2023
State of the Environment Report

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Saskatchewan

Table of Contents

Minister's Message

Hon. Dana Skoropad
Minister of Environment

I'm pleased to present the 2023 State of the Environment Report.

Saskatchewan's rich natural resources and diverse ecosystems are not only essential to our economy, but also to our identity and the quality of life we enjoy in the province. We have a lot to be proud of in Saskatchewan, and our commitment to protecting our natural resources should be near the top of the list.

We are seeing the outcome of our collective efforts in many parts of this report. Some of the highlights include:

- The average pollution levels for most pollutants have been dropping over time. Sulphur dioxide and nitrogen dioxide levels have declined from 2000 to 2022.
- In 2019, the province introduced the Methane Action Plan, a Saskatchewan-made plan to reduce the amount of methane emissions. The plan was expected to reduce methane-related emissions by 40 to 45 per cent by 2025, but succeeded in reducing methane emissions by 60 per cent in the first three years.
- In 2021 forestry was the largest industry and a major employer in northern Saskatchewan, representing approximately one per cent of the provincial gross domestic product. Forestry provides economic development and employment opportunities, resulting in improved quality of life for the people of northern Saskatchewan.
  - ~ Approximately 30 per cent of the provincial timber supply is allocated to Indigenous businesses, by far the largest of any province.
- The risk of Mountain Pine Beetle infestation has declined significantly.
- We are seeing some great numbers when it comes to recycling in our province. For example, Saskatchewan people recycled 82 per cent of all deposit-paid, ready-to-serve beverage containers in 2021.
- Our partners at the Water Security Agency note that with a growing population, there is increasing pressure on Saskatchewan's water resources. However, they're reporting a general decrease of usage rates. Good work, Saskatchewan.

Of course, there is always more work to be done. As we continue to follow the direction established in *Prairie Resilience* – Saskatchewan's climate change strategy – and report on regularly in the Climate Resilience Measurement Framework, we should expect to see even more positive trends in the coming years. I look forward to seeing this work evolve and to seeing these actions contribute to a stronger Saskatchewan.

About the Report

The State of the Environment Report is a requirement in *The Environmental Management and Protection Act, 2010,* with the specific purpose of producing a report "concerning the current condition of the environment in Saskatchewan and the relationships between the condition of the environment and the economy of Saskatchewan." It is updated every two years.

The Government of Saskatchewan continues to improve its reporting to offer accessible and comprehensive information to enhance our understanding of the environment. The most recent data is reported in each measure, and often depends on the availability and frequency of reporting from third parties. As such, some information may be from years prior.

The report will provide the following information in each section.

Why we measure this

A simple explanation of what information the environmental indicator conveys and why that information is important.

What is happening

An explanation, graph or map, of how human activities are having an impact on specific environmental measures.

What we are doing

Actions being taken to improve or maintain environmental conditions.

List of Indicators

Agriculture land cover
Air pollutant concentration
Air pollutant volume
Annual timber harvest
Forest sector contributions to the province
Forest type and age
Greenhouse gas emissions
Impacted sites
Indigenous involvement in the forest sector
Intact boreal forest
Mountain pine beetle detection and prevention
Natural forest disturbance
Private land stewardship
Protected and conserved areas
Regeneration of timber harvest area
Waste reduction and recycling
Water allocations
Water consumption and conservation

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Indicator ranking

State
(what is the current situation?)

good | fair | poor | unknown

Trend
(what does trend over time indicate?)

improving | mixed or no change | deteriorating | unknown

Information
(was there adequate information to assess this indicator?)

adequate | partial | inadequate | unknown

Note: a subject matter expert makes the decision on the indicator rankings
Note: Extent means area of the province to which the indicator was assessed

Agricultural land cover

Why we measure this

By area, agriculture is the dominant form of land use in southern Saskatchewan. Agricultural lands — or lands used for the production of crops and livestock — occupy most of the province south of the commercial forest. They also encompass land not exclusively dedicated to production, including wetlands and woodlands.

Good agricultural land management not only keeps land healthy and productive, it contributes to biodiversity, soil conservation and habitat availability for wild species. While the main intent of farming is food and forage, land management impacts natural processes necessary to sustain adequate water supplies, a stable climate and other important benefits for people and the economy.

Saskatchewan will continue to monitor trends in agricultural land management to ensure we are keeping agricultural landscapes healthy and productive, and sustaining joint biodiversity benefits.

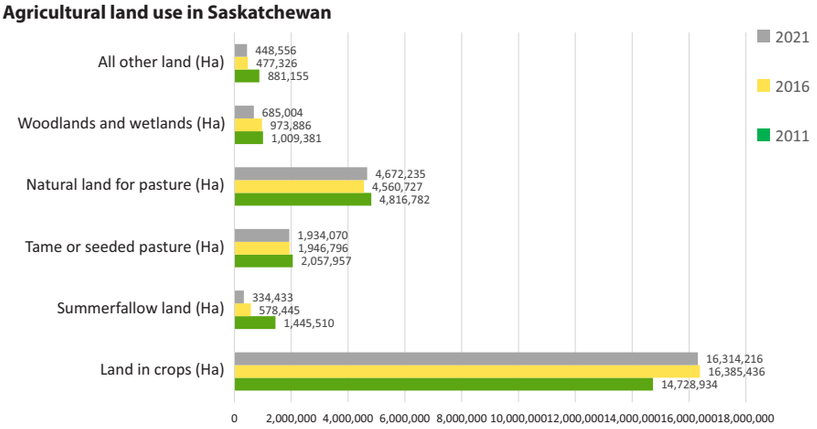
What is happening

Saskatchewan farmland

State	Trend	Information	Extent
mixed/fair	decreasing	partial	agricultural zone

For the information available, agricultural land use in Saskatchewan has remained relatively stable.

Agricultural land use in Saskatchewan



Note: Due to abnormally wet growing seasons in 2010 and 2011, land that couldn't be seeded because of excess moisture was reported to the Census of Agriculture as too wet to seed and is categorized in this figure as all other land.

Area of grassland

State	Trend	Information	Extent
mixed/fair	slight decrease	partial	agricultural zone

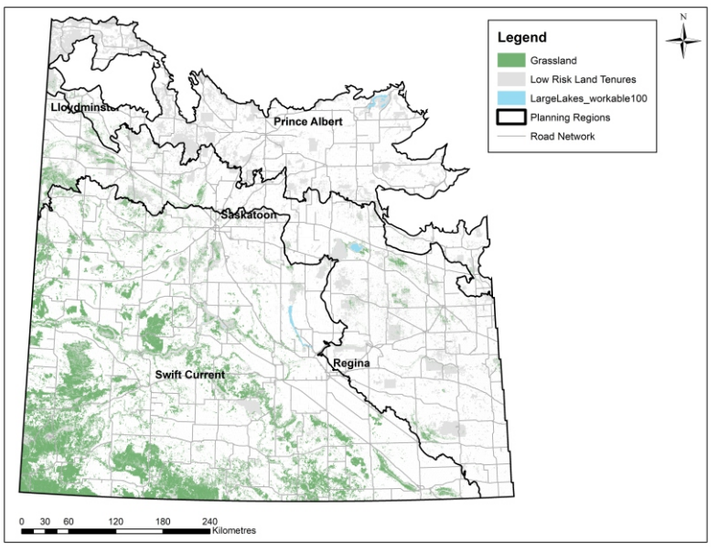
Quick facts

- Saskatchewan has more than 16 million hectares of agricultural crop land.
- Flying insects such as bees and flies are responsible for pollinating several crop species popular in Saskatchewan, including canola, flax, mustard, buckwheat and coriander. Cross-pollination by insects can increase crop yields by up to 30 per cent.
- Wildlife benefits farmers through crop pollination, breakdown of organic matter to provide nutrients for crops, and agricultural pest control. For example, a member of the little brown bat species can eat 600 mosquitoes in an hour. A breeding pair of ferruginous hawks can effectively control gophers, and lady beetles are important predators for controlling numerous agricultural pests, including aphids.

Last updated: June 2023
Update frequency: to be determined

Temperate grasslands are one of the most endangered ecosystems in the world. Most estimates suggest somewhere between 19 and 24 per cent of grassland cover remains in Saskatchewan. Many grassland wildlife species are experiencing population declines and many federally listed species at risk in the province rely on remaining patches of managed grassland. Grasslands also support Saskatchewan's beef industry. As such, it is important to conserve remaining grassland habitat for wildlife and people alike. Increasing the area of permanent cover, including grasslands, is a component of the Government of Saskatchewan's *Prairie Resilience* framework. This measure will increase resilience and help mitigate climate change.

Area of grassland

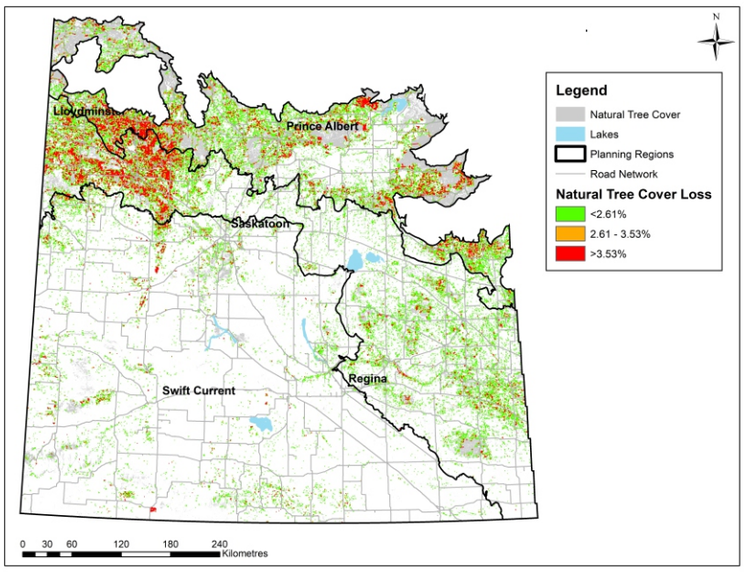


Natural tree cover

State	Trend	Information	Extent
mixed/fair	decreasing	partial	agricultural zone

Conservation of tree cover provides important habitat for forest-associated wildlife species, including economically important species such as white-tailed deer. Like other natural land covers, trees in agricultural landscapes retain stored carbon and improve resilience to climate change.

Per cent loss of natural tree cover



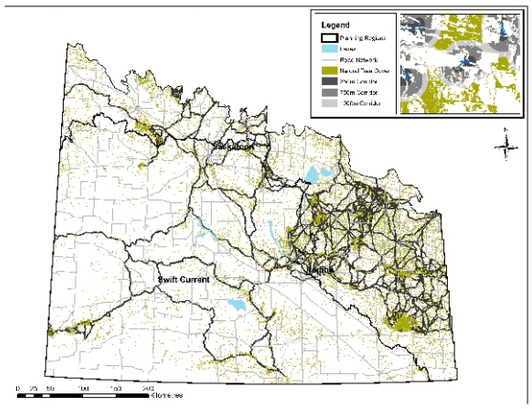
Natural tree cover is the percent loss of natural tree cover per quarter section between 2012 and 2017.

Natural tree cover connectivity

State	Trend	Information	Extent
unknown	unknown	partial	agricultural zone

Fragmentation of movement corridors for wildlife can occur when woodland patches are removed. The closer neighbouring patches are together, the more readily wildlife species can travel to find food, mates and living space. Conserving movement corridors helps facilitate dispersal and maintain resilience among populations of wide-ranging species.

Woodland movement corridors



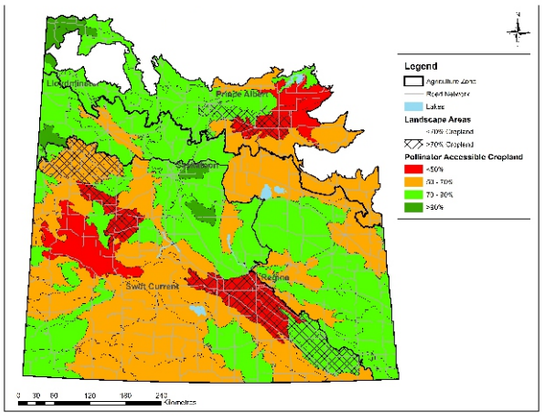
Pollinator accessible cropland

State	Trend	Information	Extent
unknown	unknown	partial	agricultural zone

Pollinator-accessible cropland is the proportion of cropland within 200 metres of natural land covers in landscape areas dominated by agriculture.

Flying insects such as bees and flies are responsible for pollinating several crop species popular in Saskatchewan, including canola, flax, mustard, buckwheat and coriander. Cross-pollination by insects can increase crop yields by up to 30 per cent. Natural land cover patches adjacent to cropland facilitate cross-pollination by providing nesting and foraging sites for insect pollinators. This is especially important in agriculture-dominated landscapes where the maximum benefit of cross-pollination is jeopardized by increasing isolation from natural patches where insect pollinators reside. Maintaining natural patches dispersed across agriculture-dominated landscapes will continue to facilitate cross-pollination by insects.

Pollinator accessible cropland



What we are doing

Land management remains a priority for Saskatchewan.

Government is continuing to support programs and services such as the Fish and Wildlife Development Fund, the Environmental Sustainability and Climate Change component of the Federal-Provincial Canadian Agricultural Partnership, the Agricultural Water Management Strategy and lease arrangements with private Agricultural Crown Land lessees and pasture patrons. This also includes collaborating with agricultural producers to achieve targets identified in the *Prairie Resilience* climate change strategy and Climate Resilience Measurement Framework.

Air pollutant concentration

Why we measure this

The Ministry of Environment monitors ambient air quality in Saskatchewan. The concentration of various air pollutants is measured to ensure Saskatchewan has a healthy and resilient environment.

Measuring and evaluating the concentration of air pollution across Saskatchewan is a vital activity. These measurements provide the public with real time air quality information and the government with long-term trends, making it easier to identify and track changes in our environment.

What is happening

Indicator	State	Trend	Information	Extent
$PM_{2.5}$ (fine particulate matter)	fair	deteriorating	The concentration of fine particulate matter is increasing over time, with annual fluctuations caused by variation in wildfire activity. The provincial annual average remains below the annual Saskatchewan Ambient Air Quality Standard.	province
O_3 (ozone)	fair	deteriorating	The trend for provincial annual average O_3 concentrations is increasing. The Saskatchewan Ambient Air Quality Standards for O_3 are rarely exceeded at provincial monitoring stations.	province
NO_2 (nitrogen dioxide)	good	improving	The trend for provincial annual average NO_2 concentrations is decreasing. The annual average is below the annual Saskatchewan Ambient Air Quality Standard.	province
SO_2 (sulphur dioxide)	good	improving	The trend for provincial annual average SO_2 concentrations is decreasing. The annual average is below the annual Saskatchewan Ambient Air Quality Standard.	province

Air quality across Saskatchewan is generally low risk to human health. Average pollution levels for most parameters have been dropping over time. Sulphur dioxide (SO_2) and nitrogen dioxide (NO_2) levels declined between 2000 to 2022.

Fine particulate matter (FPM or $PM_{2.5}$), defined as airborne particles less than 2.5 micrometres in diameter, has been increasing slightly since 2010. This is mostly due to the impacts of wildfire smoke. These fires are considered exceptional events and cause a short-term reduction in air quality.

The improvements we have seen in Saskatchewan's overall air quality do not extend to ozone (O_3). Ozone levels continue to increase, despite the reduction in pollution concentrations that contribute to ozone formation. Several reasons could explain this, including a rise in average background ozone concentrations and cross-border impacts. Background ozone includes naturally occurring ozone. The formation of ozone is complex and is dependent on a chemical reaction involving NO_x and hydrocarbons in the presence of sunlight. When there is less NO_x in the air, it can result in ozone levels remaining high and may even increase in concentration.

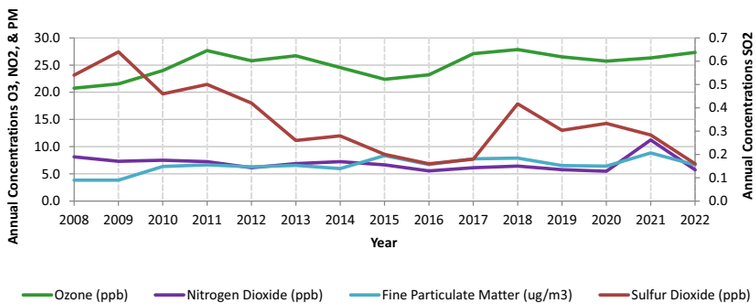
Quick facts

- The ministry conducts long-term, continuous ambient air quality monitoring in six locations across our province: Regina, Saskatoon, Prince Albert, Swift Current, Estevan and Buffalo Narrows.
- Air zone associations have been established in three of the six air zones: Southeast Saskatchewan Airshed Association, Western Yellowhead Air Management Zone and Great Plains Air Zone.

Last updated: June 2023
Update frequency: every four years

Air quality in Saskatchewan is typically low risk and pollution levels are improving for most pollutants.

Saskatchewan urban air pollutant concentrations (annual averages)



What we are doing

Saskatchewan is committed to the Air Quality Management System established by the Canadian Council of Ministers of the Environment. This system is a national approach to managing air quality in Canada. The driver of the system is the Canadian Ambient Air Quality Standards, which are federal standards developed to protect human health and the environment. Saskatchewan contributes to the system by reporting on the federal goals and developing plans to assign progressively more rigorous actions to prevent air quality deterioration, as the air quality comes closer to exceeding the federal standards.

As part of the system, Saskatchewan has identified six air zones, which are areas that exhibit similar air quality characteristics, issues and trends. These air zones form the basis for monitoring, reporting and taking action on air quality issues. Saskatchewan will continue to improve its collaborative efforts with the air zone associations to review trends and assess air quality issues.

The Ministry of Environment operates six ambient air monitoring stations, one in each air zone, under the National Air Pollution Surveillance (NAPS) Program. Continuous air quality monitoring takes place in six locations across our province: Regina, Saskatoon, Prince Albert, Swift Current, Estevan and Buffalo Narrows. NAPS is jointly operated and maintained by the provinces, territories and Environment and Climate Change Canada. The NAPS ambient air monitoring program is operated by the provincial government in Saskatchewan and provides accurate, long-term air quality data. Real time information from these monitoring sites is available to the public at saskatchewan.ca/air.

Air zone associations have been established in three of the six air zones, where higher industrial activity and population density are found: Southeast Saskatchewan Airshed Association, Western Yellowhead Air Management Zone and Great Plains Air Zone. These associations provide additional monitoring in areas not monitored by the provincial monitoring program. For more information on air zone management in Saskatchewan, please view the latest Air Zones Report.

Saskatchewan also has two mobile air quality stations used to supplement the continuous monitoring network. The Mobile Air Quality Station and the Rapid-deployment Air Quality Station are specially designed trailers equipped to supplement the ministry's air monitoring capabilities anywhere in the province accessible by road.

Air pollutant volume

Why we measure this

To evaluate air quality in Saskatchewan, it is important to know the total volume of air pollution produced. That volume is influenced by the particular characteristics of individual emissions and other factors, such as weather. In this section, we examine the total amounts of three primary air pollutants — fine particulates ($PM_{2.5}$), sulphur oxides (SO_x) and nitrogen oxides (NO_x).

Emission source location and volume are important factors to consider in evaluating and adjusting the provincial air monitoring network. The information collected from our air monitoring network will help inform provincial actions and policies that ensure air quality is safe for people and the environment.

What is happening

State	Trend	Information	Extent
$PM_{2.5}$ fine particulate matter	improving	In 2020, there were approximately 433,500 tonnes of $PM_{2.5}$ released in Saskatchewan. The most common cause was open sources such as wildfires and road dust.	province
SO_x (sulfur oxide)	improving	In 2020, there were approximately 106,400 tonnes of SO_x released in Saskatchewan. The most common cause was power generation and fuel combustion sources.	province
NO_x (nitrogen oxide)	improving	In 2020, there were approximately 129,500 tonnes of NO_x released in Saskatchewan. The most common cause was mobile sources, such as vehicle emissions.	province

Emissions in Saskatchewan come from industrial sources, non-industrial sources, open sources and mobile sources. Industrial sources include oil and gas activity, mining and industrial facilities. Non-industrial sources mainly consist of power generation. Open sources include wildfires, agricultural operations, construction and road dust. Mobile sources include vehicle emissions.

Generally, SO_x and NO_x emissions have been dropping in Saskatchewan since 2010. However, in 2019 and 2020 we saw a decrease in fine particulates ($PM_{2.5}$) emissions, mainly due to relatively quiet wildfire activity.

Levels of sulphur oxides (SO_x) and nitrogen oxides (NO_x) have been dropping is Saskatchewan since 2010.

What we are doing

Saskatchewan has a number of tools available to ensure air quality is safe for people and the environment. *The Environmental Management and Protection Act, 2010* requires an environmental protection plan for major industrial emission sources. Companies must make sure their operations meet Saskatchewan's air quality standards to ensure they are safe for human health and the environment. The Ministry of Environment has a compliance assurance program in place to ensure environmental protection plans are being followed.

The ministry supports Canada's National Pollutant Release Inventory (NPRI) Program. NPRI collects, stores and distributes annual air emissions figures from all reporting sources.

Saskatchewan has committed to an Air Quality Management System established by the Canadian Council of Ministers of the Environment. This management system will help the ministry identify and resolve potential air quality issues, including issues related to pollutant sources.

Quick facts

In 2020:

- There were approximately 433,500 tonnes of $PM_{2.5}$ released in Saskatchewan. The most common cause was open sources.
- There were approximately 106,400 tonnes of SO_x released in Saskatchewan. The most common cause was non-industrial sources.
- There were approximately 129,500 tonnes of NO_x released in Saskatchewan. The most common cause was mobile sources.

Last updated: June 2023
Update frequency: every four years

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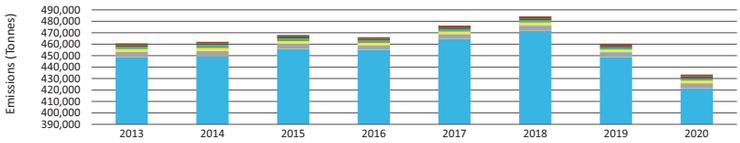
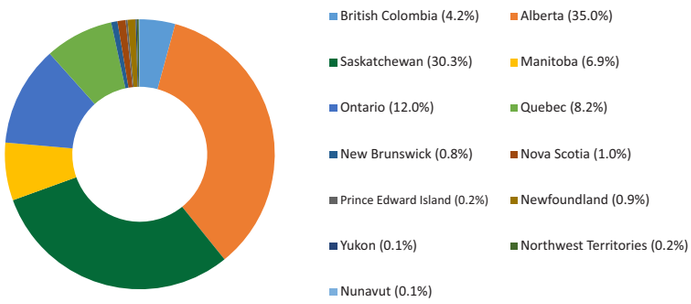
Saskatchewan $PM_{2.5}$ emissions by sector, 2020

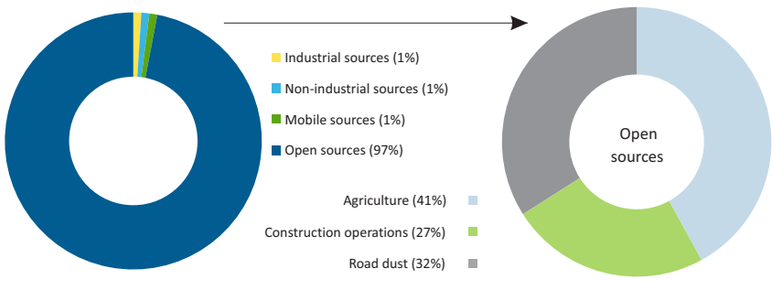


	2013	2014	2015	2016	2017	2018	2019	2020
Commercial/Residential/Institutional	1,471	1,448	1,309	1,451	1,692	1,802	1,793	1,742
Manufacturing	1,318	1,549	1,660	1,397	1,446	1,534	1,415	1,599
Oil and Gas	2,296	2,622	2,538	2,163	2,118	2,023	1,902	1,943
Ore and Mineral Industry	2,114	2,324	2,050	2,029	2,097	2,260	2,164	2,189
Electrical and Power Generation	286	282	301	297	302	726	555	522
Mobile Sources	4,649	4,507	4,262	3,657	3,892	4,135	4,037	3,942
Miscellaneous Sources	123	125	128	127	128	127	140	144
Open Sources	448,494	449,277	455,883	455,081	464,626	471,675	448,453	421,443

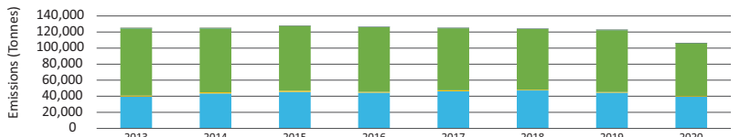
$PM_{2.5}$ emissions across Canada, 2020



Saskatchewan $PM_{2.5}$ emissions by sector, 2020

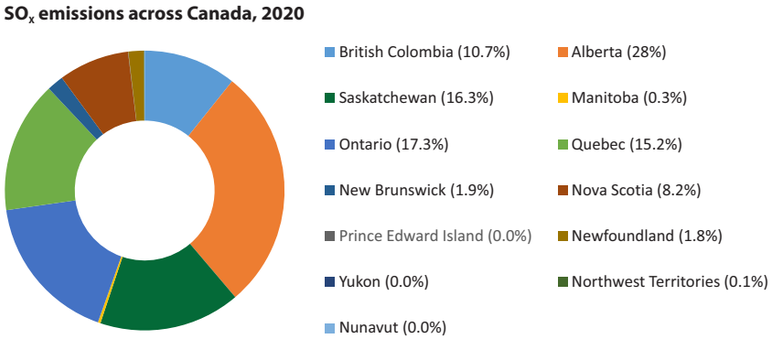


Saskatchewan SO_x emissions by sector, 2020

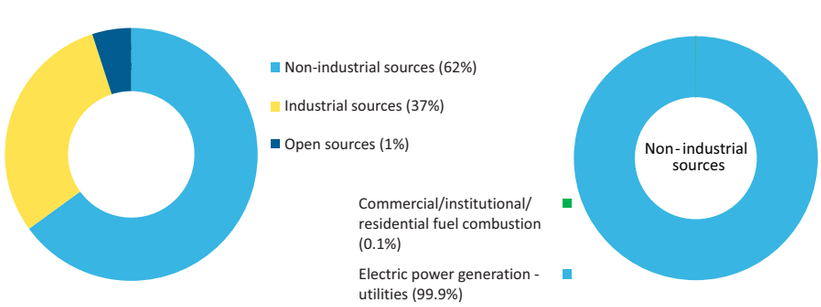


	2013	2014	2015	2016	2017	2018	2019	2020
Open Sources	7	9	10	4	7	7	3	2
Miscellaneous Sources	8	8	8	8	70	45	55	154
Commercial/Residential/Institutional	394	339	417	207	80	67	68	50
Manufacturing	89	91	51	52	55	34	79	42
Mobile Sources	131	126	134	132	134	136	134	80
Electrical and Power Generation	83,602	79,536	80,381	80,515	77,191	75,592	76,964	65,736
Ore and Mineral Industry	1,043	1,433	1,284	1,033	1,179	848	811	814
Oil and Gas	39,747	43,474	45,606	44,477	46,207	47,166	44,587	39,526

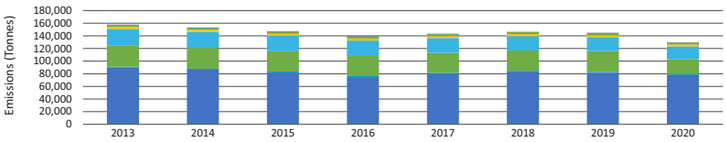
SO_x emissions across Canada, 2020



Saskatchewan SO_x emissions by sector, 2020

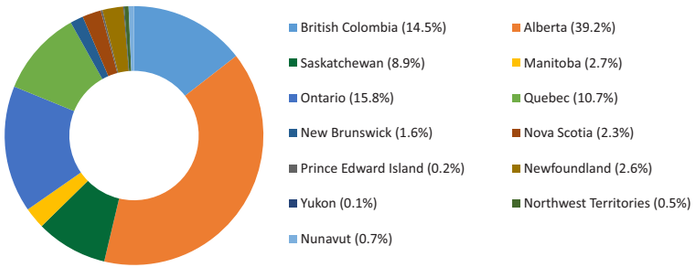


Saskatchewan NO_x emissions by sector, 2020

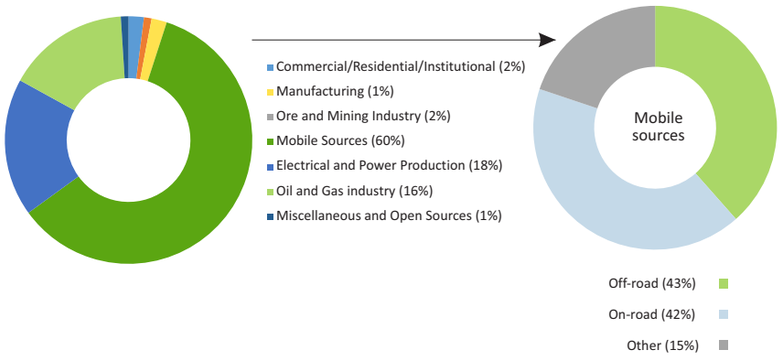


	2013	2014	2015	2016	2017	2018	2019	2020
Open Sources	287	397	407	258	258	172	110	105
Miscellaneous Sources	583	617	696	679	607	78	74	112
Commercial/Residential/Institutional	2,694	2,714	2,605	2,703	2,925	3,180	3,304	2,974
Ore and Mineral Industry	3,245	3,422	3,176	3,155	3,010	3,037	2,885	2,846
Oil and Gas	25,950	25,186	24,385	24,563	23,570	22,824	22,289	20,242
Electrical and Power Generation	34,067	33,231	32,305	31,875	31,701	32,131	33,074	23,833
Manufacturing	1,348	1,422	1,502	1,533	1,891	1,345	1,280	1,508
Mobile Sources	89,653	86,413	81,930	74,612	79,401	83,404	81,569	77,892

NO_x emissions across Canada, 2020



Saskatchewan NO_x emissions by sector, 2020



All data in graphs sourced from Environment and Climate Change Canada.

Annual timber harvest

Why we measure this

Healthy forests provide benefits such as clean air, fresh water, wildlife habitat and materials for building homes. A key forest management consideration is how forests change over time — young trees grow to maturity, decline and eventually die. Throughout this lifecycle a forest may be harvested for wood products, burned in wildfires or continue growing until it becomes old and falls over or is killed by insects and diseases.

Forest management plans are one tool used by professional foresters to care for our forests. When trees are harvested according to these plans, the harvest levels will be sustainable and the forests and the benefits they provide will continue. In Saskatchewan's managed forests, the growth rate exceeds the rate of harvest. This means that some areas will age past maturity and more harvesting may be necessary to keep the forest healthy.

What is happening

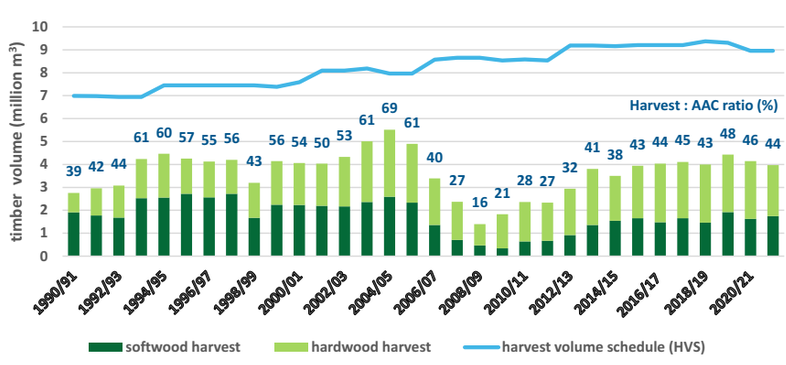
State	Trend	Information	Extent
fair	mixed	partial	commercial forest and forest fringe

For each timber supply area in the commercial forest and fringe forest (Crown agriculture) zones, an annual allowable cut (AAC) is calculated. The AAC is determined from computer modelling and analysis of forests over a 200-year period. To ensure sustainable forest management, the amount of harvest must not exceed the AAC over a specified term. Harvesting on private and federal lands is not regulated in Saskatchewan, but for the purpose of this indicator, timber harvested from private and federal lands have been included and the AAC have been estimated.

Comparing the AAC to the realized annual harvest is a key performance indicator of sustainable forest management. The comparison provides information on the over or under-utilization of wood supply and how the forestry industry is performing relative to its allocation of timber. Additionally, it may highlight potential investment opportunities for Saskatchewan's forestry sector. A higher utilization percentage of realized annual harvest to AAC may indicate that the forest industry is performing well, whereas a low utilization percentage may indicate a downturn.

The low realized annual harvest to AAC utilization percentages observed between 2006 and 2009 in Saskatchewan's commercial forest zone coincide with a period of global economic recession. Since then, as the forest industry recovers, the utilization percentage of realized annual harvest to AAC has increased and stabilized. However, the utilization percentage has not returned to pre-recession levels. In 2021-22, of the 8.95 million cubic metre provincial AAC, 3.97 million cubic metres of timber were harvested. This represents a 44 per cent harvest to AAC utilization percentage. As a consequence of not achieving a higher per cent harvest to AAC utilization percentage, Saskatchewan's forests may age past healthy maturity and be more susceptible to natural disturbances, such as wildfires, insects and disease.

Timber harvest and AAC in Saskatchewan



Quick facts

- In 2021-22, timber harvest from Saskatchewan's forests was 3.97 million cubic metres (44 per cent of the sustainable timber harvest).

Last updated: June 2023
Update frequency: annually

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What we are doing

Overharvesting is not permitted in our Saskatchewan forests. Harvest allocation holders are required to ensure their harvest levels do not exceed the sustainable AAC for their harvest area.

Annual harvest levels are further tracked and verified by the Ministry of Environment. This indicator is intended to provide stakeholders with evidence that the harvest at the provincial scale is being conducted in alignment with the principles of sustainable forest management.

For more information on the forest sector in Saskatchewan, visit saskatchewan.ca/forestry.

Forestry sector contributions to the provincial economy

Why we measure this

This indicator measures the economic benefits derived from harvesting timber and manufacturing forest products in the province.

Sustainable forest management includes balancing social, economic and environmental benefits from forest management activities. Full use of the annual allowable cut has the potential to generate more than $2.2 billion in forest product sales annually, and support nearly 8,000 direct and indirect jobs.

What is happening

State	Trend	Information	Extent
good	improving	adequate	entire province

In 2021, forestry was the largest industry and a major employer in northern Saskatchewan, representing approximately one per cent of the provincial gross domestic product. Forestry provides economic development and employment opportunities, resulting in an improved quality of life for the people of northern Saskatchewan.

Saskatchewan currently has seven large primary forest products manufacturing facilities (two pulp mills, two oriented strand board mills and three sawmills), as well as many smaller primary and secondary forest products manufacturing facilities.

What we are doing

In 2021, the forestry sector sold $1.8 billion worth of forest products, 61 per cent of which was exported to other countries.

Forest products sales and exports

In 2021, the forest sector supported nearly 4,300 direct jobs.

Quick Facts

- Forest product sales were $1.8 billion in 2021.
- The forestry sector supports nearly 8,000 direct and indirect jobs.

Last updated: January 2023
Update frequency: annually

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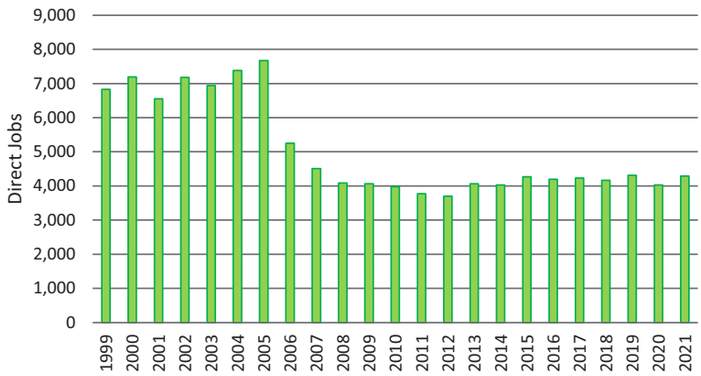
Forestry sector direct employment



Forest type and age

Why we measure this

Healthy forests provide many benefits, such as clean air, fresh water, healthy soils, habitat for plants and animals, materials for building homes and paper products. Forest management is based on the idea that forests change over time, young trees grow until they reach maturity. During this time a forest may be cut for wood products, burn in wildfires or continue growing until trees become old and fall over or are killed by insects and disease.

Forest management plans are used by professional foresters to care for the forest. When trees are cut down following these plans, the harvest is sustainable, meaning that forests and the good things they provide will always be there. In Saskatchewan's managed forests, there is a mix of different forest types, and there are more mature and older trees than would be expected naturally. Protecting forests from fires, insects and disease is one of the reasons why our forests are now older. As a result, tree cutting is needed to help the forests stay healthy.

The type and age of forests are important factors to consider when managing Saskatchewan's natural resources. Aging forests are more vulnerable to wildfire, insects and disease. Forest management in Saskatchewan is designed to result in a forest age structure that emulates natural disturbance. By emulating natural disturbances, the natural range of ecosystems should be maintained, resulting in a more resilient system.

What is happening

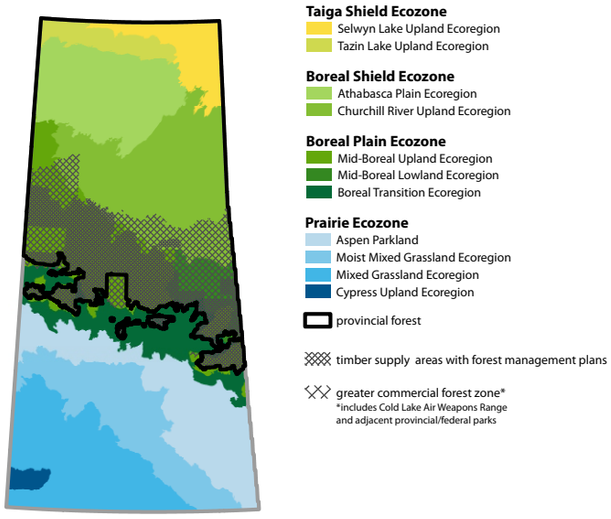
State	Trend	Information	Extent
mixed	mixed/no change	partial	province, provincial forest* and greater commercial forest zone*

The province of Saskatchewan covers an area of approximately 65.2 million hectares. The northern half of the province is largely covered by upland forests, wetlands and water. Grass and agricultural lands cover 36 per cent of the province, mainly in the south.

Four ecozones are found within the province: Taiga Shield, Boreal Shield, Boreal Plain and Prairie. The provincial forest is a region defined in *The Forest Resources Management Act* covering approximately 34 million hectares within the Taiga Shield, Boreal Shield and Boreal Plain ecozones.

About 64 per cent of the provincial forest is an upland forest (41 per cent softwood, eight per cent mixed wood, seven per cent hardwood, and eight per cent open productive/shrub forest types). Wetlands and water each account for 17 per cent of the provincial forest. Grass, barren rock/sand, agricultural and anthropogenic areas make up the remaining two per cent of the landcover.

Ecozones and analysis areas



Quick facts

- The northern half of Saskatchewan is the provincial forest. Of this area, 65 per cent is forested, an area roughly the size of the entire United Kingdom.

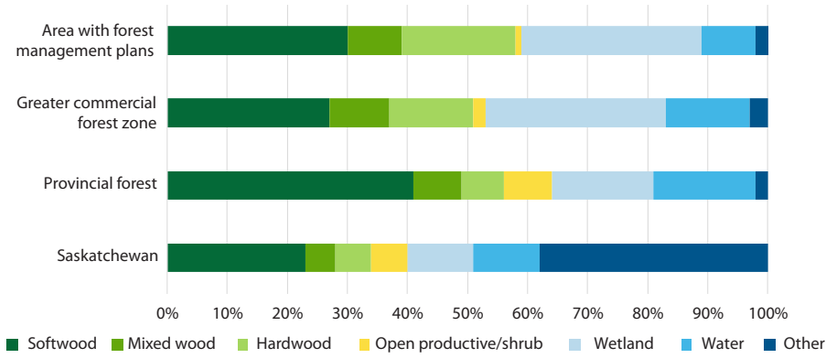
Last updated: April 2019
Update frequency: every 10 years

**For the purposes of this indicator, the 11.7 million-hectare commercial forest zone has been expanded to include the Cold Lake Air Weapons Range, and provincial and national parks within and adjacent to the commercial forest zone. Within the provincial forest, the greatest amount of human activity occurs within this 14.3 million-hectare area referred to here as the greater commercial forest zone.*

The greater commercial forest zone is largely softwood, but features a greater proportion of hardwood and mixed wood forest types compared to the provincial forest. Wetlands also feature prominently within the greater commercial forest zone, covering nearly a third of the area.

Most forest-based economic activity and fire suppression occurs within the greater commercial forest zone, which is subdivided into a number of timber supply areas. As of 2019, there are six active forest management plans, covering 8.3 million hectares.

Forest and non-forest landcover types within the province, the provincial forest, the greater commercial forest zone* and those timber supply areas with active forest management plans



*Including Cold Lake Air Weapons Range and provincial and federal parks within or adjacent to the commercial forest zone

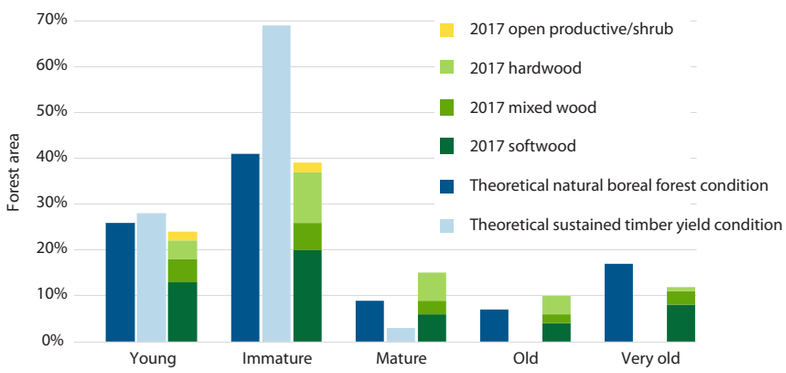
Boreal forests, when uninfluenced by human activities, are shaped by natural disturbances such as wildfire, insects, disease and wind. In theory, the greatest amount of forest area is typically found in the youngest forest ages, and the least amount of forest area is typically found in the oldest forest ages. In contrast, forests managed solely to sustain timber yield are evenly distributed among young, immature and mature forest ages, with very little area in the old and very old forest ages. The greater commercial forest zone's current forest age structure falls between these two theoretical patterns.

Where humans have been putting out wildfires for decades, the forest has become older than it would under natural boreal forest conditions. This can lead to more intense wildfires and more serious insect infestations. Letting wildfire play its natural role when safe and feasible is one way to address this age imbalance; carefully planned forest harvesting can be another.

Native plant and animal species are often associated with certain forest and wetland types and certain forest ages. The availability of habitat for various species may be partially assessed through the abundance and distribution of forest types, forest ages and wetlands. Maintaining the natural range of ecosystems results in a more resilient system, helping to sustain overall biological diversity. Ecosystem diversity, the variety and relative abundance of ecosystems and their plant and animal communities is necessary for species preservation.

The ideal distribution of forest ages for any management area depends on the ecology and management goals for that area. In reality, the target forest age structure is somewhere in between the natural pattern and that of a forest managed solely for timber. What is important is that wood fibre, habitat and ecosystems are maintained.

Forest area in the greater commercial forest zone* by forest age and type



*including Cold Lake Air Weapons Range and provincial or federal parks within and adjacent to commercial forest zone

More detailed information can be found in this technical report.

What we are doing

Saskatchewan's forest management planning process emulates natural disturbances – unlike a sustained timber yield approach – allowing ecosystems to be maintained. This results in a more resilient system, which sustains biological diversity, protects habitat, maintains recreational opportunities and ensures economic growth.

Forests must be managed to balance habitat needs, recreational opportunities and economic growth. Like a well-diversified financial portfolio makes it easier to adapt to economic market changes, biological diversity makes it possible for ecosystems and species to respond and adapt to environmental change. Generally, forest management practices over the last several decades in Saskatchewan have shifted the distribution of forest ages towards older classes in the greater commercial forest zone.

Greenhouse gas emissions

Why we measure this

The Government of Saskatchewan monitors greenhouse gas (GHG) emissions and related statistics to track our progress in achieving our commitment to action on climate change.

Saskatchewan's GHG emissions totaled 67.1 million tonnes of CO_2e in 2021.

Measuring changes in GHG emissions and related activity is necessary for understanding the effectiveness of policies that build resilience to climate change and the interactions between climate change and the broader economy.

Much of our economy relies on the natural world, including agriculture, forestry, ecotourism and other resource-based industries. The success of these industries, and the province, depends on a stable climate and a resilient environment.

Saskatchewan's infrastructure was designed and built to operate within a range defined by historical norms. As the climate changes, we will experience weather outside of those norms, putting our infrastructure at risk of failing and increasing the likelihood of events like power failures and road washouts.

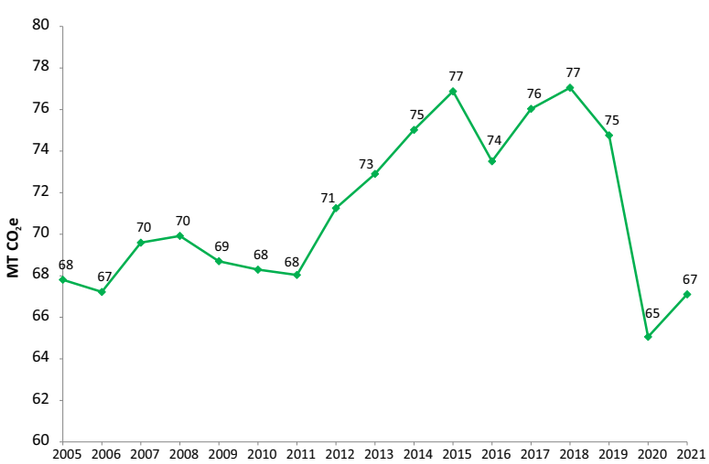
This measure discusses the effects of a changing climate on the province and economy, as well as government programs designed to address the impacts.

What is happening

State	Trend	Information	Extent
mixed/fair	mixed/no change	good	province

Saskatchewan's GHG emissions declined significantly during the pandemic, falling 16 per cent from a peak of 77.1 metric tons in 2018 to 65.1 metric tons in 2020. Emissions rebounded slightly in 2021 to 67.1 metric tons. That same year Saskatchewan's GHG emissions constituted 10 per cent of Canada's total emissions. Canada, in turn, made up about 1.8 per cent of global GHG emissions. Carbon dioxide accounted for 70 per cent of Saskatchewan's GHG emissions. Other emissions sources included methane at 21 per cent, nitrous oxide (N_2) at eight per cent and fluoridated gasses at less than one per cent.

Saskatchewan's GHG emissions: 2005-2021



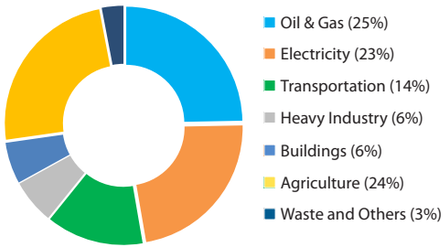
Most of Saskatchewan's GHG emissions come from oil and gas production, electricity generation and agriculture. Each of these activities make up about a quarter of the province's total GHG emissions. All remaining activities, such as transportation, heating buildings, construction, mining and others, are collectively responsible for the remaining quarter. In the oil and gas sector, emissions have fallen 40 per cent since their peak in 2015.

Quick facts

- Saskatchewan's GHG emissions in 2021 totaled 67.1Mt of CO_2e.
- Saskatchewan's GHG emission intensity dropped 18 per cent between 2005 and 2021.
- Modern farming practices remove CO_2 from the air and convert it into soil organic content. The organic content increases the ability of the soil to absorb water making it more resistant to both droughts and floods.
- Saskatchewan farmers stored 14.9 million tonnes of CO_2 in their croplands in 2021.
- It is estimated that native prairie is storing in between 22 and 86 tonnes of CO_2 per acre, per year. That's an average of over one billion tonnes of CO_2 sequestered by grass and forage land in the province.

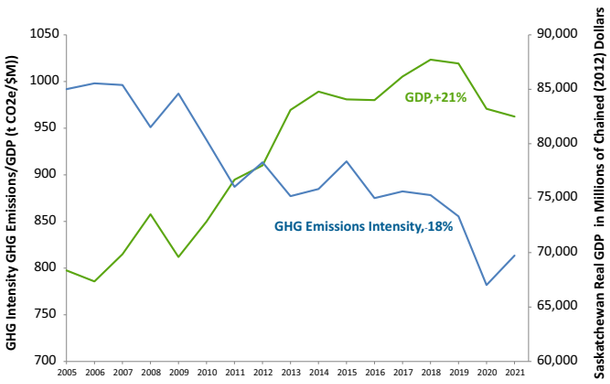
Last updated: June 2023
Update frequency: annually

Saskatchewan's GHG emissions by economic sector, 2021



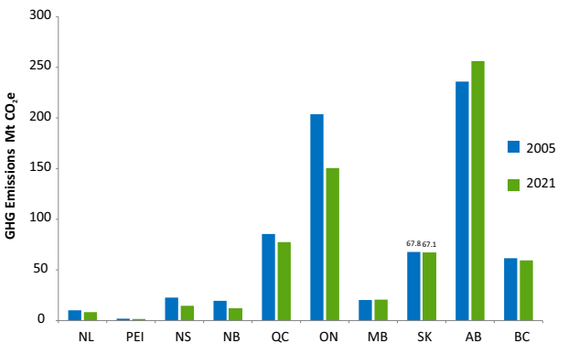
GHG emissions per dollar of gross domestic product (GDP), or the total amount of goods and services produced in an economy, is known as the GHG emission intensity. Saskatchewan's GHG emission intensity dropped 18 per cent since 2005. However, in 2021, the economy was still experiencing significant negative effects from the COVID-19 pandemic. It remains unclear what long-term effects the pandemic will have on GHG emissions or the economy.

GHG emission intensity to gross domestic product, 2005 to 2021



Saskatchewan has the fourth highest GHG emissions of the provinces after Alberta, Ontario and Quebec. Alberta and Manitoba saw their GHG emissions increase between 2005 and 2021, whereas all other provinces saw declines.

Interprovincial comparison of GHG emissions intensity, 2005 - 2021



The latest research shows Saskatchewan is getting more rain, which may lead to more floods. At the same time, higher temperatures dry the ground faster, deepening the severity of droughts.

Higher temperatures are increasing the length of the growing season, but warmer winters are causing more problems with pests and invasive species. The mountain pine beetle has already destroyed forests in British Columbia and Alberta.

In some parts of the boreal forest, trees may start growing faster because of the longer growing season. Other parts of the boreal forest will naturally burn, and aspen parkland and grassland will grow in their place.

The type of crops and livestock that grow best will change with the climate.

What we are doing

At the COP-21 meeting in Paris in 2015, 195 countries, including Canada, agreed to reduce their GHG emissions in what is known as the Paris Agreement. Following the Paris Agreement, premiers and the Prime Minister met in Vancouver, where they signed the Vancouver Declaration, in which all provinces agreed to the national goal of reducing GHG emissions by 30 per cent below 2005 levels by 2030.

Following the Vancouver Declaration, Saskatchewan developed *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy*, which is available at saskatchewan.ca/climate-change. Prairie Resilience is a strategy that takes a system-wide approach and includes more than 40 commitments designed to make Saskatchewan more resilient to the effects of a changing climate. The commitments — which go beyond emissions reductions alone — span Saskatchewan's natural systems and resources, infrastructure for electricity, transportation, homes and buildings, and community preparedness.

Prairie Resilience focuses the province's efforts on specific industries and activities that could have the greatest impact on provincial GHG emissions.

SaskPower's current electricity generation plan will see their emissions fall by half over the next decade.

To reduce GHG emissions, SaskPower will work toward reducing emissions by up to 50 per cent by 2030 and achieve up to 50 per cent of electricity generation from renewable resources by 2030.

SaskPower also pioneered the development of carbon capture and storage (CCS) technology in 2014, which has since been used to capture more than five million tonnes of CO_2. These efforts are expected to reduce emissions from electricity generation by half over the next decade.

Prairie Resilience also targets methane emissions in the oil and gas industry. About 60 per cent of GHG emissions in the industry come from the disposal of unwanted methane. In 2019, the province introduced the Methane Action Plan, a Saskatchewan-made plan to reduce the amount of methane emissions. The plan was expected to reduce methane-related emissions by 40 to 45 per cent by 2025, but succeeded in reducing methane emissions by 60 per cent in the first three years.

Heavy industry and the oil and gas industry are subject to the output-based performance standards, also known as the OBPS Program. The standards require companies to reduce the emissions intensity of their operations. Upstream oil and gas producers and refineries are required to reduce their emissions intensity by 20 per cent on top of reductions required by methane regulations, while other industrial emitters are required to reduce their emission intensity by 15 per cent.

Saskatchewan is making efforts to reduce GHG emissions, but climate change requires collective global action. For this reason, the core principle of *Prairie Resilience* is resilience — the ability to cope with, adapt to and recover from stress and change. This is essential, as the effects of climate change are already being experienced.

The province is tracking many initiatives for enhancing resilience — from forest management to culvert expansion and crop diversification to monitoring diseases. For a complete list, please refer to Saskatchewan's 2021 Climate Resilience Report.

Impacted sites

Why we measure this

An impacted site is usually a piece of land or a body of water that has been disturbed or affected by a chemical or substance as a result of human activities that may harm or alter the environment.

In Saskatchewan, environmentally impacted sites are typically associated with transportation, manufacturing, industrial, commercial or mining activities.

The Ministry of Environment's role is to manage the health of Saskatchewan's environment in a manner that supports sustainable growth through objective, transparent and informed decision-making and stewardship. Managing impacted sites allows the ministry to identify areas in the province that are a potential risk to the health and safety of the public and the environment. Failure to identify impacted sites in the province may increase the risks of an adverse effect.

What is happening

State	Trend	Information	Extent
fair	improving	adequate	province

In accordance with Section 9 of *The Environmental Management and Protection Act, 2010 (EMPA, 2010),* there is a duty to report any discoveries of a substance that may cause, or is causing, an adverse effect.

The progression of an environmentally impacted site through the impacted sites process remains self-directed and is overseen by the ministry. The responsible party is given the opportunity to identify, assess, manage and remediate impacts on a site within a reasonable amount of time to meet legislative requirements and ensure protection of human health. The Minister of Environment may direct the responsible party to take action in situations where adverse effects pose a significant risk to human health or the environment, and where the responsible party is not addressing impacts adequately.

The ministry maintains a registry of all reported impacted sites in the province. The registry includes information on contaminants, location of the site, involved parties and the environmental status of the site. The registry helps the ministry keep track of and monitor impacted sites and regulate parties responsible for remediation of the site. By maintaining a registry, the ministry can prioritize and focus on sites that present an immediate threat to human health and the environment.

The ministry manages more than 3,200 impacted sites through its environmental impacted sites registry. The registry is based on information submitted by responsible parties or involved parties. It is not an exhaustive list of all impacted sites in the province and may not include impacted sites that have not yet been discovered or reported to the ministry. It also may not include activities that are authorized under the authority of EMPA, 2010 or other activities approved under different legislation.

Four hundred and ninety-two historical discoveries were entered into the ministry's impacted sites registry. As these sites are reported, responsible parties and the ministry assess the degree of impacts. Every time a discovery is reported, the ministry obtains valuable information and acquires a better understanding of the impacts in the province.

In accordance with Section 18 of EMPA 2010, a person responsible for an environmentally impacted site may apply to file a notice of site condition in the registry if the environmentally impacted site has been reclaimed and met the requirements of EMPA 2010 and The Saskatchewan Environmental Code.

As of December 31, 2022, a total of 47 notices of site conditions were filed in the registry. The registration of a notice of site condition is an acknowledgment by the Ministry of Environment that an acceptable level of risk remains at the site and results in a limited release of liability of the responsible party. Issuing a notice of site condition enters the site into the registry. Where any subsequent information disproves or contradicts the information used to register the notice of site condition, the notice for the site can be revoked.

However, if the documentation used to register a notice of site condition for a site is incomplete or contains false or misleading information, the ministry may require further assessment and/or revoke the notice of site condition for that site.

Quick facts

- From Jan. 1, 2021 to Dec. 31, 2022:
  - ~ 492 historical discoveries were entered into the impacted sites registry; and
  - ~ 47 notices of site conditions were filed.
- In 2022, the ministry launched an online public registry of environmental impacted sites.

Last updated: June 2023
Update frequency: quarterly

By maintaining a registry, the ministry can prioritize sites based on risk and focus on sites that present an immediate threat to human health and the environment.

What we are doing

The ministry continues to work with parties involved with impacted sites to ensure appropriate application of EMPA 2010 and The Saskatchewan Environmental Code through continued stakeholder consultation.

On April 1, 2022, the ministry launched an online map of the public registry of environmental impacted sites on the Saskatchewan GeoHub. This allows users to see the location of the impacted site, the contaminant(s) of concern and its current status. Further information on specific sites can be obtained by filling out a freedom of information request with the ministry.

In 2022, the ministry created a new Environmentally Impacted Sites webpage. Users can access information on historically impacted sites and spills. There are also useful factsheets and guidance documents that provide further education and information on the impacted sites process.

As new information becomes available regarding impacted sites, the ministry reviews all information to ensure compliance with environmental legislation and any risk(s) to the public and environment are appropriately managed.

Indigenous involvement in the forestry sector

Why we measure this

The Government of Saskatchewan is committed to promoting the use of provincial forest resources in an economically, socially and environmentally sustainable manner. Indigenous involvement is critical to the success of the forestry sector in Saskatchewan.

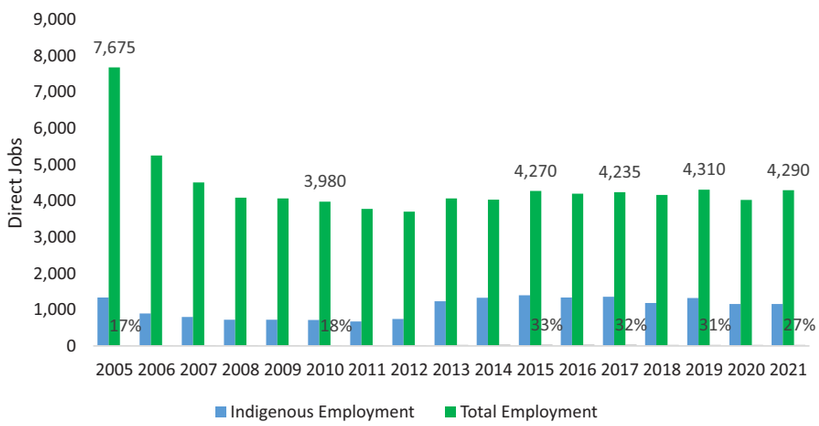
Northern Saskatchewan contains a significant population of Indigenous people. The largest industries in the region are forestry and mining. Saskatchewan has several large and small Indigenous forestry businesses that are major employers of Indigenous people in northern Saskatchewan.

What's happening

State	Trend	Information	Extent
good	mixed	adequate	provincial forest

Indigenous people represent approximately 30 per cent of the forestry sector workforce in Saskatchewan, which is by far the largest of any province.

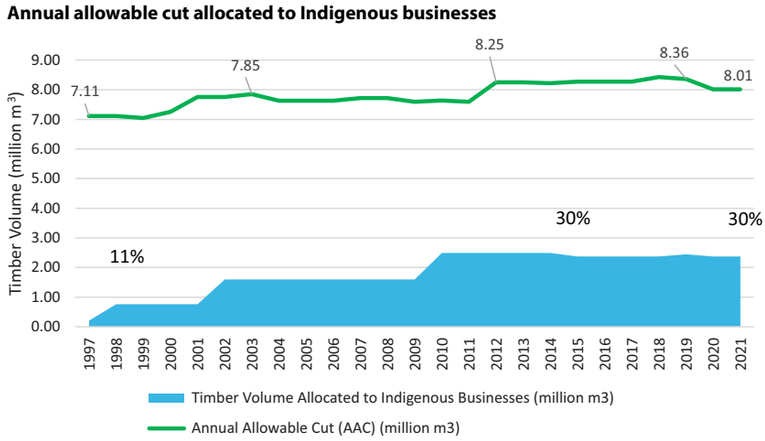
Indigenous employment in the forest sector



What we are doing

The annual allowable cut allocated to Indigenous businesses is one indicator of the level of economic involvement and benefits derived from the forestry sector by Indigenous people. NorSask Forest Products, located in Meadow Lake, is the largest First Nations-owned and operated sawmill in Canada.

Annual allowable cut allocated to Indigenous businesses



Quick Facts

- Approximately 30 per cent of the provincial timber supply is allocated to Indigenous businesses, by far the largest of any province.

Last updated: January 2023
Update frequency: annually

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Intact boreal forest

Why we measure this

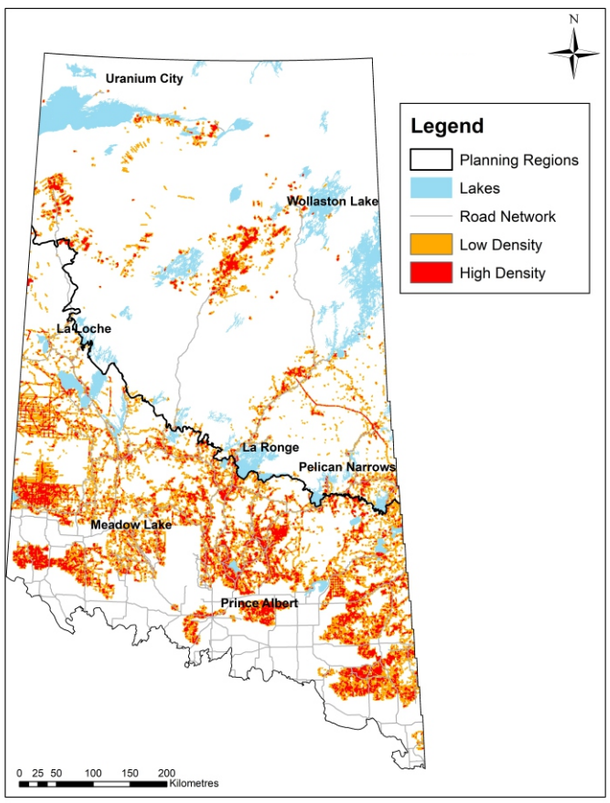
An intact boreal forest ensures contiguous tracts of diverse habitat are available for boreal wildlife species and provides a massive store of carbon. The boreal forest is important for the forestry and mining sectors. At the same time, forest harvest practices that emulate the patterns of natural disturbance and minimize the footprint of development are critical. Prompt renewal after timber harvesting and active reclamation and restoration of disturbed habitat from mineral and other sectors will be necessary to ensure sustainable use of these landscapes.

As energy, mineral exploration, forest harvest and other activities expand in the boreal region, we can expect the associated network of human disturbance (e.g. seismic, geophysical lines, forest roads) to expand as well. These features can involve clearing forest cover along corridors or expansive areas, and may be used intermittently, temporarily or permanently. These effects influence habitat suitability by altering behavioural responses among a broad array of forest-associated species. The temporary nature of human disturbance may imply lower ecological effects, but when effects are aggregated across broader landscapes, their impacts on biodiversity may be cumulative and substantial, especially where they occur in high densities.

What is happening

State	Trend	Information	Extent
mixed/fair	increasing	partial	boreal plain and shield/taiga shield

Temporary linear feature density



Temporary linear feature density - Total square kilometres containing low density (<1 km/km2) or high density (>1 km/km2) of temporary linear features with footprints that can be reclaimed to viable wildlife habitat (see Figure).

Quick facts

- Forest harvest is an important tool for managing forest health.
- Forestry companies use practices such as natural forest harvest patterns to emulate natural disturbance.
- Saskatchewan's woodland caribou range planning is a significant cumulative impacts program, aiming to manage habitat for woodland caribou and other forest-dwelling species by reducing disturbance and fragmentation on the landscape.

Last updated: March 2021
Update frequency: to be determined

What we are doing

Forest harvest is an important tool for managing forest health. The boreal forest has evolved with disturbance, particularly fire, and requires disturbance to maintain ecological health. Forestry companies are using natural forest harvest practices to emulate natural disturbance patterns. Other sectors, such as mining, are working to minimize their impact on the landscape by keeping exploration and development footprints to the minimum required to operate, along with practicing active reclamation.

Saskatchewan's woodland caribou range planning is a significant cumulative impacts program, aiming to manage habitat for woodland caribou and other forest-dwelling species by reducing disturbance and fragmentation. The program will document disturbance, prioritize reclamation, set standards for industry and designate areas of important habitat.

Mountain pine beetle detection and prevention

Why we measure this

The mountain pine beetle (MPB), or *Dendroctonus ponderosae,* is a small bark beetle about 4.0 to 7.5 mm in length — approximately the size of a grain of rice. MPB is the most significant pest threat to pine forests in North America. It can colonize and kill jack pine trees, posing a threat to pine forest ecosystems and sustainable development of the forest industry in Saskatchewan and across Canada.

Saskatchewan serves as a critical barrier to stopping the spread of mountain pine beetles in Canada's Boreal forest. If MPB spreads across Saskatchewan, the rate of spread will likely increase substantially because the distribution and density of pine forests increases in eastern forests. Confirming MPB (presence or absence) in the northern boreal is a significant measure, helping to guide the Ministry of Environment's risk assessment policies and subsequent response actions.

The MPB outbreak in British Columbia infested more than 18 million hectares and killed 731 million cubic metres, or 54 per cent, of the province's merchantable lodgepole pine. Those losses impacted forest-dependent communities.

Forestry is the largest industry in Saskatchewan's north. The forest industry depends on a sustainable supply of forest products. On average, one-third to one-half of all softwood manufactured in Saskatchewan annually is jack pine. In 2022, Saskatchewan's forestry industry supported nearly 8,000 direct and indirect jobs and generated more than $1.7 billion in forest product sales, of which more than 60 per cent is from exports. Losses of pine inventory would interrupt the long-term sustainable wood supply to mills, resulting in reduced mill productivity, manufacturing and ultimately job loss.

Many of Saskatchewan's most visited provincial parks (Cypress Hills, Meadow Lake, La Ronge, Narrow Hills, Candle Lake and Makwa Lake) have large pine forests that, if killed by the beetle, would have serious implications on visitation, experience and public safety.

The beetle has been designated under *The Forest Resources Management Act,* which makes it illegal to import, transport and store pine logs and pine forest products with bark attached if they originate from British Columbia, Alberta, an area in southwestern Saskatchewan around Cypress Hills Interprovincial Park and the United States.

What is happening

State	Trend	Information	Extent
good	improving	partial	province

Since crossing the Rocky Mountains in two mass dispersal events in 2006 and 2009, MPB has spread into lodgepole pine and jack pine forest ecosystems in central and eastern Alberta. Monitoring and early detection of the presence and severity of insect and disease in the forest helps ensure timely detection and response.

Currently, no mountain pine beetles have been detected in the boreal monitoring area.

The overall trend is improving, as the risk of eastern spread through Alberta has declined. Since reaching a peak in 2019, populations in Alberta collapsed by 94 per cent in 2022. The decline can be attributed to sustained early and aggressive control efforts and climatic events that created unfavourable conditions for beetle development and survival. Extreme cold winters in 2019, 2020 and 2021, as well as a cool wet summer in 2019, slowed population growth. Large populations that had been building in the Jasper and Hinton areas of western Alberta have now collapsed. The threat that MPB will spread east through central Alberta and into Saskatchewan's northwest boreal forest has declined. However, MPB populations can increase as quickly as they decrease, and the threat may return in the future if we experience climatically suitable conditions.

Quick facts

- Mountain pine beetles prefer lodgepole pine but can attack and kill all the pine species found in Canada.
- Mountain pine beetles affect pine trees by laying eggs under the bark. The beetles introduce a blue stain fungus into the sapwood that prevents the tree from repelling and killing the attacking beetles. If you see lumber with blue stains, it may have been salvaged from an MPB-infested stand.
- Mountain pine beetles can survive very cold temperatures, down to -40°C. Mild winters and warm summers contribute to the spread of mountain pine beetle.

Last updated: June 2023
Update frequency: annually

What we are doing

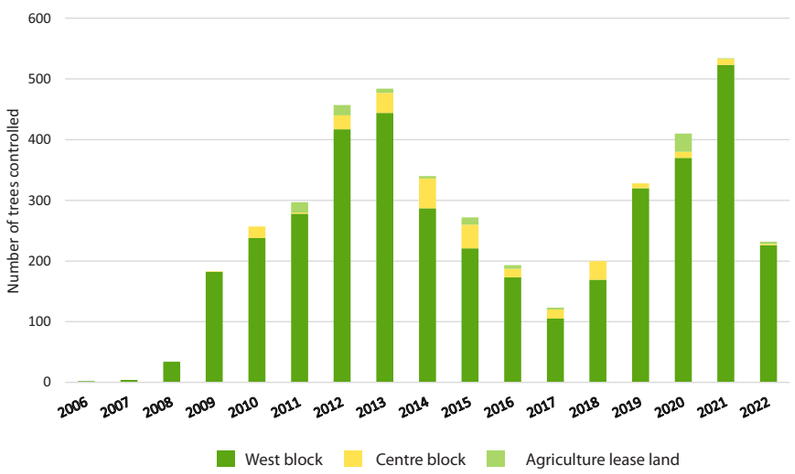
In Saskatchewan, MPB surveillance is conducted in the boreal northwest and in Cypress Hills Interprovincial Park. The ministry conducts ground-based monitoring in highly susceptible jack pine forests in the northwest boreal forest. Between 2011 and 2017, the ministry established a network of helicopter landing and tree-baiting sites to improve access and capacity to detect the leading edge of MPB infestation in the boreal forest. Trees, baited with MPB attractant chemicals, are established in 57 areas where highly susceptible pine exists throughout northwest Saskatchewan. Fifty sites are located north and south of the Cold Lake Air Weapons Range, and seven sites are located within the Air Weapons Range.

Survey and monitoring data support a framework that is crucial to the integrity of a long-term forest health management plan for Saskatchewan. The measure for MPB in the boreal forest is currently its presence or absence. Currently, no mountain pine beetles have been detected in the boreal monitoring area.

The MPB is a natural component of the lodgepole pine forest ecosystem in Cypress Hills Interprovincial Park and is being actively managed through aerial and ground surveys. All lodgepole pine stands within Cypress Hills Interprovincial Park (Centre Block and West Block) and adjacent forested agricultural leased lands around the park (excluding Alberta) are surveyed. If beetles are found, surveyors expand their search area in a circle around infested trees to locate all the trees attacked in the current year.

Once infested trees are found and marked, the next step is a quick and aggressive control response. The most effective control method is to find the beetle-infested trees in fall and winter months, cut them down and burn them before the beetles can leave and attack healthy pine trees in the late spring or early summer. MPB-infested trees are controlled within Cypress Hills Interprovincial Park by the Ministry of Parks, Culture and Sport.

Number of MPB trees controlled in Cypress Hills Provincial Park, 2006-2022



Natural forest disturbance

Why we measure this

Disturbances — such as wildfires — are natural and essential processes in Saskatchewan's boreal forests. They help keep the forest landscape healthy and diverse, and create a mosaic of habitat types that promotes biodiversity. Sustainable forest management is designed to emulate natural disturbances through harvesting to promote biodiversity and a mosaic of stand types and ages. Natural disturbance levels are closely tracked and monitored each year. These levels are then compared to natural disturbance thresholds established in each forest management plan, which are required to be adjusted to ensure sustainable harvest levels where disturbance exceeds the threshold.

While natural disturbances are essential to forest health and renewal, they can also have a negative impact on communities, businesses and public safety. Wildfires can threaten human safety, property and infrastructure, and smoke often becomes a public health concern. Wildfires are also a large source of greenhouse gas emissions in our province.

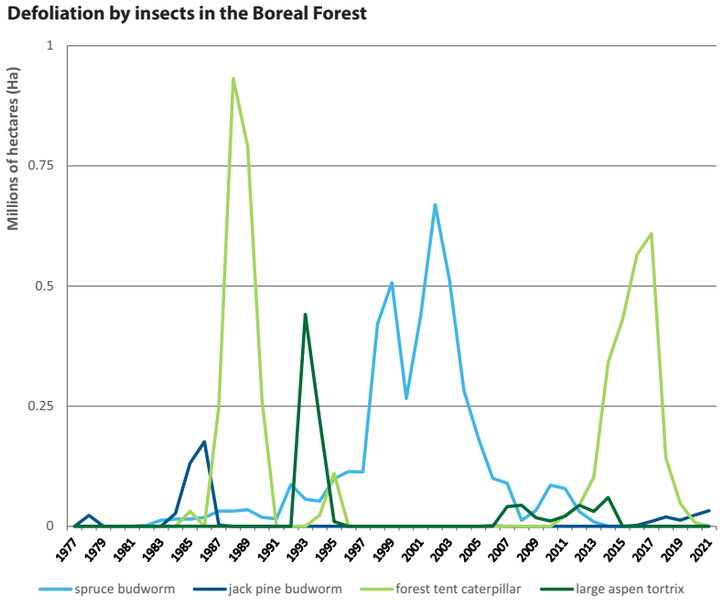
What is happening

State	Trend	Information	Extent
fair	deteriorating	adequate	commercial forest

Natural disturbances are nature's way of shaping the boreal forest. Tree species that grow in the boreal forest have evolved over time to adapt to, and even require, periodic disturbance as part of their natural life cycles. These disturbances can provide forest managers with a guide for how to manage timber harvest sustainably and understand how the landscape is changing from year-to-year. To do this, natural disturbances need to be understood and measured over time.

Insect and disease disturbances are a natural part of the forest ecosystem, but can become problematic when large outbreaks occur. Insects — such as jack pine budworm, forest tent caterpillar and large aspen tortrix — feed on tree foliage and can cause tree mortality after repeated attacks. All of these insects are cyclic in their outbreak behaviours. The spruce budworm cycle is relatively long, with peak outbreaks affecting spruce and fir foliage expected to occur roughly 35 years apart. The most recent outbreak peaked in 2002. Forest tent caterpillar outbreaks in hardwood foliage typically occur every 10-12 years, with outbreaks lasting three to five years. The pattern of outbreaks has been quite regular — occurring in 1986 to 1991, 2001 to 2007 and 2013 to 2019.

Defoliation by insects in the Boreal Forest



Aerial mapping data was unavailable for the early 2000s forest tent caterpillar outbreak and therefore the information does not appear on the graph.

Quick facts

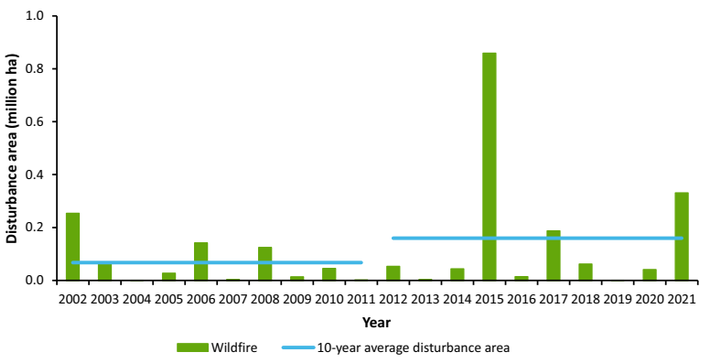
- Compared to natural disturbances, such as wildfire and insect damage, forest harvesting is a relatively small landscape disturbance within Saskatchewan's commercial forest zone. Since 2012, the average area harvested annually for forestry purposes is 21, 010 hectares, compared to an average of 159,460 hectares annually burned in wildfires.
- On average less than half of one per cent of all productive forest land in Saskatchewan is harvested. Wildfires by comparison burn roughly three per cent of the provincial forest area each year.
- A 10,000-hectare wildfire in the commercial forest burns roughly enough wood to build almost 10,000 homes.
- Large wildfires have been the norm in the boreal forest for thousands of years. On average, a given area of forest will burn every 70 years in natural boreal systems. Over half of wildfires are larger than 10,000 hectares in size.
- Every year, about half of Saskatchewan wildfires are started by human activity. These include campfires, industrial activity, agriculture fires, vehicle and ATV exhaust, and arson.

Last updated: June 2023
Update frequency: annually

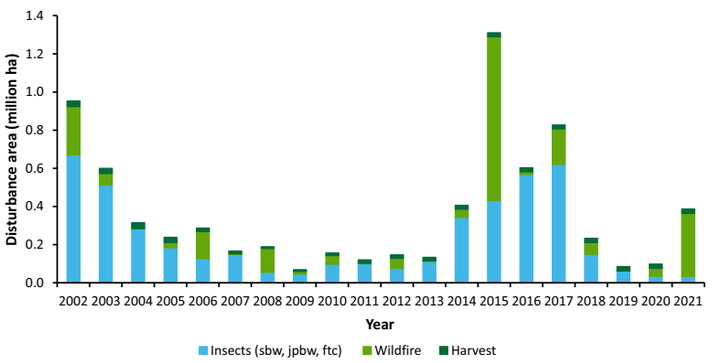
Physical disturbances, such as drought, flooding and extreme wind events, contribute to a biologically diverse and healthy forest as well, but can often result in tree mortality and changes to the forest ecosystem. These types of disturbances can be harder to track and manage.

Wildfire is the largest driver of change in the boreal forest. In pre-industrial times, the boreal plain eco-zone (which is where most of the commercial forest is today) had a fire return interval that averaged 70 years. This means that the likelihood of a fire occurring within a forest type was around once every 70 years. However, the type of fire disturbance would depend on a variety of factors such as weather, moisture levels, stand age, composition and structure. Almost all stands of mature forest you see today in the boreal forest are the result of past wildfires. Wildfires occur less frequently today due to fire prevention and suppression where cabins, infrastructure and other items of value are at risk, but they are still the largest disturbance in the forest. The area burned varies from year to year and is significantly affected by weather. While the number and size of catastrophic wildfires in some North American jurisdictions has increased over the last five years, 20 years of available data do not show any statistically significant increasing trend in Saskatchewan. A changing climate may extend the wildfire season, and the potential for more extreme weather events may be conducive to more wildfires that have a higher burn severity and intensity.

Commercial forest zone area disturbed by wildfire 2002 to 2021



Commercial forest zone area disturbed by insects, wildfire, and harvest 2002 to 2021



Harvest area for the years 2020 and 2021 was estimated based on the area reported for 2019.

What we are doing

The Government of Saskatchewan closely monitors and tracks wildfire activity, harvest levels, tree diseases and insect outbreaks to ensure forest resources are being managed sustainably. Monitoring is a key component of sustainable forest management.

To assess the health of Saskatchewan's forests, the ministry conducts annual aerial surveys to monitor insects, diseases and weather events that cause major forest disturbances. All harvesting in Saskatchewan is closely measured using a variety of tools, and harvest areas are mapped using satellite imagery. Forest managers use this information to guide their planning and decision making. Forest management plans are assessed annually to ensure forest conditions are healthy and harvest levels are sustainable. When natural disturbance levels exceed the re-planning threshold, long-term harvesting plans must be re-modelled. Forest managers are also using the science and principles of natural forest patterns to design harvesting that more closely resembles the shapes and sizes of wildfires.

Saskatchewan uses modern technology and decision-making systems to detect, monitor and suppress wildfires. Resources are also dedicated towards preventing and mitigating wildfires near communities through FireSmart activities.

Private land stewardship

Why we measure this

Land stewardship involves managing soil, air, water and biodiversity resources wisely and in a way that keeps land healthy and productive — now and into the future. Many landowners already practice good land stewardship. Several private conservation organizations and government programs support private stewardship actions through voluntary incentive-based programs. A number of private conservation agencies also contribute directly by buying, restoring and managing land for conservation purposes.

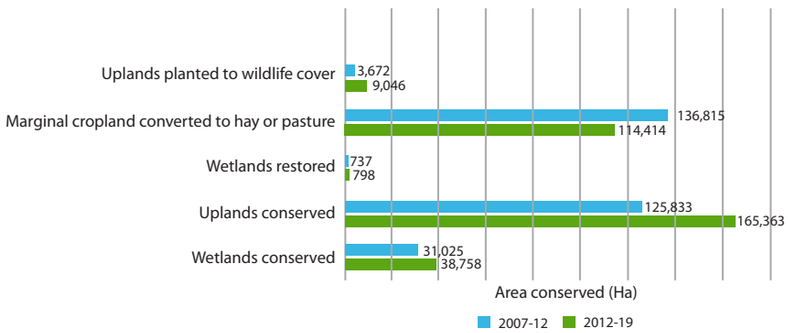
To maintain a sustainable and healthy environment, the Government of Saskatchewan needs assistance from conservation organizations and private land managers. These conservation stewards play an important role in maintaining and conserving natural areas. Good stewardship is key to conserving our natural assets and the values they provide to Saskatchewan people.

What is happening

State	Trend	Information	Extent
mixed/fair	slight decrease	partial	agricultural zone

Private land stewardship in the State of the Environment Report is the area of private and Crown land enrolled in specific programs delivered by Prairie Habitat Joint Venture partner agencies in Saskatchewan. This expands on the 2017 indicator, which was based on the number of participants enrolled in a subset of programs managed by the Water Security Agency, Agriculture and Agri-Food Canada, and Ducks Unlimited Canada.

Area conserved through private land stewardship



What we are doing

Directed by the Saskatchewan Growth Plan, we will work with private land stewards to achieve targets identified in the Climate Resilience Measurement Framework for preserving natural lands, enhancing soil organic matter, promoting nutrient stewardship and achieving economic resilience and crop diversification. Additionally, the province will strive to align regulations, policies and programming to support and reward producers who provide habitat by maintaining natural areas.

We will also continue to support private land stewardship through programs such as the Fish and Wildlife Development Fund, Environmental Sustainability and Climate Change component of the Federal-Provincial Canadian Agricultural Partnership, Agricultural Water Management Strategy and through lease arrangements with private agricultural Crown land lessees and pasture patrons.

Saskatchewan is also a key partner in the Prairie Habitat Joint Venture, a multi-agency conservation partnership under the North American Waterfowl Management Plan (NAWMP) agreement between Canada, the United States and Mexico. Through their participation, Saskatchewan and other Prairie provinces support implementation planning and enable funding support for important private land stewardship programs through NAWMP.

Quick facts

- Since 1989, the North American Waterfowl Management Plan-Prairie Habitat Joint Venture partnership has supported private land stewardship on an estimated two million hectares of land in southern Saskatchewan.
- As of 2017, Statistics Canada estimates that 28 per cent of Saskatchewan farms had developed a formal Environmental Farm Plan, while an additional eight per cent of farms were in the process of developing one.
- Agricultural land provides important habitat to a variety of wildlife species, with natural land for pasture, woodlands and wetlands having the highest habitat value. An estimated 19.3 per cent of agricultural land in Saskatchewan is pasture while wetlands and woodlands make up four per cent.

Last updated: March 2021
Update frequency: every five years

Protected and conserved areas

Why we measure this

In support of the Prairie Resilience climate change strategy, Saskatchewan has committed to protecting 12 per cent of the province's terrestrial areas and inland waters - areas that represent our diverse natural ecosystems.

What is happening

State	Trend	Information	Extent
mixed/fair	increasing	partial	province

Protected areas are added to the provincial Protected and Conserved Areas Network each year. To date, 6,390,710 ha or 9.81 per cent of Saskatchewan's land and waters are contained within the network.

A range of approaches is used for conservation — from traditional tools such as parks and ecological reserves to working landscapes conserved through the *Wildlife Habitat Protection Act* and conservation agreements with ranchers.

A multi-ministry working group assesses and prioritizes areas for conservation by:
- identifying appropriate tools for protection based on ecological value, land tenure, economic potential and cultural significance;
- establishing a work plan to achieve provincial goals for biodiversity conservation; and
- identifying actions and challenges associated with meeting provincial and national targets.

What we are doing

The Protected and Conserved Areas Working Group is a multi-ministry committee that developed the Protected and Conserved Areas Roadmap. The roadmap identifies desired outcomes and goals, as well as the significant steps needed to reach and maintain protection of 12 per cent of the province's land and waters. Saskatchewan is currently working to implement the outcomes, goals and actions identified in the roadmap.

Through the Ministry of Environment, Saskatchewan is exploring tools such as other effective area-based conservation measures (sometimes called OECMs), where biodiversity conservation is not necessarily the primary goal, yet they are managed over the long term in ways that result in effective and enduring protection of biodiversity and ecosystems. This expands the conservation of biodiversity into areas with low to moderate human use levels, but with safeguards to ensure significant components of biodiversity have long-term protection.

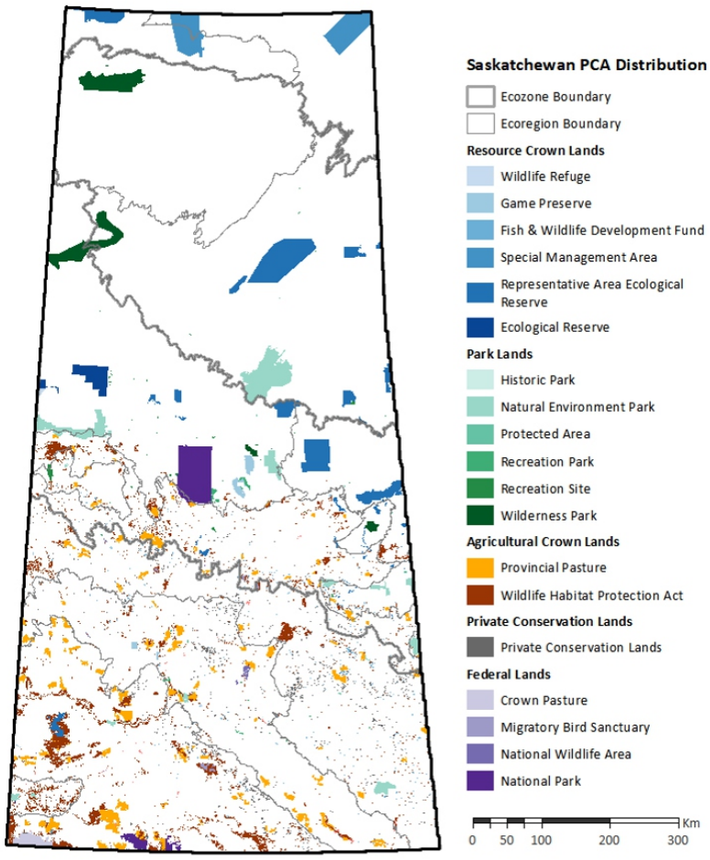
Indigenous Protected and Conserved Areas (IPCAs) are also a new and emerging opportunity where areas are set aside to conserve both ecosystems and culture, and the land is managed, in part, for continued traditional use. IPCAs involve a long-term commitment to the conservation of lands for future generations, and highlight Indigenous rights and responsibilities. Saskatchewan is currently considering how to implement these protected areas in the province.

Quick fact

- To date, 6,390,710 ha or 9.81 per cent of Saskatchewan is contained within the network.

Last updated: June 2023
Update frequency: annually

Saskatchewan protected and conserved areas network, December 2020

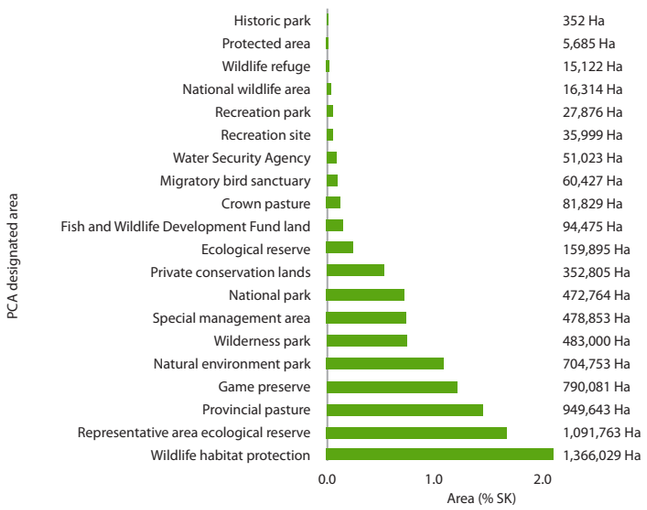


Protected and conserved areas (PCAs) by ecoregion (Ha, % total ecoregion area, % total SK area)

Ecoregion	PCA area (Ha)	PCA area (% Ecoregion)	PCA area (% SK)
Cypress Upland	107,735	21.46%	0.17%
Mixed Grassland	1,347,466	15.59%	2.07%
Mid-Boreal Lowland	329,977	15.26%	0.51%
Tazin Lake Upland	253,534	14.10%	0.39%
Mid-Boreal Uplands	1,329,561	13.05%	2.04%
Selwyn Lake Upland	337,069	11.80%	0.52%
Boreal Transition	497,452	9.18%	0.30%
Churchill River Upland	942,911	8.32%	1.45%
Moist Mixed Grassland	466,445	6.88%	0.72%
Aspen Parkland	527,880	6.46%	0.81%
Athabasca Plain	208,197	2.82%	0.32%
N/A	6,158	N/A	0.01%
TOTAL	**6,354,385**		**9.76%**

Note: N/A indicates PCAs outside of the ecoregions listed, as Saskatchewan's Ecoregion Boundary dataset excludes a small portion of Saskatchewan's total area.

PCA designated area (Ha) as a proportion of total Saskatchewan area (%)



Note: Individual Designated Area statistics do not account for overlap within the PCAN; therefore, hectare values should not be summed within this figure.

Regeneration of timber harvest area

Why we measure this

An important indicator of long-term forest productivity and sustainable forest management practices is the area of harvested forest land sufficiently regenerated according to a measurable standard. Forests that are successfully regenerated are essential to a long-term sustainable flow of wood products and ecosystem productivity. They are also an important indicator of anticipated long-term forest productivity and sustainable forest management practices.

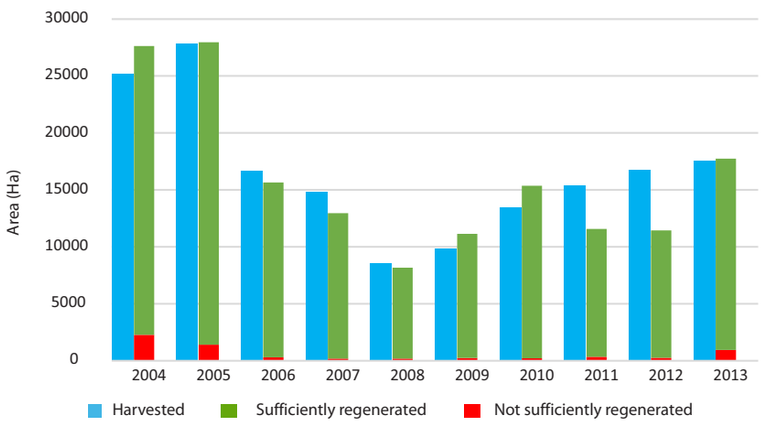
What is happening

State	Trend	Information	Extent
good	improved	partial	commercial forest

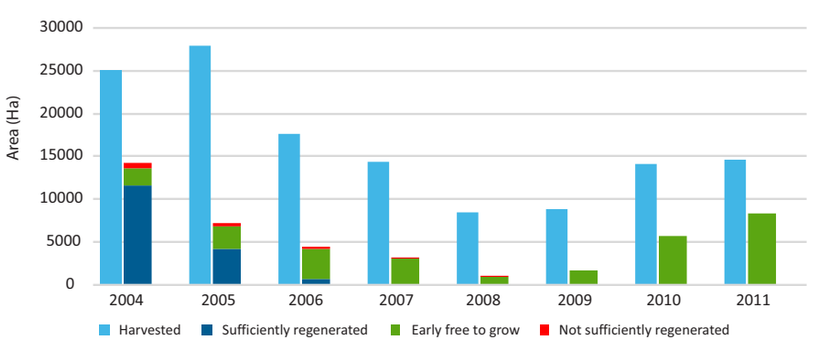
The harvested area does not always match the area surveyed by year of harvest because of the changing sources of the harvest and survey data. The area harvested and surveyed is reported by industry within 18 months of the activity being completed. While every effort is made to ensure data sets are correct at the time of reporting, there can be discrepancies. The reporting time period includes the harvest/fiscal years 2004-05 to 2013-14, as this is the most up-to-date regeneration survey data available from industry.

The establishment survey results demonstrate the forest industry is renewing harvested areas in a timely manner and within acceptable growth standards to meet future forest conditions. The amount of area reported as not sufficiently regenerated (NSR) at establishment for the reported time period is four per cent.

Sufficiently regenerated area at establishment survey
(Four to seven years post-harvest)



Sufficiently regenerated area at free-to-grow survey
(Eight to 14 years post-harvest)



Quick fact

- Ninety-six per cent of the area harvested from 2004 to 2013 is sufficiently re-stocked with healthy growing trees.

Last updated: June 2023
Update frequency: annually

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What we are doing

Every major licensee (forest management agreement and area-based term supply licence holders) that harvests forest products in the province has a legal obligation to ensure that the licence area has also been renewed.

The Forest Regeneration Assessment Standard applies to blocks harvested after 2004 and provides assurance that the achievement of the desired forest condition is likely. There are two timeframes when regeneration is assessed:

1. Establishment: four to seven years post-harvest; and
2. Free-to-grow: eight to 14 years post-harvest.

Waste reduction and recycling

Why we measure this

Saskatchewan has committed to reducing the amount of waste generated per person by 30 per cent by 2030 and 50 per cent by 2040, based on 2014 baseline levels. Finding ways to enhance and expand waste diversion across Saskatchewan will be key in meeting our goals.

Waste management includes reducing, reusing and recycling our waste to prevent it from ending up in Saskatchewan's landfills. Waste reduction or prevention is the preferred approach to managing waste, as it avoids creating additional waste through product design and consumer purchasing habits. Reusing or repurposing an item can give products a second life before they become waste, while recycling is one of the final options available to responsibly manage waste before disposal.

Recycling uses time, energy and resources to reprocess waste materials into new products or materials. Saskatchewan has several regulations and programs that use the extended producer responsibility (EPR) model to encourage reducing, reusing and recycling products and materials. EPR is a policy in which responsibility for the end-of-life management of products and materials shifts to the producers of these materials (i.e. brand owners, first importers or manufacturers) and away from municipalities and general taxpayers. The Ministry of Environment maintains regulations for EPR programs in Saskatchewan for used oil and antifreeze, scrap tires, waste paint, electronic equipment, printed paper and packaging, agricultural plastics, batteries and household hazardous waste. The ministry also works with SARCAN Recycling through a contract to manage the province-wide depot system for the collection and recycling of beverage containers.

One way to reduce pressure on the environment and sustain scarce resources is to divert waste before it gets to landfills. Much of what we describe as trash or waste is a valuable resource. Less waste means better landfill management and less pressure on natural resources. It also means lower carbon emissions. Recycling is an indicator of public commitment to share in the responsibility for environmental stewardship.

What is happening

State	Trend	Information	Extent
good	improving	partial	province

Since 2014, the amount of waste going to landfills in Saskatchewan has decreased from 845 kilograms per capita in 2014 to 791 kilograms per capita in 2015 and 744 kilograms per capita in 2018. A significant and decreasing trend has been observed since 2010. Reducing the amount of waste going to landfill increases their longevity and reduces some of the negative impacts on the environment.

In 2021, Saskatchewan citizens recycled 82 per cent of all deposit-paid, ready-to-serve beverage containers sold in the province, for a total of more than 498 million beverage containers collected. Since 2015-16, the average number of containers recycled and recovery rate has been trending upward, but saw a decline in 2019-20.

The Saskatchewan Paint Stewardship Program collected 375,000 litres of waste paint and 135.5 tonnes of paint cans and containers in 2021. Leftover household paint is also collected at all 73 SARCAN locations for customers to take free of charge and reuse. The Paint Share Program was put on hold in March 2020 due to the pandemic and was restarted in 2022.

Saskatchewan established the first industry-led electronics recycling stewardship program in North America. In 2018, the program was expanded to incorporate additional products, including net-top computers, external disk drives, desktop scanners, e-book readers, floor-standing printers and countertop microwaves.

The Multi-Material Recycling Program is a cost-sharing program between businesses and municipalities to help pay for the collection and recycling of household packaging and paper materials. In 2021, more than 40,146 tonnes of printed paper and packaging materials were recycled and the program now includes more than 500 municipalities, representing 84 per cent of the population.

In 2021, 941,010 tires (more than 24,500 tonnes) were collected through the province-wide tire recycling program.

Quick facts

In 2021:

- 498 million beverage containers were recycled through SARCAN.
- 375,000 litres of paint were collected.
- 2,024 tonnes of waste electronics were collected and recycled.
- 16 million litres of used oil and 1.5 million oil filters were recycled.
- 40,146 tonnes of printed paper and packaging materials were recycled.
- 941,000 tires were collected.
- 2,450 tonnes of grain bags were collected.
- 103 tonnes of single use and rechargeable batteries were collected.
- 11,800 litres of flammables, corrosives, toxics and household pesticides were collected.
- 20,700 units of aerosols and physically hazardous products were collected.

Last updated: June 2023
Update frequency: annually

In 2021, the used oil recycling program collected and recycled more than 16 million litres of used oil, over 271,000 litres of used antifreeze, more than 1,000 tonnes of oil filters and almost 410 tonnes of plastic containers.

Saskatchewan launched an agricultural plastics recycling program under *The Agricultural Packaging Product Waste Stewardship Regulations in 2018*. The program is the first of its kind in Canada and provides a responsible option for producers to return plastic grain bags for recycling. In 2021, the program collected more than 2,450 tonnes of grain bags.

In 2019, The Household Hazardous Waste Product Stewardship Regulations came into effect, requiring sellers of household hazardous waste products to manage the collection and safe disposal of the products. The program for household batteries was launched in January 2021 and collected over 103 tonnes of single use and rechargeable batteries that year. The program for flammable, corrosive and toxic materials, aerosols and physically hazardous products launched in April 2021, with more than 11,800 litres of flammables, corrosives and over 28,000 units of aerosols and physically hazardous products collected during the year.

What we are doing

Plastic waste management has emerged as a significant and rapidly evolving public issue that is putting pressure on municipal recycling programs in Saskatchewan and throughout Canada. In November 2018, through the Canadian Council of Ministers of the Environment (CCME), federal, provincial and territorial governments approved the Canada-wide Strategy on Zero Plastic Waste. Building on the Ocean Plastics Charter, the CCME strategy takes a circular economy approach to plastics and provides a framework for action. The key areas in the strategy include product design, single-use plastics, collection systems, markets, recycling capacity, consumer awareness, aquatic activities, research and monitoring, clean up and global action. Saskatchewan supports the strategy, which complements other waste reduction efforts in the province, such as the development of the Solid Waste Management Strategy.

The Government of Saskatchewan continues to work with partners and stakeholders to implement the actions in the Solid Waste Management Strategy, which was released in January 2020. The strategy strives for a practical, sustainable and integrated solid waste management system in Saskatchewan, and serves as a roadmap for waste reduction and management. It outlines six goals and several commitments to raise public awareness, encourage regional collaboration, modernize rules and regulations, enhance waste diversion, foster innovation and demonstrate government leadership. Saskatchewan's strategy adopts and supports the targets set in the CCME's Strategy on Zero Plastic Waste — to reduce the amount of waste generated per person by 30 per cent by 2030 and 50 per cent by 2040. The Solid Waste Management Strategy supports the Saskatchewan Growth Plan, ensuring economic growth is balanced with responsible management of our waste and protection of our environment.

Most of the waste we generate is actually a resource that can be used more than once. A thriving Saskatchewan economy is a circular economy, where the value of materials is recaptured by reuse and recycling programs.

Water allocations

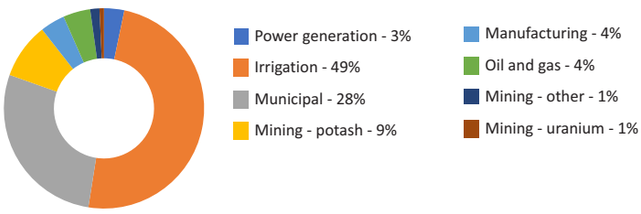
Why we measure this

Reliable water supplies are essential to Saskatchewan's continued economic development and high standard of living. Water is allocated for various purposes, including agricultural, industrial, municipal and domestic use. Governing water allocations ensures the province's water resources are available for current and future generations.

What is happening

State	Trend	Information	Extent
mixed/fair	mixed/no change	adequate	province

Surface allocations by sector 2022



Usage by source and watershed, 2021

Cubic decametres (dam^3)

1 dam^3 = 1,000 m^3 = 1 million litres

Source Watershed	Ground	Surface
Assiniboine River	7,061	1,729
Battle River	3,817	1,745
Beaver River	1,629	2,853
Big Muddy Creek	180	1,198
Black Lake	0	440
Carrot River	1,203	2,432
Churchill River	281	1,877
Cypress Hills North Slope	859	19,990
Eagle Creek	7,043	4,554
Lake Athabasca	0	181
Lake Diefenbaker	999	2,905
Lake Winnipegosis	1,520	2,917
Lower Qu'Appelle River	7,395	6,546
Lower Souris River	2,165	1,874
Milk River	636	40,707
Moose Jaw River	366	19,930
North Saskatchewan River	31,550	28,368
Old Wives Lake	2,204	46,520
Poplar River	1,835	6,233
Quill Lakes	2,761	4,534
Reindeer River / Wollaston Lake	2,379	1,055
Saskatchewan River	2,152	2,370
South Saskatchewan River	4,532	239,764
Swift Current Creek	1,129	13,253
Upper Qu'Appelle River	6,666	62,215
Upper Souris River	9,842	21,042
Wascana Creek	5,030	3,034

The table provides a snapshot of the total volume of water allocated from surface water sources within each of the watersheds. It provides a general indication of development intensity, but is not necessarily an indication of stress on our water resources. Individual projects are reviewed on a case-by-case basis against the available water from the proposed source. This review also considers the cumulative impacts of all uses.

Quick facts

- Irrigation and municipal uses are the two largest users of water in Saskatchewan, accounting for almost 80 per cent of surface water use.
- The Water Security Agency operates 72 dams in Saskatchewan to ensure a sustainable and reliable quantity of water for municipal, industrial and agricultural use.

Last updated: June 2023
Update frequency: to be determined

The Water Security Agency receives approximately 150 to 200 water allocation requests per year: 60 per cent of requests are for surface water use, 40 percent are for groundwater use.

What we are doing

The use or diversion of water in Saskatchewan is regulated by the Water Security Agency, through *The Water Security Agency Act*.

Requests for water allocations for various purposes, including agricultural, industrial, municipal and, in some cases, domestic use, must undergo a regulatory review and are subject to licensing and conditions to ensure water resources are managed properly.

The first step in reviewing a request to use water is an assessment of water availability at the point of diversion. The Water Security Agency completes this using the best available information to determine the suitability of the source to provide adequate water under a range of climatic conditions (such as drought) without negatively impacting existing water users, the watershed or future water management. Subject to a satisfactory review, and once all legislative requirements have been met, the agency may issue a Water Rights Licence and an Approval to Construct the necessary diversion works. Upon completion of the construction and confirmation of compliance of the project and plans, the Water Security Agency issues an Approval to Operate Works.

Water consumption and conservation

Why we measure this

With a growing population, there is increasing pressure on Saskatchewan's water resources. Economic growth, climate change and extreme weather events also add to the strain, making this measure even more important.

Conserving our water makes economic sense. If water conservation can keep demand within the capacity of existing systems, expensive investments in new reservoirs and pipelines can be reduced or avoided. Pumping and treating water also consume energy. Reducing the use of treated water cuts energy consumption and greenhouse gas emissions.

What is happening

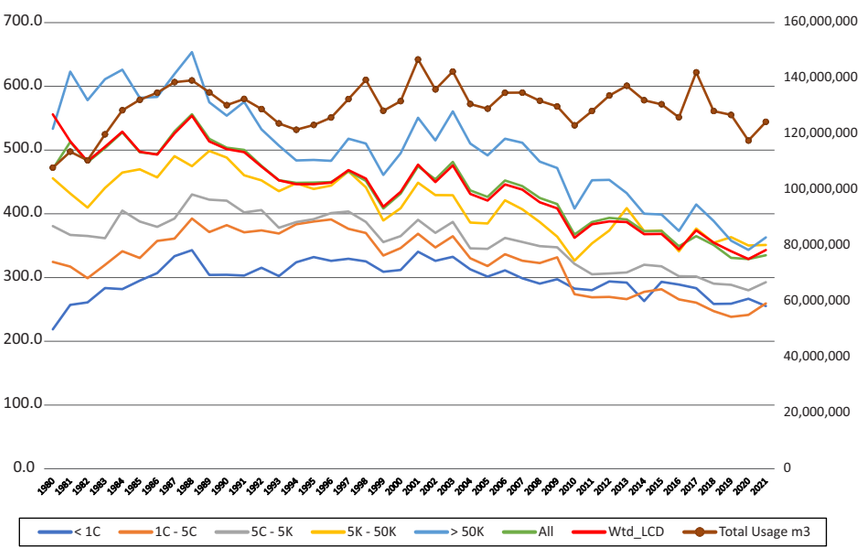
State	Trend	Information	Extent
good	improving	adequate	province

Saskatchewan's water usage continues to trend downward; however, in 2021 there was a slight increase over the previous couple of years, with residents using an average of 343 litres per capita per day (versus 329 litres per capita per day in 2020). Since some communities have not reported (400 communities reported in 2017 and 336 in 2021), the Water Security Agency cannot determine an absolute difference in overall usage.

Over the last 30 years, total community water consumption has generally been stable, but with a general decrease in usage rates (litres per day). The decline in usage is likely the result of technological investments (e.g. new water mains and high efficiency plumbing fixtures) and behavioural influences on water use.

Usage rates in smaller communities are more variable, with the smallest communities trending towards increased usage. This is likely due to improvement in the security of water supplies, or the transition to other water treatment technologies with higher raw water requirements (e.g. reverse osmosis). Small communities are also more likely to see increases in per capita use as a result of declining populations. That is, the water used for municipal services and commercial operations may not decline, but will be spread over a smaller population base.

Community water usage and rates, 1980-2021



Quick Facts

Here are some simple ways to significantly reduce water consumption in your home:

- Retrofit faucets and showerheads with a tap aerator.
- Use a broom instead of a hose to clean driveways, sidewalks, patios and similar areas in the yard.
- Water your garden early in the morning to avoid excessive loss by evaporation.
- Turn off the water tap when brushing your teeth.
- Wait until you have a full load to run laundry and dishwashing machines.
- Take shorter showers. Reducing your shower time by two minutes can save 2,600 litres per month.
- Check your toilet for leaks and retrofit with water-saving devices.

Last updated: June 2023
Update frequency: to be determined

What we are doing

The Water Security Agency continues to promote responsible water use through public education, partnerships and a variety of programs. Water rates set by waterworks owners that recognize the true and full cost of system design, construction, operation and maintenance also help promote water conservation.