
6 Criterion

Maintenance and Enhancement of Long-term Multiple Socio-economic Benefits to Meet the Needs of Societies



Criterion 6. Maintenance and Enhancement of Long-term Multiple Socio-economic Benefits to Meet the Needs of Societies

Forests are valued for the economic, cultural, social, and spiritual benefits they provide. Tracking the diverse values of forests as well as shifts in the demand for forest products and services can provide insights for the future, such as potential drains on the forest resource and opportunities for management.

Production of wood and nonwood products is dependent upon the available supply of raw materials, the demand for finished products, and the capability to process raw materials into desired products. While market forces are a major factor influencing demand for resource-based goods and services, nonmarket forces—such as the desire to sustain biological diversity or to dwell in or visit a natural place—remain critical factors. Shifts in demand can serve as an alert to potential drains on forest resources; however, the sustainability of forests lies primarily in the conservation and management of the resources.

- The Northern United States has a finite land base of 413 million acres. Though forested area has been increasing over the last century, it is leveling off and is currently at 169 million acres. Given a population of 121 million people in 2000, there are 3.4 acres of land, which includes 1.4 acres of forest land, per resident from which goods and services can be derived. Most forests can provide multiple goods and services simultaneously; however, there will always be situations in which multiple activities and desired uses are incompatible.

Wood Volume Removals

- Wood volume removals from timberland growing stock and other sources in the Northern United States totaled nearly 5.1 billion cubic feet in 1996—78 percent of which consisted of hardwoods. About 69 percent of the total output was harvested for roundwood products, 27 percent was left at logging sites, and the remaining 4 percent was removed for cultural reasons or obtained from land converted to nonforest uses (figure 28). **Roundwood** refers to wood suitable for primary forest products such as sawlogs, logs for veneer, posts, pulpwood, and fuelwood. Twenty-four percent of the Nation's wood volume and 21 percent of total roundwood volume originates in the Northern United States.
- Of the 3.5 billion cubic feet of roundwood products harvested in the Northern United States in 1996, the majority was from hardwood species. The top three roundwood products were sawlogs (36 percent), pulpwood (30 percent), and fuelwood (24 percent) (figure 29). Wood for composite products accounted for 6 percent of the total. Sixty-five percent of the pulpwood volume came from hardwoods, exceeding the national average of 43 percent (Smith and others 2001).
- Most roundwood is harvested from growing stock on timberland. Other sources include wood from sound dead trees, trees affected by rot, or trees located in fencerows,

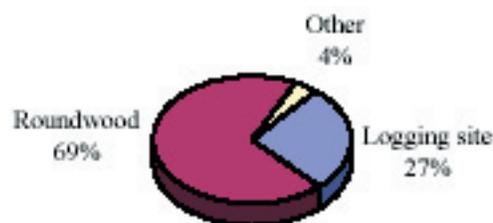


Figure 28. **Disposition of wood removals in the Northern United States, 1996** (Smith and others 2001).

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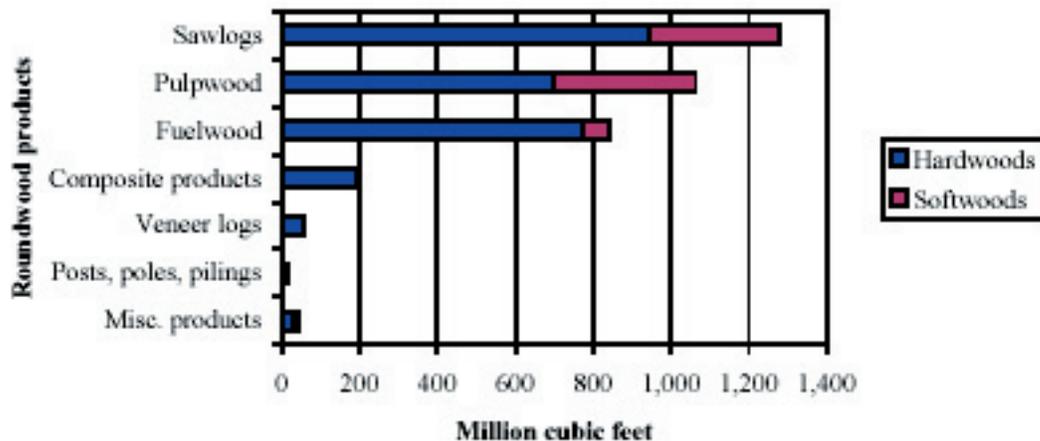


Figure 29. Volume of roundwood products harvested in the Northern United States by species group, 1996 (Smith and others 2001).

windbreaks, wooded strips, and pastures. Black walnut trees in these situations, for example, can produce substantial economic returns. Fuelwood is the only major product category that is harvested predominantly from other sources; only 15 percent comes from growing stock (figure 30).

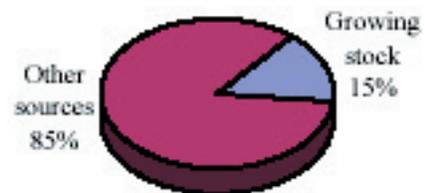


Figure 30. Sources of fuelwood in the Northern United States, 1996 (Smith and others 2001).

Wood Product Production and Consumption

- The region has over 15,500 wood products, paper and paperboard, and wood furniture manufacturing companies and over 2,500 logging companies (table 10). While all of the States in the region have some wood-based manufacturing, a few States are leaders in the three industry components. Based on the 1997 value of shipments: (1) Indiana, Michigan, Minnesota, Ohio, Pennsylvania, and Wisconsin manufactured 65 percent of the region's wood products; (2) Illinois, Michigan, New York, Ohio, Pennsylvania, and Wisconsin led the paper products industry with a combined total of \$44.3 billion, or 61 percent of the regional total; and (3) Indiana and Ohio each shipped over \$1.6 billion in wood furniture, accounting for nearly a third of the regional total (USDC Bureau of the Census 2002).

Table 10. Major timber harvesting and processing industries in the Northern United States (U.S. Department of Commerce 2002).

Industry type	Number of establishments	Value added (thousands)	Total value of shipments (thousands)	Total
Logging	2,685	\$731,470	\$1,641,603	
Wood product manufacturing	7,348	11,105,245	26,340,977	
Paper manufacturing	3,230	34,803,424	72,840,486	
Wood furniture manufacturing	5,304	5,813,919	10,547,137	
Total	18,567	\$52,454,058	\$111,370,203	

pulpwood production for the States of Illinois, Indiana, Iowa, Maine, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, and Wisconsin increased 78 percent from 1965 to 1997, from 7.9 million to 14.1 million cords (figure 31, Howard 1999).

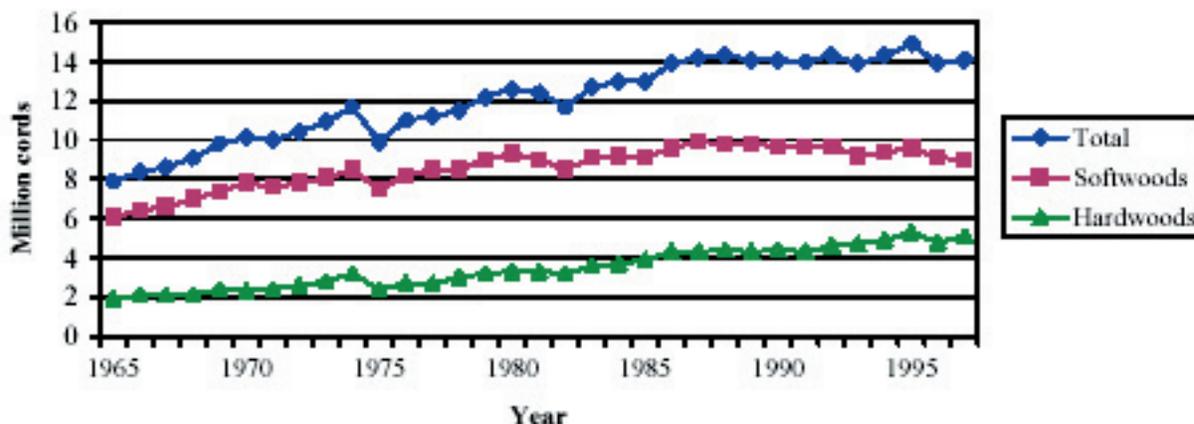


Figure 31. Pulpwood production in 11 Northern States¹, 1965–1997 (Howard 1999).

¹Illinois, Iowa, Maine, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, and Wisconsin

- Total consumption and consumption per capita increased for roundwood, sawnwood, wood-based panels, pulpwood, and paper and paperboard in the Northern United States between 1960 and 1990 (table 11).
- More wood products are being produced per unit of timber harvested today than in the past due largely to gains in the use of wood residue (chips, slabs, edgings, and planer shavings from sawmills and planer mills) and recycled paper (Ince 2000). In 1998, the U.S. industrial wood productivity—the quantity of wood product output produced per unit of roundwood input—based on industrial timber harvest was about 92 percent.

Table 11. Forest products consumption in the Northern United States and U.S. rate of consumption per capita¹ (USDA Forest Service 1996).

Forest products category and year	Estimated consumption for the Northern United States (thousand m ³ or MT) ²	U.S. rate of consumption per capita
Roundwood		
1960	175,026 m ³	1.79 m ³
1990	240,148 m ³	2.15 m ³
Sawnwood		
1960	45,878 m ³	0.47 m ³
1990	59,260 m ³	0.53 m ³
Wood-based panels		
1960	4,600 m ³	0.05 m ³
1990	11,461 m ³	0.10 m ³
Wood pulp		
1960	13,013 MT	133 kg
1990	25,326 MT	226 kg
Paper and paperboard		
1960	18,835 MT	426 kg
1990	34,958 MT	689 kg

¹Population figures based on census data were used to estimate consumption for the Northern United States. Consumption data originate from USDA Forest Service annual reports of forest production and consumption statistics.

² m³ = cubic meters
MT = metric tons

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Recycling

- Recycled fiber is an economical substitute for pulpwood for a large share of the paper and paperboard industries, but the two materials compete with one another for market share. When recycled fiber is used as a substitute for pulpwood, it can reduce wood use in the short run. Almost 50 percent of paper is recycled in the United States (AF&PA 1999).
- The paper and paperboard industries in the Northern United States use a higher proportion of recycled fiber than the rest of the Nation. The recovered paper utilization rate in the region averaged about 55 percent in 1996, compared with a nationwide average of 37 percent (AF&PA 1999). The utilization rate is the ratio of the tons of recovered paper used in paper and paperboard mills relative to the tons of finished product produced. Paper and paperboard mills in the Northern United States recycled 14 million tons of paper and paperboard in 1995.

Nonwood Forest Products

Nonwood forest products such as maple syrup, mushrooms, botanicals, and wreaths often have cultural and social values for families and communities in addition to market values.

- The ten major maple syrup producing States in the region (Connecticut, Maine, Massachusetts, Michigan, New Hampshire, New York, Ohio, Pennsylvania, Vermont, and Wisconsin) experienced an average of \$34 million in annual sales between 1994 and 1998 (USDA National Agricultural Statistics Service 1995–1999).
- Records of the production and value of maple syrup are maintained by States and compiled by the USDA Forest Service’s North American Maple Project.

Cultural, Social, and Spiritual Needs and Values

- When given a choice among four forest values, 59 percent of Northern U.S. residents surveyed identified clean air and water as the most important value to consider in the management of public forests, followed by scenic beauty, cultural and natural heritage, and wood products. On private lands, clean air and water also ranked first with 48 percent, but wood products ranked second, followed by scenic beauty, and cultural and natural heritage (figure 32, Cordell and Betz 2003).
- Forest land that provides opportunities for the protection of cultural, social, and spiritual values includes Federal forests and parks, State and county parks, natural areas, historic sites, and private land under conservation easements to public and private agencies and organizations.
- Specific land areas have spiritual meaning in some Native American cultures, such as burial grounds and offering sites. In general, however, forest-related spirituality is linked to untouched, cathedral-like, large trees, often called old growth forests.
- Forested landscapes are valued for residential use.

Recreation and Tourism

Outdoor recreation is an important basis for tourism and adds to the health and well-being of people of all ages and walks of life. Forests of the Northern United States provide

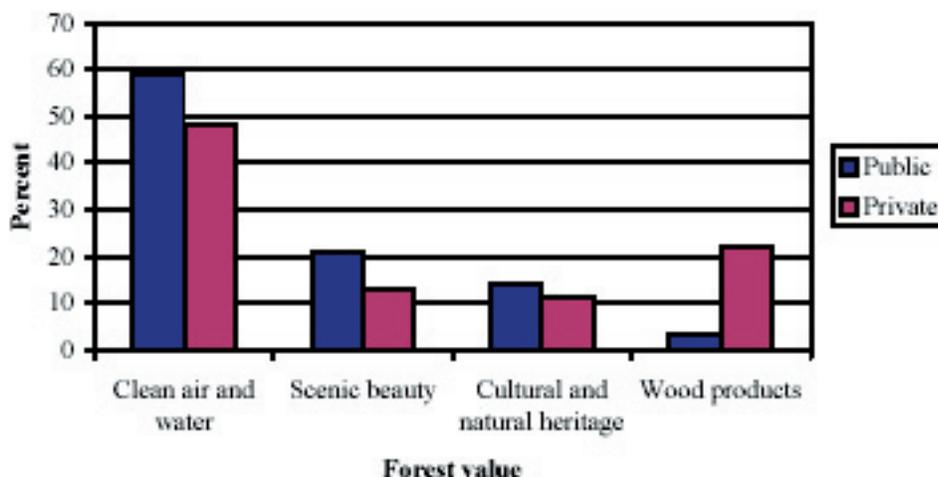


Figure 32. **Ranking of forest values on public and private lands in the Northern United States** (Cordell and Betz 2003).

opportunities for many different types of recreation.

- The Northern United States leads the Nation in the number of recreation activity days devoted to the enjoyment of scenery and wildlife in the forest setting. Recreation activity days measure recreation activities of any duration undertaken by forest users and generally include multiple activities that recreationists engage in during an outing (table 12). Many people enjoy walking, hiking, and camping in the woods. Some opt for strenuous activities such as backpacking, rock climbing, or river rafting; others prefer to travel in cars, off-road vehicles, or snowmobiles. Traditional activities such as big and small game hunting, and fishing are still enjoyed by many. Wilderness areas, nature centers, and both historic and prehistoric sites are popular destinations.
- It is difficult to determine the precise number of acres of forest land available for recreation by the general public versus that available to exclusive groups such as family

Table 12. **Recreation activity days occurring in forest settings in the Northern United States, 2000–2001** (adapted from Cordell and Betz 2003).

Activity	No. of days (millions)
View/photograph birds and other wildlife	3,188
View/photograph scenery	2,549
View/photograph flowers, trees, etc.	2,236
Walking for pleasure	1,281
Day hiking	749
Sightseeing	587
Picnicking, family gathering	545
Driving for pleasure	473
Mountain biking	445
Fishing (warmwater, coldwater, anadromous)	401
Visit a wilderness	319
Gather mushrooms, berries, etc.	249
Swimming	245
Drive off-road	239
Visit nature center	213
Visit a historic or prehistoric site	188
Hunting	158
Developed camping	135
Canoeing, rafting, kayaking	121
Backpacking, primitive camping	98
Downhill skiing, snowboarding	82
Horseback riding	74
Snowmobiling	72
Cross-country skiing, snowshoeing	52
Orienteering	23
Rock climbing, caving	23
Mountain climbing	22

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or friends. The majority of public forest lands are open to the general public, whereas only a portion of private lands allow public access. Nationally, the percentage of nonindustrial lands open to the public has decreased from 29 percent in 1977 to about 11 percent in 2000–2001. The Northern United States has the Nation’s highest percentage of private nonindustrial land open to the general public for recreation (13 percent) (Cordell and others, Cordell and Betz 2003).

Recreation Facilities

- The Northern United States had 144 million acres of forest potentially available for outdoor recreation in 1997, an average of about 1.2 acres per resident compared to a national average of 2.3 acres (Cordell and Betz 2003, Smith and others 2001).
- The bulk of forest land available for recreation in the Northern United States is in private ownership (63 percent). The remainder is managed by Federal agencies (9 percent), State and local governments (19 percent), and industrial landowners (8 percent).
- Amenities on federally administered lands included 2,150 miles of national recreation trails, 546 miles of wild and scenic rivers, 285,000 acres in national recreation areas, and 1.4 million acres in wilderness areas in 1987 (Cordell and others 1990).
- In the Northern United States, 278 out of 428 Federal recreational facilities and 939 out of 1,249 State parks occur in forested areas, including facilities for camping, hiking, picnicking, and snow sports. There are an estimated 1,978 public and private campgrounds and 240,405 campsites in forested areas (Cordell and Betz 2003).
- The number of campgrounds and campsites in forested areas is only a fraction of the total. For example, Leefers and Vasievich (1999) identified 1,854 campgrounds in Michigan, Wisconsin, and Minnesota alone hosting 147,585 campsites. Just over half of the campgrounds and nearly two-thirds of the total campsites were in private ownership, while only 9 percent of the campgrounds and 3 percent of campsites were located in national forests. State recreation areas had the most campsites per campground.
- Trends indicate that trails and green space will be used more heavily in the future, especially in locations near large population centers.

The decline in recreation opportunities on private lands due to conversion to other uses and restricted access could be addressed through cooperative public/private efforts.

- Water- and land-based recreation activities in the United States have a net economic value ranging from \$15 to \$155 per person per day; however, most range in value from \$20 to \$30 per person per day (USDA Forest Service 1997a).

Investments in the Forest Sector

- About 95 to 99 percent of tree regeneration in the Northern United States is accomplished through natural seeding and sprouting. The remaining 1 to 5 percent is accomplished by tree planting. In Federal Fiscal Year 1999, public and private nurseries produced 138 million trees with a market value of approximately \$27 million. About \$22.5 million was invested in tree planting for reforestation (Overton 2001).

- Forest management and improvement is carried out for a number of purposes, including wood production, wildlife enhancement, watershed protection, protection from destructive grazing, and fire, insect, and disease prevention. The total Federal investment in forest management and improvement was \$12.7 million in Fiscal Year 1999 (table 13).

Table 13. **Level of investment in forest growing and improvement in the Northern United States, FY 1999** (USDA Forest Service 1999b).

Treatment	Acres	Cost per acre	Investment
Timber stand improvement	81,946	\$55.00	\$4,507,030
Wildlife enhancement	141,498	20.00	2,829,960
Watershed protection	237,391	15.00	3,560,865
Fire prevention	181,830	5.00	909,150
Insect and disease prevention	183,188	5.00	915,940
Protection from destructive grazing	9,554	2.50	23,885
Total	835,407	—	\$12,746,830

- The Federal investment in forest health management and monitoring in the Northern United States was \$10.2 million in 1999 and rose to \$15 million in 2000 due to changes in pest suppression needs, specifically, the southern and western advancement of the gypsy moth (USDA Forest Service 1999b, 2000).
- The rate of return on forest land for timber value in the Northern United States remained relatively stable between 1952 and 1997, but is consistently lower than the national average (figure 33).

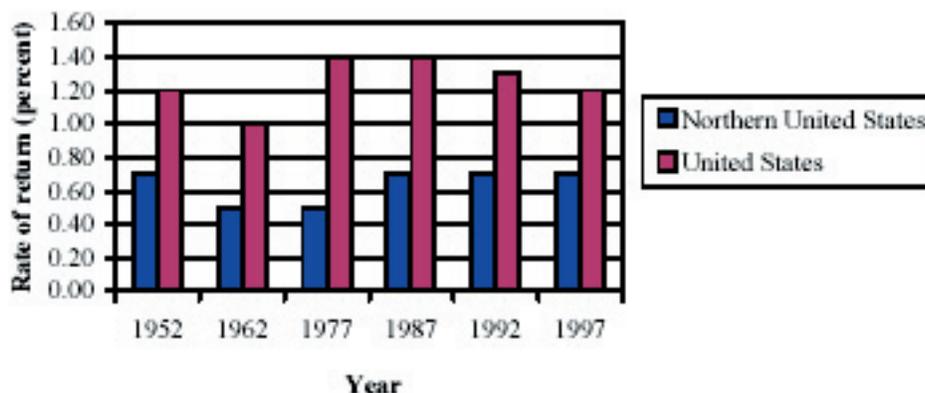


Figure 33. **Estimated rates of return from timber production to timber assets, 1952–1997** (USDA Forest Service [In press]).

- Investments by the wood products and paper industry in new capital expenditures, and pollution abatement and control in the Northern United States were estimated at \$6.5 billion in 1994 (AF&PA 1999).

Investments in Research and Education

- In 2000, \$76.4 million was invested in forestry research at 33 universities in the Northern United States, up from \$67.8 million in 1995 (figure 34). Fifty-two percent of this funding was provided by State governments and 31 percent by Federal government sources. Almost half of the Federal support (\$10.9 million) was from USDA Cooperative State

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Research Extension and Education Service funding sources, including the McIntire-Stennis Cooperative Forestry Research Program that funds forestry graduate research. Other Federal sources of funding include Agricultural Experiment Station Act of 1887 (Hatch Act) funds for State agriculture experiment stations and forestry school research, and Renewable Resource Extension Act grants.

- The Forest Service provides each of the Northern States an annual allocation of \$10,000–\$15,000 for conservation education.

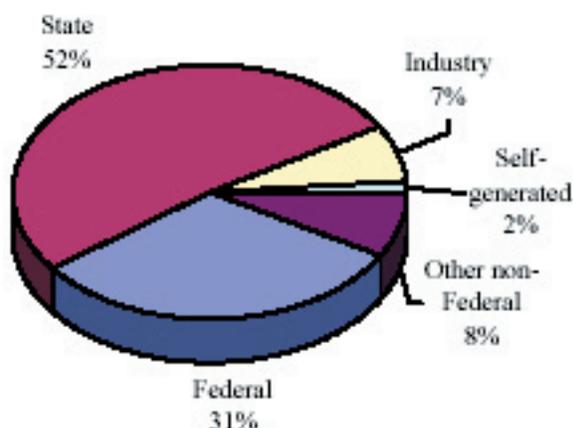


Figure 34. **National investment in forestry schools, 2000.** Of the \$76.4 million invested in forestry schools in 2000, the largest portion came from State governments (Norland 2003).

Employment and Community Needs

- Timber processing industries provide income and employment opportunities, and contribute to the economic diversity of the communities where they are located. The logging, wood products, paper and paperboard, and wood furniture industries in the Northern United States employed 612,000 people in 1997 (table 14).

Table 14. **Employment, payroll, and hourly wages for major wood processing industries in the Northern United States, 1997** (U.S. Department of Commerce 2002).

Industry	Number of employees	Annual payroll (thousands)	Average wages per hour for production workers
Logging	12,288	\$259,876	\$12.70
Wood product manufacturing	196,485	4,890,711	11.26
Paper manufacturing	302,710	11,413,062	15.60
Wood furniture manufacturing	100,855	2,625,074	11.26
Total	612,338	\$19,188,723	—

- Employment levels reflect the nature of the end product more than the number of establishments. Industries producing secondary products such as furniture tend to have more employees than industries producing primary products such as lumber. Higher average compensation in the paper industry (over twice as much as the lumber industry) reflects the need for better-trained employees, mill ownership, degree of unionization of the labor force, and relatively stable levels of end product consumption.
- The Northern United States accounted for nearly a third of the Nation's workers in agriculture, forestry, fishing, and related fields in 1998. The most highly paid categories of forestry occupations are foresters, conservation scientists, forest fire inspectors, and fire prevention specialists. There are considerable disparities in wage rates for similar jobs from State to State (USDL Bureau of Labor Statistics 2001a).

- Most Federal and State forestry positions are technical, professional, and managerial. Forestry technicians are paid the least, and managers the most. Pay for experienced field foresters varied across States from a high of \$58,800 to a low of \$28,000 in 1998. A maxim in forestry is that work gets done in the field; however, the average difference in annual pay between entry level and experienced field or service foresters among the 20 States is only \$11,136. The premium for experience among the States ranged from \$5,000 to \$23,800 (NASF 2001).
- Timber industry jobs in the region are declining in spite of increased logging due to a number of factors: mechanization is enabling more work to be done by fewer people, competition is shifting jobs to other regions of the world, and improvements in engineering and technology have decreased society's reliance on wood manufacturing. As with other manufacturing jobs, some wood manufacturing jobs have been replaced by recreation, tourism, and other service sector jobs. On a local and regional basis, however, wood manufacturing continues to provide an important component of community and economic stability (NWF-NNRC 1996).

Worker Safety

- Safety has improved in many forest products jobs in the last decade, although logging continues to be one of the most dangerous professions. Death and injury are frequently associated with jobs such as felling, limbing, bucking, and choke setting. Between 1992 and 1996, 172 loggers are known to have died in the Northern United States. Injury rates for occupations in key forest sectors are higher than the national average (USDL Bureau of Labor Statistics 2001b,c,d).

