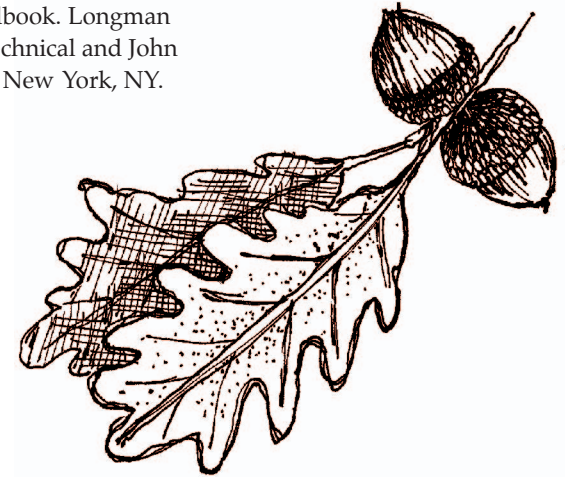
Although more work is required to fully understand the links between forests and community development, there are clear implications of this research for both development and forest management policy.

Development of rural forested regions benefits from a clear understanding of the tourism and forestry sectors. While the tourism industry needs to better recognize the latent value of forests as a basis for timber demand, forest managers and the forest products industry need to continue their efforts at managing forests in a sensitive and scientifically sound manner that more fully accounts for both timber and nontimber values.

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Extensions of results and further analysis

Five separate analysis extensions to this publication are fully reported elsewhere. Their titles and a short abstract of each follows. For copies of these publications, contact Dave Marcouiller at the Center for Community Economic Development (608-262-2998).

1. Analyzing the compatibility of alternative forest uses

Marcouiller, Dave 1998. The compatibility of timber production with forest-based recreation: Developing a basis for evaluating user conflicts.

Paper presented at the annual meetings of the Association of Collegiate Schools of Planning, November 5–8, 1998, Pasadena, CA

Abstract: *Natural resources provide the basis for much of the economic activity that takes place in rural America. This is particularly true in forested regions where leisure-based tourism and wood-products manufacturing provide mainstays to local economies. In large part, these industries rely on the same general input—forests.*

In the past, there has been a general lack of consensus among interest groups, local citizens and industry representatives over appropriate forest land uses. Public policy often views simultaneous use of forested lands for timber and for recreation as being mutually exclusive.

In this paper, the interface between these two uses is examined using importance/performance and factor analysis as a basis for explanatory regression models of forest-based recreational user perceptions. Results suggest that forest

use compatibility depends on the type of recreationist involved, their previous understanding of forest management effects, attitudes toward land use regulation, concern for local economic conditions and socio-demographic characteristics. While recreationists realize the importance of forest use to local development, there are distinct differences among forest-based recreationists in their support of timber management and related activities.

2. Analysis specific to the Northern Highlands-American Legion State Forest

Marcouiller, Dave and Terry Mace. 1998. Forest-based recreation and timber production in the northwoods: A resource planning assessment with specific reference to the Northern Highlands-American Legion State Forest (NHAL-SF.) Staff Paper 98.3; Department of Urban and Regional Planning, University of Wisconsin-Madison/ Extension, Madison, WI.

Abstract: *In this report, data and analysis focus attention on the region including and surrounding the Northern Highlands-American Legion (NHAL) State Forest. The intent of the research was to develop estimates of the role this property plays in community development and to develop measures that assist in understanding the ability of the NHAL State Forest (and other forested lands in the region) to support multiple uses.*

Specifically, the objectives included identifying characteristics of two primary uses of these forests —recreation and timber production. These

characteristics included the extent, importance, performance and compatibility of uses. In addition, estimates of the regional economic impacts of forest land use for recreation and timber are developed for the seven counties including and surrounding the NHAL State Forest.

3. Analyzing the user profiles of forest-based recreationists

Olsen, Eric, Dave Marcouiller and Jeffrey Prey. 1998. Recreational user groups and their leisure characteristics: Analysis for the Statewide Comprehensive Outdoor Recreation Planning (SCORP) process. Wisconsin Department of Natural Resources, Madison, WI

Abstract: *In this publication, we develop user profiles of 12 specific forest-based recreational user groups. As a part of the 1998 SCORP process, our goal was to develop a better understanding of basic recreational demand with specific reference to the forest resources of Wisconsin. Survey data from over 1,000 forest-based recreation users was analyzed to identify patterns and issues. The method used in collecting this data is presented with a discussion of compatibility and importance-performance analysis (IPA). The data, together with the IPA, are then used to describe the characteristics of user groups including hunters, campers, snowmobilers, hikers, anglers, all-terrain motor vehicle users, wildlife watchers, off-road bikers, cross-country skiers, horseback riders, plant collectors and pack animal users.*

4. Developing the concepts that support the role of forest resources in producing tourism

Marcouiller, Dave 1998. Environmental resources as latent primary factors of production in tourism: The case of forest-based commercial recreation. *Tourism Economics* 4, 2: 131-145.

Abstract: *The market supply of tourism, in many respects, remains an unresolved area of theoretical and empirical development. The reasons for this are many, but this paper argues that one of the limiting core areas of conceptual development in tourism economics is the general need for an analytical framework that captures generic production processes used to produce output from the tourism sector. One important unresolved issue of production includes use of critical resources such as environmental goods that serve as latent primary factor inputs to the production process of tourism.*

Often, these resources are hidden from analysis due to their non-priced common-pool attributes. This is particularly true in rural, amenity-rich regions where nature-based tourism firms are becoming increasingly important to regional economies. Using forest resources as an example, the incorporation of non-priced tourism production inputs more completely specifies the tourism production function, provides a critical link to land and recreation resource management and allows for more integrative tourism planning approaches.

5. Status of Lake States' forest productivity

Stier, J.C., K.K. Kim, and D.W. Marcouiller. 1998. Growing stock, forest productivity and land ownership. Paper presented at the Seventh International Symposium —Society and Resource Management, May 27-31, 1998, University of Missouri–Columbia.

Abstract: *The characteristics of forest growing stock and its rate of growth are important determinants of current stand value, silvicultural practice and future productivity. The level of silvicultural practice, or management intensity also positively affects productive potential of timber yield. Among forest ownership groups, the standard expectation is that the forest products industry manages lands of relatively higher productivity and applies more intensive silvicultural practices to maximize timber production.*

This appears to be the case throughout the United States with the exception of the Great Lake States. In this paper, we analyze forest inventory data to examine the relationships between land ownership and attributes of growing stock productivity for the forested region of the Lake States of Minnesota, Wisconsin and Michigan.

Results suggest that industrial private forest owners of the Lake States operate on sites of inferior quality relative to other forest owners. The most productive sites in the region are owned by nonindustrial private landowners or are part of the public forestland system owned by counties, states and the federal government. Policy implications include constraints of timber supply that limit the potential of regional forest-products led economic growth in the U.S. Lake States. This is particularly acute given continued fragmentation of nonindustrial private land parcels and less intensive, ecosystem management approaches to timber production on public lands.

Sample survey

Forest-based Recreational Use Study
University of Wisconsin - Cooperative Extension
Wisconsin Department of Natural Resources

I. Your Use of Forests for Recreation:

1. Please estimate the number of days last year that you participated in the following forest-based recreational activities. If you did more than one activity in a day, please associate only your primary reason for spending time in the woods with each day identified.

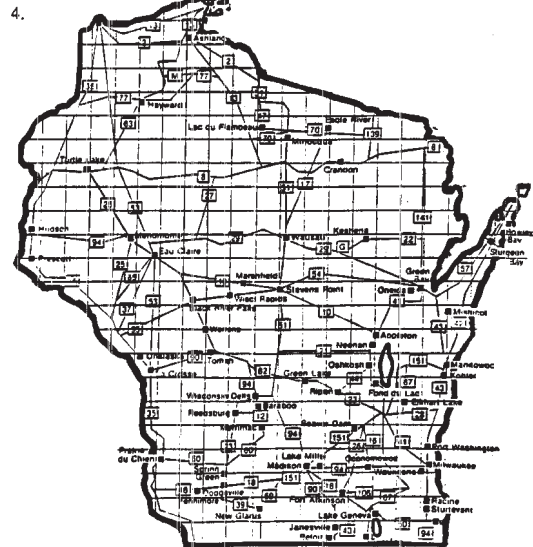
- hunting
- watching wildlife (not hunting)
- off-road bicycling
- all-terrain motorized vehicle
- camping
- snowmobiling
- hiking
- pack animal use
- cross-country skiing
- horseback riding
- fishing
- plant collecting

2. Please allocate the total number of days from Question 1 by season.

Fall Winter Spring Summer

3. In percent, please estimate the amount of time spent recreating on forest lands in Wisconsin by who owns the land (total should equal 100 percent of your forest-based recreational time last year).

- on private land owned by the timber industry
- on private land NOT owned by the timber industry
- don't know, but definitely private land
- on federal lands (i.e. national forests)
- on state lands (i.e. parks and forests)
- on county lands
- on city/municipal lands
- don't know, but definitely public land



Using the map and based on your previous responses, please identify the locations where you recreated during the past 12 months. Feel free to mark x's in each cell or draw lines around and shade-in regions frequented during the past year.

II. How You Impact the Economy of Forested Regions:

5. The following questions pertain to your spending for items used in outdoor recreation activities. Please estimate the dollar amount spent for use during your forest-based recreational activity and where that spending took place on an annual basis.

	dollar amount spent for use in forest-based recreation (last 12 months)	percentage purchased within 25 miles of your activity (percent)
EXAMPLE		
entrance or user fees	\$ 50	50 %
entrance or user fees (include public and private campground fees)	\$ _____	_____ %
licenses	\$ _____	_____ %
groceries/liquor	\$ _____	_____ %
restaurants/drinks	\$ _____	_____ %
casinos/gambling	\$ _____	_____ %
gas, auto service	\$ _____	_____ %
overnight stays (hotels/motels/resorts)	\$ _____	_____ %
recreation (<i>amusements, etc.</i>)	\$ _____	_____ %
recreational equipment (<i>snowmobiles, sporting goods, etc.</i>)	\$ _____	_____ %
other retail (<i>gifts, souvenirs, etc.</i>)	\$ _____	_____ %
property taxes on second home(s)	\$ _____	_____ %

III. Your Attitude About Land Management Activities

For the following statements, please place a check mark on the line best identifying your level of agreement.

- 6. I am usually aware of who owns and/or manages the different forest lands that I use for recreation.

strongly agree agree disagree strongly disagree

|-----|-----|-----|-----|
- 7. Producing timber is a legitimate use of forested land.

strongly agree agree disagree strongly disagree

|-----|-----|-----|-----|
- 8. I feel that the creation of small openings in the forest for the removal of timber are compatible with my recreational interests.

strongly agree agree disagree strongly disagree

|-----|-----|-----|-----|
- 9. Encountering large openings in the forest does not bother me.

strongly agree agree disagree strongly disagree

|-----|-----|-----|-----|

10. I am aware of the history of timber harvesting activities on the forests where I recreate.

strongly agree agree disagree strongly disagree

I-----I-----I-----I-----I

11. Intermittent clearings in the woods have important wildlife habitat benefits.

strongly agree agree disagree strongly disagree

I-----I-----I-----I-----I

12. Timber harvesting has major impacts on the water quality characteristics of forest lands.

strongly agree agree disagree strongly disagree

I-----I-----I-----I-----I

13. I find forest-based recreation to be generally compatible with timber harvesting activities.

strongly agree agree disagree strongly disagree

I-----I-----I-----I-----I

IV. Your Attitudes About Recreational Conflicts

For the following statements, please place a check mark on the line best identifying your attitudes.

14. My use of forests for recreation does not impact other people's recreational use.

strongly agree agree disagree strongly disagree

I-----I-----I-----I-----I

15. The people that I encounter while recreating on forest lands do not generally bother me.

strongly agree agree disagree strongly disagree

I-----I-----I-----I-----I

16. The forests of Wisconsin have exceeded their ability to produce high quality recreational opportunities.

strongly agree agree disagree strongly disagree

I-----I-----I-----I-----I

17. I don't have problems with the concept of user fees to pay for forest-based recreational development.

strongly agree agree disagree strongly disagree

I-----I-----I-----I-----I

18. Increased road densities have compromised my recreational experience.

strongly agree agree disagree strongly disagree

I-----I-----I-----I-----I

19. Deer baiting has caused user conflicts where I recreate.

strongly agree agree disagree strongly disagree

I-----I-----I-----I-----I

V. Your Attitudes About Issues of Forested Regions in Wisconsin

20. Please examine the following elements of forest-based recreation and indicate the LEVEL OF IMPORTANCE and the LEVEL OF SATISFACTION you associate with each of the issues listed.

	<u>Level of Importance</u>					<u>Level of Satisfaction</u>				
	Very Important	Neutral/ Unsure	Very Unimportant	Very Satisfied	Neutral/ Unsure	Very Unsatisfied				
Solitude	1	2	3	4	5	1	2	3	4	5
Crowding (too many people)	1	2	3	4	5	1	2	3	4	5
Access to public forest lands	1	2	3	4	5	1	2	3	4	5
Access to private forest lands	1	2	3	4	5	1	2	3	4	5
Quality of County Roads	1	2	3	4	5	1	2	3	4	5
Silt-free streams	1	2	3	4	5	1	2	3	4	5
Abundance of wildlife	1	2	3	4	5	1	2	3	4	5
Diversity of wildlife	1	2	3	4	5	1	2	3	4	5
Abundance of plant life	1	2	3	4	5	1	2	3	4	5
Diversity of plant life	1	2	3	4	5	1	2	3	4	5
Amount of timber harvesting	1	2	3	4	5	1	2	3	4	5
Appearance of timber harvesting	1	2	3	4	5	1	2	3	4	5
Availability of campsites	1	2	3	4	5	1	2	3	4	5
Availability of picnic sites	1	2	3	4	5	1	2	3	4	5
General environmental quality	1	2	3	4	5	1	2	3	4	5
Recreational user fees	1	2	3	4	5	1	2	3	4	5
Trespass concerns	1	2	3	4	5	1	2	3	4	5
Rules and regulations	1	2	3	4	5	1	2	3	4	5

21. This question addresses your attitude on the compatibility of different forest land uses.

First, please identify your primary forest-based recreational activity: _____

Now, ask yourself the following:

	<u>Level of Compatibility</u>				
	Very Compatible	Neutral	Very Incompatible	Very Compatible	Very Incompatible
How compatible is my primary activity with ...					
... motorized vehicle use?	1	2	3	4	5
... bicycling?	1	2	3	4	5
... use of animals (horses or dogs)?	1	2	3	4	5
... hunting?	1	2	3	4	5
... hiking or cross-country skiing?	1	2	3	4	5
... primitive camping?	1	2	3	4	5
... auto-camping?	1	2	3	4	5
... maintaining clean water?	1	2	3	4	5
... wood production and harvest?	1	2	3	4	5
... wildlife habitats?	1	2	3	4	5
... wilderness?	1	2	3	4	5
... generally attractive landscape?	1	2	3	4	5
... other types of recreation?	1	2	3	4	5
... biodiversity?	1	2	3	4	5
... maintaining healthy ecosystems?	1	2	3	4	5

VI. Your Attitudes About Land Use and Regulations

With regard to forested regions of Wisconsin, please place a check mark on the line best identifying your response to the following statements that address land use controls.

22. Private owners of forested lands should be allowed to manage the land and its resources without regulation.

strongly agree agree disagree strongly disagree
 |-----|-----|-----|-----|

23. There needs to be public regulation of private land management activities.

strongly agree agree disagree strongly disagree
 |-----|-----|-----|-----|

24. Use of private land should be based on what the owner wants rather than being restricted by zoning.

strongly agree agree disagree strongly disagree
 |-----|-----|-----|-----|

25. Provision should be made for adequate public access to privately owned forested lands.

strongly agree agree disagree strongly disagree
 |-----|-----|-----|-----|

26. Zoning restrictions hurt more than they help a forested area.

strongly agree agree disagree strongly disagree
 |-----|-----|-----|-----|

27. It is important that good paying jobs exist in rural forested regions.

strongly agree agree disagree strongly disagree
 |-----|-----|-----|-----|

28. It is important to attract new manufacturing industries to rural forested regions.

strongly agree agree disagree strongly disagree
 |-----|-----|-----|-----|

29. Land use regulation should be locally determined.

strongly agree agree disagree strongly disagree
 |-----|-----|-----|-----|

30. The well-being of local residents should drive land use regulation.

strongly agree agree disagree strongly disagree
 |-----|-----|-----|-----|

31. My recreational use of forest lands is over-regulated.

strongly agree agree disagree strongly disagree
 |-----|-----|-----|-----|

VII. Your Views About Economic Development in Forested Regions of Wisconsin

There is much discussion over the direction of economic development in forest-based regions. Which of the following economic development projects would you support, for the forested region you visit most regularly?

32. Please rank the following strategies as a means of improving the quality of life in your forested region.

	Very Important	Somewhat Important	Not Important
Growing and harvesting trees	1	2	3
Processing trees into wood products	1	2	3
Extracting minerals	1	2	3
Processing minerals	1	2	3
Tourism development	1	2	3
Native American casinos	1	2	3
Attracting manufacturing firms	1	2	3
Development of retail and service industries	1	2	3
Supporting entrepreneurial activities	1	2	3
Helping existing businesses remain viable	1	2	3

VIII. Demographic Information

33. How many children do you have living at home? _____ children

34. What is your gender? _____ male _____ female

35. What is your age? _____ years old

36. How many years of school did you complete? _____ years of school

37. If you are employed, what do you do for a living? _____

38. What was your 1995 before tax annual household income?
 _____ Less than \$15,000 _____ \$100,000 - \$149,999
 _____ \$15,000 - \$29,999 _____ \$150,000 - \$199,999
 _____ \$30,000 - \$49,999 _____ \$200,000 - \$249,999
 _____ \$50,000 - \$69,999 _____ \$250,000 or greater.
 _____ \$70,000 - \$99,999

39. How would you describe the area where you live?
 _____ Rural _____ Suburban _____ Urban

THANK YOU FOR HELPING US IN THIS RESEARCH EFFORT.

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Forests and Regional Development: Economic Impacts of Woodland Use for Recreation and Timber in Wisconsin

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