



# Climate Resilience in Saskatchewan

2023 Report

# Table of Contents

Minister's Message .....	1
Executive Summary .....	2
About the Climate Resilience Measurement Framework .....	3
Snapshot of 22 Resilience Measures .....	5
Five Key Areas of Resilience .....	7
Status of Measures by Key Area	
Natural Systems .....	8
Physical Infrastructure .....	14
Economic Sustainability .....	23
Community Preparedness .....	29
Human Well-Being .....	33
Glossary .....	38
List of Abbreviations .....	39

## How to Read this Report

The Resilience Report is divided into five key areas: natural systems, physical infrastructure, economic sustainability, community preparedness and human well-being.

The trend and status are given for each measure (Figure 1). The trend indicates whether values are increasing, decreasing, or maintained. The status is deemed as either good, fair or poor. Whether or not the target is met is described alongside its status.

The direction of each trend arrow depends on the measure. A downward arrow is positive in some cases, like with greenhouse gas (GHG) emissions, as reducing emissions helps promote resilience. In others, like forest areas under wildfire fuel management, an upward arrow would be positive, representing an increase in the total area.

The indicator direction can land above or below targets annually, but the indicator status is based on trends over time.

A statement of how each measure contributes to building resilience is provided for each of the 22 measures.

Trend		Status	
Increasing	↑	Good	●
Maintained	↔	Fair	●
Decreasing	↓	Poor	●

**Figure 1:** Symbols for classifying the trend and status of progress of measures to achieving their respective target. Both the trend and the status are presented for each measure.

# Minister's Message



Hon. Christine Tell  
Minister of Environment

I am pleased to provide this update on Saskatchewan's continued efforts to implement and report on the Climate Resilience Measurement Framework, a key component of *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy*. This is our fifth iteration of the report, highlighting work from across the government to support climate resilience in alignment with *Saskatchewan's Growth Plan for the Next Decade of Growth: 2020-2030*.

The framework comprises twenty-two resilience indicators across five essential areas: natural systems, physical infrastructure, economic sustainability, community preparedness and human well-being. The comprehensive approach adopted by Saskatchewan is unique in Canada, encompassing emission reduction efforts and adaptation to climate change impacts.

Key highlights from the 2023 Resilience Report include:

- Twenty of the 22 reported measures are in good standing, indicating progress in strengthening climate resilience.
- Positive trends in economic sustainability and human well-being demonstrate Saskatchewan's commitment to building resilience in these sectors.
- Oil and gas emissions fell for the third year in a row. Emission reductions have been achieved and will likely be exceeded in 2025.
- Impressive strides by SaskPower in adding more renewable energy to the provincial grid, improving our provincial energy sustainability.

In addition, the report provides further insight into the progress made in implementing the Climate Resilience Measurement Framework, revealing the impact of climate change policies as the primary social and economic effects of the pandemic recede.

The implementation and reporting of the framework is a solid example of collaboration between ministries and agencies, exemplifying the one-government approach to addressing climate change and building resilience in Saskatchewan.

We remain dedicated to monitoring the province's resilience to climate change and identifying areas for improvement or additional policies and programs to enhance our overall resilience.

To learn more about Saskatchewan's resilience-based approach, please visit *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy* at [saskatchewan.ca/climate-change](https://saskatchewan.ca/climate-change).





# Executive Summary


The 2023 Resilience Report is the fifth annual report by the Ministry of Environment monitoring resilience in Saskatchewan's natural systems, physical infrastructure, economic stability, community preparedness and human well-being. Five years of data collection allows Saskatchewan to assess trends over an extended period of time and to evaluate the effectiveness of policies and programs.

Overall, trends in the resilience measures are positive. The number of measures with "good" status is 20, maintaining the trajectory upwards. Two measures are considered "fair" status. As in previous reports, there are no measures with "poor" status. These results demonstrate that the province continues to make progress in resiliency to climate change.

All reported measures under community preparedness, human well-being and physical infrastructure are in good standing. Resilience measures considered fair include total protected areas and emissions intensity of Saskatchewan's economy.

The Ministry of Environment works in partnership with stakeholders to pursue complementary programming to improve the status of resilience measures. For example, SaskPower has contributed updates on several initiatives that strengthen its efforts to build resiliency in the electricity sector. Saskatchewan is also working with Fertilizer Canada to support adopting 4R practices in our province's cropland, reducing greenhouse gas emissions and increasing resiliency in the agriculture sector.

The Government of Saskatchewan will continue tracking, reporting and improving climate resilience measures to identify areas to focus on and improve and better understand Saskatchewan's resilience to climate change.



Resilience is the ability to cope with, adapt to and recover from stress or change, while continuing to develop.



# About the Climate Resilience Measurement Framework

Climate change is a multifaceted and multi-sectoral issue requiring an approach that allows Saskatchewan to increase resilience in its natural landscapes, physical infrastructure, economy and communities. *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy* takes a resiliency-based approach to reduce greenhouse gas emissions while strengthening Saskatchewan's adaptation to climate change.

In 2018, Saskatchewan released its Climate Resilience Measurement Framework. The framework contains a broad and balanced set of measures with specific targets across five key areas: natural systems, physical infrastructure, economic sustainability, community preparedness and human well-being. The Government of Saskatchewan is committed to tracking progress toward building resilience by reporting and assessing the measures in these five key areas yearly. The first annual Resilience Report was released in April 2019 and introduced the baselines and targets for each measure. From 2020 the reports present the trend and status for each measure, showing most measures in good standing and none with poor status.

## How is Saskatchewan building its resilience to climate change?

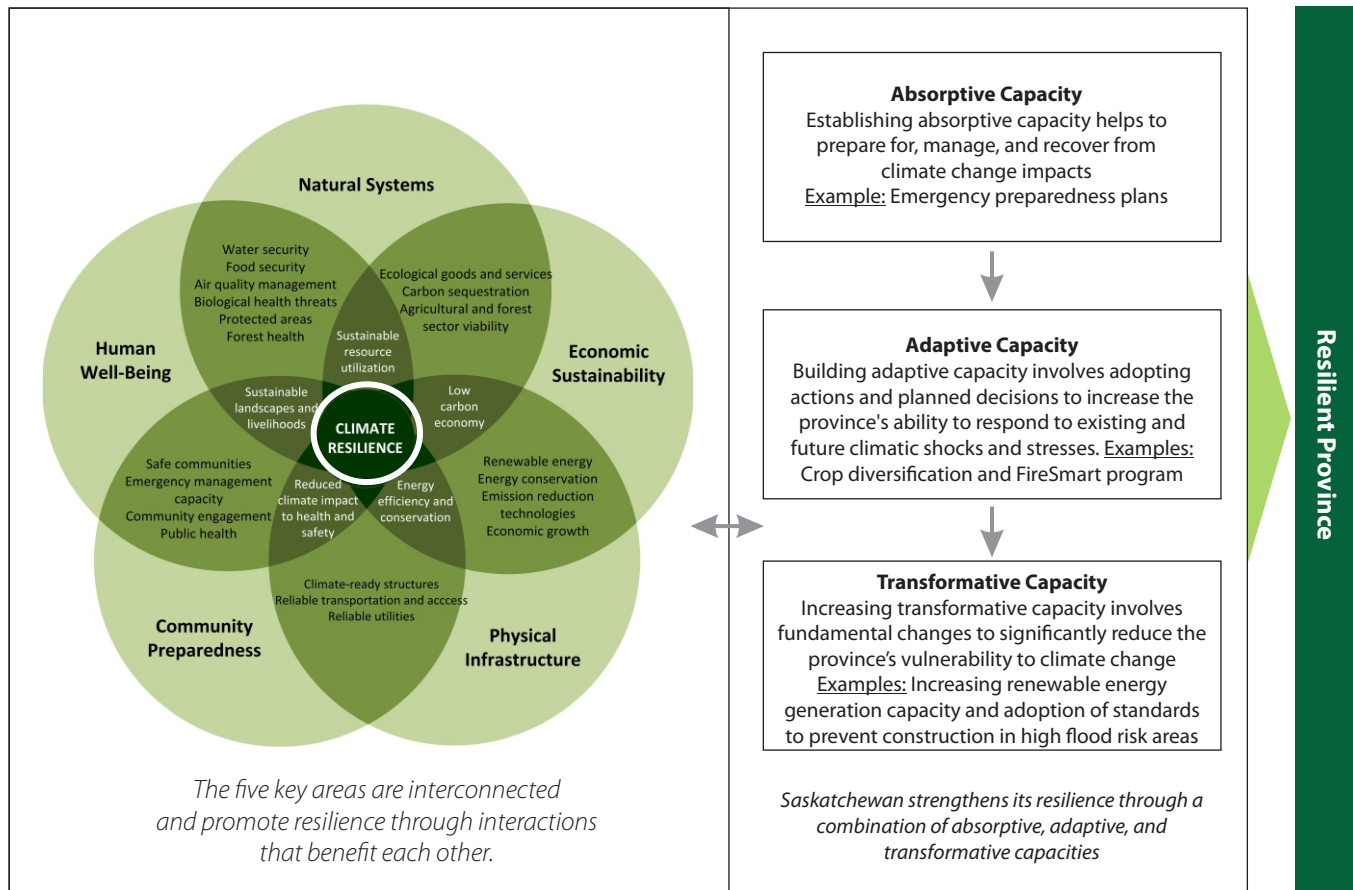
Saskatchewan takes a system-wide approach to prepare for a changing climate. This includes improving the resilience of the province's natural landscapes, physical infrastructure, economy, communities and people (Figure 2). This approach strengthens Saskatchewan's absorptive, adaptive and transformative capacities in adapting to climate change.

All five resilience areas are interconnected and interdependent. For example, growth in the province's economy has far-reaching benefits to communities and the well-being of people in Saskatchewan. Managing the province's natural landscapes provides multiple benefits, including support for economic growth and ecological services, such as food, fuel, water, air purification, carbon storage and maintenance of wildlife habitats. In contrast, the amount of energy consumed by residents and industries in the province influences greenhouse gas emissions. These interconnections are further highlighted in the following sections describing each indicator.

Resilience refers to a system's ability – such as a community, ecosystem, or province – to cope with, adapt to and recover from stress or change while continuing to grow and evolve.







**Figure 2:** The five key areas of the *Climate Resilience Measurement Framework*. The diagram shows the interrelated nature of the framework, as well as its contribution to three components of resilience.

Saskatchewan's system-wide approach to climate resilience focuses on strengthening the province's ability to absorb, adapt and transform throughout all key resilience areas.

# Snapshot of 22 Resilience Measures<sup>1</sup>

Measures <sup>2</sup>	Target	Current Status <sup>3</sup>	<div> <div>Increasing</div> <div>Maintained</div> <div>Decreasing</div> </div> <div> <div>Good</div> <div>Fair</div> <div>Poor</div> </div> <div> <div>↑</div> <div>↔</div> <div>↓</div> </div> <div> <div>↔</div> <div>↔</div> <div>↔</div> </div> <div> <div>↑</div> <div>↓</div> </div> <div> <div>↔</div> </div> <div> <div>↑</div> </div>
-----------------------	--------	-----------------------------	--

Trend<sup>4</sup>

<sup>1</sup> The Climate Resilience Measurement Framework and previous Resilience Reports account for 25 measures. This year 22 measures have been reported, and three are being reassessed.

<sup>2</sup> The numbers of ongoing and updated measures have changed from previous reports. New measures also have new numbers. The measures' names have not changed.

<sup>3</sup> Some measures have a one- to two-year lag in data availability, including measures 8, 13, 14 and 20. Measure 1 has a five-year lag in data from the Census of Agriculture.

<sup>4</sup> The trend indicates whether values increase, decrease or maintain and whether status is good, fair or poor. Whether a specific trend is good will vary by measure. For example, a downward arrow in green is deemed as "good" for a decreasing trend in GHG emissions since it increases resilience. In contrast, for a measure of the area of fuel management, a green, upward arrow indicates an increasing area managed for wildfire and assessed as "good".















<sup>5</sup> The timeline for this target has been updated as part of the assessment of this measure. The target is also slightly higher than that used in past reports, which proposed a target of 7,809,629 hectares. The revised target is based on a new protocol by Environment and Climate Change Canada in 2020 to calculate statistics for protected areas, which used a provincial land area of 65,103,600 hectares. This resulted in an increase of approximately 3,000 hectares to achieve 12 per cent protection.

<sup>6</sup> The methodology to determine total protected areas was adjusted in 2020. As a result, the reported total area in previous reports has been adjusted. Refer to the measure's summary for revised estimates.

<sup>7</sup> This target increased to a 50 per cent reduction from 2005 levels of 40 per cent, which was given in previous reports. The adjustment is based on an increased commitment to reducing GHG emissions in this sector by 2030.

<sup>8</sup> Using updated Geographic Information System (GIS) data sources, SaskPower improved the accuracy of this measure's baseline and previous years' reported area. This resulted in a change in the total area managed from 21,785 hectares to 13,894 hectares. Therefore, the target of this measure changed to 1389 hectares.

<sup>9</sup> "Government-owned buildings" refers to executive government buildings only; excludes Crown, Saskatchewan Health Authority and Education School Board buildings.

Measures	Target	Current Status	Trend	
<div>Increasing ↑ Maintained ↔ Decreasing ↓</div> <div>Good Fair Poor</div> <div>  </div>				
Economic Sustainability				
12. Total GHG emissions produced in association with oil.	By 2025, reduce GHG emissions to 6.4 Mt CO <sub>2</sub> e (4.5 Mt CO <sub>2</sub> e reduction from 2015 emissions).	3.9 Mt CO <sub>2</sub> e in 2022, falling below the 2025 target.	Decreased	
13. Emissions intensity of Saskatchewan's economy (GHGs per unit of GDP).	Continued decrease in the emission intensity of Saskatchewan's economy.	In 2021, GHG emission intensity was 813 tonnes of CO <sub>2</sub> e per million, chained 2012 dollars.	Increased	
14. Realized net farm income (RNFI).	No greater than 50 per cent decrease in RNFI from the previous five-year average.	In 2021, realized net farm income showed an increase of 36 per cent compared to 2020.	Maintained	
15. Percentage of cultivated land in different types of crops.	No one crop type to rise above 50 per cent of the cultivated area.	In 2022, no crop comprised more than 50 per cent of the cultivated area.	Maintained	
16. Annual sustainable timber harvest utilization.	Not to exceed 100 per cent of the annual allowable cut (AAC) for any Timber Supply Area (TSA).	As of the 2021-22 fiscal year, all TSAs in the province were below the AAC limit.	Maintained	
Community Preparedness				
17. Flood mapping completed for communities at risk of flooding and where benefits validate the costs.	By 2030, 100 per cent of communities at risk of flooding have completed modern flood-mapping, where costs are commensurate with the benefits.	In 2021-22, five communities had access to modern maps, an increase of one from the previous year.	Increased	
18. Number of wildfire community preparedness completed for at-risk northern communities.	By 2030, all 84 at-risk communities have wildfire community preparedness plans completed.	In 2021-22, two wildfire community preparedness plans were completed, resulting in 68 at-risk communities (81 per cent) with plans.	Increased	
19. Total hectares of Saskatchewan Crown land with wildfire fuel management work complete.	By 2028, 2,248 hectares adjacent to communities.	As of March 31, 2022, the Saskatchewan Public Safety Agency has completed fuel management for 1,394 hectares of Crown land in the provincial forest. This is an increase of 197 hectares from the previous year.	Increased	
Human Well-Being				
20. Average municipal water consumption per capita and total municipal water consumption, as a measure of water use efficiency.	Decrease municipal water consumption per capita and total municipal water consumption (increased water use efficiency).	Per capita, municipal water use increased in 2021, with residents using an average of 335 litres per person per day, compared to 326 litres per day in 2020.	Maintained	
21. Saskatchewan's Healthy Beaches Program.	At least 95 per cent of water samples taken from suitable beaches in Saskatchewan are within the healthy limits for pathogens ( <i>E. coli</i> ) and microcystin (cyanobacteria).	In 2022, <i>E. coli</i> was within acceptable safety limits in more than 95 per cent of water samples taken from participating beaches, and microcystin was within acceptable safety limits in more than 98 per cent of water samples.	Maintained	
22. Number of active surveys at suitable habitat sites for Lyme disease and other tick-borne diseases.	Beginning in 2022, conduct at least 55 surveys across samples from at least 50 sites annually to monitor the risk of vector-borne illnesses influenced by a changing climate.	In 2022, 58 surveys were conducted at 53 sites for Lyme disease and other tick-borne diseases. No black-legged ticks ( <i>Ixodes scapularis</i> ) were detected during active surveys in 2022.	Maintained	



# Five Key Areas of Measures

This year's report includes 22 measures organized into five key areas:



## Natural Systems

1. Total agricultural land under permanent cover.
2. Percentage of agricultural land areas with 4R nutrient stewardship plan.
3. Soil protection compliance rate of commercial forest harvesting in Saskatchewan.
4. Total protected areas in Saskatchewan.
5. Seedlings distributed from SaskPower's Shand Greenhouse.



## Community Preparedness

17. Flood mapping completed for communities at risk of flooding and where benefits validate the costs.
18. The number of wildfire operational preparedness plans completed for at-risk northern communities.
19. Total hectares of Saskatchewan Crown land with wildfire fuel management work complete.



## Physical Infrastructure

6. The total number of culverts on the national highway system meets new provincial flood standards.
7. Saskatchewan's renewable energy generation capacity.
8. Total greenhouse gas (GHG) emissions from Saskatchewan's electricity sector.
9. The area of SaskPower power line right-of-way widened.
10. Total energy consumption for Saskatchewan government-owned buildings.
11. Total GHG emissions from Saskatchewan government-owned buildings.



## Human Well-Being

20. Average municipal water consumption per capita and total municipal water consumption.
21. Saskatchewan's Healthy Beaches Program.
22. The number of active surveys at suitable habitat sites for Lyme disease and other tick-borne diseases.



## Economic Sustainability

12. Saskatchewan's total GHG emissions from gas produced in association with oil.
13. Emissions intensity of Saskatchewan's economy.
14. Saskatchewan's realized net farm income.
15. Percentage of cultivated land in several types of crops.
16. Annual sustainable timber harvest utilization.





# Natural Systems

**Natural systems** refer to the integrity of Saskatchewan's land, water and forests. The management of natural systems determines the ecosystem's resilience to climate change and the ecological goods and services they provide, such as food, fibre, fuel, water, air purification, carbon storage and wildlife habitat. Natural systems also provide cultural ecosystem services, including sites for recreation and the provision of traditional practices. Natural systems inherently support climate change mitigation through carbon sequestration in soils, forests and wetlands.

1. Total area of agricultural land under permanent cover
2. Percentage of agricultural land area with 4R nutrient stewardship plan
3. Soil protection compliance rate of commercial forest harvesting in Saskatchewan
4. Total protected areas in Saskatchewan
5. Seedlings distributed from SaskPower's Shand Greenhouse





## Measure 1

### Total area of agricultural land under permanent cover

This measures the total area of native prairie, tame or seeded pasture and tame hay.



### Target

Maintain total area at 8.06 million hectares (19.93 million acres).

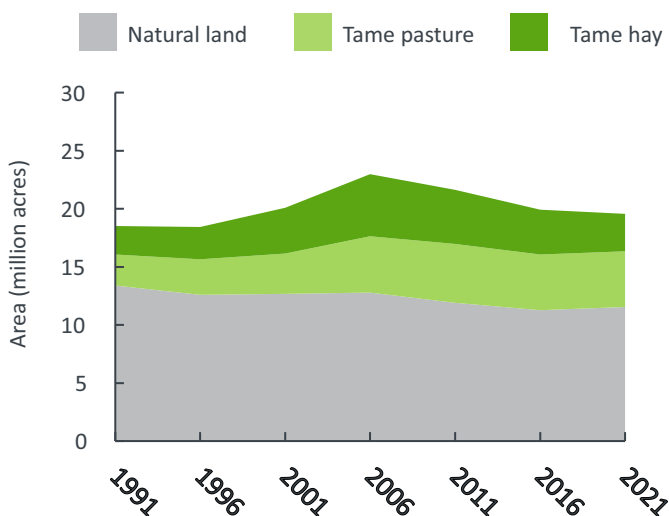
### Status

The most recent Census of Agriculture (2021) was released by Statistics Canada in May 2022. As of 2021, there are 7.91 million hectares (19.56 million acres) of agricultural land under permanent cover. Saskatchewan's total agricultural land under permanent cover decreased slightly (374,025 acres or 1.9 per cent) between 2016 and 2021 (Figure 3).

Several factors have contributed to the decrease in agricultural land under permanent cover. One of the largest impacts is the widespread drought over the last few years and declining cattle herd size across the province. Land under permanent crop cover (forage) tends to fluctuate with trends in annual crop prices relative to livestock prices and corresponding changes in cattle herd size. Saskatchewan has recently experienced record-high crop prices, influencing an increase in annual crop area and contributing to the decline in total forage acres. An additional factor of the decrease in permanent crop cover is the rise of producers' retirements/exits from the industry with fewer new entrants, contributing to the reduction in cattle herd size and land under permanent cover.

### How does the measure contribute to building resilience?

Permanent cover includes native prairie, tame pastures, tame hay, and tree cover. Lands in grass, especially on marginal lands, are more resilient to drought and floods than lands under annual cropping. Grasslands contribute to carbon sequestration and provide habitat for wildlife, which helps maintain biodiversity, especially on native prairie. A permanent cover can also help buffer against the spread of weeds.



**Figure 3:** Total area of agricultural land under permanent cover.

Source: Statistics Canada Table 32-10-0406-01 and 32-10-0359-01

#### Program Highlight

#### The Canadian Agricultural Partnership Farm Stewardship Program

Through the Canadian Agricultural Partnership Farm Stewardship Program, the province provides cost-share funding to producers for beneficial management practices that help maintain agricultural land under permanent cover. These practices include native rangeland grazing management; conversion of marginal cultivated lands to permanent native forage; and conversion of marginal cultivated lands to permanent tame forage. For example, from April 2018 to March 2023, there were 1,382 forage applications funded at more than \$5.6 million. In the last year, 262 applications were approved.



## Measure 2

### Percentage of agricultural land area with a 4R Nutrient Stewardship Plan

This measures the total area of agricultural land in Saskatchewan managed under an improved fertilizer management strategy that incorporates the right fertilizer source at the right rate, at the right time and in the right place (4R).



### Target

By 2025, 25 per cent of Saskatchewan's cropland is under 4R designation.

### Status

As of 2022, approximately 10.9 per cent of the province's agricultural land is under 4R designation. This is an increase of 42 per cent since the last report.

Since it was first reported, uptake of 4R designation has increased among Saskatchewan producers. In 2022, the total cultivated area under the 4R designation in Saskatchewan increased by more than 1,651,400 acres compared to 2021. These results show that the Ministry of Agriculture and Fertilizer Canada's actions to increase the 4R designation are effective. The Saskatchewan 4R Nutrient Stewardship Advisory Committee continues to work to promote 4R practices in Saskatchewan through communication and extension activities.

### How does the measure contribute to building resilience?

A 4R Nutrient Stewardship Plan allows farmers to use fertilizer more efficiently. A 4R approach that considers the right source, rate, time and place of fertilizer application can help protect the environment and water bodies by reducing excess fertilizer washed away by rain or snowmelt. It can also help reduce GHG emissions from fertilizer use, specifically nitrous oxide emissions ( $N_2O$ ). This is significant as the greenhouse effect of  $N_2O$  is at least 298 times more potent than that of  $CO_2$ .

#### Saskatchewan's agricultural land under 4R designation (2022)

Total 4R Designation	1,624,935 ha (4,015,303 acres)
Total crop are in Saskatchewan	14,905,422 ha (36,832,100 acres)
% crop area under 4R designation	10.9 per cent

Source: Data for 4R designation from Fertilizer Canada; total agricultural land in Saskatchewan from Statistics Canada Table 32-10-0359-01 Fertilizer Canada reported



In 2021, Fertilizer Canada reported that roughly three out of five Saskatchewan growers were sampling soil for phosphorus every three years (as recommended).



In 2022, three out of five Saskatchewan farmers continue to follow this recommendation. These numbers show continuous interest in farmers adopting good practices for more efficient fertilizer use.





## Measure 3

### Soil protection compliance rate of commercial forest harvesting in Saskatchewan

This measure tracks the soil protection compliance rate of the Forest Operations Standard for all commercial forest operations in Saskatchewan.



### Target

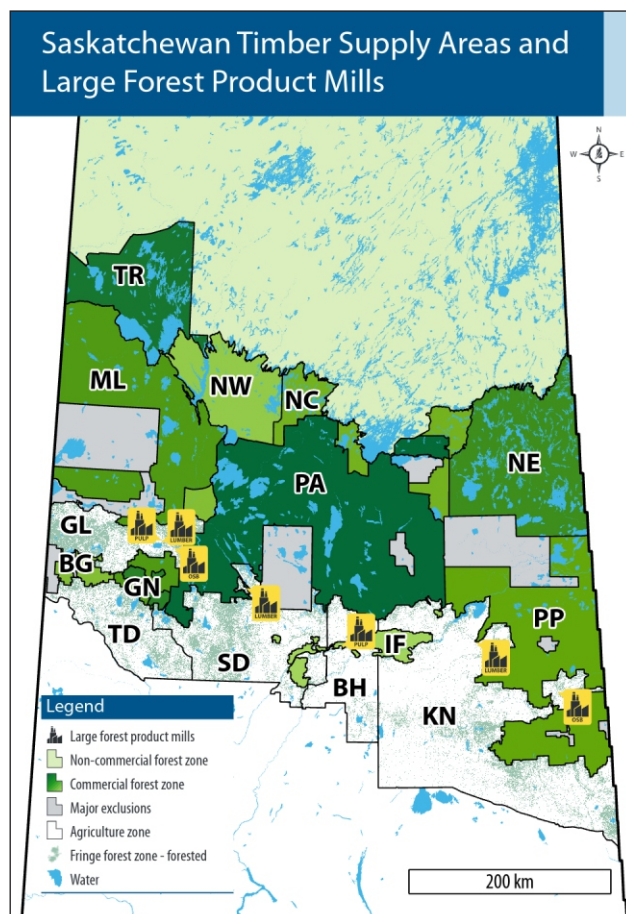
Maintain an annual compliance rate of 95 per cent with the Forest Operations Standard related to soil protection on harvest blocks inspected in the commercial forest zone provincially and by Timber Supply Areas (TSAs).

### Status

In 2021-22 the overall compliance of all inspected TSAs was 95 per cent, and the lowest compliance rate for a single TSA was 86 per cent. Not all TSAs were inspected during this period due to the low level of harvesting. Over the last four years, the overall compliance rate has been 97 per cent.

### How does the measure contribute to building resilience?

In the boreal forest, a significant amount of carbon is stored in the forest soil, including leaf litter and dead organic matter. Changes in nutrient cycling in forest soils caused by harvesting can impact soil quality, affecting ecosystem conditions and forest productivity. Saskatchewan legislation is designed to protect forest soils in harvest and riparian management areas through the provincial rutting, soil disturbance and site preparation standards. This ensures the impacts of harvesting on soil quality are minimal, which supports long-term maintenance of forest biodiversity and sustainability.



### Soil protection compliance rate on timber supply areas and overall provincial rate, by fiscal year.

Timber Supply Areas (TSAs)	2018-19	2019-20	2020-21	2021-22
Prince Albert (PA TSA)	↑ 96	↑ 98	↑ 98	→ 94
Bronson-Green Lake (BG TSA)	↑ 100	↑ 100	n/a	n/a
Meadow Lake (ML TSA)	↑ 100	↑ 100	↑ 100	↑ 100
Glaslyn (GN TSA)	↓ 67	na/	↑ 100	n/a
Pasquia Porcupine (PP TSA)	↑ 100	→ 83	↑ 100	↓ 86
Island Forests (IF TSA)	↑ 100	↑ 100	↑ 100	↑ 100
North Central (NC TSA)	n/a	n/a	n/a	↑ 100
North East (NE TSA)	n/a	n/a	↑ 100	↑ 100
Goodsoil (GS TSA)	↑ 100	n/a	n/a	n/a
Kelvington (KN TSA)	↑ 100	n/a	n/a	↑ 100
Spiritwood (SD TSA)	↑ 100	↑ 100	n/a	n/a
Overall for Province	↑ 97	↑ 98	↑ 99	→ 95
Four-year overall = 97%				



Measure 4

Total protected areas in Saskatchewan

This measure increases terrestrial and aquatic ecosystems designated as protected and conserved areas in Saskatchewan. Protected areas include Crown lands protected by legislation and private lands managed for biodiversity by agreement. These conservation lands include parks, ecological reserves and pastures.



Target

By 2025, protect 7,812,432 hectares; equivalent to 12 per cent of Saskatchewan's provincial base.

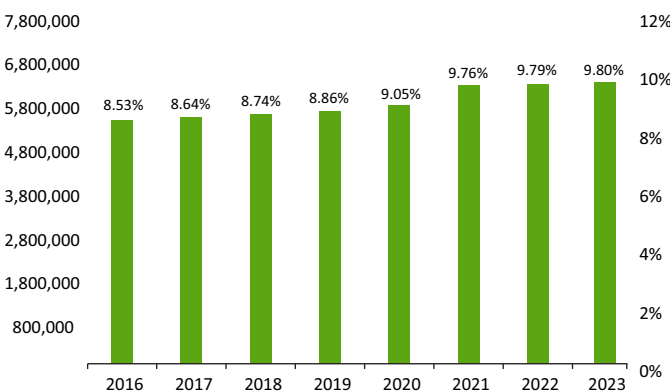
Status

As of January 2023, approximately 10 per cent (6.60 million hectares) of the province's total lands are protected areas. This includes representation from each of the province's 11 ecoregions. As of 2023, there was an increase of 229,035 hectares in Saskatchewan's protected areas. To reach the 2025 target, Saskatchewan must add approximately 1.2 million hectares to protected areas.

There are challenges to increasing protected areas. In the agricultural areas of the province, a sizable portion of the land is privately owned, and additions to existing protected areas are achieved in small quantities. Even though much of the area is Crown land in northern Saskatchewan, many interests must be considered to balance conservation, community well-being and economic development. Additional programs, such as Other Effective Area-based Conservation Measures, are in place to ensure natural areas are conserved beyond formal protected area designation.

How does the measure contribute to building resilience?

Protected areas function as habitat refuges and genetic reservoirs for species, including at-risk species. They are important to maintaining Saskatchewan's biodiversity. They also serve as ecological benchmarks, allowing for better monitoring of the response of natural ecosystems to climate change. Protected areas help maintain the integrity of traditionally and culturally important sites.



Current protected areas  
In Saskatchewan

Baseline (2017)	5,626,887 ha
Current Status (2023)	6,604,038 ha
Target (2025)	7,812,432 ha

**Figure 4:** Saskatchewan's total protected area (in hectares) from 2016 to 2023. The value for 2023 is the current status.





## Measure 5

### Seedlings distributed from SaskPower's Shand Greenhouse

This measure accounts for the number of seedlings grown and distributed from SaskPower's Shand Greenhouse. Seedlings are distributed to rural landowners to establish shelter belts, environmental groups to support habitat projects and community groups to support cultural projects or activities.



### Target

Distribute at least 500,000 seedlings to eligible customers annually.

### Status

In 2022, SaskPower distributed 559,730 seedlings across the province, roughly 155,000 more than in 2021 and beyond the target for this measure.

SaskPower conducted a monitoring program in the summer of 2022, including site visits and customer interviews. The survey results indicated that approximately 65 percent of the seedlings distributed have survived. During the survey, customers reported that the seedling program is valuable and effective in establishing or maintaining shelter belts.

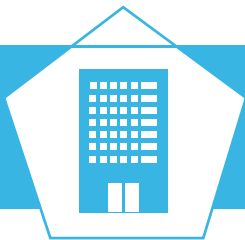
The Shand Greenhouse distributes seedlings free of charge to customers who meet eligibility requirements and submit orders several months in advance. The program has been successful for more than 30 years and each year, the orders increase. The greenhouse infrastructure and equipment are undergoing refurbishment, which will lead to improved efficiency and improved crop yields at the facility.

### How does the measure contribute to building resilience?

Planting trees is a natural climate solution that removes CO<sub>2</sub> from the atmosphere. In 2022, the Shand Greenhouse provided approximately 14,340 tree and shrub seedlings to various groups including Nature Conservancy of Canada, Nature Saskatchewan, Saskatchewan Wildlife Federation and Saskatchewan Gamebird Habitat Trust to support watershed and wildlife projects. Approximately 1,100 seedlings were also provided to the Native Plant Society of Saskatchewan to support native plants in the province. Additionally, approximately 3000 seedlings were provided to schools around the province to support planting trees in their communities.

SaskPower is exploring planting projects using seedlings produced by the Shand Greenhouse and planted on SaskPower property. In 2023, SaskPower intends to plant 10,000 seedlings on SaskPower-owned property. In the future, the number of trees planted annually may increase.





# Physical Infrastructure

**Physical infrastructure** refers to the production and movement of goods and the management of the built environment. It includes maintaining reliable transportation, utility services, and water resource management. Physical infrastructure also refers to increasing the capacity for renewable energy generation and building more energy-efficient buildings.

6. The total number of culverts on the national highway system meets new provincial flood standards
7. Saskatchewan's renewable energy generation capacity
8. Total greenhouse gas emissions from Saskatchewan's electricity sector
9. The area of SaskPower power line right-of-way widened
10. Total energy consumption for Saskatchewan government-owned buildings
11. Total GHG emissions from Saskatchewan government-owned buildings



Measure 6

The total number of provincial culverts on the national highway system meeting the new provincial flood standard

This measure indicates the province's efforts to upgrade vulnerable roadways by tracking the number of culverts on the national highway system that are upgraded or replaced to meet the new provincial flood standard of 800 mm in diameter.



Target

Increase the total number of provincial culverts on the national highway system, meeting the new provincial flood standard.

Status

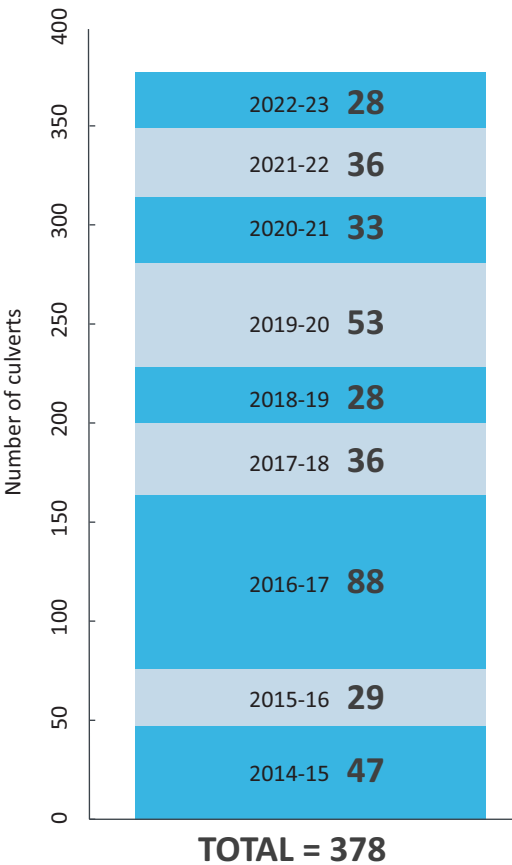
In the 2022-23 fiscal year, 28 more culverts were upgraded or replaced on the national highway system (Figure 5). The total number of culverts meeting the new flood standard is 378<sup>10</sup>.

How does the measure contribute to building resilience?

Culverts are critical in moving water from one side of roads and highways to the other. This helps protect the surface infrastructure by preventing flooding and road washouts.

In 2014, the province adopted a new provincial flood standard for culverts on the national highway system. The new standard increased the minimum culvert diameter from 600 mm to 800 mm.

Modifying culverts to the new provincial standard helps ensure the province's transportation network is more resilient to extreme weather and climate change. A reliable transportation infrastructure supports economic growth, emergency services and quality of life for Saskatchewan residents.



**Figure 5:** Culverts on the national highway system upgraded/replaced to meet new provincial standards, by fiscal year.

<sup>10</sup> There was an administrative error in the charts for this measure in the 2021 and 2022 Resilience Reports. The graphic showing new culverts for the 2018-19 fiscal year depicted only 20 new culverts. The actual number of new culverts is 28 for that fiscal year. This error has been corrected in this report.





## Program Highlight

### Ministry of Highways

The Government of Saskatchewan is committed to achieving greater efficiency and lower emissions within the transportation sector in *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy*. The Ministry of Highways has led efforts to create a freight strategy to improve delivery times, reduce fuel use and increase efficiency. The ministry has added goals and strategies to its business plan to address greenhouse gas emissions and transportation efficiency barriers while prioritizing freight movement. These include:

#### **Goal 1: Improved Safety and Environmental Sustainability**

**Strategies:** Provide environmental stewardship on all ministry activities through responsible operations, maintenance and project delivery; Examine and mitigate the impact transportation has on the environment by focusing on innovative regulatory frameworks, emerging technology and efficient traffic movement.

#### **Goal 2: Improved Road Conditions**

**Strategy:** Maintain and rehabilitate provincially owned transportation infrastructure to improve the driving experience and optimize service life of provincial highways.

#### **Goal 3: Integrated Transportation Infrastructure Network**

**Strategy:** Work with stakeholders and community partners to manage traffic demand and improve transportation asset conditions through a one-network approach.

#### **Goal 4: Efficient Travel for People and Goods**

**Strategies:** Ensure the safe and reliable flow of goods and people by efficiently managing a multi-modal transportation system; Identify and develop transportation options to improve Saskatchewan's competitiveness, by working proactively with the province's export and transportation sectors, other western provinces, the federal government and the U.S.

#### **The ministry is proactively:**

- Working toward greater efficiency and lower emissions with our own government fleet and in partnership with the transportation industry.
- Identifying and prioritizing economic opportunities available through infrastructure improvements and development during capital planning exercises.
- Making continuous efforts to apply for and secure federal and partnership funding to support infrastructure improvements that enhance supply chains.
- Advocating to participate in developing regulatory frameworks that support economic growth and the movement of goods safely and efficiently.
- Additionally, the Ministry of Highways and other ministries, agencies, and Crown corporations (SaskPower, SaskEnergy and the Ministries of Immigration and Career Training, Trade and Export Development and Energy and Resources) participated in the Saskatchewan Trucking Association's educational event "Pathways to Zero Emissions" to discuss innovations in alternative fuels and technology to reduce emissions both as a fleet owner and infrastructure provider. This session and other consultation efforts with the transportation sector will shape the movement toward achieving emission reduction targets.



## Measure 7

### Saskatchewan's renewable energy generation capacity

This measures the amount of electrical generation capacity available from SaskPower (or purchased by SaskPower) from renewable sources.



### Target

By 2030, up to 50 per cent of Saskatchewan's electrical generation capacity is from renewable energy sources.<sup>11</sup>

### Status

In 2022, roughly 34.7 per cent of SaskPower's electrical generation capacity was composed of renewable energy sources. A total of 1,887 megawatts (MW) of electricity was available from renewable energy sources — an increase of 565 MW from 2021. Utility-scale wind generation was responsible for most of the net increase in 2022, with 364 MW.

### How does the measure contribute to building resilience?

Increasing Saskatchewan's renewable energy generation capacity lowers the province's GHG emissions. Diversifying energy sources also increases resilience by improving the capacity to manage peak demands and service disruptions.

Steady increases in renewable capacity are expected in the province over the next five years. Sources will include imported hydropower, net metering (solar), geothermal, waste heat, flare gas, wind and utility-scale solar projects.

#### Energy generation capacity in Saskatchewan across renewable and non-renewable sources

Type of energy generation	2021	2022
<b>Renewables</b>	<b>1,322 MW (26.4 per cent)</b>	<b>1,887 MW (34.7 per cent)</b>
Hydropower (including imports)	989 MW	1,154 MW
Wind	251 MW	615 MW
Energy recovery	82 MW*	118 MW*
<b>Non-renewables</b>	<b>3,689 MW</b>	<b>3,549 MW</b>
Natural gas	2,159 MW	2,160 MW
Coal	1,530 MW	1,389 MW
<b>Total</b>	<b>5,011 MW</b>	<b>5,436 MW</b>

\*Increase from net metering, Power Generation Partnership Program (PGPP) solar and utility scale solar.

<sup>11</sup> Targets are driven by the requirements in the Canada-Saskatchewan equivalency agreement for the control of greenhouse gas emissions from electricity producers in Saskatchewan.



## Measure 8

### Saskatchewan's total greenhouse gas emissions from the electricity sector

This measures Saskatchewan's progress towards its commitment to reduce GHG emissions from the electricity sector by 50 per cent from 2005 levels by 2030.



#### Target

By 2030, reduce GHG emissions from Saskatchewan's electricity sector to 7.1 Mt CO<sub>2</sub>e (50 per cent<sup>12</sup> reduction from 2005 levels).

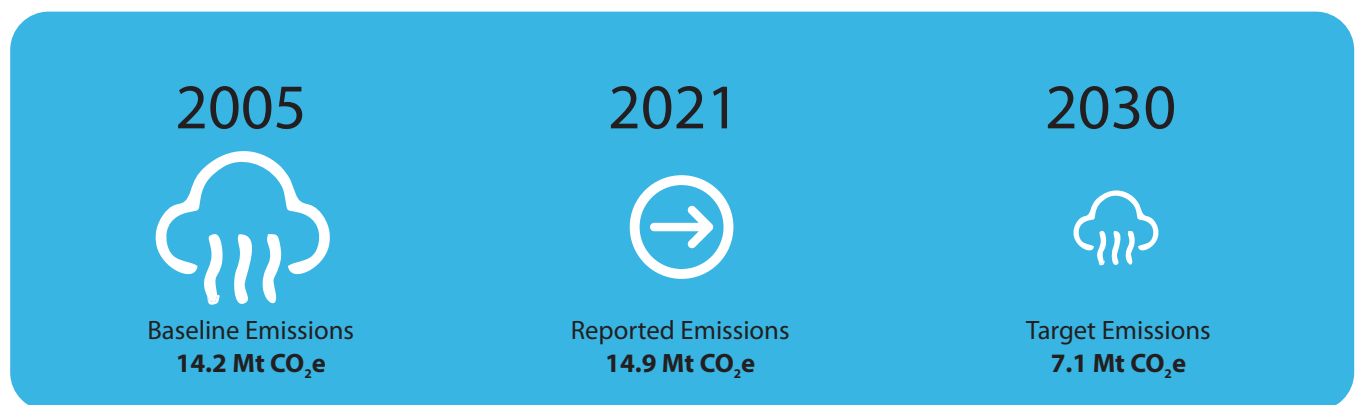
#### Status

In 2021, emissions on a sector-wide basis increased to 14.9 Mt CO<sub>2</sub>e, which was 5.1 per cent higher than in 2005 – the baseline year<sup>13</sup>. This was an increase of 2.2 Mt CO<sub>2</sub>e from the previous year.

The decrease in GHG emissions registered in 2020 was mainly due to the impact of the COVID-19 pandemic and actions taken to lower emissions. In 2021, we saw an increase in GHG emissions from the electricity sector as the economy started to recover from the impacts of the pandemic. GHG emissions for 2022 are being quantified and are expected to be lower than 2021 emissions due to reduced generation from fossil-fuel sources, increased generation from hydro and renewables and more capture at SaskPower's carbon capture facility at Boundary Dam Power Station. As the electricity system integrates more renewable and non- or low-emitting energy capacity through 2030, the trend in emissions is anticipated to decline steadily.

#### How does the measure contribute to building resilience?

The electricity sector represented approximately 21 per cent of Saskatchewan's total GHG emissions in 2018. Reducing emissions in the electricity sector contributes significantly to reducing the province's overall GHG emissions.



<sup>12</sup> This target increased to a 50 per cent reduction from 2005 levels from 40 per cent, listed in previous reports. The adjustment is based on an increased commitment to reduce GHG emissions in this sector by 2030.

<sup>13</sup> Data for this measure is based in part on independent laboratory analysis, introducing a lag of up to six months from sampling to availability of results to emissions calculation. 2022 emissions information was published in SaskPower's 2022-23 annual report.





Measure 9

The area of SaskPower powerline right-of-way widened

This measures SaskPower's vegetation management activities to protect its facilities and reduce the risk of power outages and wildfires from fallen trees. The measure includes right-of-way for transmission and distribution lines.



Target

By 2030, 10 per cent of right-of-way (ROW) will be cleared per year to maintenance standards. In 2022, SaskPower managed 13,894 hectares (at 30 metres in width) of ROW. The annual target area is 1,390 hectares, or 10 per cent of the total managed area.

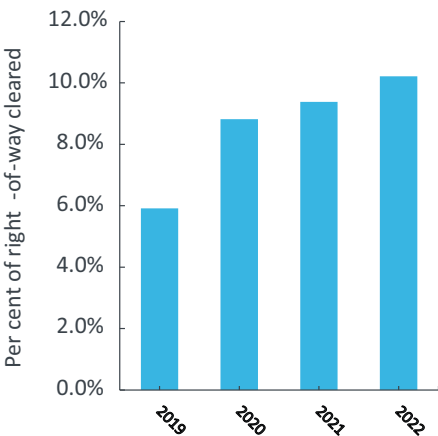
Status

In 2022, 1,419 hectares, or 10.2 per cent, of ROW were cleared to reduce wildfire risk and ensure service reliability. The annual ROW area clearing rate reached 100 per cent of the target.

The total managed area, which includes the adjusted 2019 and 2020 data on cleared ROW, is accounted for in the data. Figure 6 depicts the adjusted ROW cleared areas from 2019 to 2022.

How does the measure contribute to building resilience?

Trees in Saskatchewan cause about 1,000 power outages a year and can also cause fires when they contact power lines. Vegetation management is important to prevent wildfires and outages and increase the resilience of the province's electrical system to the impacts of climate change. These efforts also help ensure reliable service delivery to residents and industries. SaskPower focuses on the rights-of-way in fire management plan areas, where vegetation management is a priority.



**Figure 6:** Per cent of managed right-of-way cleared from 2019 to 2022.

Enhancing this measure's accuracy

In 2021, SaskPower improved the accuracy of calculating the ROW total area by using updated Geographic Information System (GIS) data. This resulted in a change in the total managed area to prevent encroachment of vegetation on electricity infrastructure. The improved data also helped increase the accuracy of the ROW area cleared in 2019 and 2020. These are the revised areas:

ROW total area (baseline)	13,894 ha
Total area treated in 2019	822 ha or 5.9%
Total area treated in 2020	1,225 ha or 8.8%
Total area treated in 2021	1,304 ha or 9.4%
Total area treated in 2022	1,419 ha or 10.2%



### Program Highlight

## Other SaskPower Initiatives Contributing to Saskatchewan Resiliency

### Energy Assistance Program

SaskPower offers the Energy Assistance Program to help low-income customers lower their monthly utility (electric, gas and water) bills. Qualified participants receive an assessment of their home, one-on-one energy coaching and the free installation of several energy savings technologies, including a smart thermostat, LED lighting upgrades and water-saving measures. To be eligible, customers must meet an income threshold. The program is open to renters and homeowners across Saskatchewan. It is offered in partnership with the Low Carbon Economy Fund. In 2022-23, over 1,800 applications were received and more than 700 home upgrades were completed.

### Northern Home Retrofit Program

This program is designed to help First Nations communities in Northern Saskatchewan who use electric heat as their primary heating source. Participating homes receive free energy efficient products and upgrades including water heater jackets, air sealing, attic and basement insulation to improve the efficiency and comfort of their homes while helping to cut costs. Participants receive education about energy efficiency to increase knowledge and awareness of their energy use. The program is offered in partnership with the Low Carbon Economy Fund and will provide upgrades to 264 homes by March 2024.

### Net Metering

Under this program, SaskPower customers can generate electricity and deliver surplus energy to the grid. This program is designed for residential, farm and business customers. Now in its 15th year, Net Metering has added over 42 megawatts of solar generation produced by more than 3,100 Saskatchewan customers. In 2022-23 there were over 400 Net Metering applications totaling more than 5 megawatts of solar power generation.

### Power Generation Partner Program

This program helps SaskPower build a cleaner, more reliable, modernized electricity grid. Customers and businesses can generate electricity using renewable and carbon-neutral technologies to sell to SaskPower.

### Energy Advisor Training Program

This program provides Energy Advisor Training at no cost to qualified candidates. The program is intended to raise the number of registered energy advisors in Saskatchewan – especially in under-represented groups and underserved areas of the province. The Canadian Institute for Energy Training is delivering multiple training sessions over the three-year life of the program. Funding for the program is provided by the Government of Canada as part of the Greener Homes Initiative. Three sessions have occurred since the program started, with a total of 49 participants, 22 of whom were from underrepresented groups or underserved areas.

### Power Support Service

This program is offered to SaskPower's largest industrial and manufacturing customers. The program provides customers with custom energy diagnostic reports that provide detailed information about their energy use, as well as recommendations for energy efficiency enhancements. In 2022-23, energy diagnostic reports were provided to 18 different customers.



## Measure 10

### Total energy consumption for Saskatchewan government-owned buildings

This measures energy intensity consumption in all Ministry of SaskBuilds and Procurement owned and operated buildings. It indicates the province's success in maximizing operational efficiencies while minimizing environmental impacts.



### Target

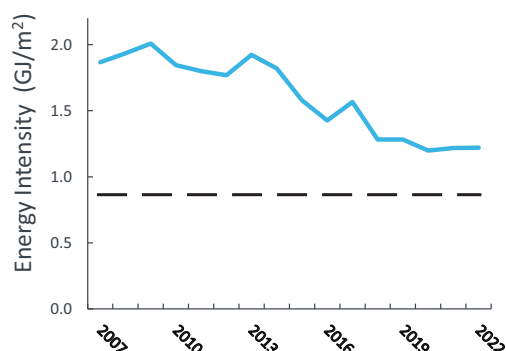
The Ministry of SaskBuilds and Procurement set a new target for this measure: to reduce energy intensity consumption to 0.818 GJ/m<sup>2</sup> (gigajoule per square metre) by 2030.

### Status

Since 2014, significant reductions in total energy intensity consumption of government-owned buildings have been made. In 2022, government-owned buildings total energy intensity consumption was 1.272 GJ/m<sup>2</sup>, slightly higher than last year's intensity consumption (Figure 7).

### How does the measure contribute to building resilience?

Maximizing operational efficiencies for Saskatchewan's government-owned buildings increases resilience by reducing GHG emissions and energy costs. This helps the province reduce its overall GHG emissions and energy use and provides provincial leadership in enhancing the energy efficiency of buildings.



**Figure 7:** Annual energy intensity consumption from government-owned buildings.

#### Program Highlight

#### LEED® and BOMA certification buildings update

As part of the Ministry of SaskBuilds and Procurement's (SBP) sustainability efforts, the ministry adheres to environmental standards and strives to achieve environmental certifications on new builds and major renovations. SBP has increased the number of certified buildings over the past year:

- As of March 31, 2023, SBP had 51 buildings in its portfolio recognized by BOMA for environmental property management.
- At the end of the 2022-23 fiscal year, SBP has achieved LEED® certification on nine buildings throughout the province.





## Measure 11

### Total greenhouse gas emissions from Saskatchewan government-owned buildings

This measures GHG emissions from provincial government-owned and operated buildings. Emissions are measured in tonnes of CO<sub>2</sub>e, based on energy consumed (i.e. electricity, natural gas) and are estimated from billing information.



### Target

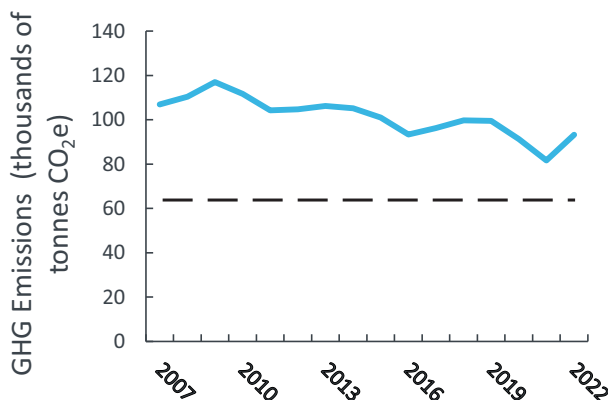
This year, the Ministry of SaskBuilds and Procurement set a new target for this measure: by 2030, to reduce GHG emissions to 63,875 tonnes of CO<sub>2</sub>e.

### Status

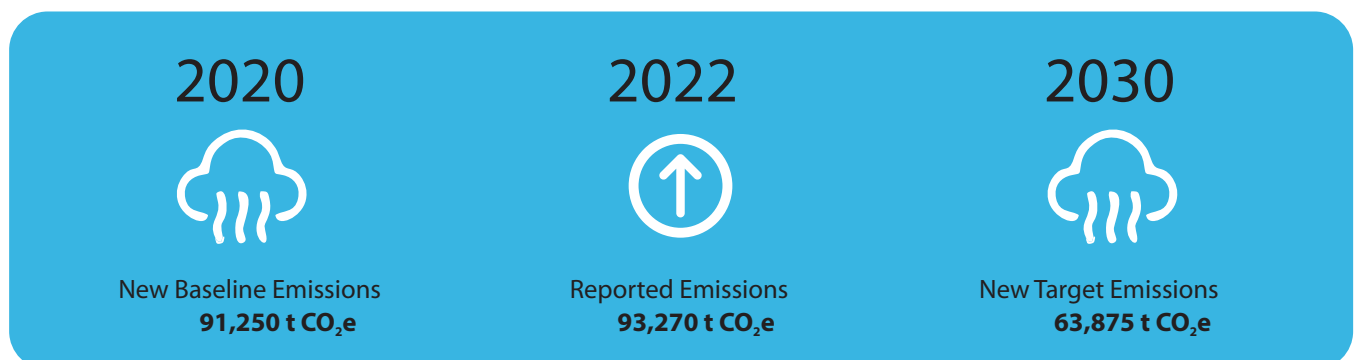
The total GHG emissions for 2022 were 93,270 tonnes of CO<sub>2</sub>e (Figure 8). Total emissions in 2022 were higher than last year by 11,566 tonnes of CO<sub>2</sub>e. The current target for this measure requires lowering emissions from government-owned buildings by roughly 29,395 tonnes of CO<sub>2</sub>e in eight years; this is about 3,500 fewer tonnes of CO<sub>2</sub>e per year.

### How does the measure contribute to building resilience?

Reducing GHG emissions in government-owned and operated buildings contributes to the province's overall emissions reduction. In this way, the Government of Saskatchewan is leading improvements that can be applied to buildings in other sectors.



**Figure 8:** Annual greenhouse gas emissions from government-owned buildings.





## Economic Sustainability

**Economic sustainability** refers to the ability to remain competitive in a global marketplace and encourage investment while reducing greenhouse gas emissions. Economic sustainability ensures that Saskatchewan businesses and industries have the support they need to develop marketable innovations that address climate change. This category tracks Saskatchewan's GHG emissions intensity. It includes measures relating to key natural resource sectors, like agriculture, forestry, and oil and gas.

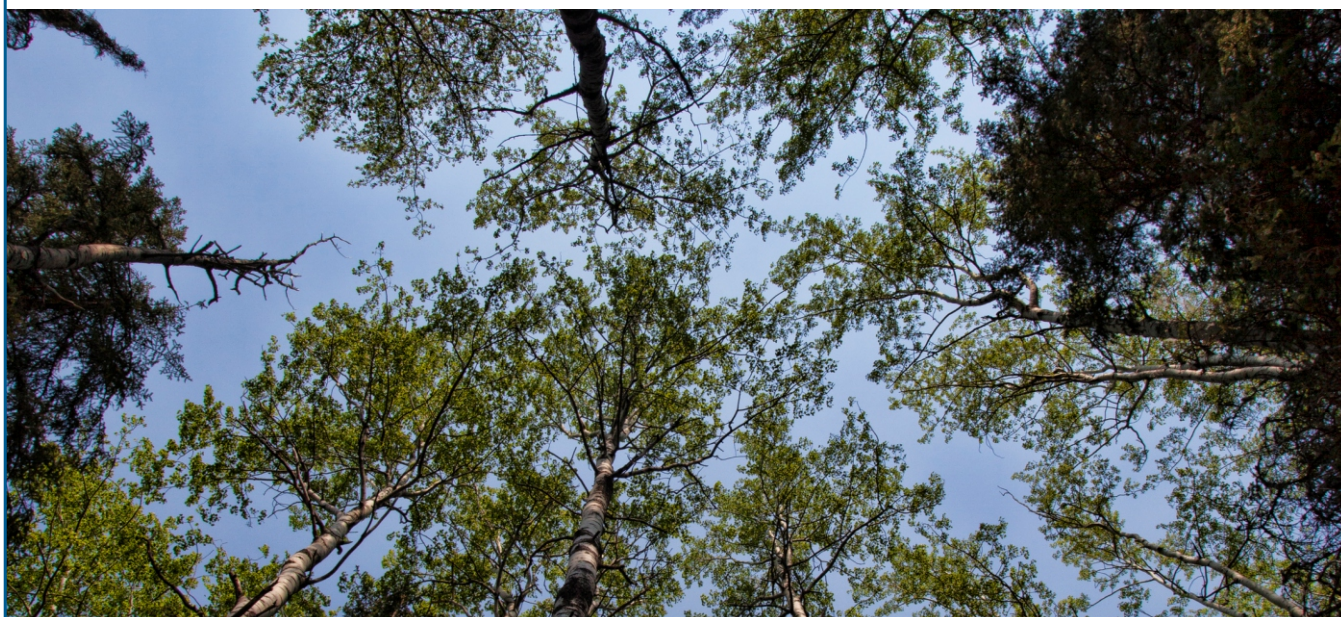
12. Saskatchewan's total GHG emissions from gas produced in association with oil

13. Emissions intensity of Saskatchewan's economy

14. Saskatchewan's realized net farm income

15. Percentage of cultivated land in different types of crops

16. Annual sustainable timber harvest utilization



## Measure 12

### Saskatchewan's total GHG emissions from gas produced in association with oil

This measure accounts for reduced GHG emissions from the flaring and venting of gas produced in association with oil.



#### Target

By 2025, reduce GHG emissions to 6.4 Mt CO<sub>2</sub>e. This is equivalent to a 4.5 Mt CO<sub>2</sub>e reduction from 2015 emissions.

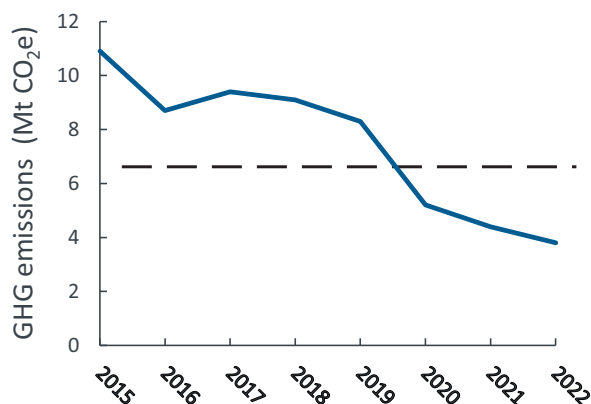
#### Status

GHG emissions from reported flaring and venting activities in the upstream oil industry decreased to 3.9 Mt CO<sub>2</sub>e in 2022, falling further below the 2025 target and continuing the steady drop of emissions from previous years (Figure 9).

In 2022, Saskatchewan's oil production increased from 2021 as the industry recovered from COVID-19-related impacts. Despite increasing oil production in 2022, GHG emissions from reported flaring and venting activities continue to decline by more than 12 per cent from 2021 levels. Although venting and flaring emissions in 2022 were below the 2025 target outlined in the Methane Action Plan, the Ministry of Energy and Resources and the oil and gas industry will need to continue to take steps to decrease the industry's carbon footprint as development continues.

#### How does the measure contribute to building resilience?

This contributes to resilience by reducing the carbon footprint of oil and gas operations. It also reduces overall provincial GHG emissions (see Measure 13).



**Figure 9:** Annual greenhouse gas emissions generated from reported flaring and venting activities in the upstream oil industry.

#### Program Highlight

#### Reducing GHG Emissions in Saskatchewan's Oil and Gas Sector

By implementing the Methane Action Plan, the Government of Saskatchewan works with the oil and gas industry to meet provincial GHG emissions reduction targets. The plan uses a results-based system that supports adopting emissions reduction technologies at oil and gas wells and facilities. This increases the incentive for industry to develop innovative solutions and continue to invest in the province.





## Measure 13

### Emissions intensity of Saskatchewan's economy (GHG per unit of GDP)

This measure reveals if CO<sub>2</sub>e reductions result from gains in efficiency or a loss of production. Data is available sixteen months after the end of a given year. 2022 data will be available in April 2024.



### Target

A continued decrease in the GHG emissions intensity of Saskatchewan's economy.

Emissions intensity is the amount of GHG emitted relative to the value of goods and services produced in the economy. The value of goods and services produced in the economy is also known as the Gross Domestic Product (GDP). Real GDP is measured in "chained 2012 dollars," a form of GDP that factors out inflation to reveal changes in production over time<sup>14</sup>.

### Status

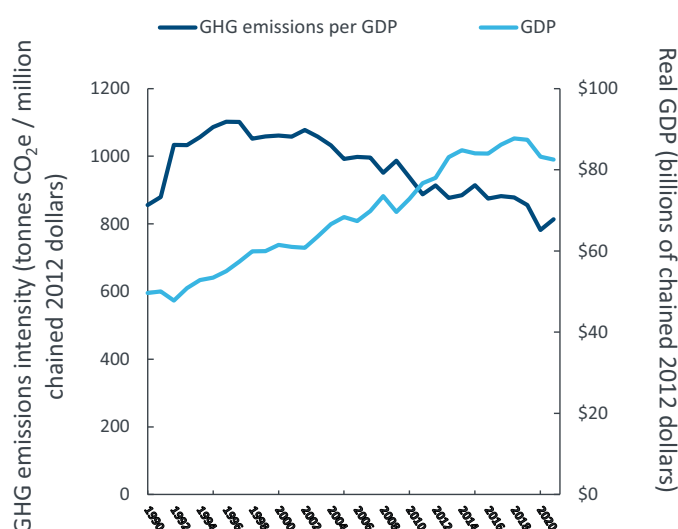
From 2007 to 2021, GHG emissions intensity dropped by 18 per cent, while the province's GDP increased by 18 per cent during the same period (Figure 10). Saskatchewan's GHG emissions intensity peaked in 1996 at 1,102 tonnes of CO<sub>2</sub>e per million (chained 2012) dollars but has been trending downward ever since.

In 2021, GHG emission intensity was 813 tonnes of CO<sub>2</sub>e per million chained 2012 dollars – the second lowest value since 1990, only behind 2020 results. However, the shock of the pandemic created short term disruptions to GHG emissions and economic activity, while also driving long term changes in behavior, the scale of which are yet unknown. As a result, the true status of this measure will not be clear until we have data from the post pandemic period.

The programs and regulations introduced by Saskatchewan will continue to reduce Saskatchewan's GHG emissions intensity. These include expanding the use of renewables; regulating methane emissions from the upstream oil and gas sector; implementing output-based performance standards for Saskatchewan's regulated emitters; and making energy efficiency improvements.

### How does the measure contribute to building resilience?

This measure investigates the effectiveness of climate change policies. If GDP falls alongside GHG emissions, policies address climate change at the expense of prosperity. If GHG emissions rise with GDP, climate change is not being addressed. Resilience is achieved when GHG emissions fall and GDP rises.



**Figure 10:** Saskatchewan's GHG emissions intensity, 1990 to 2021.

Source: Environment and Climate Change Canada's National Inventory Report (2023) and Statistics Canada

<sup>14</sup> The GDP and GHG data were obtained from Statistics Canada and ECCC websites, respectively. The most recent data for GHG emissions is for 2021 since there is a standard two-year delay for the National Inventory Report data processing.



## Measure 14

### Saskatchewan's realized net farm income

This is a measure of farm business income. Realized net farm income (RNFI) is the difference between a farmer's cash receipts (crop receipts + receipts from livestock and livestock products + government program payments) and expenses (operating expenses + depreciation) plus income in kind. Data is available up to 2021, representing a lag of approximately one year.



### Target

No greater than 50 per cent decrease in realized net farm income from the previous five-year average. The target for this measure aims to limit drastic declines in profitability relative to the past five years.

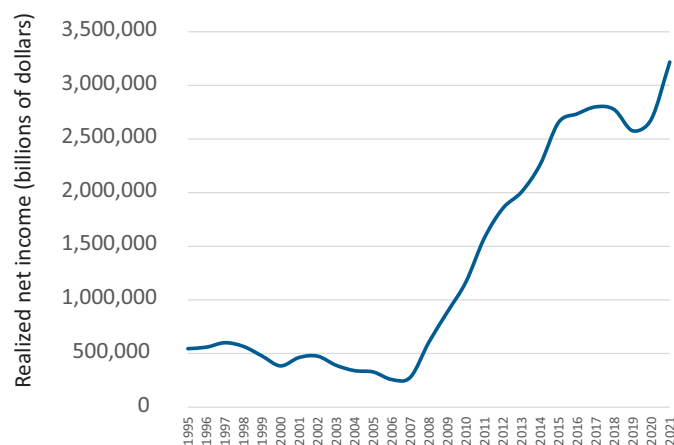
### Status

In 2021, realized net farm income showed an increase of 36 per cent compared to 2020 and a 107 per cent rise compared to Saskatchewan's previous five-year average<sup>15</sup>. Due to high commodity prices and government support in response to drought conditions, the measure is steadily overcoming a slight decrease in recent years.

### How does the measure contribute to building resilience?

Agriculture is a key economic driver in our province. Reduced volatility in realized net farm income indicates the agricultural sector's resilience from a production and financial perspective.

Joint business risk management programs with the province and Agriculture and Agri-Food Canada help limit farmers' income volatility. These include AgrilInsurance, which includes fire insurance (under the Forage Rainfall Insurance Program), AgrilInvest, AgriStability, Western Livestock Price Insurance Program and compensation for livestock predation and wildlife damage to crops. Saskatchewan also provides funding for crop-related research that helps farmers adapt to climate change (e.g. research into drought-resistant crops).



**Figure 11:** Realized net farm income (five-year average) in Saskatchewan from 1995 to 2021.

Source: Statistics Canada Table 32-10-0052-01

Despite the drought conditions in most Prairie regions, the total farm cash receipts remain consistent as crop, livestock and program payment receipts increased in 2021. Also, the increase in farm cash receipts was significant enough to offset the increased operating costs and depreciation, leading to overall RNFI improvement. Realized net farm income in Saskatchewan in 2021 reached \$5,551,389, a 107 per cent increase from the previous five-year average.

<sup>15</sup> The 2020 values for realized net farm income slightly differ from last year's report. This discrepancy is due to the data source adjustments to better ensure the accuracy of recently collected data.



## Measure 15

### Percentage of cultivated land in different types of crops

The crop diversity target measures the mix of crops in Saskatchewan. This measure organizes crop types into cereals, oilseeds, pulses and soybeans, and summer fallow. A measure of one crop type above 50 per cent would suggest more potential risk than a broader mix of crops.



### Target

No one crop type rises above 50 per cent of the annual cultivated area. This target is assessed on an annual basis.

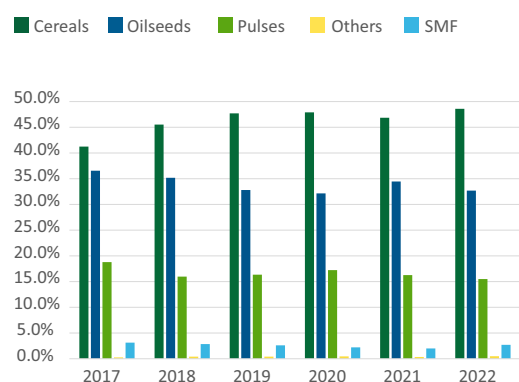
### Status

In 2022, no crop comprised more than 50 per cent of the cultivated area. Cereals have consistently comprised the largest cultivated land area in the last five years (Figure 12). However, they have not exceeded 50 per cent of the total area since 2008, when cereal cultivation was 52 per cent. In 2022, cereals made up 48 per cent of the cultivated land area (7.4 million hectares or 18.4 million acres), oilseeds made up approximately 33 per cent (5.0 million hectares or 12.4 million acres), pulses and soybeans made up 15 per cent (2.3 million hectares or 5.9 million acres), summer fallow made roughly three per cent (0.41 million hectares or 1.0 million acres) and other crops less than one per cent.

### How does the measure contribute to building resilience?

Coverage of one crop type exceeding 50 per cent of the total cultivated area would suggest more potential risk from drought, pests and diseases than a more diverse mix of crops. For example, diseases that target cereals will generally have less impact on the farm and provincial-level productivity if a broader range of crops is cultivated, thereby reducing the volatility of farm revenue (e.g. Measure 14).

In addition to mitigating financial risk, crop diversification supports resilience by enhancing soil health and assisting with managing pests and diseases. Adding pulses to crop rotations also helps reduce GHG emissions (see Measure 13) through reduced fertilizer use.



**Figure 12:** Crop diversity across Saskatchewan in the last 5 years.

Source: Statistics Canada Table 32-10-0359-01. Others include buckwheat, corn, hemp and mixed grains, which comprised less than one per cent of cultivated land in 2022

#### Program Highlight

#### The Crop Development Center

Continued research and development through the Crop Development Centre at the University of Saskatchewan and in partnership with the Ministry of Agriculture contribute to diversifying crop production in the province. Increased variety and quality of crops have allowed farmers to take advantage of more diverse market opportunities in Canada and worldwide.

For instance, plant breeding technology and variety development has the potential to produce pulse crops more suitable to Saskatchewan's climate. Pulse crops also contribute to soil management, health and disease mitigation.



## Measure 16

### Annual sustainable timber harvest utilization

This measure tracks the annual ratio of harvested timber volume to the sustainable limit for the commercial forest in Saskatchewan.



### Target

The annual allowable cut (AAC) will not exceed 100 per cent for any Timber Supply Area (TSA) in the province.

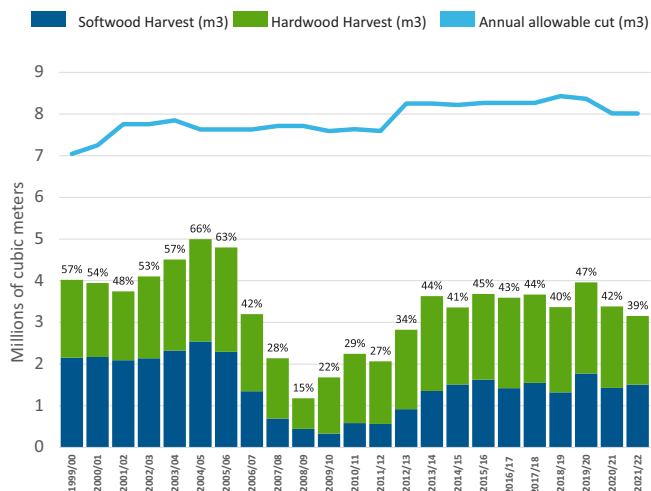
### Status

The Ministry of Environment has tracked the annual sustainable timber harvest utilization since 1990. As of the 2021-22 fiscal year, all TSAs in the province were below the AAC limit. Saskatchewan's commercial forest, cumulatively, reached 39 per cent of the provincial AAC, following the pattern of the last seven years (Figure 13).

This indicator informs the public about sustainable harvesting management for the Crown's commercial forest areas. It also illustrates how appropriate forest resource utilization promotes ecological resilience while supporting jobs and communities.

### How does the measure contribute to building resilience?

Forest management that adheres to the AAC ensures a range of ages and conditions in forests across the province. Harvesting creates diverse patches of forest habitat, which support biodiversity. When guided by a forest management plan, a TSA fully using the AAC will comprise a mixture of young to old stands that are more resilient to wildfire, pest outbreaks and extreme weather events and may help mitigate large emissions from these natural disturbances.



**Figure 13:** Annual allowable cut (AAC) and Timber Harvest from 1999/00 to 2021/22 fiscal years, in millions of cubic meters and percentage of AAC, for the Commercial Forest in Saskatchewan.

Source: Forest Service Branch

#### Program Highlight

#### Modelling Sustainable Timber Harvest

In other Canadian jurisdictions, the sustainable limit of harvested timber is also known as harvest volume schedule, annual allowable cut, or sustainable wood supply. The AAC is determined based on wood supply analysis results, which use computer models to assess sustainable wood supply over two hundred years. The calculated AAC for a given timber supply area represents what can be sustainably harvested while ensuring enough forest remains to meet ecosystem management goals, such as wildlife habitat, forest age class distribution, natural forest patterns and forest regeneration.







# Community Preparedness

**Community preparedness** refers to Saskatchewan communities' resilience to climate change impacts. It includes providing the necessary information to the public; responding to and recovering from extreme weather events; understanding the risks of flood, drought and wildfires; establishing emergency preparedness and management plans; and adopting appropriate standards and practices to reduce risks from extreme weather events.

17. Flood mapping completed for communities at risk of flooding and where benefits validate the costs
18. The number of wildfire operational preparedness plans completed for at-risk northern communities
19. Total hectares of Saskatchewan Crown land with wildfire fuel management work complete



## Measure 17

### Flood mapping completed for communities at risk of flooding and where benefits validate the costs

This measures the percentage of flood-prone Saskatchewan communities that would benefit from access to modern engineered flood mapping and have access to such maps.



#### Target

By 2030, 100 per cent of communities in Saskatchewan considered at risk of flooding, and where the benefits are commensurate with the costs, have access to modern flood maps. This target's total number of communities is estimated for later in 2024.

#### Status

Guided and partially funded by the Water Security Agency (WSA), six communities at risk of recurrent flood damage have access to modern flood maps.

The WSA, in partnership with Natural Resources Canada (NRCAN), is currently working with an additional 20 priority communities to develop modern flood maps. While the pandemic has significantly delayed progress on this initiative, it is anticipated that WSA will move forward on reviewing and endorsing community flood map studies throughout 2023-24 and will provide these maps to the communities. Ten more communities at risk of flood damage are expected to have access to modern flood maps by 2024.

#### How does the measure contribute to building resilience?

Modern flood maps are an important analytical tool for communities that include or are adjacent to streams, rivers or lakes. Flood maps inform the completion of official community plans, direct development planning and assist with the developing emergency flood plans or guide the construction of flood-protection works. Knowing what lands are likely to flood and how often can help communities assess risk and employ informed measures to mitigate impacts. Such measures are important to prevent recurrent flood damage, reduce flood recovery time and cost and reduce or eliminate stress to citizens.

WSA is undertaking risk assessments to finalize the number of communities at risk of flooding that would benefit from flood mapping.

#### *Program Highlight*

#### **Additional Strategies to Mitigate and Protect Against Floods in the Prairies**

Flood mapping generally benefits communities near a stream, river or lake. Other communities experience floods from soil saturation (groundwater) and/or overland stormwater flooding during extreme precipitation. In these circumstances, flood mapping does not provide practical benefits to prevent damage.

However, there are other programs to help these communities. The Saskatchewan Public Safety Agency (SPSA) provides emergency response services to implement temporary flood protection measures and lead evacuations for an imminent or ongoing flood event.

The WSA-led Emergency Flood Damage Reduction Program and Flood Damage Reduction Program assist citizens and support communities with preventing or reducing damage to buildings due to imminent flooding and take an initiative-taking approach to mitigate community flood risk. Lastly, the Provincial Disaster Assistance Program provides cost-recovery assistance to homeowners suffering uninsured flood losses, enabling them to return their homes to pre-disaster states following significant flooding.



## Measure 18

### The number of wildfire community preparedness plans completed for at-risk northern communities



This measures the number of at-risk northern communities in Saskatchewan's wildland-urban interface that have wildfire community preparedness plans. These communities are rated as being moderate to high-risk of wildfire based on a 2004 Community Risk Assessment.

### Target

By 2030, all 84 at-risk communities will have wildfire community preparedness plans completed.

### Status

As of March 31, 2022, there were 68 wildfire community preparedness plans completed for at-risk northern communities. These communities are rated as being moderate to high-risk of wildfire based on a 2004 Community Risk Assessment. In 2021-22, three new plans were completed.

### How does the measure contribute to building resilience?

Wildfire community preparedness plans support a commitment in the province's *Prairie Resilience* climate change strategy. The plans assess the risk of wildfire to communities by providing an overview of the planning area, fire behaviour potential, values-at-risk such as infrastructure and buildings and fire operations that can be used in the event that a wildfire threatens wildland-urban interface values; enable communities to identify hazards and vulnerable areas/populations with higher risks and prioritize efforts to address these risks well in advance of potential wildfire impacts to the area; and help with wildfire suppression efforts when communities are threatened by wildfire.

**Figure 14:** Number of at-risk communities with wildfire preparedness plans

Number of communities with wildfire community risk assessments	104
Total number of communities identified as at-risk	84 <sup>16</sup>
Number of communities with operational preparedness plans (as of March 31, 2022)	68 (81%)
Remaining number of communities with preparedness plans needed	16 (19%)

<sup>16</sup> After analysis by the Saskatchewan Public Safety Agency, the number of at-risk communities has been revised to 84 (previously 86).



## Measure 19

### Total hectares of Saskatchewan Crown land with wildfire fuel management work complete

This measures wildfire mitigation projects completed in Saskatchewan's provincial forest within and adjacent to communities.



### Target

Complete all mitigation work on 2,264 hectares of Crown land adjacent to communities (84) by 2028.

### Status

In 2021-22, 196.8 hectares of fuel mitigation work was completed by the Saskatchewan Public Safety Agency (SPSA) at the following locations: Bear Creek, Candle Lake, Chitek Lake, Dore Lake (Michele Pt. Tower Beach), East Trout Lake, Hudson Bay, Jeanette Lake, Little Bear Lake, Lower Fishing Lake, McPhee Lake, Napatak, Potato Lake, Prince Albert, Sandy Bay, Sled Lake, Stanley Mission, Uranium City and White Swan Lake (Whelan Bay).

As of March 31, 2022, the SPSA has completed fuel management for 1,394 hectares of Crown land in the provincial forest. This is an increase of 197 hectares from the previous year.

### How does the measure contribute to building resilience?

Vegetation and wildfire fuel management projects enhance the effectiveness of wildfire suppression. Vegetation management reduces the intensity of fire behaviour, providing an anchor point for suppression activities and reducing the level of wildfire risk to the community. This increases a community's resilience by mitigating the risk of severe wildfires. The Saskatchewan Community Wildfire Risk Assessment identifies all Crown land locations requiring fuel management projects and sets priorities for project completion.

### Tracking areas managed for fuel load on Crown land

Date	Crown land with fuel management
As of March 31, 2021	1,197 hectares
As of March 31, 2022	1,394 hectares
Target over 2021-2028	2,264 hectares

#### Program Highlight

#### Reducing Wildfire Fuel Load in First Nation Communities

Since 2015, a partnership with the Saskatchewan Public Safety Agency, First Nations and Indigenous Services Canada has resulted in fuel mitigation work now completed in most First Nations communities in Saskatchewan. The project is being used as a template for Canada-wide fuel mitigation programs funded by the federal First Nation Emergency Management Mitigation Program, which began in 2019.







## Human Well-Being

**Human well-being** refers to Saskatchewan residents' resilience to climate change impacts. It ensures that residents are healthy and have stable jobs to provide for their needs and families. The measures under this area focus on the amount of water available for recreational purposes and consumed by communities, as well as monitoring the potential risk of exposure to vector-borne illnesses.

20. Average municipal water consumption per capita and total municipal water consumption
21. Saskatchewan's Healthy Beaches Program
22. The number of active surveys at suitable habitat sites for Lyme disease and other tick-borne diseases



## Measure 20

### Average municipal water consumption per capita and total municipal water consumption

This measures the change in water use efficiency as a relationship between per capita and total municipal water consumption. Data is available up to 2022.



#### Target

Decrease per capita municipal water consumption and decrease or stabilize total water use. Together, these measures approximate relative water use efficiency.

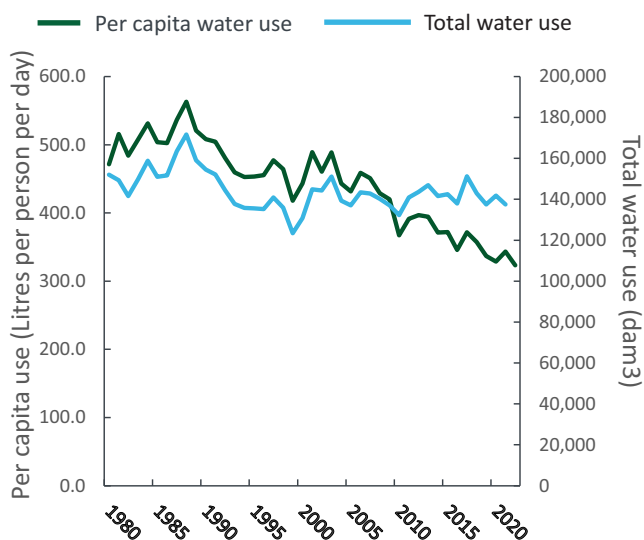
#### Status

Per capita municipal water use decreased in 2022, with residents using an average of 323 litres per person per day, compared to 343 litres per day in 2021. Total municipal water use also decreased from 138 million cubic metres in 2021 to 135 million cubic metres in 2022, a decrease of approximately three million cubic metres (Figure 15).

#### How does the measure contribute to building resilience?

Declining trends in per capita use indicate gains in water use efficiency. Compared with per capita use, total use can indicate how water conservation efforts support population and economic growth, even under water resource constraints. Greater water use efficiency can support a water source's sustainability and the infrastructure used to provide water. Using less water helps reduce GHG emissions, as less energy is needed to pump and treat water. This may also buffer against impacts on water resources, where climate change may affect municipal water sources' reliability (e.g. water quality or quantity).

The Water Security Agency promotes responsible water use through public education, partnerships and other 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.



**Figure 15:** Per capita municipal water use and total municipal water use across Saskatchewan from 1980 to 2022 (1 dam3 = 1,000,000 litres).

*\* The data in Figure 15 does not perfectly match data presented in previous reports because the Water Security Agency receives reports infrequently throughout the year, and data submissions are not always complete on the first submission.*



## Measure 21

### Saskatchewan's Healthy Beaches Program

This measure helps monitor and ensure safe water quality for users of selected public beaches that may carry some risk for human health due to pollutants and other environmental factors, including climate-related events.



### Target

At least 95 per cent of water samples taken from suitable beaches in Saskatchewan are within the healthy limits for pathogens (*E. coli*) and microcystin (cyanobacteria toxin), following the guideline values suggested by Health Canada.

### Status

In 2022, *E. coli* was within acceptable safety limits in more than 95 per cent of water samples taken from participating beaches, and microcystin (cyanobacteria) was within acceptable safety limits in more than 98 per cent of water samples.

The Ministry of Health runs the Healthy Beaches Program at recreational beaches across the province. During the summer, active monitoring of these sites ensures that water quality is safe for swimming and other in-water activities. Collected water samples are tested, and results are reported weekly from June to early September. Bacteriological tests for *E. coli* are analyzed at the Roy Romanow Provincial Laboratory. The samples are also screened for microcystin, harmful toxins released by cyanobacteria (blue-green algae) during algal blooms. Cyanobacterial toxins, such as microcystin, can affect human and animal liver and nervous systems, resulting in severe illness or death. The public is advised to avoid swimming and other in-water activities in recreational areas when test results indicate poor water quality.

In 2022, the Healthy Beaches Program included the high salinity Little Manitou Beach. Follow-up testing was conducted after complaints regarding excessive algae growth at the beach.

### How does the measure contribute to building resilience?

During the beach sampling process, temperature and precipitation are recorded, and information is available upon request.

#### Percentage of *E. coli* and Microcystin Exceedances (2017 to 2022)

Year	Percentage of <i>E. coli</i> Single Sample Exceedances	Percentage of <i>E. coli</i> Geomean Exceedances	Percentage Microcystin Positive Samples
2017	2.2%	0.5%	0.0%
2018	0.3%	0.1%	0.0%
2019	1.4%	0.3%	0.0%
2020	0.8%	0.0%	0.0%
2021	0.2%	0.2%	0.0%
2022	4.4%	0.9%	1.6%



## Program Highlight

### Saskatchewan's Healthy Beaches Program

The Ministry of Health started the Healthy Beaches program in 2012. It has been reporting water quality test results and associated actions on the Government of Saskatchewan Healthy Beaches Program website since 2019.

Beaches are monitored to prevent or reduce the burden of water-borne illness and injury related to recreational water use at public beaches. Swimming in contaminated water can increase the risk of ear, nose and throat infections or gastrointestinal illnesses. Several environmental and artificial factors influence recreational water quality, including rainfall, wave action, water and ambient air temperatures, waterfowl, industrial waste discharges, stormwater outflows, septic system discharges and agricultural run-off.

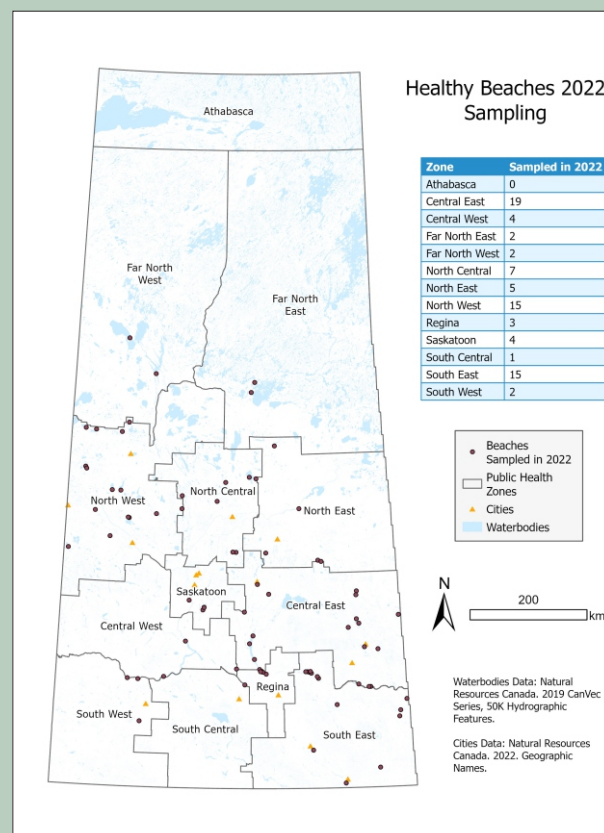
Due to climate change, extreme weather events such as heat waves and large storms are becoming more frequent and intense. Lake temperatures rise as more sunlight is absorbed and water evaporates, encouraging toxic algae blooms. As a result of contaminated run-off from heavy rain, pathogenic organisms and algal blooms are more likely to occur in beach water, which puts human health at risk.

The sampling program includes around 165 selected public beaches and waterfront areas used for aquatic activities at recreational camps with lands controlled by a provincial, regional or municipal agency with access to a lake or river. However, not all public swimming areas in Saskatchewan are monitored every year. Historical data and an environmental health assessment may indicate that only occasional sampling is necessary.

Beach monitoring occurs weekly, monthly or annually depending on risk assessments. Each public swimming area in the Healthy Beaches Program is inspected at least once every five years.

Risk assessment includes consideration of water quality parameters (including *E. coli* and microcystins), site amenities, user information (bather load, ease of access, primary contact recreation, etc.), physical safety and environmental hazards of the recreational sites. Assessments are used to prioritize and establish sampling frequency at public swimming areas.

Map of sampled beaches in the province in 2022.



For more information: [Healthy Beaches Program | Environmental Health | Government of Saskatchewan](#)





## Measure 22

### The number of active surveys at suitable habitat sites for Lyme disease and other tick-borne diseases

This measures the number of surveys conducted at sites in Saskatchewan with active surveillance for tick-borne diseases.



#### Target

This measure aims to conduct at least 55 surveys at a minimum of 50 sites annually, targeting sites with suitable habitat for tick establishment.

#### Status

In 2022, 58 surveys were conducted at 53 sites for Lyme disease and other tick-borne diseases. No blacklegged ticks (*Ixodes scapularis*) were detected during active surveys in 2022.

Survey sites included areas of likely exposure to Lyme disease for humans or domestic animals. Sites also included sentinel sites sampled multiple times yearly and new locations where blacklegged ticks are found through passive surveillance. These include parks, recreation and historic sites and select ecological reserves.

#### How does the measure contribute to building resilience?

Monitoring and surveillance inform risk messaging to the public and provide details about the encroachment of ticks into environments with supportive climates. Monitoring also informs adaptive measures to control tick populations.

Active surveillance for blacklegged ticks has been ongoing in Saskatchewan since 2008. This tick is the primary carrier for the agents that cause Lyme disease and several other tick-borne diseases in Canada and the United States. The active tick surveillance program aims to assess the risk of Lyme disease in Saskatchewan by checking for blacklegged ticks and determining if they have become established in any area of the province.

#### Program Highlight

##### eTick: 2022 tick surveillance results

To improve passive tick surveillance in Saskatchewan, the Ministry of Health collaborated with researchers at the University of Saskatchewan and Bishop's University to launch eTick, a digital tick identification platform ([www.eTick.ca](http://www.eTick.ca)).

Here are some results from the eTick platform based on the data submitted by the public in 2022:

- In total, 1,079 valid submissions were received via eTick for Saskatchewan.
- Like previous years, the vast majority were American dog ticks, Rocky Mountain wood ticks or winter ticks, which are not known to transmit Lyme disease.
- Approximately two per cent of submissions (17 out of 1,079) were blacklegged ticks.



# Glossary

**4R nutrient stewardship:** a nutrient management plan that supports fertilizer's effective and efficient application. The 4R nutrient stewardship incorporates the right fertilizer source at the right rate, at the right time and in the right place to achieve cropping system goals. It helps organize decisions toward high production, increased profitability, improved environmental protection and improved sustainability.

**Absorptive capacity:** the ability of a system to prepare for, mitigate or recover from climate change impacts using predetermined coping responses to preserve and restore essential basic structures and functions (e.g. human life, housing, productive assets). It refers to the capacity to recover from specific shocks and short-term stresses.

**Adaptation:** in human systems, this refers to the adjustment process to actual or expected climate change and its effects to moderate harm or access to beneficial opportunities. In natural systems, this refers to the adjustment process to the actual climate and its effects; human intervention may facilitate adjustment to the expected climate.

**Adaptive capacity:** the ability of a system to adjust, modify or change its characteristics and actions to better respond to existing and anticipated future climatic shocks and stresses.

**At-risk communities:** communities in Saskatchewan's wildland-urban interface are rated as having moderate to high risks of wildfires, based on the Saskatchewan Ministry of Environment's Community Wildfire Risk Assessment. This may also refer to the Water Security Agency's assessment of communities potentially at risk of flooding due to being adjacent to waterbodies or other topographic characteristics (e.g. low relief).

**Carbon dioxide equivalent (CO<sub>2</sub>e):** a term for describing different GHGs in a common unit. CO<sub>2</sub>e signifies the amount of CO<sub>2</sub> that would have the equivalent global warming impact. A quantity of GHG can be expressed as CO<sub>2</sub>e by multiplying the amount of GHG by its global warming potential. For example, given a GWP of 25 for methane (CH<sub>4</sub>), if 1 kg of CH<sub>4</sub> is emitted, this can be expressed as 25 kg of CO<sub>2</sub>e (1 kg CH<sub>4</sub> \* 25 = 25 kg CO<sub>2</sub>e).

**Climate change:** a change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forces and persistent human-caused changes in the composition of the atmosphere or land.

**Climate:** the average weather conditions over a long period (decades and longer).

**Community preparedness:** the resilience of Saskatchewan communities to climate change impacts. It includes providing the public with the necessary information, responding to and recovering from extreme weather, understanding flood risks, drought and wildfires, establishing emergency preparedness/ management plans and adopting appropriate standards and practices to reduce risks.

**Economic sustainability:** the ability to remain competitive in a global marketplace and encourage investment while reducing GHG emissions. This includes ensuring businesses and industries receive the support they need to develop marketable innovations to address climate change.

**Human well-being:** the resilience of Saskatchewan residents to climate change impacts. It includes ensuring residents are healthy and have stable jobs to provide for their needs and families.

**Land under permanent cover:** land cultivated with long-term crops replanted for several years, land under trees and shrubs producing flowers or nurseries (except those of forest trees, which are classified as Forestry). This includes native prairie, tame or seeded pasture and tame hay.

**Mitigation (of climate change):** a human intervention to reduce the sources or enhance the sinks of greenhouse gases.

**Natural systems:** maintaining the integrity of Saskatchewan's land, water and forests. Management of natural systems determines the ecosystem's resilience to climate change and the ecological goods and services derived from them (e.g. food, fuel, water, air purification, carbon storage, wildlife habitat and cultural provisions). Natural systems also inherently support mitigation through carbon sequestration in soils, forests and wetlands.

**Physical infrastructure:** producing and moving goods and managing the built environment. It includes maintaining reliable transportation and utility services and water resource management. This also means increasing the capacity for renewable energy generation and building more energy-efficient buildings.

**Realized net income:** the amount by which the total cash gains from an investment exceed the total losses. Realized net income is the net cash income minus (-) depreciation plus (+) income in kind.

**Resilience:** the ability to cope with, adapt to and recover from stress and change. It is scalable and can refer to, for example, the resilience of individuals, communities, ecosystems or provinces.

**Soil organic matter (SOM):** any material produced originally by living organisms (plant or animal) that is returned to the soil and undergoes decomposition. SOM mitigates climate change by decreasing atmospheric carbon dioxide. Thus, increasing SOM in an area can reduce net carbon dioxide emissions.

**Summer fallow:** keeping normally cultivated land free of vegetation throughout one growing season by cultivating and/or applying chemicals to destroy pests and diseases and allowing a buildup of soil moisture reserves for the next crop year. This practice can result in the loss of SOM through erosion.

**Transformative capacity:** the ability of a system to holistically and fundamentally change its characteristics and actions when the existing conditions become untenable in the face of climatic shocks and stresses. It goes beyond incremental adjustments by changing primary systems, structures and assumptions to substantially reduce vulnerability.

**Weather:** the state of the atmosphere at a given time, which changes with the passing of hours, days and seasons.

# List of Abbreviations

<b>AAC</b>	Annual allowable cut
<b>BMP</b>	Beneficial management practices
<b>CO<sub>2</sub></b>	Carbon dioxide
<b>CO<sub>2</sub>e</b>	Carbon dioxide equivalent
<b>ECCC</b>	Environment and Climate Change Canada
<b><i>E. coli</i></b>	<i>Escherichia coli</i>
<b>GDP</b>	Gross domestic product
<b>GHG</b>	Greenhouse gases
<b>GJ/m<sup>2</sup></b>	Gigajoule per square meter
<b>m<sup>3</sup></b>	Cubic meter
<b>mm</b>	Millimeter
<b>Mt</b>	Million (or mega) tonnes
<b>MW</b>	Megawatts
<b>Mwh</b>	Megawatts per hour
<b>N<sub>2</sub>O</b>	Nitrous oxide
<b>PGPP</b>	Power Generation Partner Program
<b>RNFI</b>	Realized net farm income
<b>ROW</b>	Right-of-way
<b>SPSA</b>	Saskatchewan Public Safety Agency
<b>SOM</b>	Soil organic matter
<b>TSA</b>	Timber Supply Area
<b>WSA</b>	Water Security Agency

## More info?

Further information about the Climate Resilience Measurement Framework and *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy* is available at [saskatchewan.ca/climate-change](https://saskatchewan.ca/climate-change).

