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# Minnesota **Milestones**

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2002 Minnesota Milestones, archived version

*Note to users: The content below was featured on a website that is no longer live. All of the data and discussion, however, remains below. This document is organized by a summary of indicators in four sections — People, Community & Democracy, Economy, and Environment. Discussion and trend data for each indicator appears following the indicator list specific to each section.*

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## ENVIRONMENT

**Minnesotans will conserve natural resources to give future generations a healthy environment and a strong economy.**

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## INDICATOR 5 5 : ENERGY USE PER PERSON

**Goal:** *Minnesotans will conserve natural resources to give future generations a healthy environment and a strong economy. Continued prosperity and community well-being depend on conserving and maintaining the natural systems that are the base for economic activity.*

**Rationale:** Energy use is a good measure of both economic and environmental health because virtually all economic activities require energy, and all forms of energy production and use have environmental impacts.

**About this indicator:** Despite a slight decline between 1996 and 1999, Minnesota's overall energy use per capita rose 13 percent between 1990 and 1999, from 312 million BTUs (British Thermal Units) to 351 million. This includes all traditional sources of energy and all uses – residential, commercial, industrial and transportation. The rate of population growth between 1990 and 1999 was nine percent while the energy consumption rate was 22 percent.

Increased energy use places a burden on the environment mainly because the vast majority of Minnesota's energy comes from finite fossil fuels, such as coal, petroleum and natural gas. These fuels are a key source of toxic air pollution and a major factor in global climate change, which could have significant effects on Minnesota's economy and environment. One limitation of the indicator is that "energy use per person" makes no distinctions among sources of energy or methods of producing it, when in fact energy produced from coal, natural gas and wind have very different economic and environmental effects.

**For comparison:** Minnesota ranked 21st in the nation for total energy use in 1999. Minnesota's energy use per person is near the national average, but both Minnesota and the United States use relatively large amounts of energy per dollar of goods and services produced, compared to other industrialized countries.

**Things to think about:** A 1999 article in the *Harvard Business Review*, "A Road Map for Natural Capitalism" estimates that if the United States adopted the most efficient lighting, appliances and other electric devices available, the nation's \$220 billion electric bill could be cut in half. Similarly, the Lawrence Berkley National Laboratory reports that currently available technologies could significantly reduce the world's annual growth rate in energy demand to 0.5 percent per year between 1990 and 2020

**Technical notes:** This indicator now relies on data from the federal Energy Information Administration to allow easier comparisons with other states and the nation as a whole. Figures reported in earlier editions of *Minnesota Milestones* have been revised to be consistent with Energy Information Administration data

**Sources:**

- Lawrence Berkley National Laboratory, *Energy Efficiency Improvement Utilising High Technology: An Assessment of Energy Use in Industry and Buildings*, 1995: <http://eetd.lbl.gov>
- "A Road Map for Natural Capitalism," by Amory Lovins, L. Hunter and Paul Hawken, *Harvard Business Review* (May-June 1999)
- U.S. Department of Energy, Energy Information Administration, *State Energy Data Report 1999; Minnesota Energy Use Rankings in 1999; and Energy Consumption Estimates by Source, 1960-1999, United States: [www.eia.doe.gov](http://www.eia.doe.gov)*

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**INDICATOR 5 6 : RENEWABLE ENERGY SOURCES**

**Goal:** *Minnesotans will conserve natural resources to give future generations a healthy environment and a strong economy.* Continued prosperity and community well-being depend on conserving and maintaining the natural systems that are the base for economic activity.

**Rationale:** Trends in the use of energy from renewable sources give an indication of the state's future energy situation. The percentage of energy that Minnesota derives from local, clean and renewable sources directly affects the state's long-term economic and environmental stability and security because much of the state's fuel is currently imported.

**About this indicator:** With slight fluctuations, the percentage of Minnesota's energy coming from local, renewable sources has risen from 4.1 percent in 1990 to 6.1 percent in 1999. Renewable energy includes hydroelectric, wind, solar, geothermal, wood and wood waste, other plant matter, municipal solid waste and landfill gases. Greater reliance on renewable sources of energy inside Minnesota could dramatically reduce air and water pollution, lower regulatory costs and lead to greater energy stability. Data for this indicator does not differentiate among energy sources.

Complete data on renewable energy supplied from outside the state is not available because the Minnesota Department of Commerce gets information only from companies within the state.

The total amount of renewable energy consumed in Minnesota has gone up 67 percent since 1990, but as a percent of total energy used remains below the 10 percent level that state officials thought might be achieved by 1998. This could be due to demand for energy outpacing the growth of renewable energy production.

**For comparison:** While Minnesota's use of renewable energy rose between 1990 and 1999, the United States' use of renewable energy slipped from 11.8 percent of total energy use to 10.8 percent in the same time period. Based on 1998 data, renewable energy use in other states varies widely, from 97 percent in Idaho and 63 percent in South Dakota to 5 percent in Wisconsin and 3 percent in Iowa.

**Things to think about:** Traditional, fossil-fuel-based energy production and use, including fuel burned in vehicles, is responsible for most of Minnesota's air pollution and emissions of greenhouse gases.

Giving consumers greater choice among electricity generation methods could boost solar, wind, and other renewable energy sources 40 percent by the end of the decade, according to a recent study by the National Renewable Energy Laboratory and the Lawrence Berkeley National Laboratory.

Wind power, in particular, has become the fastest growing energy sector in the world, and may become increasingly important in meeting Minnesota's future energy demands given the state's abundant wind resources. Stanford University researchers contend that wind power's cost of 3 to 4 cents per kilowatt hour is now competitive with coal, and possibly cheaper if environmental costs are factored in.

**Technical notes:** Figures may differ slightly from those presented in *Minnesota Milestones 1998* because the data source for all years is the U.S. Energy Information Administration rather than the Minnesota Department of Commerce. One megawatt hour equals 1,000 kilowatt-hours. Renewable generation includes net utility and gross non-utility energy production while total generation includes all net data from all energy sources, both utility and non-utility.

**Sources:**

- Minnesota Department of Commerce, Energy Division, [www.commerce.state.mn.us/pages/EnergyMain.htm](http://www.commerce.state.mn.us/pages/EnergyMain.htm)
- Minnesota Pollution Control Agency, *Air Quality in Minnesota: Problems and Approaches*, January 2001, [www.pca.state.mn.us/hot/legislature/reports/2001/eq-report-na.pdf](http://www.pca.state.mn.us/hot/legislature/reports/2001/eq-report-na.pdf)
- Stanford University, *Stanford Report*, "Study advocates 'large-scale' U.S. wind power program," August 23, 2001, [www.stanford.edu/dept/news/report/news/september5/windpower-95.html](http://www.stanford.edu/dept/news/report/news/september5/windpower-95.html)
- U.S. Energy Information Administration, *Annual Energy Review 2000*, Electricity Overview, 1949-2000, [www.eia.doe.gov](http://www.eia.doe.gov)
- U.S. Energy Information Administration, Electric Power Industry Generation of Electricity by Primary Energy Source, 1988 through 1998, [www.eia.doe.gov](http://www.eia.doe.gov)
- U.S. Energy Information Administration, *Renewable Energy Annual 2000*, Appendix C, [www.eia.doe.gov](http://www.eia.doe.gov)
- National Renewable Energy Laboratory, *Forecasting the Growth of Green Power Markets in the United States*, October 2001 [www.nrel.gov/](http://www.nrel.gov/)

## INDICATOR 5 7 : VEHICLE MILES

**Goal:** *Minnesotans will conserve natural resources to give future generations a healthy environment and a strong economy.* Continued prosperity and community well-being depend on conserving and maintaining the natural systems that are the base for economic activity.

**Rationale:** Trends in motor vehicle use give an indication of pressures on the environment, particularly through air and water pollution and global climate change.

**About this indicator:** Vehicle miles traveled per person have risen nearly every year in the past two decades, up 53 percent between 1980 and 2001. This includes all personal, public, and commercial traffic. Vehicle miles rose 33 percent between 1990 and 2000, while Minnesota's population increased by 12 percent.

The potential costs of increases in vehicle miles include road congestion, which wastes time and fuel; higher private costs of car ownership; and higher public costs to maintain roads and bridges and to build new ones. To the extent that Minnesota vehicles continue to rely on fossil fuels, increased driving also harms the environment.

**For comparison:** Between 1995 and 2000, the national rate of vehicle miles traveled per person increased from 9,202 to 9,870, an increase of 7 percent. Minnesota's rate rose 10.6 percent during the same time period, from 9,579 to 10,594.

**Things to think about:** The Minnesota Department of Transportation estimates that congestion costs the Twin Cities metropolitan region \$1 billion a year. A perpetual rise in miles traveled also reduces the time available for other things, such as work, family life, and community activities. In addition, more than 50 percent of toxic air emissions in Minnesota come from motor vehicles, and the carbon dioxide generated by vehicles is a key factor in global climate change.

**Technical notes:** The Minnesota Department of Transportation estimates vehicle miles from traffic data collected at 8,000 sites across the state. Some numbers in this edition of *Minnesota*

Milestones differ from past versions due to revised data from the U.S. Department of Transportation and the U.S. Census Bureau.

**Sources:**

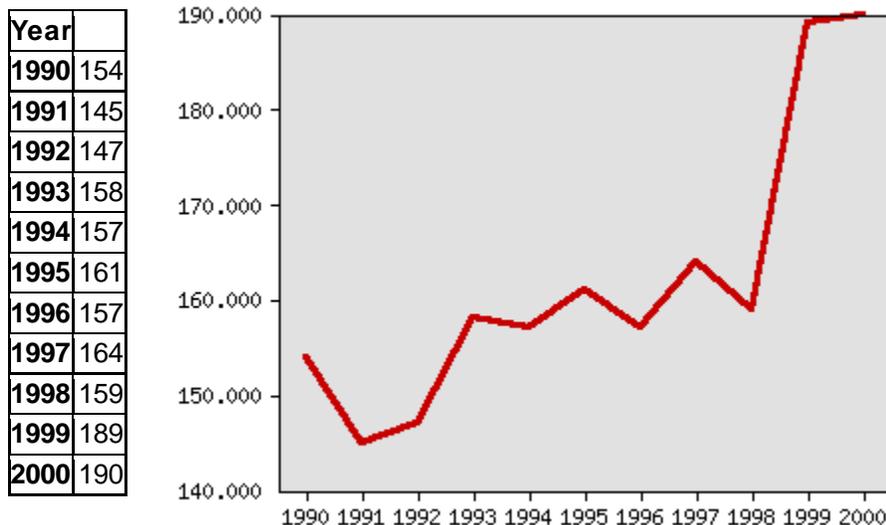
- University of Minnesota Center for Transportation Studies, *Congestion in the Twin Cities: Who's Paying the Price? A Summary Report*, November 2000: [www.cts.umn.edu/pdf/ValuePricing.pdf](http://www.cts.umn.edu/pdf/ValuePricing.pdf)
- Minnesota Department of Transportation, Office of Investment Management: [www.mndot.state.mn.us](http://www.mndot.state.mn.us)
- Minnesota Pollution Control Agency, *Air Quality in Minnesota: Problems and Approaches*, January 2001: [www.pca.state.mn.us](http://www.pca.state.mn.us)
- U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 1999*, "Functional System Travel 1999"

**INDICATOR 5 8 : AIR POLLUTANTS**

**Goal:** *Minnesotans will conserve natural resources to give future generations a healthy environment and a strong economy.* Continued prosperity and community well-being depend on conserving and maintaining the natural systems that are the base for economic activity.

**Rationale:** Air pollutants can harm human health and the environment. Air pollution imposes environmental costs through such things as acid rain and toxic exposure for aquatic life and economic costs mainly in the form of public health expenditures and regulatory costs.

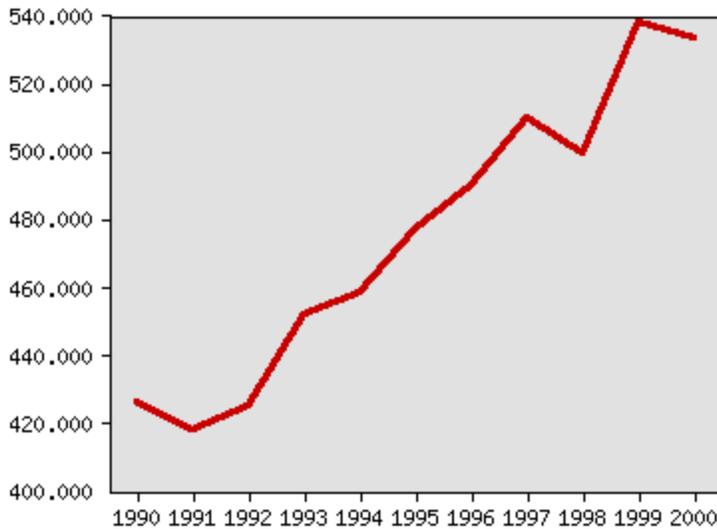
**Sulfur dioxide emissions, in thousands of tons**



**Data source:** U.S. Environmental Protection Agency

**Nitrogen oxides emissions, in thousands of tons**

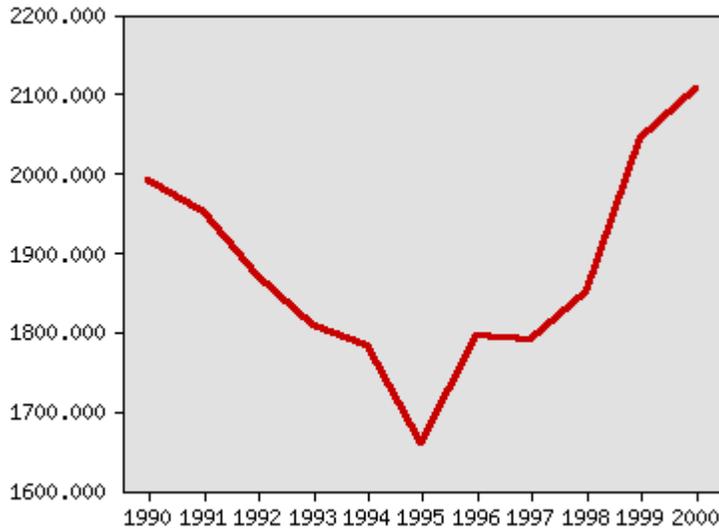
Year	
1990	426
1991	418
1992	425
1993	452
1994	458
1995	477
1996	490
1997	510
1998	499
1999	538
2000	533



**Data source:** U.S. Environmental Protection Agency

**Carbon monoxide emissions, in thousands of tons**

Year	
1990	1,990
1991	1,951
1992	1,869
1993	1,806
1994	1,782
1995	1,660
1996	1,794
1997	1,790
1998	1,851
1999	2,044
2000	2,105



**Data source:** U.S. Environmental Protection Agency

**About this indicator:** Sulfur dioxide and nitrogen oxide emissions have risen gradually since 1990. Carbon monoxide emissions fell and then increased again starting in 1996, ending the decade with a slight net increase. These trends cover all sources of the three pollutants, including motor vehicles and stationary sources like factories and businesses.

Total emissions of sulfur dioxide rose about 23 percent, from 154 thousand tons in 1990 to 190 thousand tons in 2000. Monitored levels are below the legal limit and are unlikely to exceed it unless

sulfur emissions from coal-burning power plants increase dramatically. Increased sulfur emissions will reduce visibility and may hasten acidification in Minnesota's lakes.

Nitrogen oxide emissions increased about 26 percent, from 426 thousand tons to 533 thousand tons. The increase is likely due to several factors: more people driving more miles per person; growth in energy use and therefore an increase in emissions from power plants; and increased emissions from taconite mining (part of which may reflect more accurate measurement). Although nitrogen oxide emissions may continue to rise because of increased travel and fuel use, it is unlikely that these increases will violate the legal standard. Nitrogen oxides contribute to the formation of ozone and smog on hot summer days.

As with both sulfur dioxide and nitrogen oxides, emissions of carbon monoxide showed a net increase for the decade, from 1,990 thousand tons in 1990 to 2,105 thousand tons by 2000. This net increase of three percent is likely due to increased auto travel, which appears to be outpacing any improvements in vehicle emissions or fuel efficiency. Carbon monoxide is a colorless, odorless, highly toxic gas emitted from automobiles. In small amounts it can impair alertness, cause fatigue and headaches. In large amounts it can kill. People with heart conditions and respiratory ailments are especially susceptible.

**For comparison:** In sulfur dioxide emissions, Minnesota ranks 28th among the states. National emissions dropped 24 percent between 1991 and 2000. While Minnesota's are increasing. In nitrogen oxide emissions, Minnesota ranks 18th. Emissions rose three percent nationally between 1991 and 2000, compared to 26 percent in Minnesota.

Minnesota ranks 20th in carbon monoxide emissions. Monitored levels of carbon monoxide have dropped five percent across the country despite significant growth in vehicle miles traveled.

**Things to think about:** According to research by the University of Minnesota's Center for Transportation Studies, health care and other costs from air pollution emitted by transportation sources alone in the Twin Cities are estimated at \$1 billion per year. This estimate includes monetary and nonmonetary costs to individuals, businesses and governments and covers such things as road construction and maintenance, travel time and the costs of owning and operating vehicles. External costs such as congestion, crashes, air pollution, and petroleum consumption accounted for seven percent of the total estimate.

The Minnesota Pollution Control Agency's regulation of large industrial sources of air pollution has contributed to large improvements in air quality in the last two decades. However, hundreds of chemicals, including most toxic chemicals and greenhouse gases, such as carbon dioxide, remain unregulated and pose significant challenges for Minnesotans' long-term health. Since many of these pollutants come from cars, trucks, buses, airplanes and power plants, protection of air quality involves reducing fuel and energy consumption, adopting cleaner fuels and shifting to other technologies that reduce air pollution, such as fuel cells.

**Technical notes:** Sulfur dioxide, nitrogen oxides and carbon monoxide are three of six primary pollutants (called criteria pollutants) regulated under the federal Clean Air Act. Differences from the numbers reported in *Minnesota Milestones 1998* reflect the U.S. Environmental Protection Agency's policy of revising historical data for accuracy and consistency.

#### **Sources:**

- Minnesota Pollution Control Agency, [www.pca.state.mn.us](http://www.pca.state.mn.us)

- Minnesota Pollution Control Agency, *Air Quality in Minnesota: Problems and Approaches*, January 2001, [www.pca.state.mn.us/hot/legislature/reports/2001/aq-report-na.pdf](http://www.pca.state.mn.us/hot/legislature/reports/2001/aq-report-na.pdf)
- U.S. Environmental Protection Agency, [www.epa.gov/oar](http://www.epa.gov/oar)
- University of Minnesota, Center for Transportation Studies, *The Full Cost of Transportation in the Twin Cities Region*, August 7, 2000 [www.cts.umn.edu/trg/research/rpt5abs.html](http://www.cts.umn.edu/trg/research/rpt5abs.html)

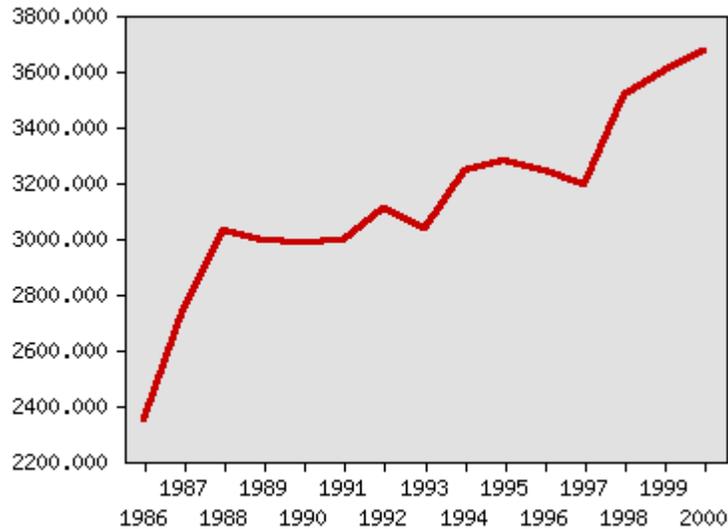
## INDICATOR 5 9 : WATER USE

**Goal:** *Minnesotans will conserve natural resources to give future generations a healthy environment and a strong economy.* Continued prosperity and community well-being depend on conserving and maintaining the natural systems that are the base for economic activity.

**Rationale:** A clean and abundant water supply is essential to economic and human health. Nearly every commercial and biological process requires it; the human body is roughly two-thirds water. The use, quality and availability of water are important indicators of future economic and environmental conditions.

### Gallons of water used per day, in millions

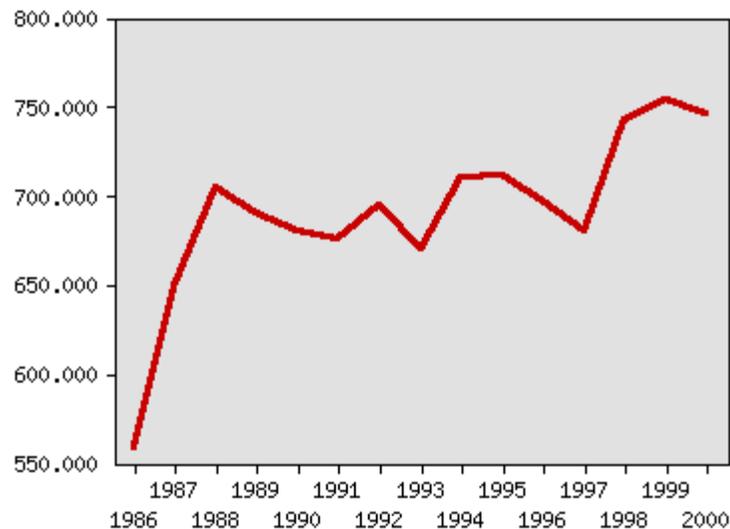
Year	
1986	2,348
1987	2,748
1988	3,027
1989	2,992
1990	2,981
1991	2,989
1992	3,104
1993	3,030
1994	3,241
1995	3,277
1996	3,238
1997	3,186
1998	3,510
1999	3,597
2000	3,669



**Data source:** Minnesota Department of Natural Resources

### Gallons of water used per person per day

Year	
1986	558.4
1987	648.9
1988	704.6
1989	689.7
1990	679.5
1991	675.1
1992	694.2
1993	670.1
1994	709.8
1995	711.5
1996	696.7
1997	679.6
1998	742.6
1999	753.2
2000	745.8



**Data source:** Minnesota Department of Natural Resources

**About this indicator:** Minnesota uses significantly more water today than in the mid-1980s, both in total quantity (56 percent more) and in quantity per person (34 percent more).

Total gallons of water used each day (including power generation, residential and other public supply, industrial processing and irrigation) increased from 2,348 million gallons in 1986 to 3,669 million gallons in 2000. Roughly two-thirds of this amount is used for power generation, but much of that water is then discharged and available for other uses.

The number of gallons used each day per person increased 34 percent between 1986 and 2000, from 558 gallons per person to 746 gallons per person.

Most of the state has plentiful water supplies, but water scarcity is a potentially limiting factor for water-intensive activities in parts of western and southwestern Minnesota. Using too much water from a limited supply can cause lakes, rivers or wells to dry up. Water shortages caused by drought or unplanned increases in water use could lead not only to economic disruptions and environmental decline, but also to a higher cost of government. New water and wastewater infrastructure can be expensive to build and maintain.

**For comparison:** Meaningful comparisons are difficult because of different methods for tracking water use. Total freshwater use per day in the United States stayed roughly stable between 1990 and 1995 at an estimated 341 billion gallons. Minnesota's daily water use during the same time period grew 5 percent.

**Things to think about:** Water is a finite resource. In some places groundwater is withdrawn faster than it can replenish itself. Sixty-eight percent of Minnesota's public water supply comes from groundwater sources, compared to 39 percent nationally. Irrigation, while representing a relatively small portion of Minnesota's overall water use, is the second-largest user of groundwater and

increased 140 percent between 1986 and 1999. Insufficient information about the state's complex ground water systems makes it difficult to predict the long-term effects of the state's increasing reliance on groundwater.

**Sources:**

- Minnesota Department of Natural Resources, *Water Year Data Summary, 1999 and 2000*, [www.dnr.state.mn.us/waters](http://www.dnr.state.mn.us/waters)
  - United States Geological Survey, [www.usgs.gov](http://www.usgs.gov)
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**INDICATOR 6 0 : TIMBER HARVEST**

**Goal:** *Minnesotans will conserve natural resources to give future generations a healthy environment and a strong economy.* Continued prosperity and community well-being depend on conserving and maintaining the natural systems that are the base for economic activity.

**Rationale:** Not exceeding a sustainable yield of timber is important to maintain the quality of Minnesota's forests. Timber is critical to a wide range of industries in the state, from paper to tourism.

**About this indicator:** The timber harvest has increased substantially over the past two decades, rising from 2.3 million cords in 1980 to 3.7 million cords in 2000, an increase of 61 percent. The harvest has fluctuated some during this time period, but has been quite stable since 1995. As harvests grow, it becomes increasingly important to use methods that preserve the economic, environmental and recreational benefits of Minnesota's forests.

**For comparison:** A study conducted for the Minnesota Environmental Quality Board in 1994 estimated a maximum sustainable yield of 5.5 million cords per year from commercial forests, assuming that the harvesting is done in a way that minimizes its impact.

**Things to think about:** The size of the timber harvest is only one of several important factors with an impact on forest habitats. Other factors include where, how and what types of trees are harvested, as well as what types of trees are left standing. Tree stands of a single age or species do not provide as rich a habitat as mixed forest.

Forests provide such benefits as erosion and flood control, regulation of the climate, wildlife habitat, hunting and recreation. Forests also absorb and store carbon dioxide, reducing Minnesota's contribution to global climate change. Some county and state forests in Minnesota have been independently certified as being sustainably managed. Lumber coming from such forest lands is called certified. Demand for such lumber has been strongest in Europe, but has been growing in the U.S.

**Technical notes:** This indicator includes harvests from all Minnesota's commercial timberlands, including all types of ownership and all species of trees. The drop in the timber harvest in 1995 reflects an adjustment based on decreased use of firewood since 1989 and 1990.

**Sources:**

- Minnesota Department of Natural Resources, [www.dnr.state.mn.us](http://www.dnr.state.mn.us)

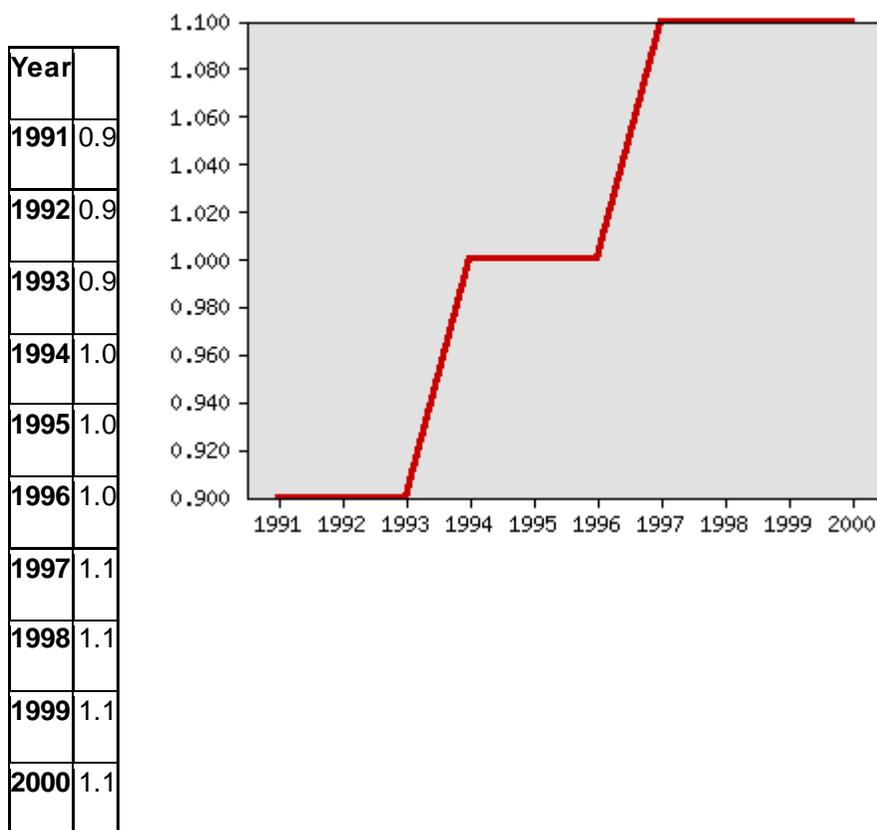
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## INDICATOR 6 1 : SOLID WASTE AND RECYCLING

**Goal:** *Minnesotans will conserve natural resources to give future generations a healthy environment and a strong economy.* Continued prosperity and community well-being depend on conserving and maintaining the natural systems that are the base for economic activity.

**Rationale:** Waste generation, and the proportion that is recycled, is one measure of how efficiently Minnesota's economy uses resources. It is also an indication of environmental quality because solid waste puts stress on the environment in the form of air, land, and water pollution.

### Tons of solid waste generated, per person

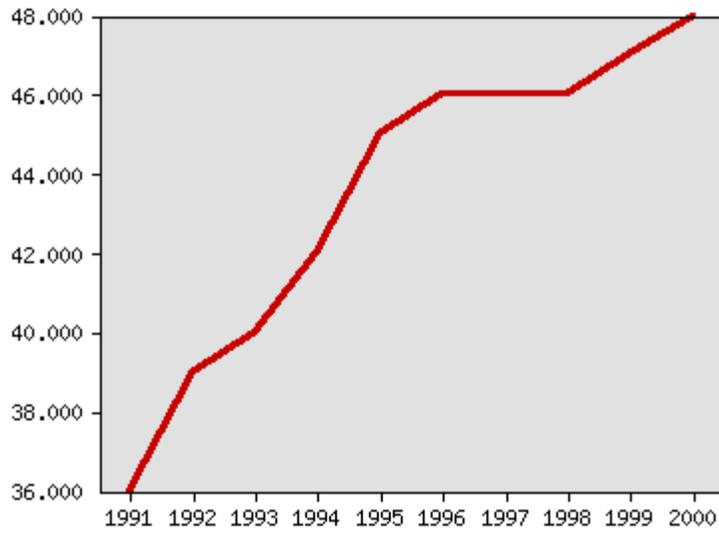


[Local data](#)

**Data source:** Minnesota Office of Environmental Assistance

### Percentage of solid waste recycled

Year	
1991	36%
1992	39%
1993	40%
1994	42%
1995	45%
1996	46%
1997	46%
1998	46%
1999	47%
2000	48%

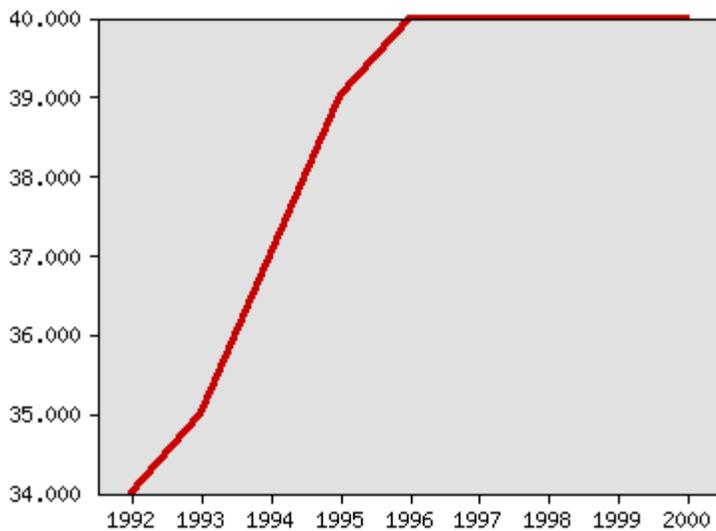


[Local data](#)

**Data source:** Minnesota Office of Environmental Assistance

**Base recycling rate**

Year	
1992	34%
1993	35%
1994	37%
1995	39%
1996	40%
1997	40%
1998	40%
1999	40%
2000	40%



**Data source:** Minnesota Office of Environmental Assistance

**About this indicator:** The amount of solid waste generated per person has risen steadily since 1991 and the base recycling rate has changed little since 1996. When yard waste and source reduction credits are added to the recycling rate (the middle column in the graphic), the recycling rate shows a modest increase.

The tons of solid waste generated per person each year in Minnesota increased from .88 tons in 1991 to 1.15 tons per person in 2000. The base recycling rate rose from 33.7 percent in 1992 to 40.3 percent in 2000, where it has remained mostly unchanged since 1996. After adding in yard waste and source reduction credits to the base rate, the recycling rate shows an increase from 36 percent in 1991 to 48 percent in 2000. While Minnesota's population grew by 11 percent between 1991 and 2000, total generation of solid waste grew by 44 percent.

The amount of solid waste Minnesotans produce and the portion they recycle have significant economic and environmental impacts. More waste means having to spend more on waste management. In addition, waste accumulates faster than natural systems are able to break it down.

Tracking the amount of solid waste by weight provides no information about the relative toxicity of what is thrown away. Materials containing toxic heavy metals, such as electronics, pose a growing challenge.

**For comparison:** In 1993, the Minnesota Legislature set a minimum target of reducing per capita generation of municipal solid waste by 10 percent by 2000, but the rate instead rose by 24 percent, from .93 tons per person to 1.15 tons per person.

**Things to think about:** Harvard Business School's Michael Porter suggests that waste should be thought of as an inefficiently used resource, which he equates with lost profits and wasted labor, since creating and managing waste imposes costs, but adds no value to the final product or service.

A 1989 study by the National Academy of Engineering estimates that more than 90 percent of the materials used in commercial activity do not turn up in durable goods, and quickly become waste. The study found that of the more than 10 tons of mass extracted per person annually in the United States, (excluding atmospheric oxygen and fresh water), roughly 75 percent is nonrenewable and 25 percent is renewable. This suggests that there are opportunities to create the same or greater economic value using fewer resources. Other national research suggests that continual reuse, recycling, and remanufacturing of materials and more efficient processes could cut resource use more than 90 percent in most sectors of the economy.

**Technical notes:** Data for this indicator is collected by counties and reported to the Minnesota Office of Environmental Assistance under a 1989 law commonly referred to as SCORE, for Select Committee on Recycling and the Environment.

The solid waste that is tracked for this indicator does not include yard waste, auto hulks, street sweepings, ash, construction debris, mining waste, sludge, tree and agricultural waste, tires, lead acid batteries, motor and vehicle fluids and filters or other materials collected as separate waste streams, such as hazardous waste.

This edition of *Minnesota Milestones* reports a higher recycling rate for 1996 than was reported in 1998 because the updated figure includes the base recycling rate plus credits for yard waste and source reduction.

Starting in 1995, yard waste was not included in the state's base recycling rate. Instead, the state mandated a credit system for yard waste and source reduction activities to be added to the base recycling rate.

**Sources:**

- Minnesota Office of Environmental Assistance: [www.moea.state.mn.us](http://www.moea.state.mn.us)
- Rocky Mountain Institute: [www.rmi.org](http://www.rmi.org)
- National Academy of Engineering, *Technology and Environment* by Robert U. Ayres, 1989: [www.nae.edu](http://www.nae.edu)
- "Green and Competitive: Ending the Stalemate," by Michael Porter, *Harvard Business Review*, September-October 1995 [www.hbsp.harvard.edu/hbr](http://www.hbsp.harvard.edu/hbr)

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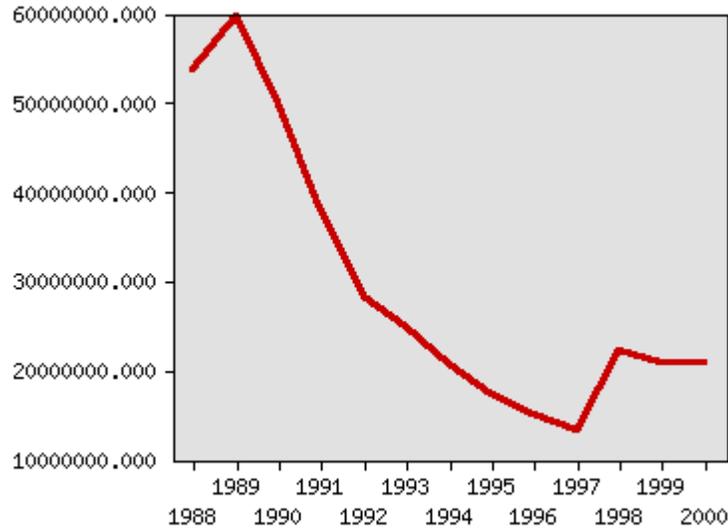
## INDICATOR 6 2 : TOXIC CHEMICALS

**Goal:** *Minnesotans will conserve natural resources to give future generations a healthy environment and a strong economy.* Continued prosperity and community well-being depend on conserving and maintaining the natural systems that are the base for economic activity.

**Rationale:** Toxic chemicals released into Minnesota's environment harm natural systems and human health, and are expensive to clean up.

**Pounds of toxic chemicals released, in millions**

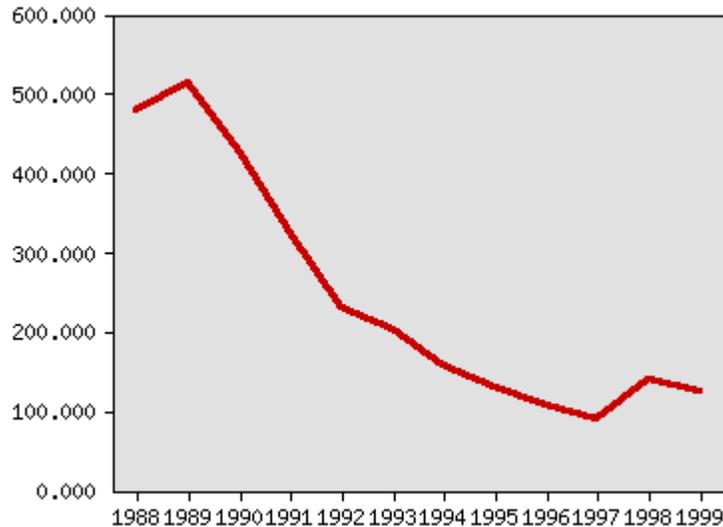
Year	
1988	53,681,994
1989	59,555,150
1990	49,760,153
1991	38,076,857
1992	28,275,519
1993	24,738,651
1994	20,540,910
1995	17,341,712
1996	15,112,852
1997	13,284,425
1998	22,109,152
1999	20,804,335
2000	20,931,166



**Data source:** Minnesota Department of Public Safety

**Pounds of toxic chemicals released per \$1 million Gross State Product**

Year	
1988	477.3
1989	514.0
1990	426.6
1991	325.7
1992	230.4
1993	200.9
1994	157.8
1995	129.6
1996	106.8
1997	88.3
1998	139.5
1999	124.5



**Data source:** Minnesota Department of Public Safety

**About this indicator:** Reported releases of toxic chemicals in Minnesota have declined from nearly 54 million pounds in 1988 to 21 million pounds released in 2000. The number of pounds released per \$1 million of gross state product dropped from 477 pounds to 124 pounds between 1988 and 1999.

The dramatic improvement in reported toxic releases means that much smaller quantities of toxic chemicals are released directly into the air, land and water, including legally allowed releases and reported spills. However, this does not necessarily mean that there are fewer toxins in the environment. The toxic chemicals reported as released in Minnesota make up only a small portion of the total amount manufactured, handled and used. Most of the chemicals handled at facilities that must report their use are disposed of through accepted methods.

Facilities are required by federal law to use the best available data for their reporting, but the accuracy of the reported data is unknown since it can be based on both actual measurements and estimates. Still, the Toxic Release Inventory is the best public information available on toxic chemicals.

**For comparison:** Reported toxic releases for the United States totaled almost 8 billion pounds in 1999. Minnesota ranked 35th lowest in the nation for total on-site releases, while Wisconsin and Iowa ranked 29th and 30th respectively. Wisconsin generated 268 pounds and Iowa 516 pounds per \$1 million of gross state product, compared to Minnesota's 164 pounds in 1999.

**Things to think about:** Persistent organic pollutants, also called persistent bioaccumulative toxins, are mostly human-made chemicals that do not break down in the environment and can accumulate in living organisms, including fish, birds and humans. In December 2000, the United States was among 122 nations that negotiated the first worldwide treaty on persistent organic pollutants. If ratified, the agreement will impose worldwide bans or controls on a dozen such pollutants including nine pesticides (aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex and toxaphene) and three chemical families (PCBs, dioxins, and furans). Over 50,000 synthetic organic chemicals are in regular use around the world and roughly a thousand new chemicals enter the marketplace each year.

**Technical notes:** This indicator relies on the U.S. Environmental Protection Agency's Toxic Release Inventory, which covers 650 chemicals. It covers reported releases into the air and water, on-site land disposal and transfers of heavy metals to public sewage plants. The data is reported by 400 of the largest manufacturing and some non-manufacturing facilities in Minnesota. It does not include chemicals that are transferred off-site because some of those go out of the state and are difficult to track. Because the current reporting requirements apply only to industrial sources, this indicator also omits sources of toxic chemicals from transportation, farming and households.

Differences from the figures reported in *Minnesota Milestones 1998* are due to the U.S. Environmental Protection Agency's revised Toxic Release Inventory data and revised figures for Minnesota's gross state product. The numbers for the year 2000 differ from 1998 because the 2000 figures reflect only a core set of chemicals that the U.S. Environmental Protection Agency has consistently required facilities to report since 1988.

In 2000, the Environmental Protection Agency for the first time added to the Toxic Release Inventory, or lowered the reporting threshold for, a number of persistent bioaccumulative chemicals and chemical families. These are chemicals such as mercury and dioxin that do not break down in nature, or break down very slowly. Future *Minnesota Milestones* updates may include this data when there are several years of data available to analyze. No gross state product data was available for 2000, thus pounds per \$1 million of gross state product could not be computed.

#### **Sources:**

- Minnesota Emergency Response Commission, *2000 Right-To-Know Chemical Information Report*, November 2001, [www.erc.state.mn.us](http://www.erc.state.mn.us)

- U.S. Environmental Protection Agency, [www.epa.gov/tri](http://www.epa.gov/tri)
  - International Institute for Sustainable Development, [www.iisd.ca/linkages/chemical/pops5/](http://www.iisd.ca/linkages/chemical/pops5/)  
[www.iisd.org/pcdf/meadows/POPs.html](http://www.iisd.org/pcdf/meadows/POPs.html)
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## INDICATOR 6 3 : URBAN AIR POLLUTION

**Goal:** *Minnesotans will improve the quality of the air, water and earth.* Continuously improving the health of Minnesota's natural systems not only ensures continued access to the raw materials that fuel Minnesota's economy, but also protects the irreplaceable roles of healthy natural systems, such as flood and pest control, moderation of the climate and pollination of crops.

**Rationale:** Air pollution in the Twin Cities metropolitan area, Minnesota's most urbanized region, is one indicator of the state's air quality.

**About this indicator:** The Twin Cities area has seen dramatic improvement in the number of days above "moderate" levels for six monitored air pollutants. From 1990 to 2000, the frequency dropped from 205 days to 38 days, an 82 percent reduction. The six pollutants are carbon monoxide, nitrogen dioxide, sulfur dioxide, volatile organic compounds, lead and dust. This indicator is based on the Air Pollutant Standards Index developed by the U.S. Environmental Protection Agency to provide a simple, uniform way to report daily air pollution concentrations. It does not measure whether certain combinations of pollutants occur.

A downward trend in the six criteria pollutants suggests that regulation and pollution prevention efforts, including reduced emissions in newer cars, have produced significant gains in urban air quality, even while the state's economy and population have grown. Minnesota's vehicle emissions testing program, which ended in 1999, may also have contributed to the emissions reductions.

**For comparison:** The U.S. Environmental Protection Agency collects national air quality data but uses a different method, making comparisons difficult. Air quality in the Twin Cities region is better than in many other urban areas in the United States. Minnesota's relatively flat terrain and exposure to rapidly moving weather systems allows wind to disperse and carry away air pollution. Also, industry is less concentrated here than in some U.S. cities.

**Things to think about:** Weather patterns can cause large variations in pollution levels in a single year. For example, hot, dry weather increased the levels of dust and ozone in 1994.

Hundreds of airborne chemicals remain unregulated, including most toxic chemicals and greenhouse gases such as carbon dioxide.

**Technical notes:** This indicator is based on data collected Monday through Friday in the Twin Cities metropolitan area. A moderate level of pollution is reported if any one of the six criteria pollutants exceeds half the federal standard. The data does not differentiate days when more than one pollutant reaches moderate levels from days when only one pollutant does. Data from the 1998 edition of *Minnesota Milestones* differ somewhat from data presented here because of revisions by the Minnesota Pollution Control Agency. In addition, the agency's reports formerly covered the state's four largest urban areas, but now cover all six of these pollutants only for the Twin Cities area. There are not enough monitoring stations in Rochester, St. Cloud and Duluth to calculate the Air Pollutant Standards Index in those cities.

**Sources:**

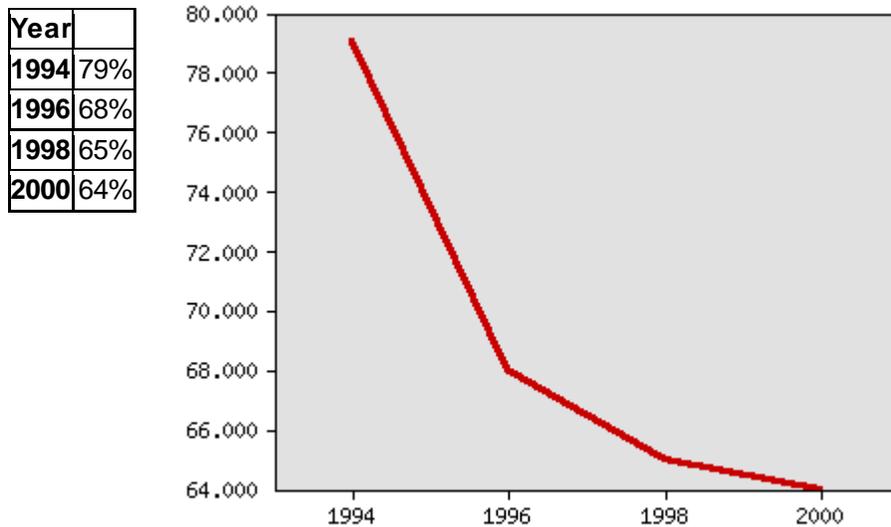
- Minnesota Pollution Control Agency, [www.pca.state.mn.us](http://www.pca.state.mn.us)
- U.S. Environmental Protection Agency, [www.epa.gov/oar/aqtrnd98](http://www.epa.gov/oar/aqtrnd98)
- Metropolitan Council, [www.metrocouncil.org/Region/ri104.htm](http://www.metrocouncil.org/Region/ri104.htm)

**INDICATOR 6 4 : WATER QUALITY IN LAKES AND RIVERS**

**Goal:** *Minnesotans will improve the quality of the air, water and earth.* Continuously improving the health of Minnesota's natural systems not only ensures continued access to the raw materials that fuel Minnesota's economy, but also protects the irreplaceable roles of healthy natural systems, such as flood and pest control, moderation of the climate and pollination of crops.

**Rationale:** The suitability of Minnesota's lakes, rivers and streams for swimming and aquatic life is a good indicator of water quality.

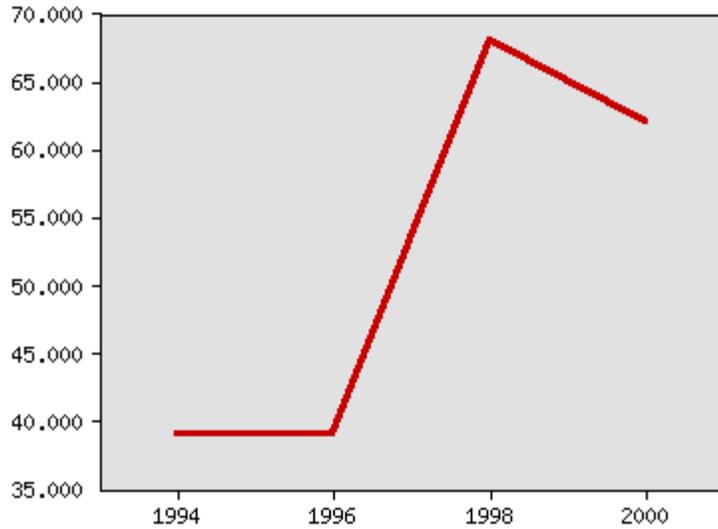
**Percentage of monitored lakes acres suitable for swimming**



**Data source:** Minnesota Pollution Control Agency

**Percentage of monitored river miles suitable for swimming**

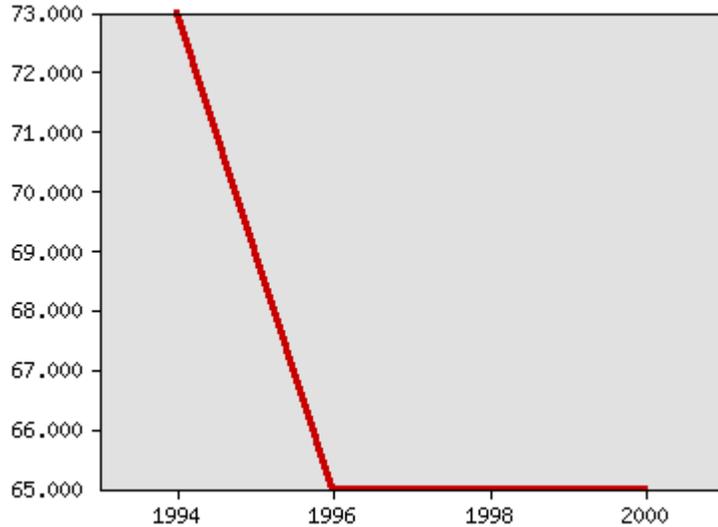
Year	
1994	39%
1996	39%
1998	68%
2000	62%



**Data source:** Minnesota Pollution Control Agency

#### Percentage of monitored river miles supporting aquatic life

Year	
1994	73%
1996	65%
1998	65%
2000	65%



**Data source:** Minnesota Pollution Control Agency

**About this indicator:** Of the sampling of lakes and rivers that are monitored, more lake acres became unswimmable, fewer river miles supported aquatic life, but more river miles became suitable for swimming between 1994 and 2000. Defining a body of water as swimmable is based largely on the presence of fecal coliform and E-coli bacteria, while suitability for aquatic life is based on the presence of toxins (such as ammonia, chlorine and heavy metals), water clarity and the availability of oxygen in the water.

The percentage of monitored lake acres suitable for swimming slipped from 79 percent in 1994 to 64 percent in 2000. The percentage of monitored river miles supporting aquatic life dropped from 73 percent to 65 percent during the same six years. However, the percentage of monitored river miles suitable for swimming rose from a low of 39 percent in 1994 to 62 percent in 2000.

**Things to think about:** The 1972 federal Water Pollution Control Act set a goal of ensuring that U.S. waters are "swimmable" and "fishable." Minnesota has made progress in controlling end-of-pipe discharges from wastewater treatment plants and industrial plants. However, the challenges posed by sources of pollution such as water runoff from cities and agricultural areas are increasing.

**Technical notes:** In 2000, the most recent year for which data is available, the figures are based on monitoring 53 percent of lake acres and 1.12 percent of river miles for their swimmability, and not quite five percent of river miles for their ability to support aquatic life. The Minnesota Pollution Control Agency reports its findings on about one-third of Minnesota's 10 watersheds every two years.

**Sources:**

- Minnesota Pollution Control Agency, [www.pca.state.mn.us](http://www.pca.state.mn.us)
- U.S. Environmental Protection Agency, [www.epa.gov](http://www.epa.gov)

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## INDICATOR 6 5 : NITRATE IN GROUND WATER

**Goal:** *Minnesotans will improve the quality of the air, water and earth.* Continuously improving the health of Minnesota's natural systems not only ensures continued access to the raw materials that fuel Minnesota's economy, but also protects the irreplaceable roles of healthy natural systems, such as flood and pest control, moderation of the climate and pollination of crops.

**Rationale:** Ground water is a vital source of drinking water for more than 75 percent of Minnesotans and 98 percent of the state's nearly 1,000 community water systems.

**About this indicator:** Less than half a percent of public water supply systems in Minnesota had average nitrate-nitrogen concentrations above the drinking water standard during a two-year period from 1999 to 2000. The U.S. Environmental Protection Agency has established a public drinking water standard for nitrate-nitrogen (nitrate) concentrations at 10 parts per million (ppm). Nitrate in water poses a health threat, especially to infants, and is used nationally as an indicator of overall water quality. Many experts consider nitrate levels above one part per million to be a sign of human influence on water quality. Sources of nitrate include fertilizer, crop residue, manure, septic systems and deposits from the atmosphere.

Twenty-eight public water supply systems, or less than half a percent of Minnesota's 8,121 public water supply systems, had average nitrate-nitrogen concentrations above the drinking water standard in 1999-2000. Public water supply systems include both community and non-community systems. Community systems supply drinking water for more than 15 connections or 25 residents year-round. Non-community water systems, such as for schools, factories, hospitals, restaurants, and the like serve at least 15 connections used by people other than year-round residents for 60 days a year or 25 or more people for at least 60 days a year.

Nearly one-fourth of Minnesota's population relies on private wells as a primary source of drinking water. Local water quality databases, developed by counties such as Nicollet, Brown, and Cottonwood in the southwestern part of the state, indicate that the statewide database for public water supply wells does not accurately reflect nitrate-nitrogen concentrations for private water wells. This is because wells installed by the homeowner (such as sand points), those installed before the state well code went into effect in 1974, and hand-dug wells with large diameters are not included in statewide databases. According to data from these counties, about 5 percent of the private wells in Nicollet County, 12 percent of the private wells in Brown County, and 27 percent of the private wells in Cottonwood County have average nitrate-nitrogen concentrations above the drinking water standard of 10 parts per million. However, if wells of questionable construction (i.e., wells less than 50 feet in depth and with diameters 10 inches or greater) are excluded, the percentage of unacceptable nitrate-nitrogen concentrations drops to 3 percent for Nicollet and Brown counties and to 11 percent for Cottonwood County.

**Things to think about:** The data from Nicollet, Brown and Cottonwood counties suggest the value of localized water quality tracking. Data from the three counties also provides evidence that Minnesota's well construction code is effective, since wells that do not meet code requirements are responsible for most of the problems.

Nitrate contamination is more frequent in wells that are poorly constructed or sited. In addition, some areas are more susceptible to nitrate contamination because geologic conditions, such as sandy soil, allow nitrate to seep into the ground more easily or the chemical makeup of the groundwater does not break down nitrate.

**Technical notes:** This indicator was calculated for public water supply systems where the average nitrate-nitrogen concentrations for all the wells for each system were fairly consistent (within one standard deviation). Results for 440 public water supply systems were excluded because the results were not as consistent between sampling events or because the system used various wells with diverse water quality. Eight of the 28 public water supply systems with average nitrate results above the drinking water standard are no longer active. None of these 28 public water supply systems are community systems.

**Sources:**

- U.S. Bureau of the Census, [www.census.gov](http://www.census.gov)
- U.S. Environmental Protection Agency, Safe Drinking Water Information System, federal version, [www.epa.gov/safewater/data/getdata.html](http://www.epa.gov/safewater/data/getdata.html).

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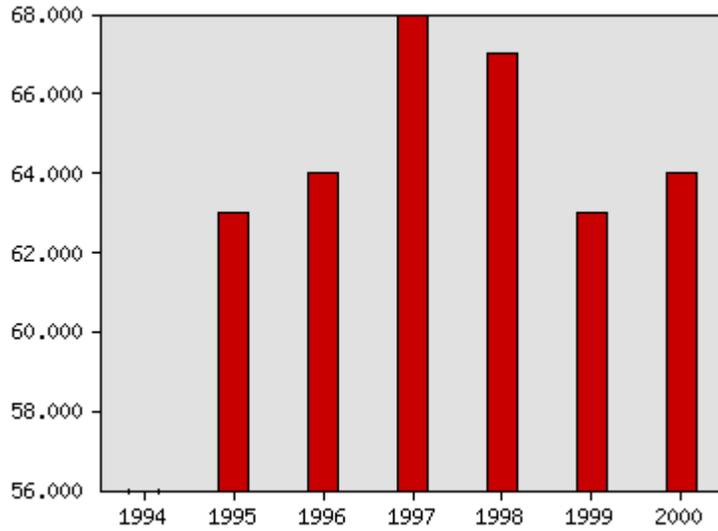
## INDICATOR 6 7 : WILDLIFE HABITAT

**Goal:** *Minnesotans will restore and maintain healthy ecosystems that support diverse plants and wildlife.* This goal expresses the importance of lakes, wetlands, wildlife, prairies and forests to Minnesota's quality of life. It also recognizes that healthy ecosystems serve many environmental, social and economic purposes, from maintaining abundant plant, animal and fish life to sustaining a vibrant tourism industry.

**Rationale:** Tracking changes in the population of "indicator species" is a good measure of how other birds, plants and animals in the same type of habitat may be doing.

**Percentage of surveyed lakes that have adult loons**

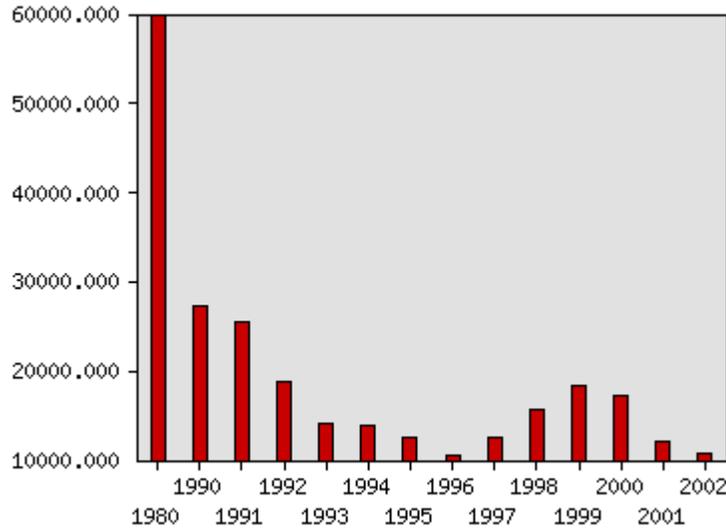
Year	
1994	56%
1995	63%
1996	64%
1997	68%
1998	67%
1999	63%
2000	64%



Data source: Minnesota Department of Natural Resources

**Population of sharp-tailed grouse**

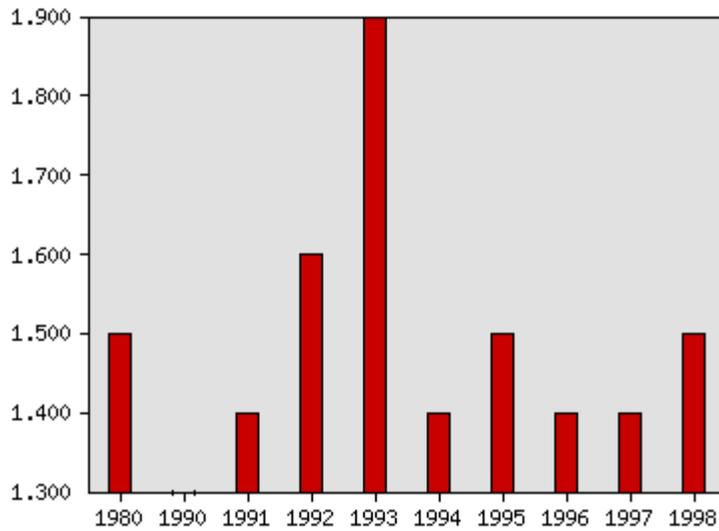
Year	
1980	60,000.0
1990	27,400.0
1991	25,600.0
1992	18,900.0
1993	14,100.0
1994	13,800.0
1995	12,500.0
1996	10,500.0
1997	12,500.0
1998	15,800.0
1999	18,300.0
2000	17,300.0
2001	12,200.0
2002	10,700.0



Data source: Minnesota Department of Natural Resources

**Index of abundance for the black-throated green wabler**

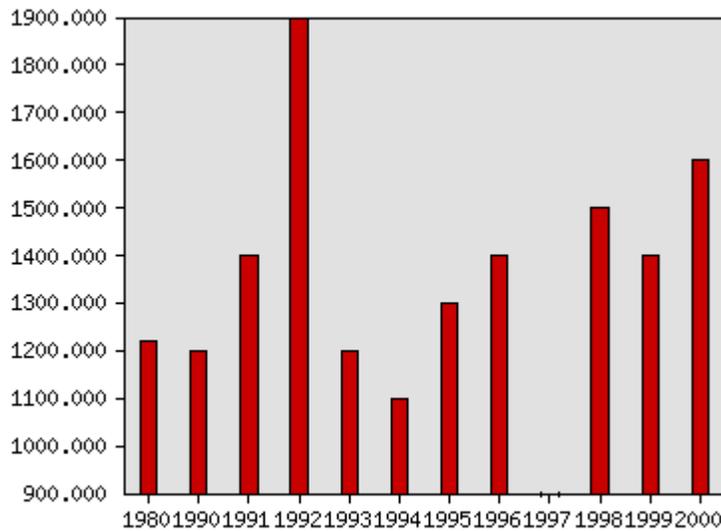
Year	
1980	1.5
1990	1.3
1991	1.4
1992	1.6
1993	1.9
1994	1.4
1995	1.5
1996	1.4
1997	1.4
1998	1.5



Data source: U.S. Geological Survey

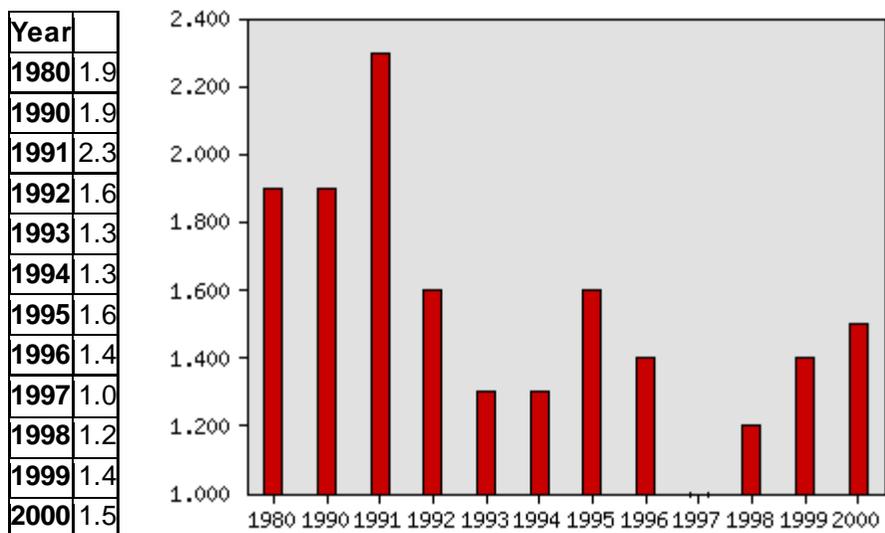
### Male prairie chicken population

Year	
1980	1,220.0
1990	1,200.0
1991	1,400.0
1992	1,900.0
1993	1,200.0
1994	1,100.0
1995	1,300.0
1996	1,400.0
1997	900.0
1998	1,500.0
1999	1,400.0
2000	1,600.0



Data source: Minnesota Department of Natural Resources

### Estimated fall pheasant population



**Data source:** Minnesota Department of Natural Resources

**About this indicator:** Trends in the five habitat types show mixed results. Loons and prairie chickens appear to be more plentiful while sharp-tailed grouse and pheasant have decreased, with the black-throated green warbler population remaining stable.

These birds are considered indicators of the overall health of their usual habitat. Although a single species cannot fully represent all other life in the same habitat, it can indicate the general health of an ecosystem and thus give some insight into how other birds, plants and animals in the habitat may be faring. The population estimates presented here are based on different monitoring techniques for each species, and are subject to some margin of error. In addition, some caution is warranted when evaluating these trends, since some population change arises from natural population cycles and changing weather conditions.

**Lakes:** The percentage of surveyed lakes that have adult loons rose from 56 percent in 1994 to 64 percent in 2000, with a peak of 68 percent in 1997. Although loon populations appear to be on the rise, loons live for 25 to 30 years, so the effects of any habitat changes may take years to show up in population trends. Loons are a good indicator because they are at the top of their food chain. They eat fish that in turn have eaten smaller aquatic organisms. As a result, loons are exposed to higher concentrations of toxins such as mercury.

**Brush land:** The number of sharp-tailed grouse in spring in northwest and east-central Minnesota dropped from 60,000 in 1980 to 12,200 in 2001, with the sharpest drop occurring during the 1980s. The population rebounded between 1998 and 1999, but by 2001 had fallen back below its 1997 level. Brush land has grass, shrubs and young trees. The 80 percent drop in sharp-tailed grouse reflects a heavy loss of brush lands, which provide habitat for many species. Brush lands have historically been maintained by wildfires; control of fires has allowed much brush land to mature into forest.

**Forests:** The population of the black-throated green warbler is relatively stable. The “index of abundance” for this species rose from 1.5 in 1980 to a high of 1.9 in 1993, dropping back to 1.5 by 1998. Warblers nest in mature, mixed forests of conifer and deciduous trees.

Prairie: The male prairie chicken population in spring rose from an estimated 1,220 in 1980 to 1,600 in 2000, with a low of 900 in 1997. The population of prairie chickens is considered relatively stable, given normal fluctuation. The drop between 1996 and 1997 reflects a severe winter. This population reflects the amount and health of native prairie and other grassland.

Farmland: The estimated fall pheasant population in Minnesota's central and southern counties fell 27 percent between 1980 and 1999, from 1.9 million to 1.4 million, rebounding from a low of 1.0 million in 1997. The federal Conservation Reserve Program has led to the conversion of 1.6 million acres of former cropland into grassland since 1988. Grasslands are considered a better habitat for pheasants than cropland. Increases in the number of acres enrolled in the program during the late 1990s may have contributed to the rise in the pheasant population since 1997.

**Things to think about:** Species diversity and ecosystem health is not just an environmental concern. Research published in the journal *Nature* has estimated that the economic value of ecosystem services, such as cleaning the air and breaking down wastes, is in the range of \$33 trillion worldwide, or about 1.8 times the current global gross national product.

**Technical notes:** Loon data is collected by volunteer observers on the same lakes each year and reported to the Department of Natural Resources. The Department of Natural Resources estimates sharp-tailed grouse numbers based on spring counts at selected breeding sites in their northwest and east-central range and from hunting data. Prairie chickens are surveyed when they gather at traditional breeding sites and the numbers are averaged. Pheasant populations are estimated using surveys along selected roadsides in August (birds seen per 100 miles) and from hunting data. Because songbirds are difficult to count, numbers for the black-throated green warbler are based on an index of abundance, which estimates the number of warblers heard in 50 three-minute counts along specific routes on an early June morning.

**Sources:**

- Minnesota Board of Soil and Water Resources, *Conservation Reserve Enhancement Program Fact Sheet*, January 17, 2002, [www.bwsr.state.mn.us/easements/crep/factsheet.html](http://www.bwsr.state.mn.us/easements/crep/factsheet.html)
- Minnesota Department of Natural Resources: [www.dnr.state.mn.us](http://www.dnr.state.mn.us)
- Minnesota Natural Resources Conservation Service, USDA: [www.mn.nrcs.usda.gov](http://www.mn.nrcs.usda.gov)
- North American Breeding Bird Survey: [www.mbr.nbs.gov/bbs/bbs.html](http://www.mbr.nbs.gov/bbs/bbs.html)
- *Nature*, "The value of the world's ecosystem services and natural capital," Vol. 387, pp. 253-260, 1997 [www.nature.com/nature](http://www.nature.com/nature)

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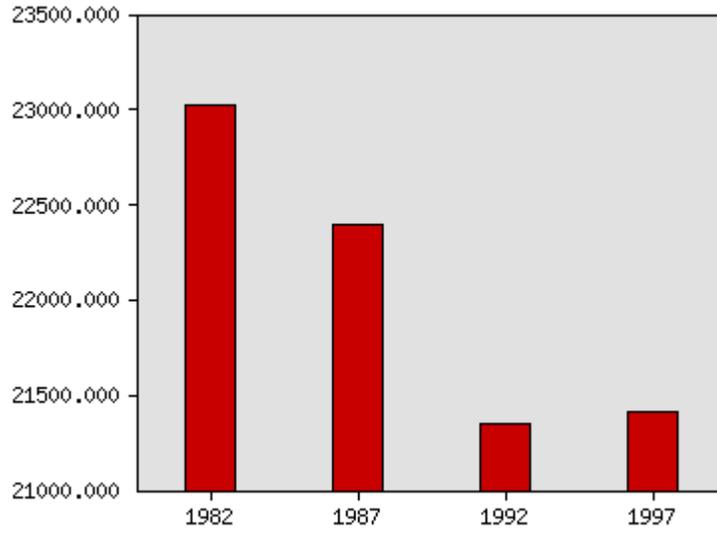
## INDICATOR 6 8 : CHANGES IN LAND USE

**Goal:** *Minnesotans will restore and maintain healthy ecosystems that support diverse plants and wildlife.* This goal expresses the importance of lakes, wetlands, wildlife, prairies and forests to Minnesota's quality of life. It also recognizes that healthy ecosystems serve many environmental, social and economic purposes, from maintaining abundant plant, animal and fish life to sustaining a vibrant tourism industry.

**Rationale:** Shifts in land use give an indication of how the diversity of habitats is changing.

**Minnesota land use, cropland (thousands of acres)**

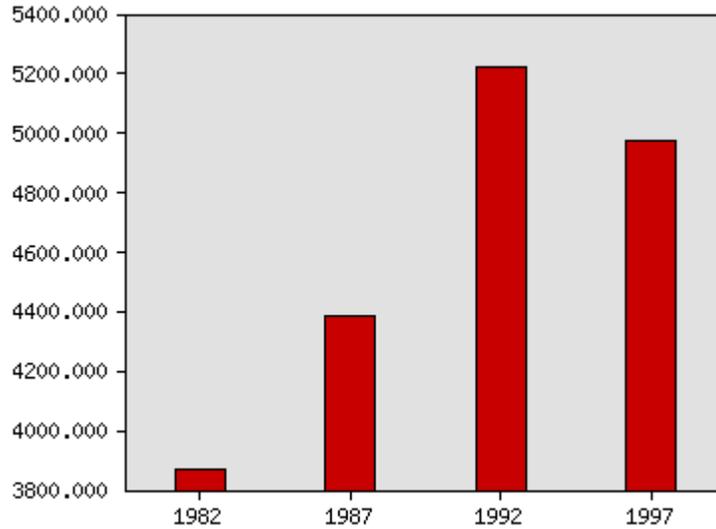
Year	
1982	23,025
1987	22,395
1992	21,355
1997	21,414



Data source: U.S. Department of Agriculture

**Minnesota land use, grassland (thousands of acres)**

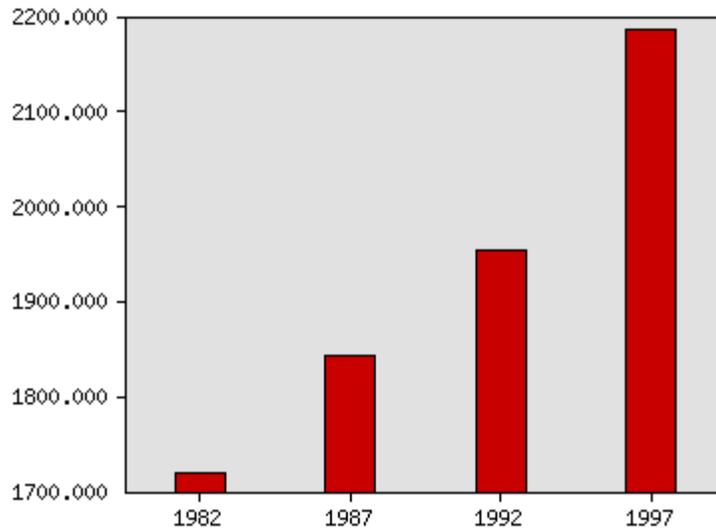
Year	
1982	3,873
1987	4,386
1992	5,225
1997	4,978



Data source: U.S. Department of Agriculture

**Minnesota land use, urban (thousands of acres)**

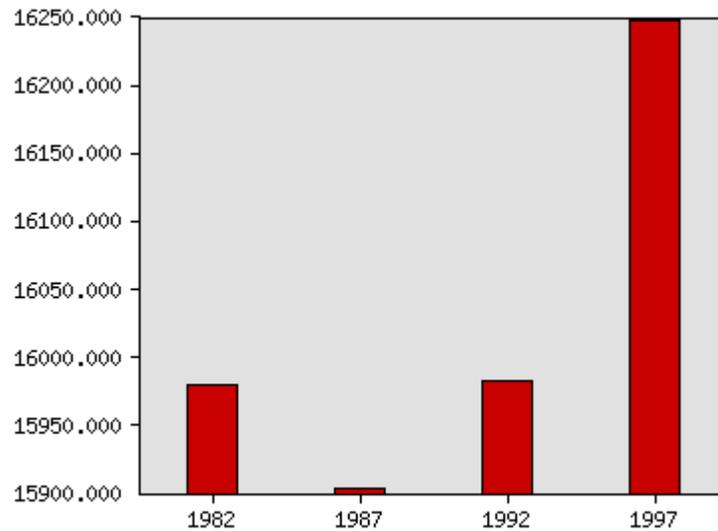
Year	
1982	1,720
1987	1,843
1992	1,954
1997	2,186



Data source: U.S. Department of Agriculture

#### Minnesota land use, forest (thousands of acres)

Year	
1982	15,980
1987	15,903
1992	15,983
1997	16,248



Data source: U.S. Department of Agriculture

**About this indicator:** Trends from 1982 to 1997 show a slight net increase in forest land, a significant rise in both grassland and urban land, and a modest decline in cropland. Forest land increased from 16.0 million acres in 1982 to 16.2 million acres in 1997, an increase of just under 2 percent. Grassland increased from 3.9 million to 5.0 million acres, a 29 percent rise, and urban land climbed from 1.7 million to 2.2 million acres, up 27 percent, while Minnesota's population rose roughly 14 percent. Some of the increase in grassland, as well as a 7 percent decrease in cropland, can be attributed to shifting cropland into the Conservation Reserve Program.

**For comparison:** Minnesota's land use changes somewhat mirrored national trends, with forest land in the U.S. increasing by 1 percent, grassland rising 15 percent and urban areas expanding by 34 percent. Only cropland declined nationally, with a decrease of 11 percent.

**Things to think about:** Minnesota converted to urban use a total of 232,000 acres between 1992 and 1997, placing it 17th among the 50 states for its rate of development of non-federal land. During this same time period, Minnesota converted an average of 46,400 acres per year.

Although a relatively small percentage of Minnesota's land is urban, highly dispersed development patterns can fragment habitats into small, disconnected plots, and significantly affect ecosystems and the viability of species that depend on them.

**Technical notes:** The National Resources Inventory covers non-federal land in the United States - some 75 percent of the country's land area- and is conducted every five years by the USDA Natural Resources Conservation Service in cooperation with Iowa State University. The inventory is based on a sampling of 800,000 selected locations.

Figures may differ slightly from those reported in *Minnesota Milestones 1998* because in 1997 the U.S. Department of Agriculture updated its figures for previous years of the National Resources Inventory.

There is no figure for wetlands because the data for 2000 is not yet available. Adding up the total number of acres for all land uses will not match the total acres of land in Minnesota because wetlands are not only reported separately but also counted as part of several other land use categories, such as grasslands, cropland and forest land.

**Sources:**

- U.S. Department of Agriculture, National Resources Inventory, [www.nhq.nrcs.usda.gov/CCS/NRIr1se.html](http://www.nhq.nrcs.usda.gov/CCS/NRIr1se.html)

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## INDICATOR 6 9 : PARKLAND AND OPEN SPACE

**Goal:** *Minnesotans will have opportunities to enjoy the state's natural resources.* Preserving the state's natural heritage is important not only for preserving plant and animal life and sustaining the state's economy, but also for recreation and enjoyment.

**Rationale:** The amount of land in parks and open space reflects the deliberate setting aside of land for outdoor recreation and enjoyment of natural areas.

**About this indicator:** Parkland and open space increased, but did not keep pace with population growth. The amount of land in federal, state and regional parks, forests and wildlife refuges increased 1.8 percent, or by 213,000 acres, between 1991 and 2000. However, the number of acres per person declined from 2.6 in 1991 to 2.4 in 2000, an 8 percent drop. One implication of the state's population growing faster than public parks and open space is that existing facilities may become more crowded. Minnesota has 70 state parks and 57 state forests - one within 50 miles of any point in Minnesota.

**For comparison:** Although state parks represent only a fraction of the land included in this indicator, Minnesota ranks eighth in the nation in acres of state parkland per capita. The top seven states are Alaska, Wyoming, Vermont, South Dakota, New Hampshire, Colorado and New Mexico.

**Things to think about:** State parks receive about 8.5 million visitors annually, with day use accounting for most of the visits. About 20 percent of these visitors come from outside the state, and nonresidents spend more money than residents. According to research by the Minnesota Department of Natural Resources, day visitors to state parks spend an average of \$22 per day in nearby communities, and visitors who stay overnight spend about \$28.50 per day. This translates into more than \$196 million in visitor spending per year. According to the Minnesota Department of Trade and Economic Development, tourism of all kinds contributed \$8.3 billion to the state's economy in 1999.

**Technical notes:** City, county and private parklands are not included in this indicator, except for those in the Twin Cities region (such as Como Park) that are designated as regional parks. Per capita figures may differ slightly from those reported in *Minnesota Milestones 1998* due to changes in population estimates from the U.S. Census Bureau.

**Sources:**

- Minnesota Department of Natural Resources, [www.dnr.state.mn.us](http://www.dnr.state.mn.us)
- Metropolitan Council, [www.metrocouncil.org](http://www.metrocouncil.org)
- National Association of State Park Directors, [www.indiana.edu/~naspd/](http://www.indiana.edu/~naspd/)
- Minnesota Department of Trade and Economic Development, [www.dted.state.mn.us](http://www.dted.state.mn.us)

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## INDICATOR 7 0 : RECREATIONAL TRAILS

**Goal:** *Minnesotans will have opportunities to enjoy the state's natural resources.* Preserving the state's natural heritage is important not only for preserving plant and animal life and sustaining the state's economy, but also for recreation and enjoyment.

**Rationale:** Miles of recreational trails are a good indicator of access to Minnesota's parkland and open space.

**About this indicator:** Recreational trails expanded substantially between 1990 and 2001. Trail miles increased from 17,061 in 1997 to 21,322 in 2001, a rise of 25 percent. The increase reflects growing public interest in activities such as biking, inline skating, hiking, walking, nature observation, snowmobiling, horseback riding, skiing and other activities that trails make possible.

**Things to think about:** In July 2000, the Minnesota Department of Natural Resources issued the results of surveys conducted from 1996 to 1998 on nine representative trails. The report, *State Trail Use*, documents \$5 million per summer in spending by trail users. Eighty-three percent of this spending came from people who were away from home on a trip, although not necessarily from outside the state. Scenic touring is the second most popular activity for out-of-state visitors, behind shopping, according to the Minnesota Department of Trade and Economic Development.

**Technical notes:** Data for 1990-1996 includes county and privately administered trails, and is not directly comparable to data for 1997-2001, which includes only state-owned trails and locally sponsored trails developed with state grants.

**Sources:**

- Minnesota Department of Natural Resources, biennial budget reports, [www.dnr.state.mn.us](http://www.dnr.state.mn.us)
  - Minnesota Department of Natural Resources, *State Trail Use - Summary of Summer Trail Use and User Surveys Conducted in 1996, 1997 and 1998*, [www.dnr.state.mn.us](http://www.dnr.state.mn.us)
  - Minnesota Department of Trade and Economic Development, travel activities, [www.dted.state.mn.us](http://www.dted.state.mn.us)
-