



# Climate Resilience in Saskatchewan

2022 Report

# Table of Contents

Minister’s Message . . . . .	ii
Executive Summary . . . . .	iii
Snapshot of 22 Resilience Measures . . . . .	iv
Introduction . . . . .	1
How is Saskatchewan building its resilience to climate change? . . . . .	1
New and Updated Measures . . . . .	3
Five Key Areas of Resilience. . . . .	4
How to read this report . . . . .	5
Status of Measures by Key Area	
Natural Systems . . . . .	6
Physical Infrastructure . . . . .	12
Economic Sustainability . . . . .	21
Community Preparedness . . . . .	27
Human Well-Being . . . . .	31
Glossary . . . . .	35
List of Abbreviations . . . . .	37

# Minister's Message



I am pleased to share the 2022 Resilience Report for Saskatchewan's Climate Resilience Measurement Framework – a commitment from the province's *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy*. This report represents the fourth year of reporting on the framework since the Government of Saskatchewan released it in 2018.

Over the last four years the Resilience Report has become a connection point across ministries, ensuring a one-government approach to supporting climate resilience in Saskatchewan and alignment with *Saskatchewan's Growth Plan for the Next Decade of Growth: 2020-2030*, which supports a resilient environment for a stronger Saskatchewan.

The framework pledges an annual assessment of measures and the identification of actions that could further enhance resilience in Saskatchewan. The 2021 assessment recognized the first set of measures that reached their target timeframes, prompting new measures and updated targets to be included in 2022.

The 2022 Resilience Report shows sustained positive trends and improvements from last year in all resilience measures. Of the 22 measures reported this year, 18 measures are in good standing and no measures are in poor standing.

Key highlights of the 2022 Resilience Report include:

- All economic sustainability and human well-being measures are in good standing and have remained stable or improved from last year.
- All new measures in the 2022 Resilience Report began in good standing and are on track to achieve their new targets.
- SaskPower is implementing several initiatives that complement and contribute to increasing resiliency in the province.
- In 2020 there was an encouraging increase in realized net farm income, overcoming a slight decline from the last few years. This is the result of continued efforts to strengthen provincial resiliency in the agriculture sector.
- The number of culverts on the national highway system increased to meet a new provincial flood standard, helping ensure a more resilient provincial transportation network in the face of extreme weather events.
- Greenhouse gas emissions from the upstream oil industry continue to decrease.

Four years of reporting on the Climate Resilience Framework have enabled Saskatchewan to assess, improve and continue to strengthen resilience in the province. The reports have also identified further action to ensure our province adapts and thrives in a changing climate. To learn more about Saskatchewan's resilience-based approach, please see *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy* at [saskatchewan.ca/climate-change](https://saskatchewan.ca/climate-change).

Dana Skoropad  
Minister of Environment



# Executive Summary

The 2022 Resilience Report is the fourth annual report by the Ministry of Environment monitoring resilience in Saskatchewan's natural systems (our land, water, and forests), physical infrastructure, economy and communities. With it, four years of data collection allows Saskatchewan to assess trends over a longer period and evaluate the effectiveness of policies and programs.

This report re-evaluated the eight measures that reached their timeline targets in 2020. Four measures were replaced with new ones, and four were updated with new targets. Three additional measures, not included in this report, are being reassessed to ensure they continue to meaningfully contribute to our overall resilience goals. As such, this year's report will inform on the progress of 22 measures.

Overall, trends in the resilience measures are positive. The number of measures with good status is 18, above last year's total of 17 measures in this category. Four measures are considered to have fair status. As in previous reports, there are no measures with poor status. **These results demonstrate the province continues to make progress in building resilience to climate change.**

All reported measures under economic sustainability are in good standing. Resilience measures considered fair include some under natural systems (e.g. total protected areas), physical infrastructure (e.g. renewable energy generation capacity) and community-preparedness (e.g. communities with modern flood mapping).

Our province works in partnership with stakeholders to pursue complementary programming to improve the status of resilience measures. For example, SaskPower is implementing several initiatives that strengthen their efforts to build resiliency in the electricity sector. Saskatchewan is also working with Fertilizer Canada to support the adoption of 4R practices in our province's cropland, reducing greenhouse gas emissions and increasing resiliency in the agriculture sector. In addition, two new measures in natural systems, one new measure in economic sustainability and one new measure in human well-being will help Saskatchewan's path to resiliency. At the same time, the province is working to reassess and improve measures to reinforce the capacity to respond to the impacts of climate change in key areas such as community preparedness and human well-being.

The Government of Saskatchewan will continue to track, report and improve climate resilience measures to help identify further areas to focus and improve, as well as better understand Saskatchewan's resilience to climate change.



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

Measures <sup>2</sup>	Target	Current Status <sup>3</sup>	Trend	Status
			Trend <sup>4</sup>	
<b>Natural Systems</b>				
1. Total area of agricultural land under permanent cover in Saskatchewan.	Maintain at 8.06 million hectares (19.93 million acres).	In 2016, 8.06 million hectares (19.93 million acres) of agricultural land under permanent cover.	The past trend shows a slight decrease from 2011 to 2016, but an increase from 1996 to 2006.	
2. Percentage of agricultural land area with 4R nutrient stewardship plan.	By 2025, 25 per cent of Saskatchewan's cropland under 4R designation.	Approximately 6.3 per cent in 2021 – an increase of 2.3 per cent from the previous report.	Increased	
3. Soil protection compliance rate of commercial forest harvesting in Saskatchewan (new).	Maintain an annual overall compliance rate of 95 per cent with the Forest Operations Standard related to soil protection.	In 2020-21, the overall compliance of all inspected TSA was 99 per cent – above the target of 95 per cent.	Increased	
4. Total protected areas in Saskatchewan (updated).	By 2025, 7,812,432 hectares (12 per cent) are protected <sup>5</sup> .	As of January 2022, 6.37 million hectares (9.8 per cent) <sup>6</sup> – an increase of 20,618 hectares from the previous year.	Increased	
5. Seedlings distributed from SaskPower's Shand Greenhouse (new).	Distribute at least 500,000 seedlings to eligible customers annually.	In 2021, 404,363 seedlings were distributed in the province.	Maintained	
<b>Physical Infrastructure</b>				
6. Total number of provincial culverts on the national highway system that meet the new provincial flood standard.	Increase the total number of culverts on the national highway system that meet the new provincial flood standard.	In 2021-22, 36 culverts were added, for a total of 350 – an increase from 314 last year.	Increased	
7. Renewable energy generation capacity.	By 2030, up to 50 per cent of electricity generated from renewable energy sources.	In 2021, 26.4 per cent of electricity generated was from renewable energy sources – an increase of 25 MW from 2020.	Increased	

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

<sup>2</sup> The numbers of ongoing and updated measures have changed from previous reports. New measures have also new numbers. 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 are increasing, decreasing, or maintained, and if status is deemed good, fair, or poor. Whether a certain 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 on 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, reported total area in previous reports have been adjusted. Refer to the measure's summary for revised estimates.

8. Total greenhouse gas (GHG) emissions from the electricity sector.	By 2030, 7.1 Mt CO <sub>2</sub> e GHG emissions from the electricity sector (50 per cent reduction from 2005 levels) <sup>7</sup> .	In 2020, 12.8 Mt CO <sub>2</sub> e emissions (10 per cent lower than the baseline year) - a 2.4Mt CO <sub>2</sub> e decrease from the previous year.	Decreased	
9. Area of SaskPower powerline rights of-way (ROW) widened <sup>8</sup> .	By 2030, 10 per cent of ROWs cleared to maintenance standard per year.	In 2021, 9.4 per cent of ROWs widened in wildfire management areas – an increase from the 8.8 per cent widened in 2020.	Increased	
10. Total energy consumption for government-owned buildings <sup>9</sup> (updated).	By 2030, reduced energy consumption to 0.818 GJ/m <sup>2</sup> .	In 2021, 1.218 GJ/m <sup>2</sup> – a slight increase compared to 2020.	Increased	
11. Total GHG emissions from government-owned buildings (updated).	By 2030, reduced GHG emissions to 63,875 tonnes of CO <sub>2</sub> e.	In 2021, 81,704 tonnes CO <sub>2</sub> e emissions – a reduction of 9,365 tonnes of CO <sub>2</sub> e from the previous year.	Decreased	
<b>Economic Sustainability</b>				
12. Total GHG emissions produced in association with oil.	By 2025, reduced GHG emissions to 6.4 Mt CO <sub>2</sub> e (4.5 Mt CO <sub>2</sub> e reduction from 2015 emissions).	In 2021 4.4 Mt CO <sub>2</sub> e <sup>10</sup> - a reduction of more than 15 per cent from 2020.	Decreased	
13. Emissions intensity of Saskatchewan's economy (GHGs per unit of GDP).	Continued decrease in the emission intensity of Saskatchewan's economy.	In 2020, 798 tonnes of CO <sub>2</sub> e per million of GDP (chained 2012 dollars) – a 23.6 per cent decrease from 2007 to 2020.	Decreased	
14. Realized net farm income (RNFI).	No greater than 50 per cent decrease in RNFI from the previous five-year average.	In 2020, \$4.14 billion (61 per cent rise when compared to the previous five-year average).	Maintained < 50 per cent decrease in RNFI from the previous 5-year average	
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 2021, all crop types were below 50 per cent coverage.	Maintained	
16. Annual sustainable timber harvest utilization (new).	Not to exceed 100 per cent of the annual allowable cut (AAC) for any Timber Supply Area (TSA), nor cumulatively for the whole commercial forest in the province.	As of the 2020-21 fiscal year, all TSAs in the province were below the AAC limit.	Maintained	
<b>Community Preparedness</b>				
17. Flood-mapping completed for communities at risk of flooding and where benefits validate the costs <sup>11</sup> .	By 2030, 100 per cent of communities at risk of flooding have completed modern flood-mapping, where costs are commensurate with the benefits.	In 2020-21, four communities have access to modern maps and 20 communities have preliminary maps requiring approval. The total number of communities for this target is currently being finalized.	Maintained	

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

<sup>8</sup> Using updated GIS data sources, SaskPower was able to improve 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 buildings.

<sup>10</sup> The COVID-19 pandemic impacted the accuracy of this measure as not all the reduction in GHG emissions can be attributed to greater efficiencies. Some of the reduction is due to reduced oil production as a result of pandemic restrictions and impact to oil trade. Approximately 70 per cent of the decrease from 2019 levels is due to emissions reduction projects implemented by the upstream oil industry.

<sup>11</sup> The Water Security Agency is currently working with 20 priority communities to approve flood maps. However, the total number of communities for this target is in the process of being determined. The Water Security Agency is currently assessing these needs and is expecting an estimate to be determined in the spring of 2023.

18. Number of wildfire operational pre-plans completed for at-risk northern communities.	By 2030, all 84 at-risk communities have wildfire operational pre-plans completed.	In 2020-21, 66 (79 per cent) communities with operational pre-plans.	Increased	
19. Total Crown land with fuel management work completed.	By 2028, complete all wildfire fuel management within 90 communities, for a total of 2,248 hectares.	As of March 2021, completed 1,197 hectares, with 1,051 hectares remaining. This was an increase of 219 hectares from the previous year.	Increased	
<b>Human Well-Being</b>				
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).	In 2020, per capita and total municipal water consumption was 326 liters/person/day and about 111 million m <sup>3</sup> , respectively.	Decreased water consumption per capita and decreased total municipal consumption (increase in water use efficiency).	
21. Saskatchewan's Healthy Beach Program (new).	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).	In 2021, more than 99 per cent of water samples taken from participating beaches for measuring E.coli and 100 per cent of water samples taken for measuring microcystin were within acceptable safety limits.	Maintained	
22. Number of active surveys at suitable habitat sites for Lyme disease and other tick-borne diseases (updated).	Beginning in 2022, conduct at least 55 surveys across samples at a minimum of 50 sites <sup>13</sup> annually to monitor the risk of vector-borne illnesses influenced by a changing climate.	In 2021, 63 surveys across 52 sites were completed. This was one survey short of meeting the 2021 target <sup>14</sup> .	Increased	

<sup>12</sup> With funding secured from the Disaster Mitigation and Adaptation Fund in 2019-20, the target year was changed in the 2020 Resilience Report from 2030 to 2028. In addition, the total target areas to be managed was increased to 2,248 hectares in 2021, increasing from the original target area of 1,547 hectares projected.

<sup>13</sup> The target for this measure has been updated with the purpose of setting a long-term target for continuously monitoring the risk of vector-borne illnesses influenced by a changing climate.

<sup>14</sup> The 2021 target for this measure was 64 surveys at 55 sites. The remaining survey could not be completed by project contractors due to poor weather conditions.

# 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 the province's ability to adapt and thrive in a changing climate.

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 every year.

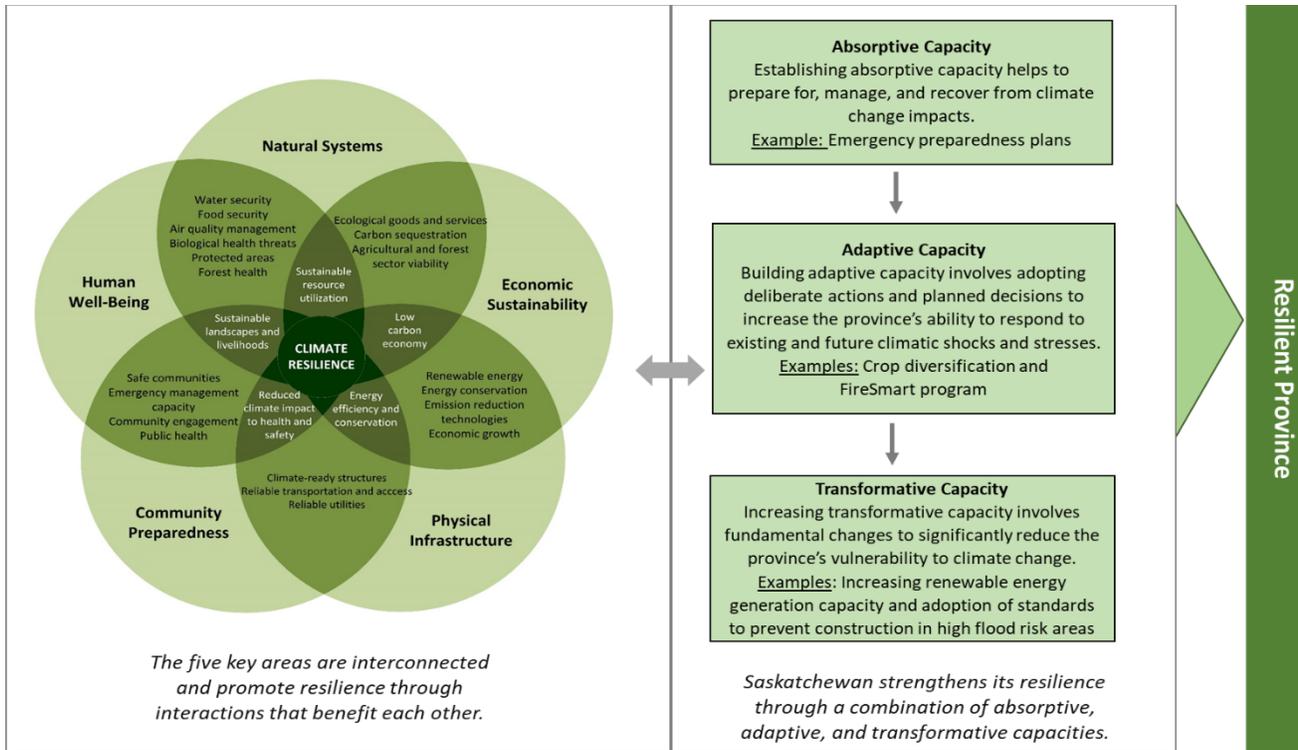
The first annual resilience report was released in April 2019 and introduced the baselines and targets for each measure. The 2020 and 2021 reports presented the trend and status for each measure, showing the majority of measures in good standing and none with poor status. The 2022 Resilience Report is the fourth annual report and provides the most recent data and status for each measure. It also introduces four new measures and four ongoing measures with updated targets.

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

**Saskatchewan takes a system-wide approach to preparing for a changing climate.** This includes improving the resilience of the province's natural landscapes, physical infrastructure, economy, communities and people (Figure 1). This approach strengthens the province's absorptive, adaptive and transformative capacities to adapt and thrive in a changing climate.

**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 provision of 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 (GHG) emissions. These types of interconnections are further highlighted in the following sections describing each indicator.

**Resilience** refers to the ability of a system – 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 1:** 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.

# New and Updated Measures

Throughout 2021 and early 2022, Saskatchewan evaluated several measures, including those that reached their timeline targets in 2020. Four new measures (measures 3, 5, 16, and 21) were developed to continue to build resiliency in Saskatchewan and four existing measures were updated (measures 4, 10, 11 and 22).

Measures	Status	Previous measure
<b>Natural Systems</b>		
3. Soil protection compliance rate of commercial forest harvesting in Saskatchewan.	New	Number of forest management plans that incorporate Values, Objectives, Indicators and Targets (VOITs) related to forest age class distribution for the licence area.
4. Total protected areas in Saskatchewan.	Updated	Updated target.
5. Seedlings distributed from SaskPower's Shand Greenhouse.	New	Total amount of energy savings from SaskPower's Energy Efficiency and Conservation Program.
<b>Physical Infrastructure</b>		
10. Total energy consumption for government-owned buildings.	Updated	Updated target.
11. Total GHG emissions from government-owned buildings.	Updated	Updated target.
<b>Economic Sustainability</b>		
16. Annual sustainable timber harvest utilization.	New	Incorporation of natural forest disturbance patterns in provincial forest harvest design.
<b>Human Well-Being</b>		
21. Saskatchewan's Healthy Beach Program.	New	Number of communities (with suitable habitat) where active surveillance for West Nile Virus and other mosquito-borne diseases occurs.
22. Number of active surveys at suitable habitat sites for Lyme disease and other tick-borne diseases.	Updated	Updated target.



# 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. (new)
- 4) Total protected areas in Saskatchewan. (updated)
- 5) Seedlings distributed from SaskPower's Shand Greenhouse. (new)



## Physical Infrastructure

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




## 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 different types of crops.
- 16) Annual sustainable timber harvest utilization. (new)



## Human Well-Being

- 20) Average municipal water consumption per capita and total municipal water consumption.
- 21) Saskatchewan's Healthy Beach Program. (new)
- 22) Number of active surveys at suitable habitat sites for Lyme disease and other tick-borne diseases. (updated)



## Community Preparedness

- 17) Flood mapping completed for communities at risk of flooding and where benefits validate the costs.
- 18) Number of wildfire operational pre-plans completed for at-risk northern communities.
- 19) Total Crown land with wildfire fuel management work completed.



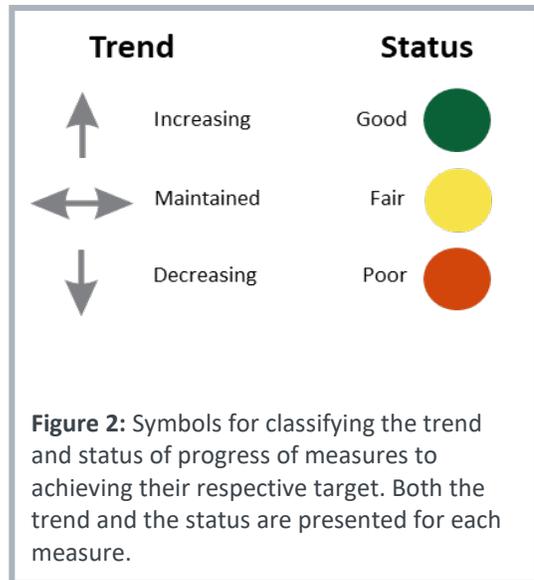
# How to read this report

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 2). 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. In some cases, like GHG emissions, a downward arrow is positive, as reducing emissions helps promote resilience. In others, like forest area under wildfire fuel management, an upward arrow would be positive, as it represents an increase in the total area.

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





# Natural Systems

**Natural Systems** refer to the integrity of land, water and forests in Saskatchewan. The management of natural systems determines the ecosystem's resilience to climate change, as well as 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 sequestration of carbon 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, as well as tame hay.



#### Target

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

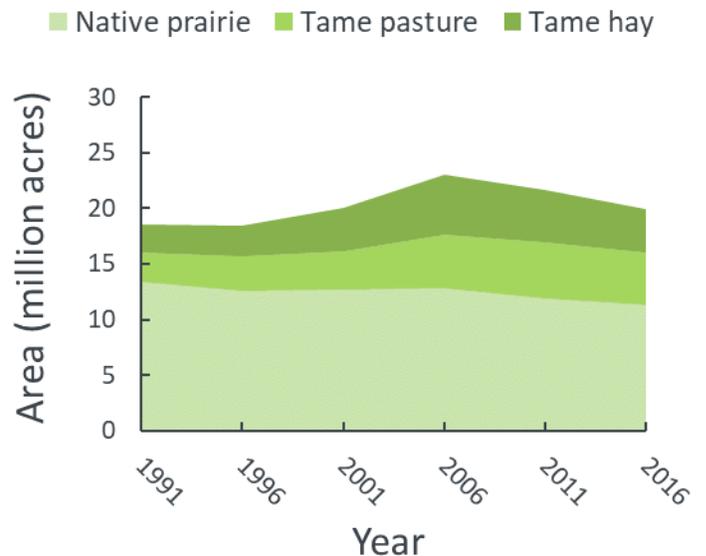
#### Status

The data for this measure is available every five years from Statistics Canada's Census of Agriculture. A new census will be released after the publication of this report. The most recent information available for this report is from the 2016 Census of Agriculture.

**As of 2016, there are 8.06 million hectares (19.93 million acres) of agricultural land under permanent cover.** Saskatchewan's total area of agricultural land under permanent cover decreased slightly between 2011 and 2016 (Figure 3). Total forage acres fluctuate with trends in crop prices relative to livestock prices and corresponding changes in herd size.

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

Permanent cover includes native prairie, tame pastures and tame hay. 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. 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 continues to provide cost-share funding to producers for beneficial management practices (BMPs) that help maintain agricultural land under permanent cover. These BMPs 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 2022 there were 1,120 forage applications funded at a total of more than \$4.5 million. In the last year, 260 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 2021, approximately 6.3 per cent of the province's agricultural land is under 4R designation.** This is an increase in area of 2.3 per cent since the last report.

Since it was first reported, uptake of 4R designation has increased among producers. Notably, in 2021, the total cultivated area under 4R designation in Saskatchewan increased by more than 868,700 acres compared to 2020. This is encouraging and steadily trending in the right direction.

These results also show that the Ministry of Agriculture and Fertilizer Canada's actions to increase 4R designation have been effective.

As a result, in 2022 the Ministry of Agriculture and Fertilizer Canada renewed their 2016 Memorandum of Cooperation for an additional three years. The Saskatchewan 4R Nutrient Stewardship Advisory Committee continues to help 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<sub>2</sub>O). This is significant as the greenhouse effect of N<sub>2</sub>O is at least 298 times more potent than that of CO<sub>2</sub>.

#### Saskatchewan's agricultural land under 4R designation (2021)

Total 4R designation	956,637 ha (2,363,903 acres)
Total crop area in Saskatchewan	15, 121,524 ha (37,366,100 acres)
% crop area under 4R designation	6.3 %

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

In 2020, Fertilizer Canada reported that roughly half of Saskatchewan growers were sampling soil for phosphorus every 3 years (as recommended). In 2021, three out of five farmers were following this recommendation.



These numbers show a growing interest in farmers adopting good practices for more efficient fertilizer use.



## Measure 3 **NEW**

### 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 overall 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 2020-21, the overall compliance of all inspected TSA was 99 per cent, and the lowest compliance rate for a single TSA was 98 per cent. Not all TSAs were inspected during this period due to the low level of harvesting. Over the last three years, the overall compliance rate is 98 per cent.

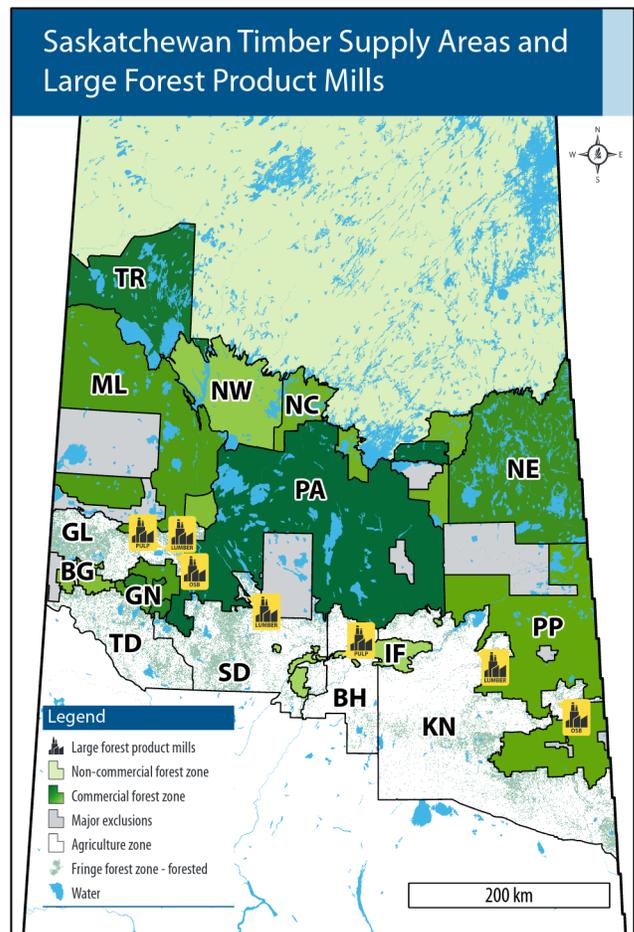
#### How does the measure contribute to building resilience?

In the boreal forest, 54 per cent 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, which can affect ecosystem conditions and forest productivity. The Saskatchewan Environmental Code is designed to protect forest soils in harvest and riparian management areas through standards for rutting, soil disturbance and site preparation. Licensees involved in harvesting activities are expected to meet these standards, ensuring 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 (TSA)	2018-19	2019-20	2020-21
Prince Albert (PA TSA)	↑ 96	↑ 98	↑ 98
Bronson-Green Lake (BG TSA)	↑ 100	↑ 100	n/a
Meadow Lake (ML TSA)	↑ 100	↑ 100	↑ 100
Glaslyn (GN TSA)	↓ 67	na/	↑ 100
Pasquia Porcupine (PP TSA)	↑ 100	→ 83	↑ 100
Island Forests (IF TSA)	↑ 100	↑ 100	↑ 100
North Central (NC TSA)	n/a	n/a	n/a
North East (NE TSA)	n/a	n/a	↑ 100
Goodsoil (GS TSA)	↑ 100	n/a	n/a
Kelvington (KN TSA)	↑ 100	n/a	n/a
Spiritwood (SD TSA)	↑ 100	↑ 100	n/a
<b>Overall for Province</b>	<b>↑ 97</b>	<b>↑ 98</b>	<b>↑ 99</b>



## Measure 4 **UPDATED**

### Total protected areas in Saskatchewan.

This measures the increase in terrestrial and aquatic ecosystems designated as protected and conserved areas in Saskatchewan. Protected areas include Crown lands that are 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 2022, **approximately 9.79 per cent of the province's total lands (6.37 million hectares) are protected areas. This includes representation from each of the province's 11 ecoregions.** In 2021, there was a slight increase of 20,618 hectares in Saskatchewan's protected areas. An additional 2.2 per cent – or approximately 1.5 million hectare – is needed to reach the new timeline target in 2025.

There are challenges to increasing protected areas. In the agricultural areas of the province, a large portion of the land is privately owned, and additions to existing protected areas are achieved in small quantities. In northern Saskatchewan, even though much of the area is Crown land, many interests must be considered to achieve a balance

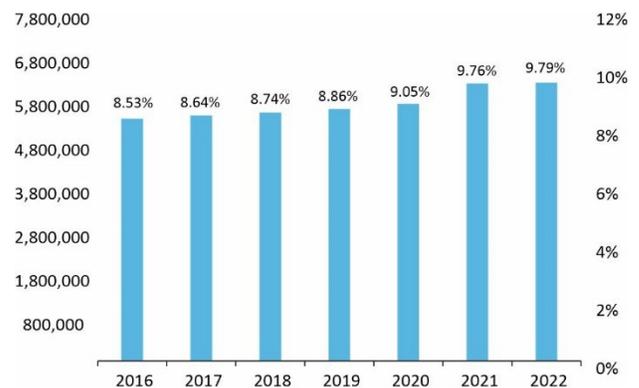
between conservation, community well-being and economic development. Additional programs, such as the Indigenous Protected and Conserved Areas and Other Effective Area-based Conservation Measures, are in place to ensure natural areas are conserved beyond formal protected area designation.

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

Protected areas act as habitat refuges and genetic reservoirs for species, including species at risk, and 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. Just as importantly, protected areas help maintain the integrity of traditionally and culturally important sites.

#### Current protected areas in Saskatchewan

Baseline (2017)	5,626,887 ha
Current (2022)	6,375,003 ha
Target (2025)	7,812,432 ha



**Figure 4:** Total protected area (in hectares) in Saskatchewan from 2016 to 2022, using the revised methodology. The value for 2022 is the current status.



## Measure 5 NEW

### 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, to environmental groups to support habitat projects and to community groups to support cultural projects or activities.



#### Target

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

#### Status

Since its inception in 1991, the SaskPower Shand Greenhouse has distributed more than 13 million tree and shrub seedlings across Saskatchewan. SaskPower invested \$400,000 in the facility in 2021-22 to replace aging infrastructure.

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

Planting trees is a natural climate solution that removes CO<sub>2</sub> from the atmosphere. The majority of seedlings distributed from the Shand Greenhouse are given free of charge to rural landowners across the

province to establish shelterbelts. In Saskatchewan, shelterbelts are valuable as they block wind during the winter months, leading to improved home and building energy efficiency. They also trap snow for dugouts and control dust.

Environmental and community groups are also able to access the seedlings. In 2021, approximately 16,000 tree and shrub seedlings were provided to environmental agencies to support habitat restoration projects for avian species. Approximately 350 milkweed plants were provided to Nature Saskatchewan to support the monarch butterfly habitat. An additional 1,200 native plants were provided to environmental agencies such as the Nature Conservancy of Canada, Native Plant Society of Saskatchewan and Grasslands National Park to support a biodiversity project.

500,000



Distributed  
Seedlings Target  
for 2022

404,363



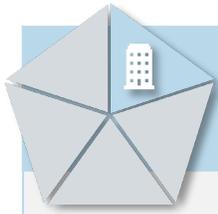
Seedlings Distributed  
in 2021

\$400,000



Invested in the  
Shand Greenhouse  
Facility





## Physical Infrastructure

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

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



## Measure 6

### Total number of provincial culverts on the national highway system meeting the new provincial flood standard.

This measure is an indicator of 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

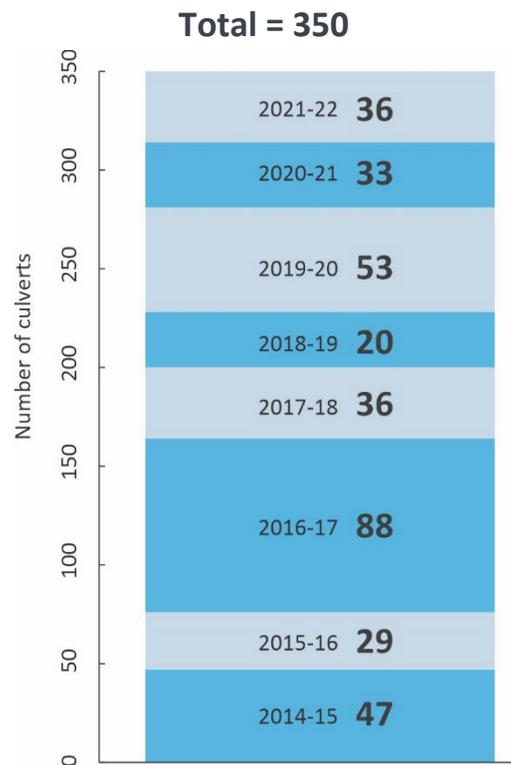
In the **2021-22 fiscal year**, 36 more culverts were upgraded or replaced on the national highway system (Figure 5). **The total number of culverts meeting the new flood standard is 350.**

#### 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 that 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 the new provincial standard, by fiscal year.



## 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>15</sup>.

#### Status

**In 2021, slightly more than 26 per cent of SaskPower's electrical generation capacity was composed of renewable energy sources.** A total of 1,322 megawatts (MW) of electricity was available from renewable energy sources—an **increase of 25 MW from 2020**. Wind generation was responsible for most of the increase in 2021.

#### 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	2020	2021
<b>Renewables</b>	<b>1,297 MW (25.9%)</b>	<b>1,322 MW (26.4%)</b>
Hydropower (incl. imports)	989 MW	989 MW
Wind	241 MW	251 MW
Energy recovery	67 MW*	82 MW*
<b>Non-renewables</b>	<b>3,702 MW</b>	<b>3,689 MW</b>
Natural gas	2,172 MW**	2,159 MW**
Coal	1,530 MW	1,530 MW
<b>TOTAL</b>	<b>4,999 MW</b>	<b>5,011 MW</b>

\*Increase from net metering generation and PGPP solar.

\*\*Decrease due to change in the calculation method. The new method calculates capacity at summer peak, and gas units are derated in hot weather.

<sup>15</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>16</sup> reduction from 2005 levels).

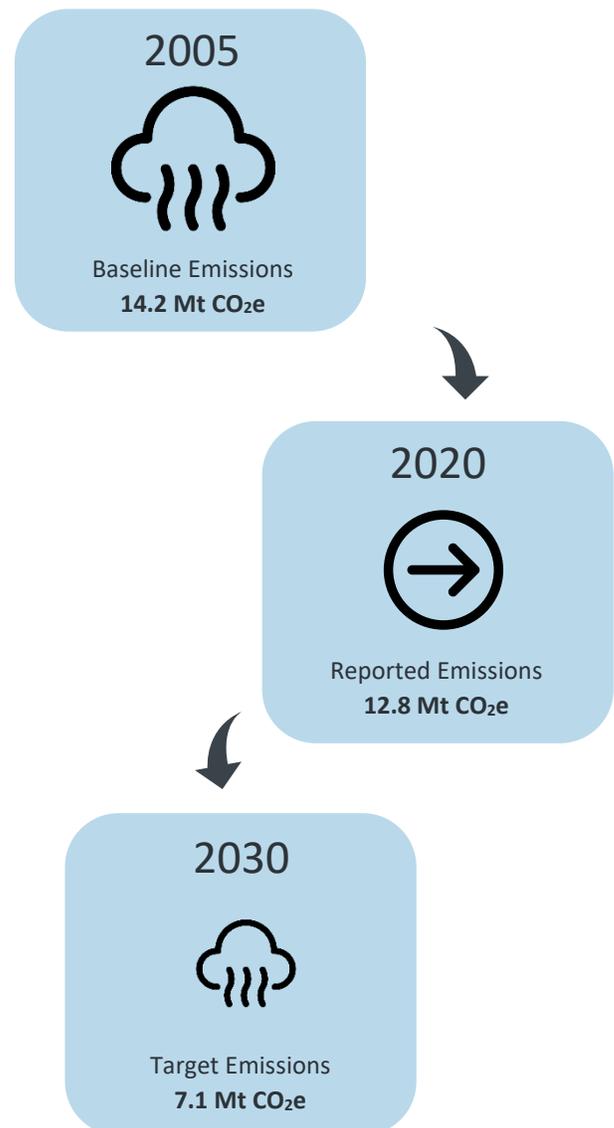
#### Status

**In 2020, emissions on a sector-wide basis decreased to 12.8 Mt CO<sub>2</sub>e, which was 10 per cent lower than 2005 – the baseline year<sup>17</sup>. This was a significant decrease from the previous year - 2.4Mt CO<sub>2</sub>e**

The decrease in GHG emissions was due to the impact of the COVID-19 pandemic and actions taken to lower emissions. Some of the actions to lower emissions include the operation of the lower-emitting Chinook Power Station for all of 2020, more CO<sub>2</sub> captured through carbon capture and storage, maximizing benefits from hydro during high water runoff in the Saskatchewan and Churchill rivers and aligning outages with maintenance and non-peak demand periods to optimize generation.

#### 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>16</sup> This target increased to 50 per cent reduction from 2005 levels from 40 per cent, which was given in previous reports. The adjustment is based on an increased commitment to reduce GHG emissions in this sector by 2030.

<sup>17</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. 2021 emissions information will be available in June 2022 and published in SaskPower's 2021-22 annual report.



## Measure 9

### 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) are cleared per year to maintenance standard. In 2021, adjustments were made to refine the measurement of the total managed area<sup>8</sup>. As such, SaskPower managed 13,894 hectares (at 30 metres in width) of ROW in 2021. The adjusted annual target area is 1,390 hectares or 10 per cent of the total managed area.

#### Status

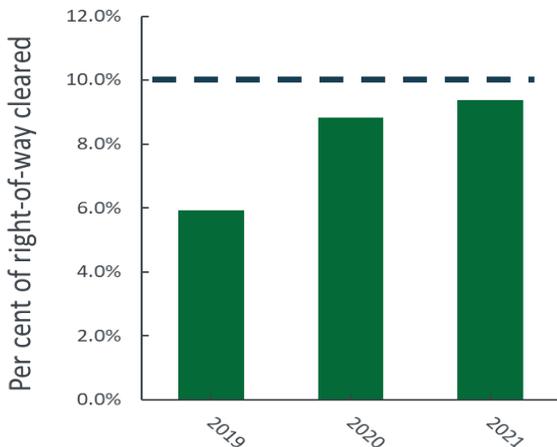
**In 2021, 1,304 hectares or 9.4 per cent of ROW** were cleared to reduce the risk of wildfire and ensure the reliability of service. The annual rate of clearing ROW areas is 94 per cent of the target rate.

The revised total managed area and the adjustments to calculate the ROW cleared in previous years have been applied to data from 2019

and 2020. Figure 6 depicts the adjusted ROW cleared areas from 2019 to 2021.

#### 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, as well as 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 is focusing 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 2021. The 2030 target (10 per cent cleared per year) is shown for comparison.

#### Enhancing this measure's accuracy

In 2021, SaskPower improved the accuracy of calculating the ROW total area by using updated 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 hectares
Total Area treated in 2019	822 hectares or 5.9 per cent
Total Area treated in 2020	1,225 hectares or 8.8 per cent
Total Area treated in 2021	1,304 hectares or 9.4 per cent



## Additional SaskPower Initiatives Contributing to Resiliency

SaskPower reports on four measures in the Saskatchewan Climate Resilience Report, which are on track to achieve their targets. However, the Crown corporation also has other initiatives in place that contribute to increasing Saskatchewan's resiliency:

**Internal Energy Management Plan:** SaskPower encourages customers to improve their energy efficiency. The Internal Energy Management Plan (IEMP) is an initiative to track the internal energy efficiency of SaskPower-owned facilities and find opportunities to improve. The IEMP provides SaskPower with a comprehensive and consistent approach to reduce energy waste and improve operational energy efficiency.

SaskPower is also renovating many of its properties. These renovations will increase productivity and accessibility, while improving energy efficiency.

Other projects involve conducting reviews and energy audits of SaskPower facilities, projects and processes. This includes using data from their newly installed commercial smart meters to track energy use in their buildings and substations across the province. Combined with the audits, data provided by smart meters and energy management training, SaskPower's facility managers have the tools they need to run properties in a more energy-efficient way.

The IEMP also helps with projects not related to SaskPower facilities, such as monitoring the savings of the Streetlight LED, Rural Rebuild and other improvement programs

In 2020-21 alone, the IEMP helped SaskPower:

- decrease its power demand by 2.35 megawatts (MW) and 14 GWh (the power needed for 2,350 Saskatchewan homes);
- lower its water consumption by more than 948,000 litres per year; and
- reduce operations-related CO<sub>2</sub>e emissions by nearly 7,438 tonnes per year (the equivalent of taking 1,907 cars off the road).

**Rural Rebuild Program:** The Rural Rebuild Program moves existing overhead lines from farm fields to road allowances, enabling SaskPower to replace aging infrastructure while improving farm safety, increasing operational efficiencies and providing energy savings by upgrading the conductor to reduce electrical losses.

The plan for the 2022 fiscal year is expected to result in 2,550 kW in demand savings and 13,197 MW in annual energy savings.



## **Other SaskPower Initiatives Contributing to Saskatchewan Resiliency**

### **Streetlight LED Program:**

The Streetlight LED Program is an ongoing effort to convert all SaskPower-owned streetlighting to LED technology. LED streetlights use 40-60 per cent of the energy previously used by conventional lights (depending on the wattage of light being replaced). They also have a much longer life expectancy, reducing maintenance costs and environmental impact.

As of January 2022, SaskPower has converted roughly 67 per cent of its streetlights to LED, and the remaining lights are expected to be replaced in the next three to four years.

Estimated demand savings achieved from all conversions so far is 3.5 MW, with annual energy savings estimated at 30723 MWh.

### **Energy Assistance Program:**

Many SaskPower customers want to be more energy efficient, reduce their carbon footprint and generate their own electricity. SaskPower provides self-generation and energy efficiency programs, including energy efficiency education and tools to help customers reduce their electricity consumption.

SaskPower offers the Energy Assistance Program to help low-income customers lower their monthly energy 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 homeowner across Saskatchewan and is offered in partnership with the Low Carbon Economy Fund. In 2021, the Energy Assistance Program generated a total of 311 MWh in annual energy savings.



## Measure 10 **UPDATED**

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

This measures energy intensity consumption in all provincial government-owned and operated buildings. It indicates the province's success in maximizing operational efficiencies while minimizing environmental impacts.



#### Target

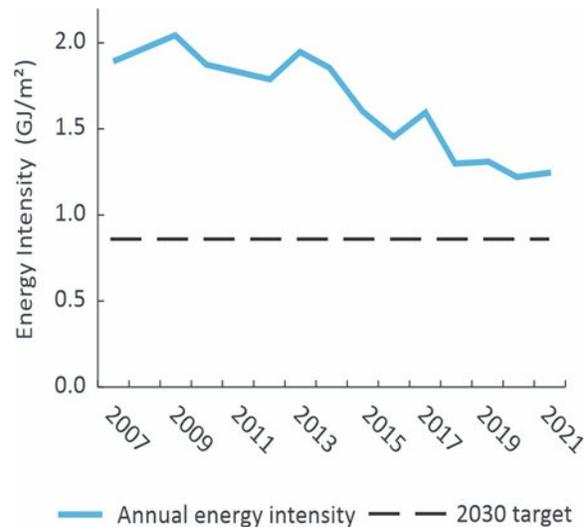
The Ministry of SaskBuilds and Procurement set a new target for this measure: to reduce energy intensity consumption to 0.818 GJ/m<sup>2</sup> (gigajoule per square metre) by 2030.

#### Status

Since 2014, significant reductions in total energy intensity consumption of government-owned buildings have been made. **In 2021, government-owned buildings' total energy intensity consumption was 1.218 GJ/m<sup>2</sup>**, slightly higher than last year's intensity consumption (Figure 7). Nonetheless, the total energy intensity consumed by government buildings was below the previous measure's target and on track toward the new target.

#### 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 sustainability efforts, the ministry adheres to environmental standards and strives to achieve environmental certifications on new builds and major renovations. It has increased the number of certified buildings over the past year:

- As of March 31, 2022, 49 government-owned buildings were recognized by BOMA for environmental property management.
- At the end of the 2021-22 fiscal year, nine government buildings across the province had achieved LEED® certification.



## Measure 11 UPDATED

### 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. both electricity and natural gas) and is 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.

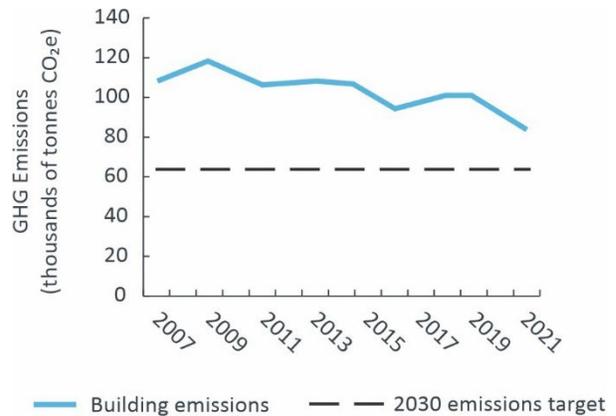
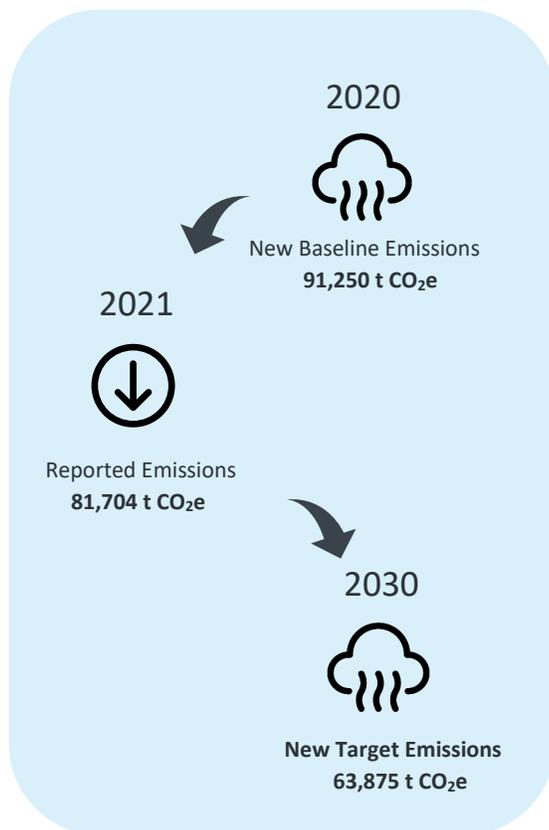
#### Status

**The total GHG emissions for 2021 were 81,704 tonnes of CO<sub>2</sub>e (Figure 8).** Total emissions in 2021 were lower than last year's emissions by 9,365 tonnes of CO<sub>2</sub>e.

The current target for this measure requires lowering emissions from government-owned buildings by roughly 17,873 tonnes of CO<sub>2</sub>e in the next nine years; this is about 2,000 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 taking the lead on 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, and 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 (GHGs per unit of GDP).

14. Saskatchewan's realized net farm income.

15. Percentage of cultivated land in difference 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 the reduction in 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.

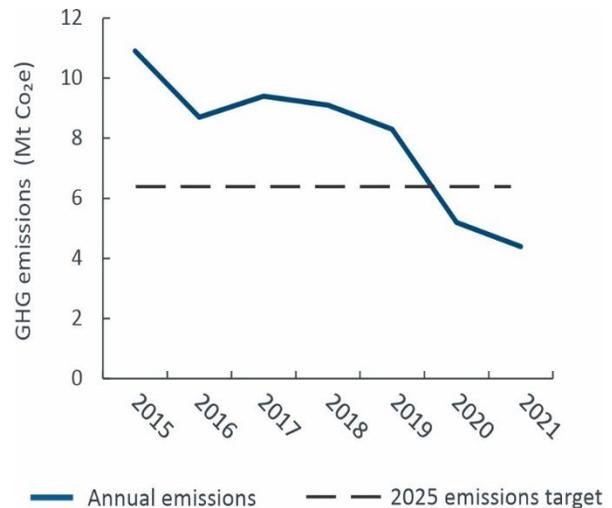
#### Status

The amount of GHG emissions from flaring and venting activities in the upstream oil industry **decreased to 4.4<sup>18</sup> Mt CO<sub>2</sub>e in 2021, falling further below the 2025 target and continuing the steady drop of emissions from previous years** (Figure 9).

In 2021, Saskatchewan's oil production increased from 2020 levels as the industry recovered from COVID-19 related impacts. Despite increasing oil production in 2021, GHG emissions from flaring and venting activities declined by more than 15 per cent from 2020 levels. As the economy recovers, GHG emissions are expected to decrease with the aid of the *Methane Action Plan*, which includes *The Oil and Gas Emissions Management Regulations, 2019*.

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

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



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

#### Program Highlight

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

With the implementation of the *Methane Action Plan*, the Government of Saskatchewan continues to work with the oil and gas industry to meet provincial GHG emissions reduction targets. The plan uses a results-based system that supports the adoption of emissions-reduction technologies at oil and gas wells and facilities. This will increase the incentive for industry to develop innovative solutions and continue to invest in the province.

Additional programs to support emissions reduction in the oil and gas sector include the Power Generation Partner Program with SaskPower and the Flare Gas Agreement with SaskPower and the First Nations Power Authority.

<sup>18</sup> Final number is subject to change as year-end data reconciliations are made.



## Measure 13

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



This measure reveals if CO<sub>2</sub>e reductions are a result of gains in efficiency or a loss of production. Data is available up to 2020, representing a lag of about one year.

#### 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.

#### Status

**From 2007 to 2020, GHG emissions intensity dropped by 23.6 per cent<sup>19</sup>**, 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 1,154 tonnes of CO<sub>2</sub>e per million (chained 2012) dollars, but has been trending downward ever since.

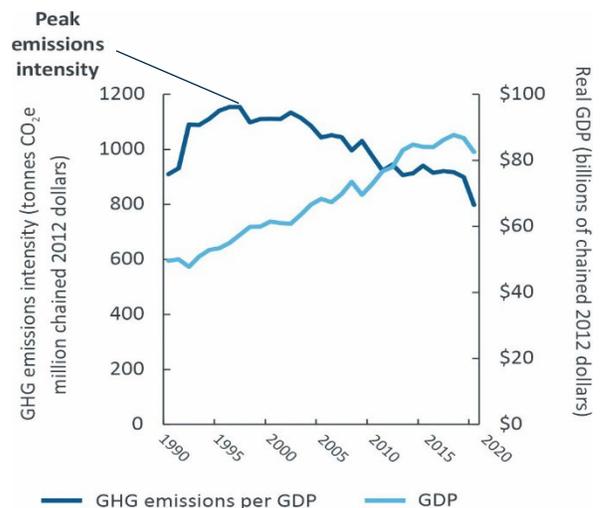
In 2020, GHG emission intensity was 798 tonnes of CO<sub>2</sub>e per million chained 2012 dollars – the lowest since records began in 1990. However, it is recognized that the restrictions caused by the pandemic have influenced GHG emissions reductions and likely overshadowed the policies designed to address this issue. Therefore, the full effect of current climate change policies will be known once the pandemic's main social and economic impacts have receded.

The programs and regulations introduced by Saskatchewan and the federal government will

continue to reduce Saskatchewan's GHG emissions intensity. These include the phasing out of conventional coal-fired electricity generation; expanding the use of renewables; regulating methane emissions from the upstream oil and gas sector; output-based performance standards for Saskatchewan's large industrial emitters; and 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 are addressing climate change at the expense of prosperity. If GHG emissions rise with GDP, climate change is not being addressed. Lasting prosperity and resilience are achieved when GHG emissions fall and GDP rises.



**Figure 10:** Saskatchewan's GHG emissions intensity, 1990 to 2020.

Source: Environment and Climate Change Canada's National Inventory Report (2022) and Statistics Canada

is for 2020 since there is a standard two-year delay for the National Inventory Report data processing.

<sup>19</sup> The gross domestic product (GDP) and GHG data were obtained from Statistics Canada and ECCC websites, respectively. The most recent data for GHG emissions



## 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 2020, representing a lag of approximately one year.

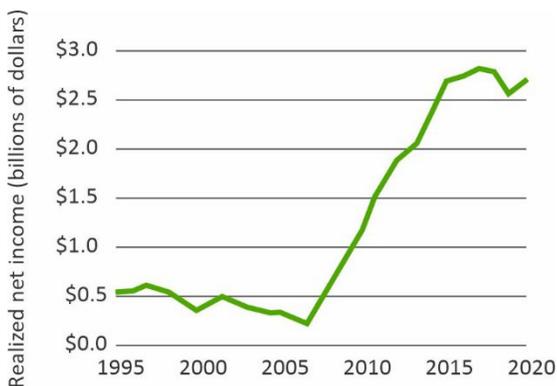


#### Target

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 2020, realized net farm income showed an increase of 139 per cent compared to 2019 and a **61 per cent rise** when compared to **Saskatchewan's five-year average of realized net farm income<sup>20</sup> (Figure 11)**. Due to high commodity prices and government support in response to drought conditions, the measure is overcoming a slight decrease in recent years.



**Figure 11:** Realized net farm income (five-year average) in Saskatchewan from 1995 to 2020.

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

#### 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 AgriInsurance, which includes fire insurance (under the Forage Rainfall Insurance Program), AgriInvest, AgriStability, Western Livestock Price Insurance Program and compensation for livestock predation and wildlife damage to crops. Saskatchewan also continues to provide funding for crop-related research that helps farmers adapt to climate change (e.g. research into drought-resistant crops).

Record high production (38.9 million metric tonnes) coupled with higher commodity prices and provincial incentives led to an increase of 21.1 per cent in crop receipts.



Realized net farm income in Saskatchewan in 2020 reached 4,143,910, a 61 per cent increase in RNFI from the five-year average.

<sup>20</sup> The estimates for realized net farm income differ slightly for 2017 and 2018 from past reports. This discrepancy is due to adjustments in methodology on behalf of

Statistics Canada, the data source, 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. With this measure, crop types are organized under the categories of 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.



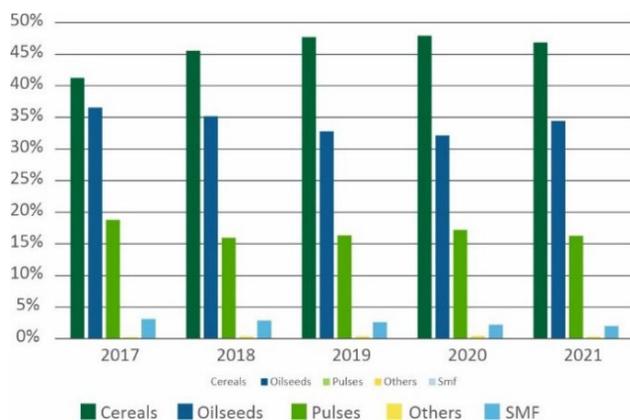
#### Target

No one crop type to rise above 50 per cent of the annual cultivated area. Meeting this target is assessed on an annual basis.

#### Status

**In 2021, there was no crop that made up 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 2021, cereals made up approximately 47 per cent of the cultivated land area (7.2 million hectares or 17.9 million acres), oilseeds made up 34 per cent (5.3 million hectares or 13.1 million acres), pulses and soybeans made up 16 per cent (2.5 million hectares or 6.2 million acres), summer fallow made up two per cent (310,000 hectares or 0.8 million acres) and other crops less than one per cent.



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

Source: Statistics Canada Table 001-0017. Others include buckwheat, corn, hemp and mixed grains, and made up < 1% of cultivated land area in 2021.

#### 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 are 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.

#### Program Highlight

##### The Crop Development Centre

Continued research and development through the Crop Development Centre at the University of Saskatchewan and the Ministry of Agriculture contributes 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 around the world.

For instance, plant breeding technology and variety development have 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 NEW

### 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.



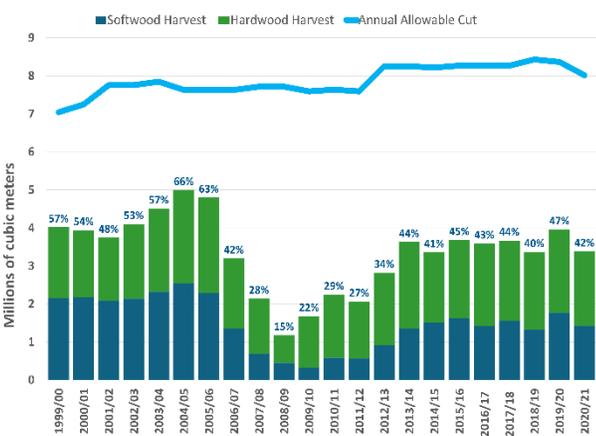
#### Target

The annual allowable cut (AAC) will not exceed 100 per cent for any Timber Supply Area (TSA) nor cumulatively for the whole commercial forest in the province.

#### Status

The Ministry of Environment has tracked the annual sustainable timber harvest utilization since 1990. **As of the 2020-21 fiscal year, all TSAs in the province were below the AAC limit. Saskatchewan's commercial forest, cumulatively, reached 41 per cent of the provincial AAC, following the pattern of the last seven years (Figure 13).**

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



**Figure 13:** Annual allowable cut (AAC) and Timber Harvest from 1999/00 to 2020/21 fiscal years, in millions of cubic metres and percentage of AAC, for the commercial forest in Saskatchewan.

Source: Forest Service Branch

### 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 that is fully using 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.

#### Program Highlight

#### Modelling Sustainable Timber Harvest

The sustainable limit of harvested timber is also known as harvest volume schedule, annual allowable cut (AAC) or sustainable wood supply in other Canadian jurisdictions. The AAC is determined based on the results of a wood supply analysis, which assesses sustainable wood supply over a 200-year timeframe using computer models. The calculated AAC for a given timber supply area represents what can be sustainably harvested while ensuring that 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 the resilience of Saskatchewan communities to the impacts of climate change. It includes provision of 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. Number of wildfire community pre-plans completed for at-risk northern communities.

19. Saskatchewan's total Crown land with wildfire fuel management work completed.



## Measure 17

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



This measures the percentage of communities in Saskatchewan at risk of flooding that would benefit from access to modern engineered flood-mapping.

#### Target

By 2030, 100 per cent of communities in Saskatchewan that are considered at risk of flooding, and where the benefits are commensurate with the costs, have access to modern flood maps. The total number of communities for this target is in the process of being determined, with an estimate expected for later in 2022.

#### Status

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

The WSA, in partnership with Public Safety Canada, 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 the review and endorsement of community flood map studies throughout 2022-2023, 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 2023.**

#### 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 development of 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 on the Prairies**

Communities near a stream, river or lake generally benefit from flood mapping. Other communities experience floods resulting from soil saturation (groundwater) and/or overland stormwater flooding during extreme precipitation events. 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 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 a proactive 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

### Number of wildfire community pre-plans completed for at-risk northern communities.



This measures the number of at-risk communities in Saskatchewan's wildland-urban interface that have community pre-plans. These communities are rated as moderate to high risk of wildfire.

#### Target

By 2030, all 84 at-risk<sup>21</sup> communities have wildfire operational pre-plans completed. Located within the wildland-urban interface with moderate-to-high risk of wildfires, these communities have been identified by the Saskatchewan Public Safety Agency through a community wildfire risk assessment.

#### Status

In 2020-2021, five wildfire community pre-plans were completed, resulting in a **total of 66 at-risk communities (79 per cent) with wildfire community pre-plans.**

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

Community pre-plans help with wildfire suppression when communities are threatened by wildfire. These pre-plans provide an overview of the planning area, fire behaviour potential, infrastructure, buildings and other resources at risk, as well as fire operations that can be utilized in the event of a wildfire. Wildfire risk assessment and planning also enables communities to identify hazards and prioritize efforts to address higher risks and more vulnerable areas or populations.

**Number of At-Risk Communities with Wildfire Pre-Plans**

Number of communities with wildfire community risk assessments	104
Total number of communities identified as at-risk	84 <sup>22</sup>
Number of communities with operational pre-plans (as of March 31, 2021)	66 <sup>23</sup> (79%)
Remaining number of communities with pre-plans needed	18 (21%)



<sup>21</sup> Communities in the wildland-urban interface rated with moderate or high risk of wildfire. The rating is based on community wildfire risk assessments previously conducted by the Ministry of Environment. Natural Resources Canada has been tasked with developing a new community risk assessment process which will take several years to complete.

<sup>22</sup> After analysis by the Saskatchewan Public Safety Agency, the current number of at-risk communities has been revised to 84 (previously 86).

<sup>23</sup> Last year's results have also been revised by the Saskatchewan Public Safety Agency. It was determined that the number of communities with operational pre-plans as of March 31st, 2020, was 61 (previously 62).



## Measure 19

### Saskatchewan's total Crown land with wildfire fuel management work completed.



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

#### Target

By 2028, complete all wildfire fuel management within 90 communities, for a total of 2,248 hectares. This ambitious target is made possible, in part, by the funding secured from the federal government's Disaster Mitigation and Adaptation Fund, which began in 2019-20.

#### Status

**As of March 31, 2021, the Saskatchewan Public Safety Agency (SPSA) has completed fuel management for 1,197 hectares of Crown land in the provincial forest.** This is an increase of 219 hectares from the previous year. These were conducted across 16 communities, including Air Ronge, Bear Creek, Beauval, Crutwell, Candle Lake, Cypress Hills Provincial Park, Denare Beach, Jan Lake, La Ronge, La Loche, Lower Fishing Lake, Patuanak, Prince Albert, Turnor Lake Hamlet, Weyakwin Lake/Ramsey Bay and White Swan Lake (Whelan Bay).

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

Date	Crown land with fuel management
As of March 31, 2020	978 hectares
As of March 31, 2021	1,197 hectares
Target over 2021-2028	2,248 hectares

#### 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 wildfire. The Saskatchewan Community Wildfire Risk Assessment identifies all Crown land locations requiring fuel management projects and sets priorities for project completion.

#### 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 the resilience of Saskatchewan residents to the impacts of climate change. 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 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 Beach Program.

22. 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 municipal water consumption and total municipal water consumption. Data is available up to 2020, representing a lag of one year.

#### Target

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

#### Status

**Per capita, municipal water use decreased in 2020, with residents using an average of 326 litres per person per day**, compared to 331 litres per capita per day in 2019. Total municipal water use also decreased from 127 million cubic metres in 2019 to 111 million cubic metres in 2020, a reduction of approximately 16 million cubic metres (Figure 14).

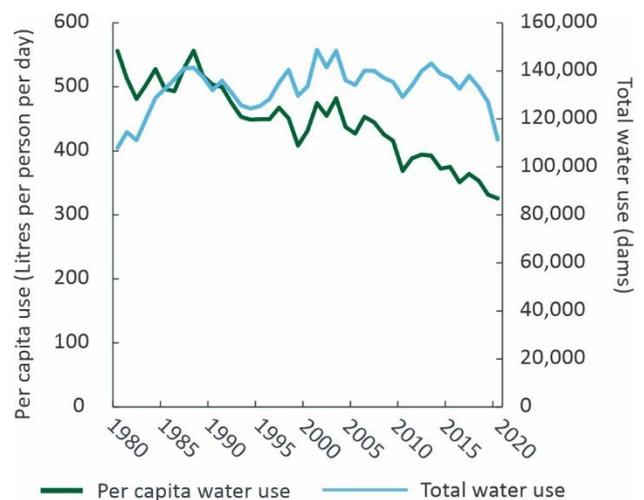
In the last 30 years, per capita rates have steadily declined. Total municipal water consumption remained relatively stable over the same period. However, there has been a decreasing trend in total water consumption in the previous five years, as depicted in the figure. Both indicators have trended downward for the last half-decade, suggesting that water use keeps becoming more efficient in Saskatchewan.

#### 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 the reliability (i.e. water quality or quantity) of municipal water sources.

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 14:** Per capita municipal water use and total municipal water use across Saskatchewan from 1980 to 2020 (1 dam = 1,000,000 litres).



## Measure 21 NEW

### Saskatchewan's Healthy Beach Program.

This measure helps monitor and ensure safe water quality for users of 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

**As of 2021, more than 99 per cent of water samples taken from participating beaches for measuring *E. coli* and 100 per cent of water samples taken for measuring microcystin (cyanobacteria) were within acceptable safety limits.**

The Ministry of Health runs the Healthy Beach Program at recreational beaches across the province. During the summer months, active monitoring of these sites ensures that water quality is safe for swimming and other in-water activities. Water samples are tested and results are reported weekly from July to early September. Bacteriological tests for *E. coli* are analyzed at the

Roy Romanow Provincial Laboratory. The samples are also screened for microcystin, which are potentially harmful toxins released by cyanobacteria (blue-green algae) during algal blooms. Cyanobacterial toxins, such as microcystin, can affect the liver and nervous systems in animals and humans and can result 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.

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

Monitoring the levels of *E. coli* and microcystin in the water, along with climate change drivers such as water temperature and precipitation patterns, may guide measures to increase the absorptive capacity of recreational water systems to mitigate climate change impacts on water quality and human health.

#### Percentage of *E. coli* and Microcystin Exceedances (2017 to 2021)

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%

#### Program Highlight

##### Online Algal Bloom Surveillance

As part of the Healthy Beach Program, an online form to [Report an Algal Bloom](#) is available. This data (i.e. the number of valid concerns received) may be useful in establishing trends around cyanobacteria at public beaches. In addition to microcystin as a resiliency measure, general cyanobacteria concerns may also be raised with climate change contributing to increased blooms.



## Measure 22

### 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

The Ministry of Health updated this measure to set a long-term target for continuously monitoring the risk of vector-borne illnesses influenced by a changing climate.

It is challenging to set fixed targets, as the number of surveys and sites varies depending on weather factors, soil moisture and air humidity. Therefore, **as of 2022, this measure aims to conduct at least 55 surveys for tick-borne diseases at a minimum of 50 sites annually, targeting the most promising sites for long-term monitoring.**

#### Status

**In 2021, 63 surveys were conducted at 52 sites for Lyme disease and other tick-borne diseases.** No blacklegged ticks (*Ixodes scapularis*) were detected during active surveys in 2021.

Survey sites included areas of likely exposure to Lyme disease for humans or domestic animals. Sites also included sentinel sites, which are sampled multiple times a year, and new locations where black-legged 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 black-legged ticks and determining if they have become established in any areas of the province.

#### Program Highlight

##### eTick: Crowd-sourcing 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 2021:

- In total, 859 valid submissions were received via eTick.
- The vast majority (98 per cent) were *Dermacentor* sp. ticks, which are not known to transmit Lyme disease.
- Approximately two per cent of submissions (15/859) were blacklegged ticks. One blacklegged tick was submitted outside eTick.

Of the 15 blacklegged ticks, nine were mailed in for pathogen testing and all tested negative for the bacteria that causes Lyme disease. Two ticks tested positive for the bacteria that causes anaplasmosis.



# Glossary

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

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

**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 to persistent human-caused changes in the composition of the atmosphere or land.

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

**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 the 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).

**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.

**Demand-side management (DSM):** energy efficiency, conservation, and load management programs that help reduce energy peak demand while also helping customers save power and money. DSM activities reduce GHG emissions from the electricity sector and can also lead to the deferral of growth-related capital projects.

**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 their 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.

**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 towards achieving high production, increased profitability, improved environmental protection, and improved sustainability.

**Physical infrastructure:** the production and movement of goods and the management of 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 exceeds the total losses from the investment. 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, resilience of individuals, communities, ecosystems, or provinces.

**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 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>BOMA</b>	Building Owners and Managers Association
<b>CO<sub>2</sub></b>	Carbon dioxide
<b>CO<sub>2</sub>e</b>	Carbon dioxide equivalent
<b>DSM</b>	Demand-side management
<b>ECCC</b>	Environment and Climate Change Canada
<b>E.coli</b>	Escherichia coli
<b>FMP</b>	Forest management plan
<b>GDP</b>	Gross domestic product
<b>GHG</b>	Greenhouse gases
<b>GJ/m<sup>2</sup></b>	Gigajoule per square meter
<b>GWh</b>	Gigawatts per hour
<b>IEMP</b>	Internal Energy Management Plan
<b>LEED</b>	Leadership in Energy and Environmental Design
<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>NIR</b>	National Inventory Report
<b>PGPP</b>	Power Generation Partner Program
<b>RNFI</b>	Realized net farm income
<b>ROW</b>	Right-of-way
<b>SBP</b>	Saskatchewan Builds and Procurement
<b>SPSA</b>	Saskatchewan Public Safety Agency
<b>SOM</b>	Soil organic matter
<b>TSA</b>	Timber Supply Area
<b>VOITs</b>	Values, Objectives, Indicators, and Targets
<b>WNV</b>	West Nile Virus
<b>WSA</b>	Water Security Agency
<b>WUI</b>	Wildland-urban interface

## More information?

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).

*Date published:* June 2022