



# Minnesota Environment and Energy Report Card

2019

**m** MINNESOTA

ENVIRONMENTAL QUALITY BOARD

# Introduction

The EQB's mission is to enhance Minnesota's environmental quality for current and future generations by leading interagency work to advance meaningful public engagement and facilitate informed decision-making on critical environmental issues. With the help of staff from several state agencies, the 2019 Minnesota Environment and Energy Report Card was prepared to provide a snapshot of Minnesota's environment, providing valuable information for the public and policy-makers.

The report focuses on five key areas of Minnesota's environment: climate, energy, air, water and land. Each section presents three metrics that help assess the state of the environment. Metrics either have a red, yellow, or green score depending on whether state goals for progress are being met. Metrics were selected through a Results Based Accountability process; and are the same indicators used in the 2017 report.

## Highlights

The 2017 report card set a baseline for energy and environmental metrics. The current report card shows mixed results. For many indicators, we continue to fall short of goals. Climate change, declining pheasant population, continued reliance on petroleum, nitrate in our groundwater, and a drop in public transit use are all issues that need creative collaboration to find solutions. There are positive highlights since the 2017 report card. Renewable electricity and household energy use are both metrics that changed from yellow to green in 2019 because the state has achieved 25% renewable electricity production and we continue to make energy efficiency improvements to our homes.

## Working Together

Minnesota enjoys abundant natural resources and high quality of life, but not all groups and communities share these benefits equally. Some Minnesotans are disproportionately affected by pollution, climate change, and other environmental challenges. Addressing disparities based on race, income, gender, health, and geography is critical for making progress on our statewide environmental goals.

The Environment and Energy Report Card is a living document. We hope that it will inspire new dialogue and forms of action. Tackling the complex issues in this report will require innovative approaches and cross-sector collaboration. The EQB invites you to attend our monthly meetings to learn more and join us in creating solutions. Together we can ensure a clean, healthy environment for all Minnesotans.

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Cover: Lake Nokomis, Minneapolis

# Report card

## Environment and energy in Minnesota

Tracking progress toward public expectations, state or national goals and established industry or agency benchmarks.

**GOOD** Ahead of goals and expectations.

**OKAY** Nearly meets goals and expectations.

**POOR** Well behind goals and expectations.

Metrics were chosen through extensive interagency dialogue and represent a collaborative effort to comprehensively evaluate our environment. The criteria are based on environmental and social data and were chosen to help tell a larger story about trends, challenges, and opportunities for action. In many cases, the metrics are tied to official state or federal goals.

Sources for data and information can be found here: [www.eqb.state.mn.us/content/2019-EE](http://www.eqb.state.mn.us/content/2019-EE).

### Climate



#### Heat and rainfall

Minnesota's climate is changing rapidly with more frequent extreme precipitation and increasing temperatures, especially in winter and at night.

Status

POOR

Trend



Problems are ahead

#### Greenhouse gas emissions

Despite success in the electricity generation sector, Minnesota is not on track to meet climate goals.

Status

POOR

Trend



Not much change

#### Climate change and wildlife

Populations of cisco — fish that walleye and trout rely on as a food source — are declining as temperatures rise.

Status

OKAY

Trend



Getting worse

### Energy



#### Renewable electricity

Minnesota achieved 25% renewable energy in 2018 and is on track to surpass its renewable electricity standard of 28.5% by 2025. The state has the potential to go much further.

Status

GOOD

Trend



On track

#### Household energy use

Minnesota homes are becoming more energy efficient, but increased use of air conditioners, appliances, and personal devices is driving up overall energy consumption.

Status

GOOD

Trend



Improving

#### Transportation fuel

Use of fossil fuels for transportation must decline steadily to achieve the state's greenhouse gas reduction goal. Instead, fossil fuel use has been flat or growing for the past six years.

Status

POOR

Trend



Problems are ahead

## Air



### Air pollution

Minnesota is meeting national air standards, but air quality is still periodically unhealthy for sensitive populations.

Status

GOOD

Trend



Improving

### Asthma

Asthma emergency room visits, which are linked to poor air quality, disproportionately impact communities of color and those living in poverty.

Status

OKAY

Trend



Not much change

### Transit

Public transit use is decreasing, and the Twin Cities metro is not meeting its ridership goals, and transit needs in the rest of the state are unmet.

Status

POOR

Trend



Getting worse

## Water



### Lakes and rivers

We have reduced pollution from sewers and industry in the last several decades. However, pollution from agriculture, lawns, and roads is increasingly found in our drinking water supplies, rivers, and lakes.

Status

OKAY

Trend



About the same

### Nitrate in water

Nitrate is one of the most common water pollutants in MN groundwater. In areas with vulnerable groundwater, wells are more likely to have elevated nitrate. Elevated nitrate in drinking water is a health hazard, especially for infants.

Status

POOR

Trend



About the same

### Sustainable water use

Minnesota is at risk of depleting its water supplies in several areas of the state. Sufficient water supply is vital to our public health, economy, and ecosystems.

Status

OKAY

Trend



About the same

## Land



### Pheasants

Recent declines in pheasant and other grassland bird populations reflect significant losses of prairie and grassland habitat.

Status

POOR

Trend



Getting worse

### Sprawl

Since 2002, the rate at which farmland, forest, wetlands, and wildlife habitat is converted into urban and suburban development has decreased.

Status

OKAY

Trend



On the right path

### Recycling

About one-third of our waste is still sent to landfills. More of this waste could be recycled.

Status

POOR

Trend



About the same

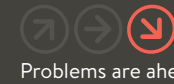
**Summary** Minnesota's climate is changing rapidly with more frequent extreme precipitation and increasing temperatures, especially in winter and at night.

**Status**

**POOR**

Moving the needle on climate change takes global coordination

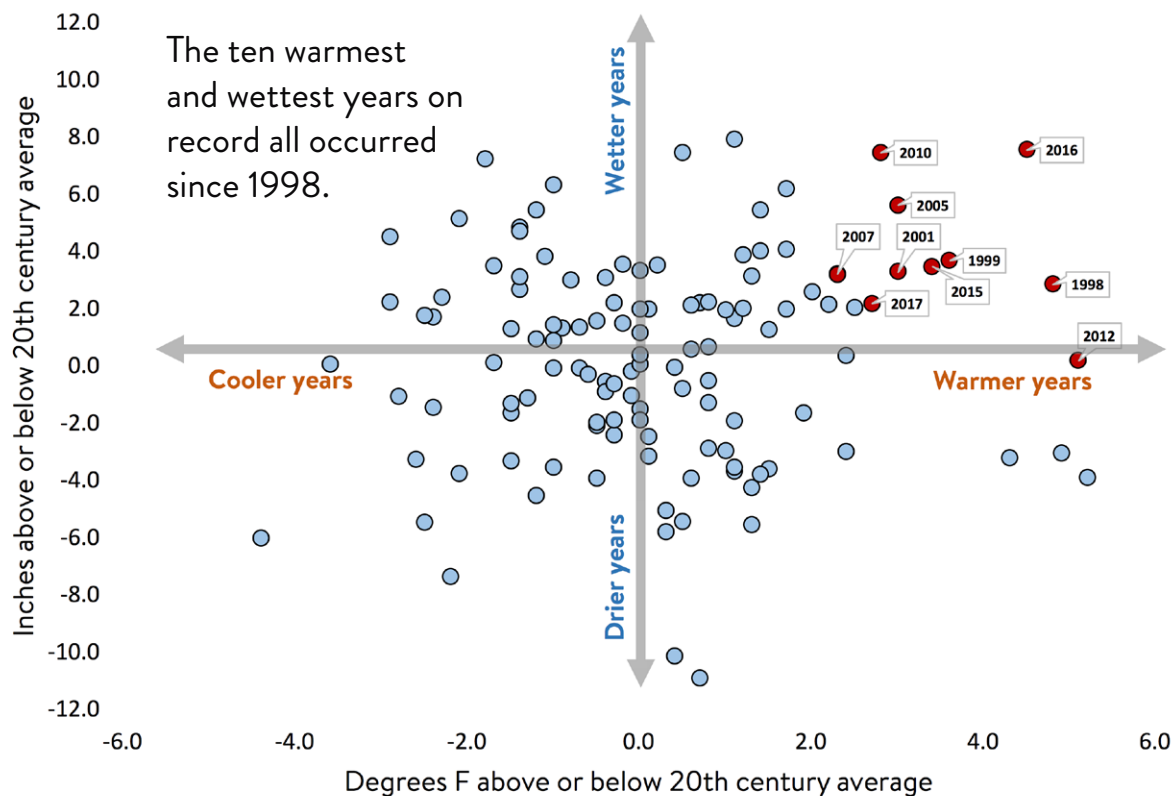
**Trend**



Problems are ahead

## Minnesota is warmer and wetter

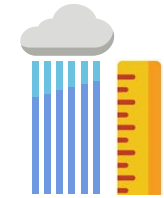
Minnesota's climate has become much warmer and wetter in the past several decades; the top ten warmest and wettest years since 1895 occurred between 1998 and 2017. Since 1970, nights have warmed 55% faster than days, and winter has warmed 13 times faster than summer. The frequency of -35F readings in northern Minnesota and -25F readings in the south have fallen by up to 90%. Minnesota is also experiencing more frequent and intense rainstorms than at any other time on record. The number of one-inch and three-inch rains, and the size of the heaviest annual rainfall have all increased dramatically.



## Heavy rains getting heavier and more common



20% increase in the number of 1-inch rains over past 100 years.



65% increase in the number of 3-inch rains over past 100 years.



Large-area "mega rains" four times more common after the year 2000, compared to the previous 30 years.

# 15.1

15.1 inch daily rainfall record set in Hokah, Minn., in 2007. It was 39% larger than the previous record.

## Heat stress

Warmer nights in summer can pose health risks to elderly people who lack air conditioning.



# Greenhouse gas emissions

**Summary** Despite success in the electricity generation sector, Minnesota is not on track to meet climate goals.

**Status** POOR We still put too much CO<sub>2</sub> in the air.

**Trend** → Not much change

**Goal** Reduce emissions 30% below 2005 levels by 2025, and 80% by 2050

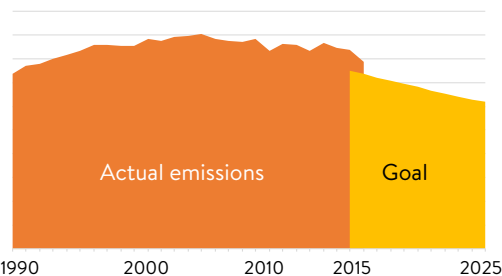
Minnesota's Next Generation Energy Act of 2007 calls for reducing annual GHG emissions by 80% between 2005 and 2050, with interim goals of 15% by 2015 and 30% by 2025. While we've made progress, achieving the 2050 goal will require much more aggressive state and federal policies. Fortunately, Minnesota is in a position to lead the efforts.

## Minnesota's GHG reductions

GHG emissions from power generation have fallen dramatically in Minnesota, so the state has started focusing on other reduction opportunities. For example, transportation is now the largest contributor to GHG emissions, so Minnesota is supporting efforts by utilities, auto manufacturers, and other partners to expand electric vehicle use. Money from Minnesota's share of the Volkswagen legal settlement is being used to create fast-charging electric vehicle corridors throughout Minnesota and to incentivize the purchase of heavy-duty hybrid and electric vehicles.

Individual Minnesotans, their communities, and our industries are working together to become more energy efficient, increase renewable energy production, and reduce our dependence on imported energy.

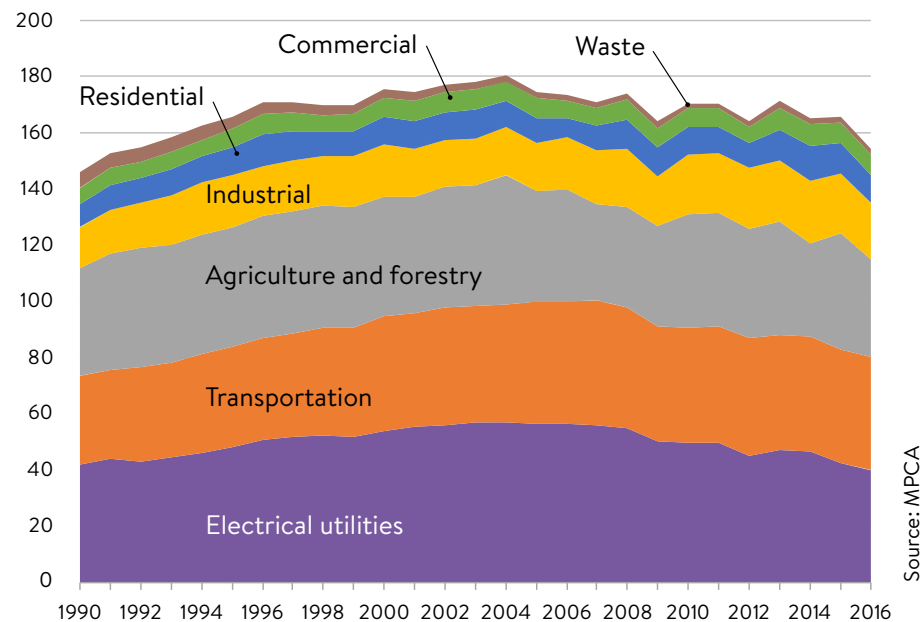
### Greenhouse gas emissions: Not on target to meet 2025 goal



**Leading by example** Minnesota state government has a goal of reducing greenhouse gases by **30%** by 2025. (Baseline year 2005)

## Some sectors improving, others worsening

Greenhouse gas emissions by sector Millions of tons of CO<sub>2</sub>-e



In 2016, the transportation sector surpassed electricity as the largest source of carbon dioxide emissions in Minnesota.

**Summary** Populations of cisco — fish that walleye and trout rely on as a food source — are declining as temperatures rise.

**Status**

OKAY

Warning from the bottom of the food chain.

**Trend**



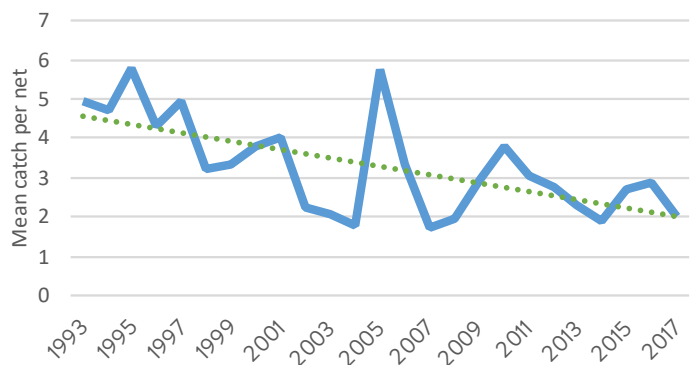
Getting worse

## Climate change driving population decline

Minnesota has about 650 cisco lakes, more than any other state in the lower 48. Many are prized by anglers because ciscoes (also known as tullibees, or lake herring in Lake Superior) provide a high-energy feast for walleye, northern pike, muskellunge, and lake trout.

Changes in land use and climate have led to declines in cisco populations in the past 30 years. Cisco fish can't tolerate warm water — 76 degrees is lethal and 54 degrees is optimal—so they need to stay deep in the warmer months. But in late summer when water near the surface is too warm, the water near the bottom has too little oxygen. Ciscoes become trapped in a narrow band — sometimes only a few feet — of habitat, which leads to die-offs.

### Cisco populations, an indicator of the health of other fish species, are declining



Source: MN DNR



**There's been a 57% decline in cisco populations between 1993 and 2017.**



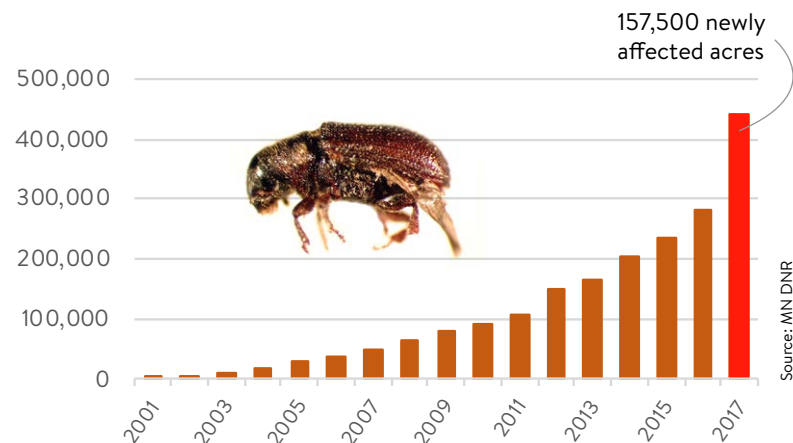
### Seeking refuge from the heat

DNR and UMN researchers have evaluated the 620 cisco lakes and identified 176 refuge lakes that are deep and clear enough to sustain ciscoes in a warming climate, if water quality is maintained. Preserving forested land can help maintain water quality in lakes with tullibees and other cold-water species.

## Eastern larch beetles march continues

The eastern larch beetle is taking advantage of longer summers related to climate change to reproduce twice each year rather than just once. The larger beetle population is killing more tamarack trees. As the forest composition changes, other forest wildlife feels the effects.

Accumulated acres affected by eastern larch beetles



Source: MN DNR

In just 17 years, the Eastern larch beetle has killed or damaged more than a third of the state's 1.25 million acres of tamarack.



U.S.F.S.

**Summary** Minnesota achieved 25% renewable energy in 2018 and is on track to surpass its renewable electricity standard of 28.5% by 2025. The state has the potential to go much further.

**Status**

**GOOD**

We can do more.

**Trend**



## Minnesota's cleaner electricity generation

Minnesota has no in-state fossil fuel but abundant renewable resources, including wind, solar, and biomass. The state passed a renewable electricity standard in 2007 requiring that 28.5% of the state's electricity use be generated with renewable resources by 2025.

In response to state policy, our electricity production has become cleaner at a pace faster than the nation as a whole. Minnesota was the 6th largest state solar market in 2017 and the 3rd largest non-residential market. Minnesota ranked 7th in the nation for the share of electricity generated from wind energy. Solar and wind energy costs are decreasing rapidly due to technology advances. Due to increases in efficient and renewable generation, electricity generation is now second to transportation for carbon emissions. As renewable resources are paired with an increasing number of electric vehicles, carbon emissions within the transportation sector will also be reduced.



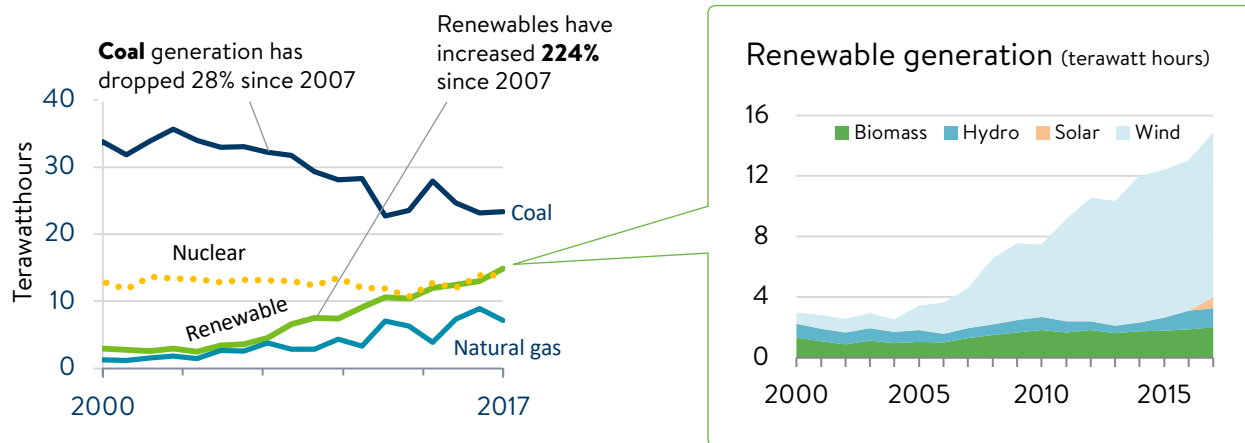
2017 solar industry economic activity in the state: **\$1 billion**

Minnesota can produce 10% of its electricity from solar by 2025 and 70% from solar and wind by 2050.

Source: Minnesota Solar Pathways, a DOE funded project



## Electricity generated in Minnesota: Renewables rising



Source: U.S. EIA

## Utilities aiming higher

Xcel Energy announced a goal to reduce CO2 emissions 80% below 2005 levels by 2030, and zero-carbon electricity by 2050, across all eight states it serves. In the Upper Midwest, Xcel Energy is targeting a generation mix that is 85% carbon-free by 2030, with about 60% coming from renewable and nuclear power supplying the remainder.

Minnesota Power met Minnesota's renewable electricity standard a decade early. By 2015, 26% of Minnesota Power's retail and wholesale electric sales were from renewable energy sources.



## Household energy use

**Summary** Minnesota homes are becoming more energy efficient, but increased use of air conditioning, appliances, and personal devices is driving up overall residential energy consumption.

**Status** **GOOD**

As a cold climate state, energy efficiency is critical.

**Trend**



Improving

### Minnesota homes are more efficient

More than 20% of the total energy used in Minnesota is consumed in our homes. Advances in heating and cooling systems, weatherization technology, and efficient lighting make newer and retrofitted homes more energy efficient. Appliances like refrigerators more than doubled in efficiency between 1987 and 2012. However, the prevalent use of new devices (tablets, smart phones, TVs, gaming consoles) is increasing overall household energy use. The graph at right shows the combined residential electric and natural gas consumption in comparison to gross domestic product and population growth.

Energy efficiency and conservation by homeowners can help cost-effectively reduce carbon emissions by reducing the use of fossil fuels to generate electricity and heat homes.



### Conservation success

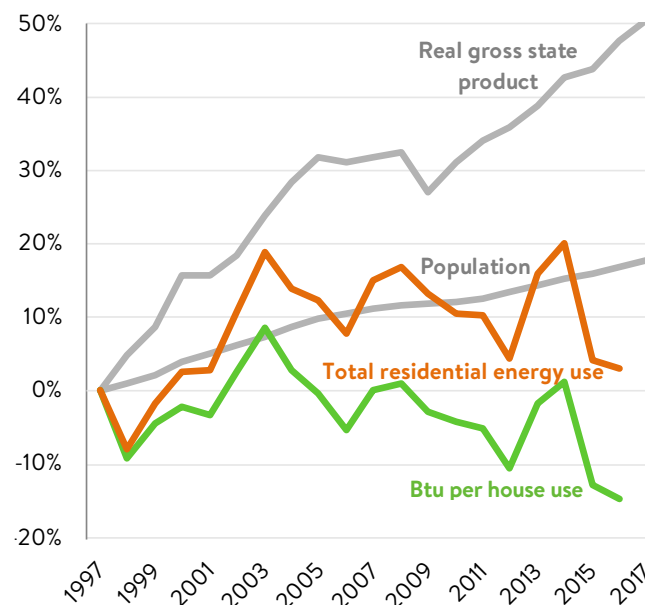
In 2007, a savings goal of a 1.5% per year decrease in electricity and a 1% decrease in natural gas sold was established within the Conservation Improvement Program. More than 130 Minnesota utilities provide technical assistance and financial incentives to their customers to help meet the goal.

Every \$1 spent on Conservation Improvement Programs returns \$4 to Minnesota's economy.



### Less energy used per household, but overall use is increasing

Percent change since 1997



BEA, MN State Demographer, EIA



### Leading by example

By 2027, Minnesota state government plans to reduce its energy use by **30%** of its 2017 consumption in state buildings.

**Summary** Use of fossil fuels for transportation must decline steadily to achieve the state’s greenhouse gas reduction goal. Instead fossil fuel use has been flat or growing for the past six years.

**Status** POOR Fuel use is increasing

**Trend** ↻ → ↘  
Problems are ahead

## Transportation priorities

Fuel use has been steadily increasing over the last few years – almost back to peak 2004 levels as low fuel prices have led many people to purchase less fuel efficient vehicles. Transportation fuel is used as an indicator of air pollution and carbon emissions from transportation. For decades, Minnesota policy and investment has emphasized automobile travel. Mass transit, walking, and biking are available at some level across the state, but additional investment is needed to make these viable travel options for all Minnesotans.

Reducing fossil fuel use in transportation is directly connected to achieving the state’s greenhouse gas reduction targets outlined in the 2007 Next Generation Energy Act, which calls for a 30% reduction in greenhouse gas emissions between 2005 and 2025.

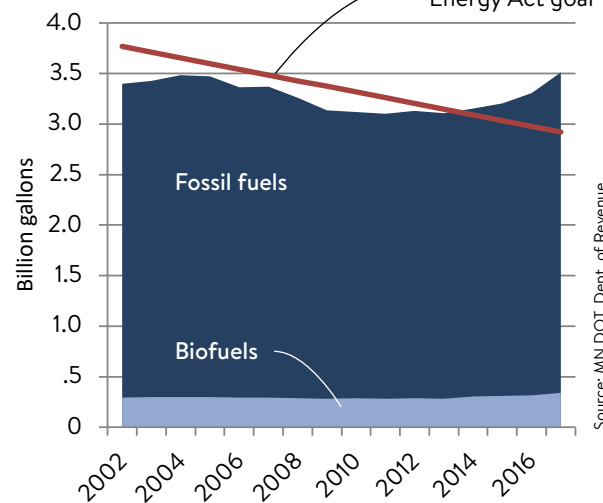
## Fuel economy standards

In August 2018 the federal administration proposed rolling back higher fuel economy standards for auto manufactures. The higher standards were put in place in 2011 so that more fuel efficient vehicles were available to American families. According to NHTSA, weakening these fuel economy standards is forecasted to reduce the nationwide fuel economy of each new vehicle by up to eight miles per gallon in 2025.

## Transportation fuel consumption

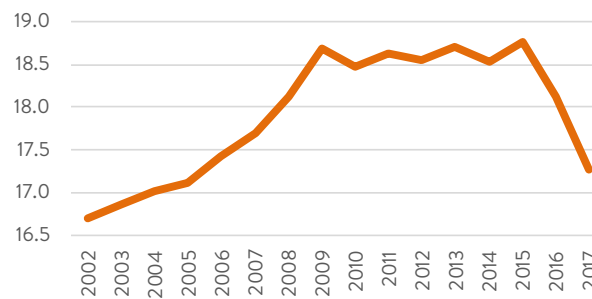
Heading upward again

Next Generation Energy Act goal



## Average miles per gallon (roadway)

After years of increasing, a reversal



Low fuel prices are influencing Minnesotans to buy SUV’s and trucks with larger carbon footprints.

## Leading by example

In 2017 state agencies reduced their fossil fuel consumption by **702,669 gallons** primarily by purchasing hybrids and electric vehicles.



## Tools for reducing transportation fuel use

- Promote electric vehicles.
- Support compact, energy-efficient development to reduce trip lengths and increase non-automobile trips.
- Investing in transit and active transportation infrastructure and operations.
- Reducing the carbon content of liquid fuels by supporting lower carbon biofuels.

**Summary** Minnesota is meeting national air standards, but air quality is still periodically unhealthy for sensitive populations.

**Status** GOOD Air is life.

**Trend** ↗ → ↘  
Improving

**Goal** Meet standards and improve air quality

## Tracking pollution

Minnesota's air currently meets all federal health standards. However, even air pollution at levels below those standards can affect people's health.

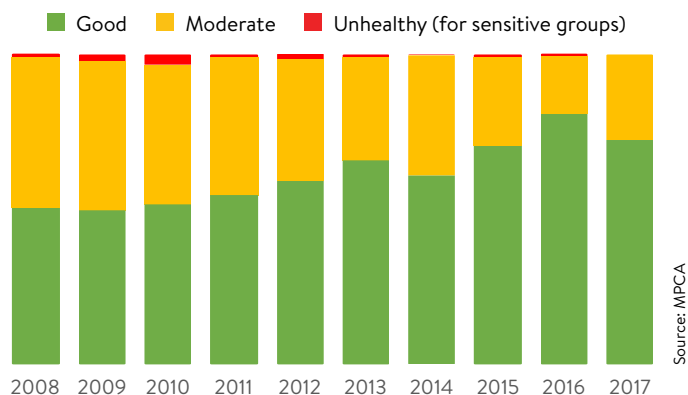
Minnesota's air quality is always changing due to weather patterns and can differ across the state. Wildfire smoke from other regions, ozone on hot summer days, and wintertime stagnation episodes are the most common recent causes of poor air quality in Minnesota. Air quality forecasts and alerts let the public know when they should take precautions to protect their health.

## Personal decisions

We make decisions every day that can negatively affect air quality, including driving, using gas-powered lawnmowers, and having backyard fires. Together, we can improve air quality by replacing car trips with riding mass transit, bicycling, and walking, and using electric or push mowers.

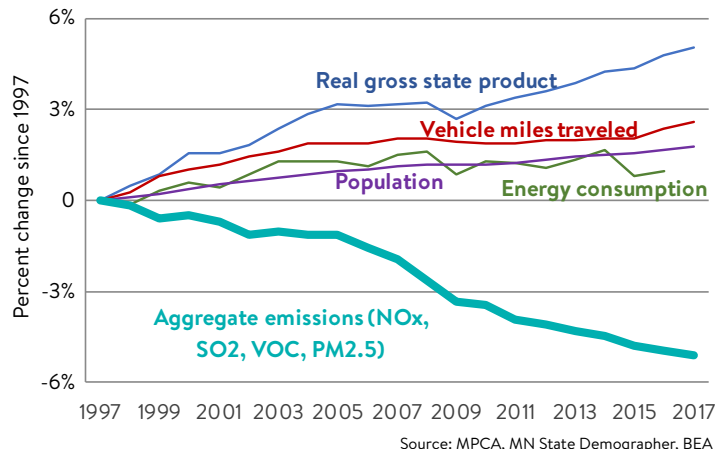
## More good days, less bad days

Proportion of days each year rated good in the Air Quality Index compared to poorer air quality days



## Air is improving despite more activity

Pollutants have dropped, even with more people, cars, and economic activity



When we breathe, pollution enters our lungs and bloodstream. Air pollution can cause coughing or itchy eyes, or, more significantly, worsen lung diseases and breathing, leading to hospitalizations, cancer, or even premature death.



## The high cost of air pollution

The Minnesota Pollution Control Agency estimates the economic impact of air pollution on health in Minnesota may exceed \$30 billion per year.

- Air pollution contributed to around 2,000 deaths per year in the Twin Cities metro area in 2008.
- Populations with higher rates of heart and lung disease, including people of color, the elderly, children with uncontrolled asthma, and people in poverty are most affected by air pollution.



**Summary** Asthma emergency room visits, which are linked to poor air quality, disproportionately impact communities of color, those living in poverty, and children.

**Status**

OKAY

Asthma inequities persist over time, despite overall gains.

**Trend**

Not much change

**Goal**

Reduce ER visits caused by poor air quality

## Air and health

Even levels of air pollution below federal standards can contribute to serious illness and early death. Asthma, a condition exacerbated by poor air quality, is one of the most common chronic diseases in the U.S. In Minnesota, one in 14 people has asthma. Asthma can be managed with tools such as an Asthma Action Plan, but thousands of Minnesotans visit the emergency room each year; **in 2016, 76 people in the state died due to asthma.**

## Some people more vulnerable

Breathing polluted air is not good for anyone, but people with preexisting conditions or uncontrolled asthma, children, the elderly, and people in particular communities are affected more than others. Children in the Twin Cities metro area go to the ER for asthma at a rate nearly twice that of children in Greater Minnesota. In some Minneapolis zip codes, asthma hospitalization rates for children are four times higher than the rest of the state. Poorer air quality in the metro area could be a contributing factor, and efforts to reduce air pollution are a critical part of addressing the disparities.

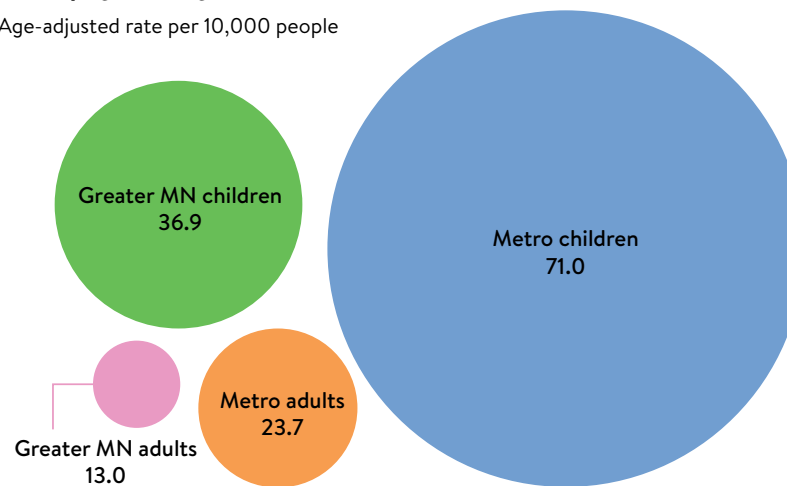
American Indian and African American middle/high school students are more likely than other students to have been diagnosed with asthma.

2016 Minnesota Student Survey

## Asthma: Where you live matters

### Minnesota rates of asthma emergency department visits by age and region, 2016

Age-adjusted rate per 10,000 people



Source: Minnesota Hospital Association, MDH

## Stats

- In Minnesota in 2016, 18,200 emergency department visits and 1,900 hospitalizations were for asthma.
- In 2014, asthma cost an estimated \$669 million, including \$615 million in direct medical expenses and \$54 million in lost work days.

## What can we do?

Improving air quality can provide significant public health benefits. If we reduce fine particles and ground-level ozone by 10% from 2008 levels, we can reduce the annual number of deaths, hospitalizations, and emergency room visits due to heart and lung conditions.



**Summary** Public transit use is decreasing, the Twin Cities metro is not meeting its ridership goals, and transit needs in the rest of the state are also unmet.

**Status** POOR Transit ridership growth is slowing

**Trend** ↻ → ↘  
Getting worse

**Goal** Double ridership between 2003 and 2030

**Transit and air quality**

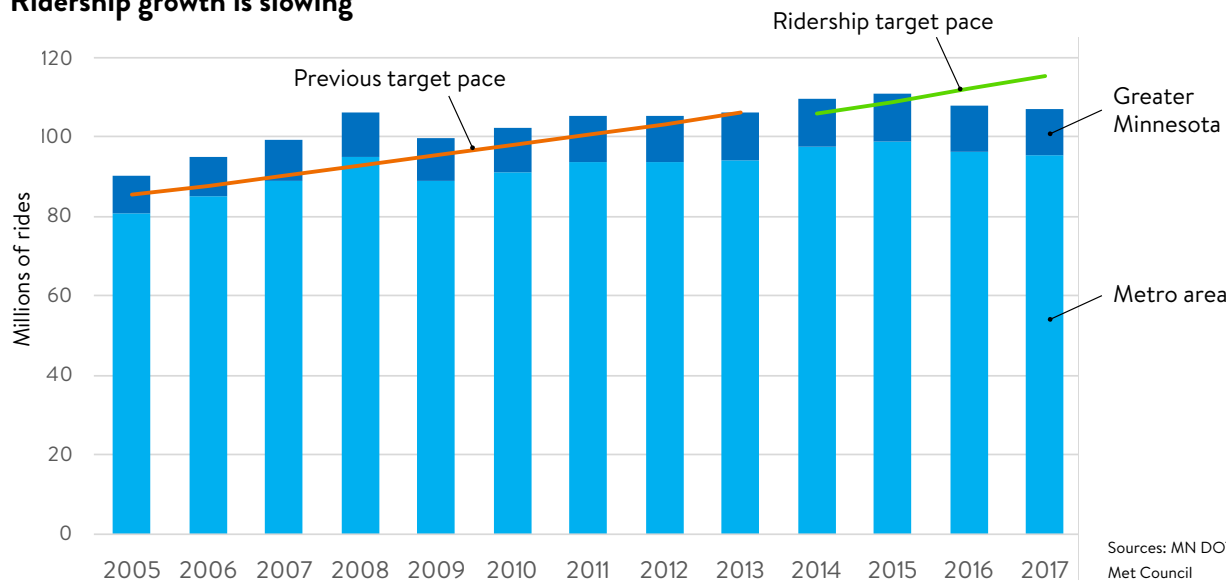
Increasing public transit options and improving access to them reduces demand for automobile travel and lessens tailpipe emissions. Areas with traffic congestion are in particular need of air quality improvements. Public transit, such as light rail and buses, also improve health equity by providing safe, convenient, reliable, and affordable access to jobs, schools, healthy food options, parks, and other opportunities for physical activity.

After many years of steady growth, transit ridership began to decline in the past two years. Ridership across the state dropped by 3% in 2016 and another 1% in 2017. Currently, Minnesota is not on pace to meet the state’s transit ridership targets. A 2017 regional fare increase, low gas prices, and shifting travel patterns are influencing the decline in ridership, which is a trend happening nationwide.

*Switching to transit reduces an individual’s transportation-related carbon emissions by up to 70 percent.*



**Ridership growth is slowing**

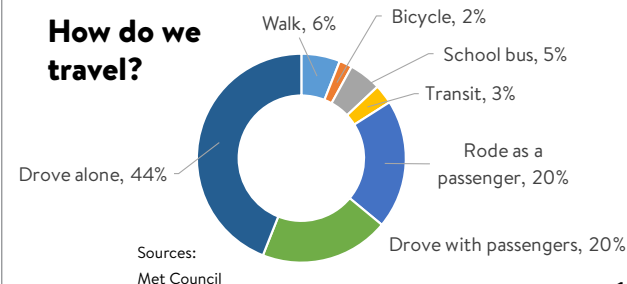


**Transit success**

- Ridership on light rail transit is up 3% and continues to see year over year increases.
- The A line, the region’s first rapid bus line, saw around 830,000 riders in its first six months of service, beating projections.

These successes demonstrate that Transit ridership growth happens when there is *frequent* options and people feel that the length of time in transit will be *consistent*.

**How do we travel?**



**Summary** We have reduced pollution from sewers and industry in the last several decades. However, pollution from agriculture, lawns, and roads is increasingly found in our drinking water supplies, rivers, and lakes.

**Status**

OKAY

Improvements in some areas but many challenges ahead.

**Trend**

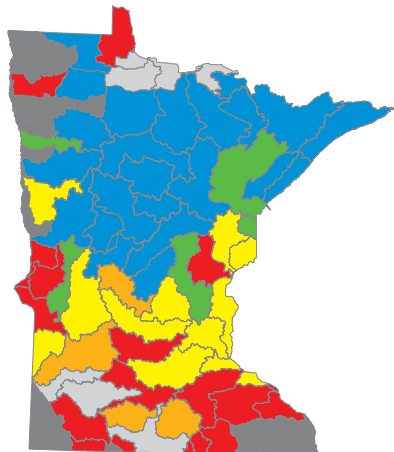

  
About the same

**Goal**

Swimmable, fishable lakes and rivers

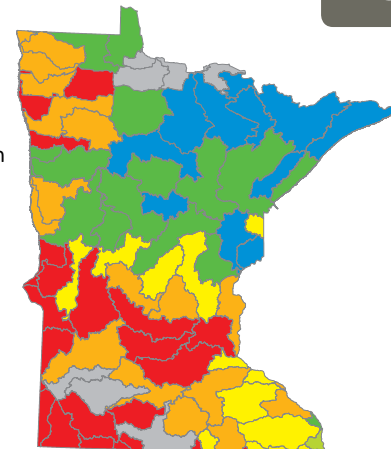
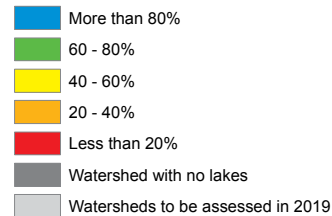
**Lakes:  
Too many nutrients**

Percent of lakes with good water quality



**Rivers and streams:  
Fish and bugs are struggling**

Percent of streams with healthy aquatic life



MPCA assessments through 2018

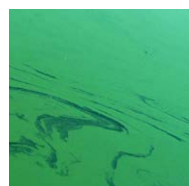
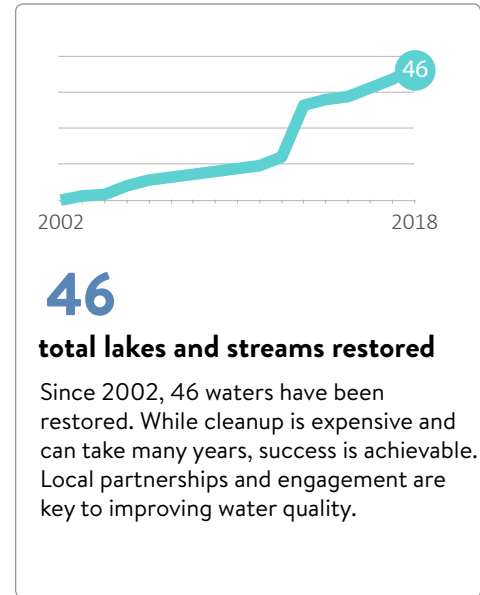
**Way of life**

Lakes are central to Minnesota’s economy and our way of life, and we need to continue to protect and restore our waters. Many lakes and streams are polluted by nutrients, particularly chloride from road and water softener salt and phosphorus. Fish and bugs in streams can be harmed by poor habitat, excess flow from modified drainage, and sediment. Runoff from agricultural land and lakeshore development increases phosphorus in lakes, which in turn causes algae growth. Algae-covered lakes are less attractive for fishing and swimming — highly valued pastimes in Minnesota and uses that are protected under the federal Clean Water Act.

**Improving water quality**

With the investment of the Clean Water Fund from the Legacy Amendment, the state has been assessing each watershed to understand where pollution is a concern. The One Watershed One Plan program supports local governments using this data to develop strategies and a plan to protect and restore their waters. Without additional action, water quality is expected to improve only 6% to 8% by 2034.

60% of lakes and rivers meet water quality standards for fishing and swimming



**Health concerns**

**Cyanobacteria** or **blue-green algae** are naturally occurring in Minnesota lakes. While often just a slimy nuisance, some blue-green algae can produce toxins that endanger pets, livestock, and children. Reducing runoff into lakes can help reduce algal blooms, but longer, warmer summers increase the bloom season. Take care to keep pets and children away from algal blooms and shoreline scum. Drinking water can also be affected by blue-green algae, though it has not yet become an issue in Minnesota.

**Summary** Nitrate is one of the most common water pollutants in MN groundwater. In areas with vulnerable groundwater, wells are more likely to have elevated nitrate. Elevated nitrate in drinking water is a health hazard, especially for infants.

**Status**

**POOR**

Removing nitrate from tap water is expensive.

**Trend**



**Goal**

## Why is nitrate a concern?

A growing body of literature suggests associations between nitrate exposure and health effects such as increased heart rate, nausea, headaches, and abdominal cramps. Some studies suggest an increased risk of cancer, especially gastric cancer, from consuming nitrate/nitrite in drinking water, but there's not scientific consensus. High levels of nitrate can also cause a fatal condition called methemoglobinemia (blue baby syndrome) in infants.

## How is drinking water being protected in Minnesota?

The Minnesota Nitrogen Fertilizer Management Plan is the state's blueprint to prevent, evaluate, and mitigate nonpoint source pollution from nitrogen fertilizer in groundwater. Its primary goal is to involve the agricultural community in problem-solving at the local level to respond to and address localized concerns about unsafe levels of nitrate.

Proper well construction, sealing, and education are tools the Minnesota Dept. of Health (MDH) uses to protect people's health. MDH also tests public water for nitrate and advises systems on ways to protect surface and groundwater from nitrate contamination.

## Nitrate contamination is impacting rural communities

**Bill increases** In Randall, Minn. (pop. 650), one of the town's two drinking water wells is contaminated with nitrate. A new treatment plant will cost \$1.37 million. Residents' water bill increases will be \$100-\$120 in the first year, and \$160-\$180 in the following years.

**Protecting health** As part of Dakota County's Delegated Well Program, when a well is constructed, repaired, or ownership changes, the water must be tested and meet standards for nitrate and bacteria.

**Disrupted supply** In May 2016, Fairmont was the first Minnesota community using surface water (Budd Lake) for its water supply to experience elevated nitrate levels. The utility notified residents and used its backup well to dilute the nitrate-contaminated water.

### Township testing program

**25%** of MDA tested private wells are above 3 mg/L, a level at which MDH prevention measures are recommended. **10%** exceed 10 mg/L, above the safe drinking water limit.

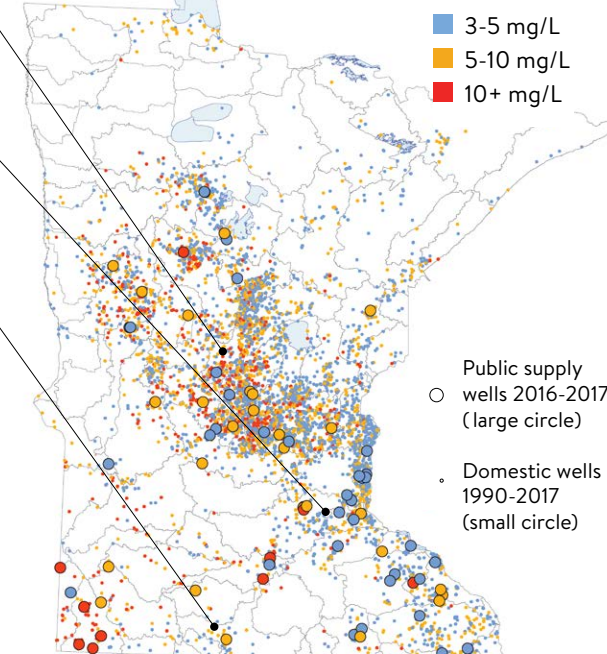
Source: MDA Township Testing Program Update-March 2018



## Minnesota Agricultural Water Quality Certified farms

Since 2014, the Water Quality Certification Program (MAWQCP) has worked with 680 farmers to implement conservation practices and commit to sustainability. The program has enrolled nearly 450,000 acres, saved 120 million lbs. of soil per year, and reduced nitrogen losses on farms up to 49%. New private-sector partnerships can help the program reach its goal of 1 million acres by 2020.

## Highest nitrate concentrations in public and domestic wells (before treatment)



Source: MDH, Wells and MNDWIS databases

**Summary** Minnesota is at risk of depleting its water supplies in several areas of the state. Sufficient water supply is vital to our public health, economy, and ecosystems.

**Status**

OKAY

We need to better understand ground-water use

**Trend**

About the same

**Goal**

Reliable water supplies for future generations

## Protecting our water supply

Water is our most precious resource, but it's often taken for granted in the "Land of 10,000 Lakes". Minnesota appears to have a good supply of water, but increasing demand from domestic, agricultural, and industrial users can strain water resources. Average water use per person has been stable for decades, however as population has grown so has overall water use. In some areas groundwater use has caused aquifer water levels to decline. If this overuse continues, groundwater may not be available as needed in the future.

The Department of Natural Resources is assessing the impacts of groundwater use in areas with historical concerns. They are collaborating with large water users and conducting long-term planning to ensure the sustainability of aquifer resources.

## The future of sustainable water use

Moving forward, the focus must be on building resilient and flexible water supply systems and determining how much water use is sustainable for Minnesota communities. Improving water efficiency and reducing waste are critical to achieving resilience.



A recent survey of residential irrigation systems found that most have leaking components and are watering streets and sidewalks.

### Leading by example



Minnesota state government has a goal of reducing water use by **15%** by 2025.

(Baseline year 2017)

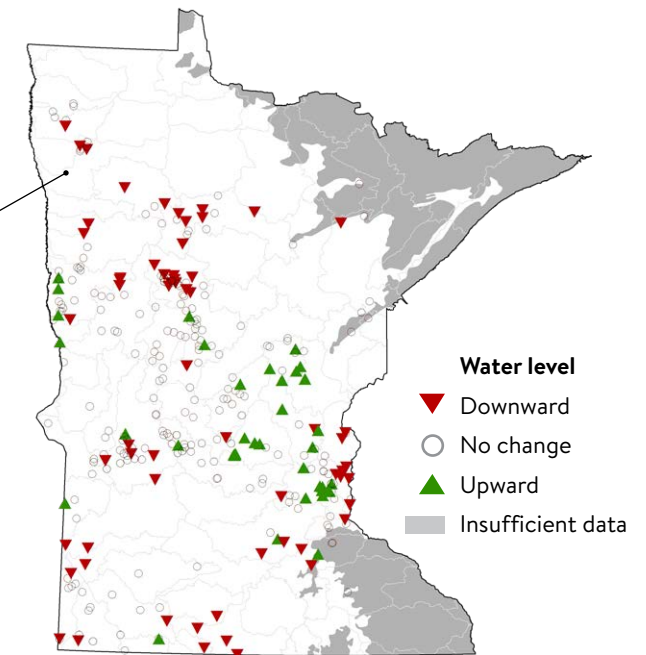
### Irrigation and water supplies

Agricultural irrigation is relatively new to the Polk County/Red Lake County area. Most of the water use permits for irrigation were issued within the past five years. High water use caused several out of water conditions (well interferences) to private domestic wells. The area's aquifer system is highly complex and only partly understood. The long-term effect on the aquifers has yet to be determined. Prevention of additional well interferences and ensuring a sustainable water supply to all area water users is of utmost importance.

## Well water levels 1997-2016

The water levels in many wells around the state have decreased in recent years.

Downward trends can result from drier climate conditions or increased local groundwater use.



Source: MN DNR



**Summary** Recent declines in pheasant and other grassland bird populations reflect significant losses of prairie and grassland habitat.

**Status**

**POOR**

Our grasslands are disappearing.

**Trend**



Getting worse

**Goal**

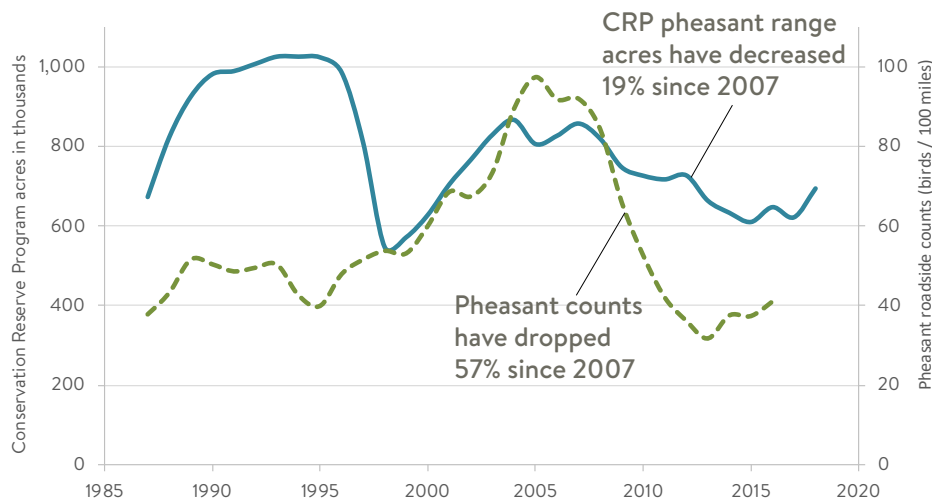
Return pheasant population and harvest to 2005-2007 levels (peak CRP years)

## Lost habitat

In the past decade, the Conservation Reserve Program (CRP), the most important private-lands conservation tool for preserving grassland habitat in Minnesota, has shrunk significantly. The federal program pays farmers to remove environmentally sensitive land from agricultural production and restore vegetation to reduce soil erosion, improve water quality, and provide habitat for wildlife and pollinators. Since 2007, about 700,000 acres of CRP have expired in Minnesota and an additional 296,000 acres are expected to expire by September 2019.

## Declining pheasant population and harvest

Loss of habitat in the state's farmland region has contributed to declines in Minnesota's pheasant index and harvest. Although the 2018 pheasant index was similar to the previous 10-year average, it was less than half of what the index was from 2005-2007. The 2017 harvest was one of the lowest in state history.



Source: MN DNR



Grassland birds are one of the fastest declining groups of birds in North America.



Since 2007, the state has lost more than 163,000 acres of CRP in the pheasant range alone.



## Saving prairies and pheasants

Just west of Regal, Minn., is a 3,000 acre habitat complex that is the result of partnerships between DNR, U.S. Fish and Wildlife Service, The Nature Conservancy, and Pheasants Forever, among others. The complex includes DNR Wildlife Management Areas, Federal Waterfowl Production Areas, and the Nature Conservancy's Regal Meadows – Knutson Tract, which was purchased with Outdoor Heritage Funds and is open to hunting, and multiple permanent conservation easements on private land.

## Prairie loss puts pollinators at risk

Native bee populations are down 23% in the U.S. from 2008 to 2013. Several native Minnesota bee and butterfly species have experienced declines in population and geographic range, with some once-common species now gone from the state.



**Summary** Since 2002, the rate at which farmland, forest, wetlands, and wildlife habitat is converted to urban and suburban development has decreased.

**Status** OKAY

**Trend**  On the right path

**Goal** More efficient development

## Efficient use of land

As our population and economy grows, we need room for housing, businesses, recreation, shopping, transportation, government services, and more. In the process, we convert farm and forested land and other open areas to developed lands. By doing so, we lose irreplaceable natural resources and risk damaging ecosystems.

Development patterns across the state have been changing. The amount of land per new person and per new household has fallen, while the population continues to grow. Reuse and cleanup of existing contaminated sites, reuse of existing buildings, smaller residential lots, and more apartments and other multi-family dwellings have contributed to this more efficient land use, and reduced the rate we impact our natural areas and farmland.

The benefits of efficient land use include improved accessibility, less costly utilities, public services, and transportation, open space preservation, and less pollution and impervious surfaces (such as pavement).



## What can we do?

**Thrive MSP 2040** The Metropolitan Council's vision for the next 30 years includes aiming to responsibly manage the region's finite natural and financial resources, and our existing investments in infrastructure.

**Land use policies** Align land use, development patterns, and infrastructure to make the best use of public and private investment, and reduce development pressures on rural and natural areas.

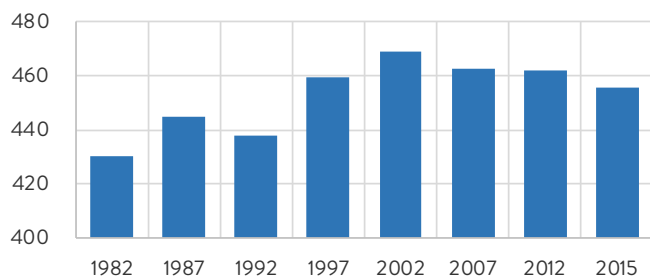
**Green development** Locate and design new developments to benefit the natural environment and reduce development pressures. Promote growth in already urbanized areas.

**Careful location of development** Where growth must occur outside of urbanized areas, avoid locating development, roads, and utilities on prime farmland, areas important for habitat, or areas containing important natural features.

## Developed land

We are converting open areas to developed land at a slower rate since 2002.

Developed land per 1000 people (in acres)



Sources: MN State Demographic Center, 2015 National Resources Inventory (USDA/NRCS)



## Camp Ripley Sentinel Landscape

The Sentinel Landscapes Partnership, a joint initiative of the U.S. Departments of Agriculture, Defense, and Interior, along with state agencies, local governments, and nonprofits, is an effort to protect Camp Ripley's training mission, while protecting and enhancing natural and cultural resources. The Camp Ripley Sentinel Landscape and the preceding Army Compatible Use Buffer program have protected approximately 35,000 acres to date, using land acquisitions and easements. ([sentinellandscapes.org](http://sentinellandscapes.org))

**Summary** About one-third of our waste is still sent to landfills. More of this waste could be recycled.

**Status**

**POOR**

We can recycle more.

**Trend**



About the same

**Goal**

75% recycling for Twin Cities, and 35% for outstate counties

## System change

Individuals and organizations all play critical roles in meeting Minnesota's 2030 recycling goals. We must shift our thinking from "How do I get rid of waste?" to "How can I avoid generating waste?"

We must also effectively manage waste by prioritizing recycling, organics management, and waste-to-energy over landfilling. To achieve our goals, we'll need to target large commercial waste generators, recover more residential organics and recyclables, process waste before disposal, increase reuse, and focus on recovering large categories of materials.

## The problem

One barrier to achieving our recycling goals is the common assumption that everyone recycles and current recycling solves the problem.

In addition, single-stream recycling causes contamination problems, which cost sorters more money and has led China to stop accepting our material.

Minnesota has set aggressive goals to increase recycling and organics collection and aims to reduce land disposal as much as possible. We need to continue to employ creative solutions to address market problems.

## Emerald ash borer aftermath

Ultimately, all of Minnesota's 1 billion ash trees—2.65 million located in communities—are expected to be lost, creating a huge waste issue.



Source-separated organics recycling has more than doubled since 2011.

Recycling is good for Minnesota's economy. It supports more than 60,000 jobs in our state, paying almost \$3.4 billion in wages, and adds \$15.7 billion to our economy.

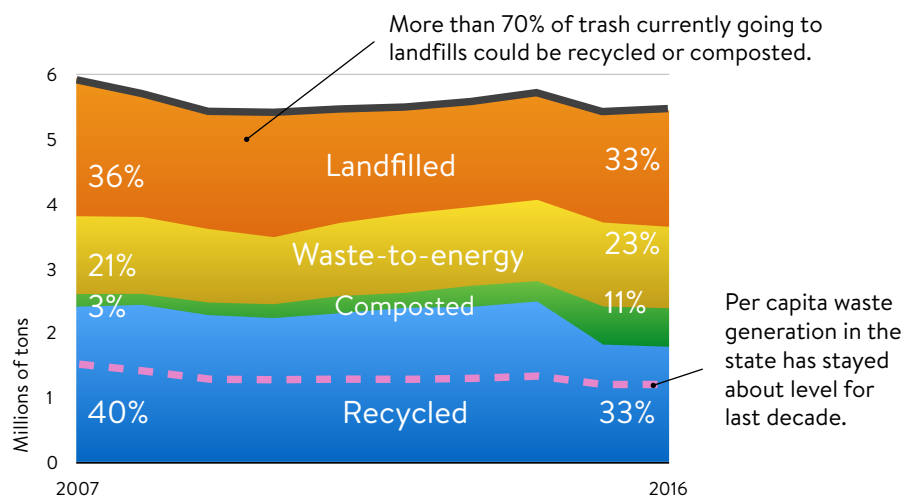


## China has stopped taking recyclables

As a result, U.S. markets have become saturated with material, creating more supply than demand. Local markets can be more selective and are buying the higher quality (clean) material. It doesn't appear that China will be changing its policy soon, so this is an opportunity for Minnesota facilities to improve their processes.



## Where does our waste go?



A reporting change, which no longer accepts estimates, only actual numbers, began in 2015.

Source: MPCA



**Wish-cycling** means the practice of tossing unacceptable items in the recycling bin, hoping they can somehow be recycled.

