



Climate Resilience in Saskatchewan

2021 Report

Table of Contents

Minister’s Messageiii
Executive Summaryiv
Snapshot of 25 Resilience Measuresv
Introduction1
How is Saskatchewan building its resilience to climate change?	1
Five Key Areas of Resilience.	3
How to read this document	4
Status of Measures by Key Area	
Natural Systems5
Physical Infrastructure	12
Economic Sustainability	21
Community Preparedness	27
Human Well-Being	33
Glossary	39
List of Abbreviations	40

Minister's Message



I am pleased to share the 2021 Resilience Report for Saskatchewan's *Climate Resilience Measurement Framework*. The report fulfills Saskatchewan's commitment to track and report on the framework annually as part of the *Prairie Resilience* climate strategy.

Introduced in 2018, the *Climate Resilience Measurement Framework* and subsequent annual reports align well with Saskatchewan's *Growth Plan for the Next Decade of Growth: 2020-2030*. This roadmap for a growing province sets goals to build a strong economy, strong communities and strong families. The measures within the 2021 Resilience Report also align with the *2021 State of the Environment Report*, ensuring linkages across government initiatives that support a healthy, resilient environment for a strong Saskatchewan.

In the 2021 Resilience Report, we continue to see positive trends and improvements in many of the resilience measures. Of the 25 measures, 17 measures are in good standing, and no measures are considered in poor standing, consistent with previous reports. This year, we see the first set of measures reach their 2020 target timeframe, and three of these measures achieved their stated target. While this is a success, this also indicates that there is room to grow as we continue to build climate resilience in Saskatchewan.

Other key highlights of the 2021 Resilience Report include:

- All measures under economic sustainability and human well-being are in good standing and have remained stable or improved from last year.
- Efforts to reduce energy consumption of government-owned buildings surpassed its target in 2018, 2019, and 2020. In addition, SaskPower has strengthened its commitment to greenhouse gas emissions reductions, aiming to reduce emissions by 50 per cent of 2005 levels by 2030.
- As of March 2020, all forest harvest designs incorporate natural forest pattern concepts, reaching the target for this measure.
- Saskatchewan continued to build its surveillance capacity to monitor risk of vector-borne diseases, like West-Nile Virus and Lyme Disease. This is a proactive approach to monitor the potential increased risk of these diseases due to climate change, ensuring plans can be developed to mitigate and communicate risk, if necessary.
- Saskatchewan is supporting communities to prepare for wildfire. Near 75 per cent of at-risk communities have preparedness plans, and the Saskatchewan Public Safety Agency has increased the number of communities undergoing annual fuel management from three to 15. Such advancements will help mitigate the risk and impact of future wildfires.

As you will read in the report, resilience is *the ability to cope with, adapt to and recover from stress and change, while continuing to develop*. With three years of reporting on the framework, this offers the opportunity for Saskatchewan to evaluate where we are building resilience. In addition, we can assess where we might place additional efforts to ensure the province can adapt and thrive in a changing climate. To learn more about the context for Saskatchewan's resilience-based approach, please see the province's full climate change strategy, *Prairie Resilience*, at saskatchewan.ca/climate-change.

Executive Summary

Climate change is a multifaceted and multi-sectoral issue. Thus, *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy* adopted a comprehensive approach focused on strengthening resilience in Saskatchewan's natural systems (our land, water and forests), physical infrastructure, economy, and communities.

Saskatchewan's Climate Resilience Measurement Framework was released in November 2018 to track and report annual progress on 25 resilience measures across five key areas: natural systems, physical infrastructure, economic sustainability, community preparedness and human well-being. These measures provide a picture of how Saskatchewan is strengthening its ability to prepare for the impacts of a changing climate. Annual reporting can help indicate where, in future years, alternative or additional policies or programs may enhance resilience. The first annual resilience report was released in April 2019 and presented the baselines and targets for each measure. The 2021 report continues with reporting on the status and trends for each measure.

Overall, trends in the resilience measures are positive. The number of measures in "good" status is 17 (68 per cent), which is close to the 2020 status of 18 measures (72 per cent), indicating that progress on building resilience is maintained. There are eight measures that are in "fair" status, and similar to previous reports, there are no measures with "poor" status. Seven measures reached their 2020 target timeline. Of these, three measures met the stated target, with new targets under development. For those in which the target was not achieved, Saskatchewan is assessing additional programming and policies needed to ensure future targets are met.

All measures under economic sustainability and human well-being are in good standing. Resilience measures considered fair include those under natural systems (e.g., agricultural land under 4R nutrient stewardship designation and total protected areas), physical infrastructure (e.g., renewable energy generation capacity), and community-preparedness (e.g., communities with modern flood mapping).

To improve the status of resilience measures, Saskatchewan continues to work in partnerships with stakeholders and pursue complementary programming. For example, Saskatchewan is working with Fertilizer Canada to support adoption of 4R practices in Saskatchewan's cropland to reduce greenhouse gas emissions. In addition, Saskatchewan is implementing the *Protected and Conserved Areas Roadmap* to maintain progress to protect and conserve natural areas. SaskPower's planned investments will increase renewable energy generation capacity and operational efficiency, which will contribute to reducing greenhouse gas emissions through to 2030. Further, the Water Security Agency is working with communities to support local flood planning needs, including advancing modern flood mapping as well as developing flood risk and response plans.

As committed to in *Prairie Resilience*, the province will continue to track and report on the climate resilience measures to help identify areas of further focus and improvement, and to better understand Saskatchewan's resilience to climate change.

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

Snapshot of 25 Resilience Measures

Measures	Target	Current Status ¹	Trend ²
Natural Systems			
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	Past trend shows slight decrease from 2011 to 2016 but an increase from 1996 to 2006 
2. Total amount of soil organic matter accumulated in Saskatchewan's cultivated land	Maintain sequestration at 5.60 Mt soil organic matter per year	4.13 Mt of soil organic matter sequestered in 2019 ³	Decreased 
3. Percentage of agricultural land area with 4R nutrient stewardship plan	By 2025, 25 per cent of Saskatchewan's cropland under 4R designation	Approximately 4.0 per cent in 2020	Increased 
4. Number of forest management plans that incorporate Values, Objectives, Indicators and Targets (VOITs) related to forest age class distribution for the licence area	By 2020, 100 per cent of approved forest management plans will contain a VOIT that identifies approved age class profile target, by area on the managed forest land base	As of February 2021, 5/6 (83 per cent)	Maintained 
5. Total protected areas in Saskatchewan	By 2020, 7,812,432 hectares (12 per cent) are protected ⁴	As of January 2021, 6.35 million hectares (9.8 per cent) ⁵	Increased 
Physical Infrastructure			
6. Total number of provincial culverts on the national highway system that meet new provincial flood standard	Increase the total number of culverts on the national highway system that meet new provincial flood standard	In 2020-21, 33 culverts were added, reaching to a total of 314	Increased (cumulative) 
7. Renewable energy generation capacity	By 2030, up to 50 per cent of electricity generated from renewable energy sources	In 2020, 25.9 per cent of electricity generated was from renewable energy sources	Increased 

¹ Some measures have a one- to two-year lag in data availability, including measures 2, 8, 9, 14, 15, and 23. Measure 1 has a five-year lag in data from the Census of Agriculture.

² 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".

³ The amount of soil organic matter sequestered through reduction in summerfallow and improved tillage practices have been largely maintained. Due to a reported reduction in area of tame forage, this measure demonstrates a decline in soil organic matter accumulation since 2017.

⁴ The target is 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.

⁵ 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 electricity sector	By 2030, 7.11 Mt CO ₂ e GHG emissions from electricity sector (50 per cent reduction of 2005 levels) ⁶	In 2019, 15.91 Mt CO ₂ e emissions (comparable to 2017) ⁷	Maintained	
9. Total amount of energy savings from SaskPower's Energy Efficiency and Conservation Program	6 MW of peak power demand reduction and 45 GWh of energy savings in 2019-2020	6.7 MW peak power demand reduction and 46 GWh energy savings in fiscal year 2019-20 ⁸ The measure exceeded the target in 2019-2020.	Increased	
10. Area of SaskPower powerline rights-of-way (ROW) widened	By 2030, 10 per cent of ROWs cleared to maintenance standard per year	7.5 per cent of ROWs widened in wildfire management areas in 2020	Increased	
11. Total energy consumption for government-owned buildings ⁹	By 2020, reduced energy consumption to 1.494 GJ/m ²	In 2019 and in 2020, 1.199 GJ/m ² ¹⁰ The target has been achieved and exceeded.	Decreased (exceeded target in 2018, 2019, and 2020)	
12. Total GHG emissions from government-owned buildings	By 2020, reduced GHG emissions to 85,489 tonnes CO ₂ e	In 2020, 91,069 tonnes CO ₂ e emissions	Decreased	
Economic Sustainability				
13. Total GHG emissions produced in association with oil	By 2025, reduced GHG emissions to 6.4 Mt CO ₂ e (4.5 Mt CO ₂ e reduction from 2015 emissions)	In 2020, 5.3 Mt CO ₂ e ¹¹	Decreased	
14. Emissions intensity of Saskatchewan's economy (GHG's per unit of GDP)	Continued decrease in the emission intensity of Saskatchewan's economy	In 2019, 864 tonnes CO ₂ e per million of GDP (chained 2012 dollars); 13 per cent decrease over 2007 to 2019	Decreased	
15. Realized net farm income (RNFI)	No greater than 50 per cent decrease in RNFI from the previous five-year average	In 2019, \$1.82 billion (34 per cent less than the previous five-year average)	Maintained < 50 per cent decrease in RNFI from the previous 5-year average	
16. Percentage of cultivated land in different types of crops	No one crop type to rise above 50 per cent of the cultivated area	In 2020, all crop types were below 50 per cent coverage	Maintained	
17. Incorporation of natural forest disturbance patterns in provincial forest harvest design	Beginning April 1, 2019, 100 per cent of forest harvest designs incorporate natural disturbance patterns	As of February 2021, 6/6 (100 per cent) The target has been achieved.	Maintained	

⁶ 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.

⁷ SaskPower's emissions on a sector-wide basis in 2020 remained comparable to the previous year and 12% higher than the baseline year (2005). However, the electricity system is becoming more efficient and emissions are expected to decrease through 2030.

⁸ In 2019, SaskPower made the decision to reposition its efforts to a broader range of program areas, including energy efficiency tools and advice, customer generation, electric vehicles, and smart technologies. These measures will continue to contribute to building resilience by achieving internal efficiencies and encouraging and supporting customers' adoption of new technologies to lower the province's GHG emissions.

⁹ "Government-owned buildings" refers to executive government buildings only; excludes Crown buildings.

¹⁰ These numbers are still subject to 3% - 5% error due to the timing of this request, where the utility provider is still using estimated meter reads at some locations

¹¹ 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% of the decrease from 2019 levels is due to emissions reduction projects implemented by the upstream oil industry.

Community Preparedness

18. Flood-mapping completed for communities at risk of flooding and where benefits validate the costs	By 2030, 100 per cent of communities at risk of flooding have completed modern floodplain mapping, where improvements commensurate costs ¹²	In 2020-21, 4 communities have access to modern maps, and 21 communities have preliminary maps requiring approval	Maintained	
19. Percentage of Saskatchewan communities with emergency preparedness and response plans	By 2025, 80 per cent of Saskatchewan communities to have emergency preparedness and response plans ¹³	Based on a 2018 survey, 238 of communities surveyed have an emergency preparedness plan	Maintained	
20. Number of wildfire operational pre-plans completed for “at-risk” northern communities	By 2030, all 86 “at-risk” communities have wildfire operational pre-plans completed	In 2020-21, 62 (72 per cent) communities with operational pre-plans	Increased	
21. Total Crown land with fuel management work completed	By 2028 ¹⁴ , 2,248 hectares adjacent to communities	As of March 2020, completed 978 hectares, with 1,270 hectares remaining	Increased	

Human Well-Being

22. Number of communities reliant on water supplies vulnerable to drought	Decrease the number of communities reliant on drought-vulnerable water supplies	More communities received lower runoff during 2020 than 2019. Three communities expressed concern about annual water supply	Increased, but the overall proportion of communities vulnerable remains low ¹⁵	
23. 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 2019, per capita and total municipal water consumption was 331 liters/person/day and about 127 million m ³ , respectively	Decreased water consumption per capita and decreased total municipal consumption (increase in water use efficiency)	
24. Number of communities (with suitable habitat) where active surveillance for West Nile Virus and other mosquito-borne diseases occurs	By 2020, increase to 20 communities	In 2020, 20 communities had active surveillance The 2020 target has been achieved.	Increased	
25. Number of active surveys at suitable habitat sites for Lyme disease and other tick-borne diseases	By 2020, increase to 60 surveys across sample 51 sites	In 2020, 59 surveys across 51 sites completed One survey short to meet the 2020 target due to poor weather conditions ¹⁶	Increased	

¹² The Water Security Agency is currently working with 21 priority communities to approve flood maps. However, the total number of communities for this target is in the process of being forecasted. The Water Security Agency is currently assessing these needs and is expecting an estimate to be determined in the fall of 2021.

¹³ The number of total communities for this target is under development. The Saskatchewan Public Safety Agency is revising its methodology to better assess the number of communities that have or need emergency preparedness and response plans. An estimate is anticipated in time for the 2022 report.

¹⁴ 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 as of the 2021 report, increasing from the original target area of 1,547 hectares projected. There are 569 hectares remaining to be managed for fuel load under the original target.

¹⁵ The measure is considered in good status as only three communities expressed concerns over the impact of lower predicted runoff to local water supplies. Due to the sensitivity of this measure to precipitation, the Water Security Agency is considering additional indicators to better measure drought resilience.

¹⁶ The remaining survey could not be completed by project contractors due to poor weather conditions. The target is considered missed, but the capacity exists to increase the number of surveys conducted in the coming years. The Ministry of Health is increasing surveillance efforts over the spring, summer, and fall of 2021, conducting 64 surveys over 55 sites.

Introduction

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, which includes 25 measures across five key areas: natural systems, physical infrastructure, economic sustainability, community preparedness and human well-being. Each of the measures have specific targets to serve as benchmarks for progress on building resilience in these areas.

The Government of Saskatchewan is committed to track and report on all 25 measures every year. Annual reporting provides a better understanding of the state of Saskatchewan's resilience to climate change. Further, this approach assists in identifying areas that will benefit from alternative or additional policies and programs.

The first annual resilience report was released in April 2019, presenting the baselines and targets for each measure. The 2021 Resilience Report is the third annual report and provides the trend and current status of each measure in relation to their target. In particular, seven measures reached their target year and are assessed to determine if targets are achieved. Together with the 2019 and 2020 reports, at least three years of data exist, allowing Saskatchewan to assess trends over a longer period and evaluate the effectiveness of policies and programs.

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 develop

How is Saskatchewan building its resilience to climate change?

Saskatchewan takes a system-wide approach to prepare for a changing climate. This includes improving the resilience of the province's natural landscapes, physical infrastructure, economy, communities and people (Figure 1). This approach to resilience focuses on strengthening 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 well-being of people in Saskatchewan. Managing the province's natural landscapes provide 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 habitat. 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.

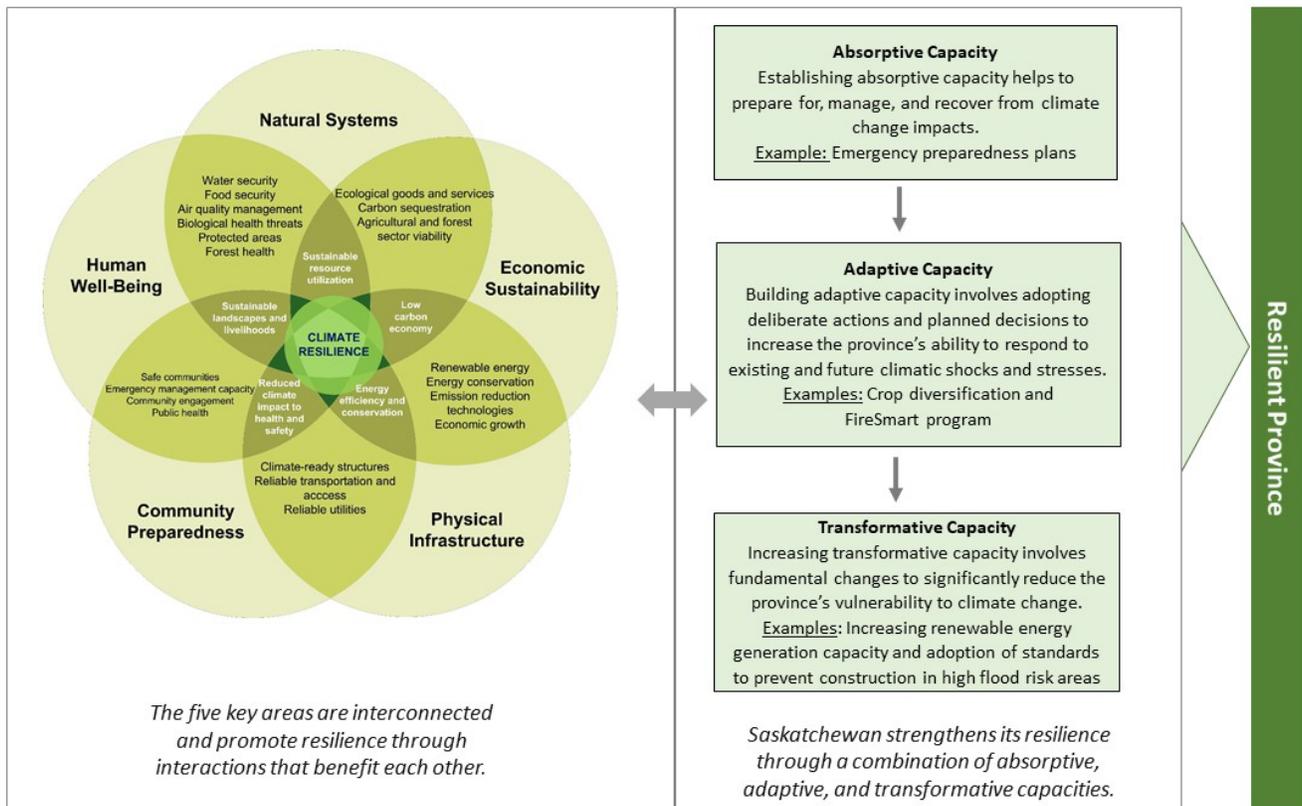


Figure 1: The five key areas of the Climate Resilience Measurement Framework. The diagram shows the interrelated nature of the frameworks as well as its contribution to three components of resilience.

Saskatchewan's system-wide approach to resilience focuses on strengthening the province's absorptive, adaptive and transformative capacities to prepare for and thrive in a changing climate.

Five Key Areas of Measures

The framework includes 25 measures organized into five keys areas in which to increase resilience:



Natural Systems

- 1) Total agricultural land under permanent cover
- 2) Total amount of soil organic matter accumulated in Saskatchewan's cultivated land
- 3) Percentage of agricultural land areas with 4R nutrient stewardship plan
- 4) Number of forest management plans with Values, Objectives, Indicators, and Targets (VOITs) related to forest age class distribution
- 5) Total protected areas in Saskatchewan



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) Total amount of energy savings from SaskPower's Energy Efficiency and Conservation Program
- 10) Area of SaskPower power line right-of-way widened
- 11) Total energy consumption for Saskatchewan government-owned buildings
- 12) Total GHG emissions from Saskatchewan government-owned buildings



Economic Sustainability

- 13) Saskatchewan's total GHG emissions from gas produced in association with oil
- 14) Emissions intensity of Saskatchewan's economy
- 15) Saskatchewan's realized net farm income
- 16) Percentage of cultivated land in different types of crops
- 17) Incorporation of natural forest disturbance patterns in provincial forest harvest design



Human Well-Being

- 22) Number of communities reliant on water supplies vulnerable to drought
- 23) Average municipal water consumption per capita and total municipal water consumption
- 24) Number of communities where active surveillance for West Nile virus and other mosquito-borne diseases occurs
- 25) Number of active surveys at suitable habitat sites for Lyme disease and other tick-borne diseases



Community Preparedness

- 18) Flood mapping completed for communities at risk of flooding and where benefits validate the costs
- 19) Percentage of Saskatchewan communities with emergency preparedness and response plans
- 20) Number of wildfire operational pre-plans completed for at-risk northern communities
- 21) Total Crown land with wildfire fuel management work completed



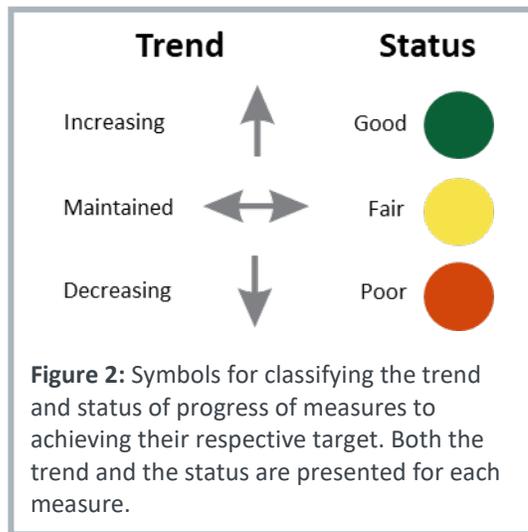
How to read this report

The report is divided into five sections that correspond to the five key areas: natural systems, physical infrastructure, economic sustainability, community preparedness and human well-being.

A trend and determination of the status is given for each measure (Figure 2). The trend indicates whether values are increasing, decreasing or maintained. The quality of the status is deemed as either good, fair or poor. Whether or not the target is met is described alongside its current status.

Whether a certain trend is good, fair or poor will vary by measure. For example, a downward arrow in green is viewed positively for a decreasing trend in GHG emissions since this trend contributes to increasing resilience. In contrast, for a measure concerning the area of forest currently under wildfire fuel management, a green, upward arrow indicates an increase in area managed. Such a measure is considered in good status (green) as this practice corresponds to increasing resilience.

A statement of how each measure contributes to building resilience is provided for each of the 25 measures.





Natural Systems

Natural Systems refers to maintaining the integrity of land, water and forests in Saskatchewan. Management of natural systems determines not only the ecosystem's resilience to climate change, but also the ecological goods and services derived from them, 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 provision of traditional practices. Finally, 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. Total amount of soil organic matter accumulated in cultivated land
3. Percentage of agricultural land area with 4R nutrient stewardship plan
4. Number of forest management plans that incorporate Values, Objectives, Indicators, and Targets related to forest age class distribution for the licence area
5. Total protected areas in Saskatchewan

Measure 1

Total area of agricultural land under permanent cover

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



Target

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

Status

The data for this measure is available every five years from Statistics Canada's Census of Agriculture. A new census is expected for 2021; the most recent information is from the 2016 census, which is used as the source for this measure's data (Figure 3).

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 slightly decreased within the last 10 years. Total forage acres fluctuate with trends in grain and oilseed prices relative to livestock prices and with changes in the size of the cattle herd.

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 against drought and flood events than lands under annual cropping. Grasslands contribute more to carbon sequestration and provide habitat for wildlife. This helps to maintain biodiversity, especially on native prairie. Permanent cover can also help buffer against the spread of weeds.

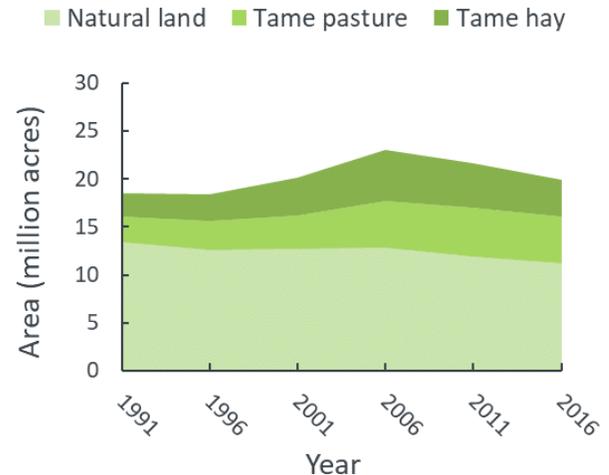


Figure 3: Total area of agricultural land under permanent cover.

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 support maintenance of 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 2021, there were 860 forage applications funded for a total of over \$3.6 million.



Measure 2

Total amount of soil organic matter accumulated in Saskatchewan's cultivated land



This measures the amount of soil organic matter (SOM) accumulated in Saskatchewan's cultivated lands from various agricultural practices, such as reduction in summerfallow, changes in tillage practices, and conversion of cropland to forage. Data for this measure are available for 2019, representing a data lag of one year.

Target

Maintain accumulation at 5.60 million tonnes (Mt) soil organic matter (SOM) per year.

Status

Improvements in production practices, including zero-till and reduced summer fallow, has supported farmers in adding organic matter to the soil every year. From 2006 to 2014, cultivated areas in Saskatchewan accumulated more than 5.0 Mt of SOM annually. SOM accumulation from reductions in summerfallow area and conventional tillage practices have been largely maintained. **In 2019, cultivated areas accumulated approximately 4.1 Mt of SOM (Figure 4).** Annual sequestration has declined since 2011 in part due to conversion of tame forage and hay acres (or “mixture of cropland type” in Figure 5). In addition, the model used to calculate SOM accumulation relies on data from the 2016 Census of Agriculture, which reported a drop in tame forage and hay land of 445,150 hectares (1.1 million acres) between 2011 and 2016. The estimated trend may change depending on findings from the 2021 Census.

How does the measure contribute to building resilience?

SOM estimates overall soil productivity. Soil organic carbon, the carbon component of SOM, represents the carbon dioxide (CO₂) sequestered in the soil (one tonne of SOM is roughly equivalent to two tonnes of carbon dioxide equivalent (CO₂e)). Cultivated land and grasslands are important carbon sinks, sequestering CO₂ from the atmosphere into soils. SOM also improves soil quality, including increased water infiltration and retention, soil stability, and nutrient retention, which can lead to higher agricultural productivity.

Tame grasslands typically store more carbon in SOM than cultivated lands. Their loss can reduce total SOM accumulated, as well as impact habitat for grassland species. The province, through the Canadian Agricultural Partnership Farm Stewardship Program, continues to provide cost-share funding to support producers who wish to convert marginal land from annual production to permanent cover.

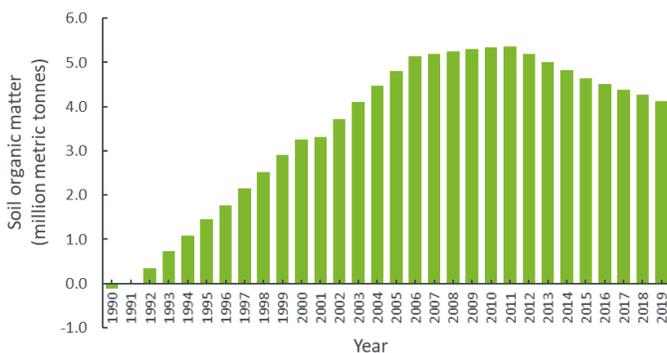


Figure 5: Soil organic matter accumulated in Saskatchewan's cultivated areas from 1990 to 2019.

Source: National Inventory Report, Environment and Climate Change Canada.



Figure 4: Soil organic matter accumulated in cultivated land according to changes in different land practices.



Measure 3

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 2020, approximately 4.0 per cent of the province's agricultural land is under 4R designation. This is an increase in area from 0.3 per cent in 2019.

The 4R Stewardship Program is relatively new in Saskatchewan, and the Ministry of Agriculture has been working with producers to increase the number of farms employing 4R practices. According to Fertilizer Canada, the increase in 2020 is partly a result of more agri-retailers working with producers to document and report 4R designated acres. In addition to these efforts, there is also an increase in formal commitments to promote 4R amongst industry, which could be resulting in increased producer uptake of the practices. However, there is currently no incentive for producers to report 4R acres through Fertilizer Canada's program, and it is possible that the implementation of 4R principles at the farm level is higher than the status indicates. As such, additional ways to report 4R acres under this measure are being pursued, which may be reflected in future reports.

Saskatchewan's agricultural land under 4R designation

Total 4R Designation	605,085 ha (1,495,197 acres)
Total crop area in Saskatchewan	15119622 ha (37,361,400 acres)
% crop area under 4R designation in 2020	4.0 %

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

How does the measure contribute to building resilience?

A 4R Nutrient Stewardship Plan allows farmers to achieve efficiency in fertilizer use when growing crops while helping to maintain the health of the soil, air and water. Determining the right source, rate, time and place can also help protect the environment and water bodies by reducing excess fertilizer washed away in rain or snowmelt. It also has the capacity to reduce GHG emissions from fertilizer use, specifically nitrous oxide emissions (N₂O). This is significant as the greenhouse effect of N₂O is at least 298 times more potent than that of CO₂.

Program Highlight

Increasing the adoption of 4R practices

The Ministry of Agriculture has taken, and continues to take, several actions to increase 4R designation. In 2019, a Saskatchewan 4R Nutrient Stewardship Advisory Committee was established with Fertilizer Canada, industry stakeholders, and the scientific community. The committee is helping to promote 4R practices in Saskatchewan through communication and extension activities. The 4R concept is currently featured through 20 Agriculture Demonstration of Practices and Technologies (ADOPT) projects being carried out at six Applied Research Management (Agri-ARM) field sites across the province. The ministry offers funding under the Farm Stewardship Program for a variable rate mapping BMP. The BMP helps producers obtain zone maps for variable rate fertilizer and can help with decreasing N₂O emissions from fertilizer application. The ministry also hosted four virtual 4R workshops in January 2021, which reached 520 individual registrants.



Measure 4

Number of forest management plans that incorporate Values, Objectives, Indicators, and Targets related to forest age class distribution for the licence area



This measure tracks the number of forest management plans that incorporate a Values, Objectives, Indicators, and Targets related to the forest age class distribution for the licence area.

Target

By 2020, 100 per cent of approved forest management plans (FMP) will contain Values, Objectives, Indicators, and Targets (VOIT) related to age class profile targets, by area, on the Managed Forest Land Base.

Status

In 2020, five out of six licence areas that have approved FMPs have an age class target. Although the target was missed, the remaining FMP is currently in development and will contain an age class target. It is expected to be completed and approved in 2021.

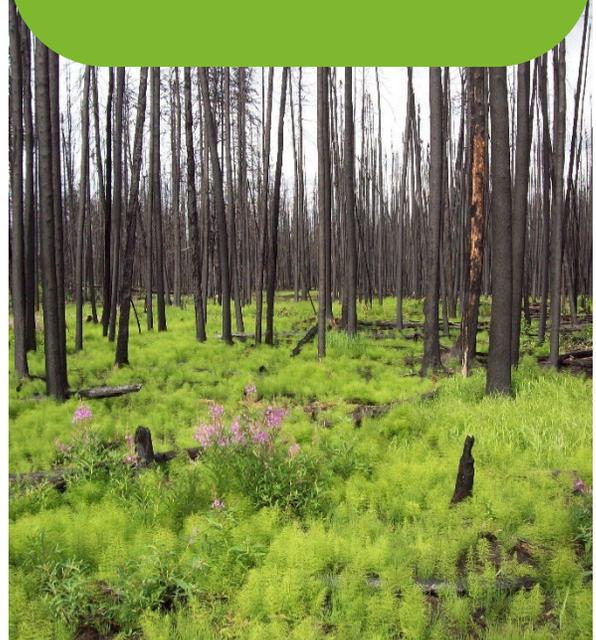
How does the measure contribute to building resilience?

Maintaining key forest attributes that are ecologically important, such as age class distribution, helps maintain an intact forest landscape. It also contributes to sustainable forests because forests comprising a mixture of young and old stands are more resilient to extreme wildfires, pest outbreaks or extreme weather events in a changing climate.

5 out of 6 forest management plans approved. These plans incorporate Values, Objectives, Indicators, and Targets related to forest age class distribution.



One forest management plan will be completed in 2021.



Measure 5

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 designated Crown lands that have been given a level of protection by legislation and private lands managed for biodiversity by agreement. These conservation lands include parks, ecological reserves and pastures.



Target

By 2020, protect 7,812,432 hectares, equivalent to 12 per cent of Saskatchewan's provincial base¹⁷.

Status

As of January 2021, there were approximately 6.35 million hectares of protected area in Saskatchewan (9.8 per cent of the province's total land base). This area contains representation from each of the province's 11 ecoregions. Efforts over 2020 increased protected lands by 461,000 hectares, or 0.71 per cent of Saskatchewan. An additional 2.2 per cent, or approximately 1.5 million hectares, is needed to reach the 2020 target. As a result, the 2020 target was missed.

There are challenges in adding significant hectares to the protected areas network. 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. As such, additional programs are in place to ensure natural areas are conserved, beyond formal protected area designation (see *Program Highlight*).

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. Finally, protected areas help maintain the integrity of traditionally and culturally important sites.

Program Highlight

More ways to conserve biodiversity

New types of protected area designations are being assessed for their potential to recognize biodiversity conservation. Having multiple strategies to collaborate and recognize efforts are valuable in regions where establishing traditional "protected areas" may be challenging. Example designations include Indigenous Protected and Conserved Areas and Other Effective Area-based Conservation Measures, which acknowledge areas beyond those formally protected that provide conservation outcomes. Such approaches can be applicable in regions where there are multiple interests that must be considered and balanced. Saskatchewan is developing a *Protected and Conserved Areas Roadmap*, which will evaluate available protection tools and detail a plan to achieve protected and conserved area goals for the province.

¹⁷ The target is slightly higher than that used in past reports, which proposed a target of 7,809,629 hectares. The revised target is based on an Environment and Climate Change Canada's protocol to calculate statistics for protected areas, which uses a provincial land base of 65,103,600 hectares. This resulted in an increase of approximately 3,000 hectares to achieve 12 per cent protection.



Revised methodology for assessing protected areas and the impact to Measure 5

In 2020, the Saskatchewan Ministry of Environment adjusted their methodology to calculate total protected areas in the province. This adjustment is intended to align Saskatchewan's reporting methodology with that of Environment and Climate Change Canada (ECCC), which resulted in an increase in the 12 per cent target¹⁷. The revised protocol also changed the reported values for total protected areas in previous resilience reports, including the 2017 baseline.

In most cases, previously reported values overestimated the total areas under protection. The revised methodology provides greater accuracy in tracking the measure's progress and to achieving the Saskatchewan's roadmap to protecting 12 per cent of its land base.

The table below summarizes the reassessed total protected areas for the baseline, current status and target. Figure 6 shows annual progress to the 2020 target using the revised methodology.

Baseline area for 2017 and 2020 target area

Baseline	5,626,887 ha
Current Status	6,354,385 ha
Target	7,812,432 ha

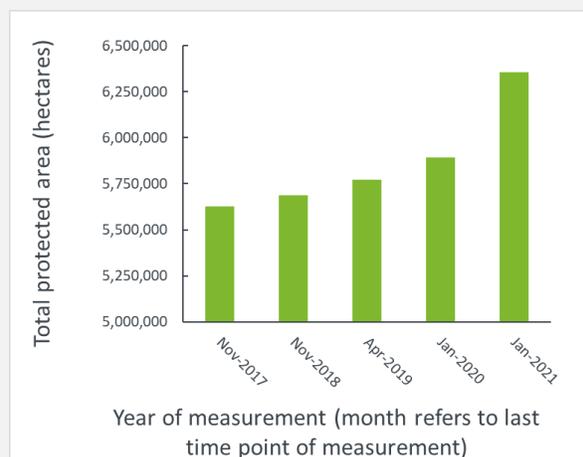
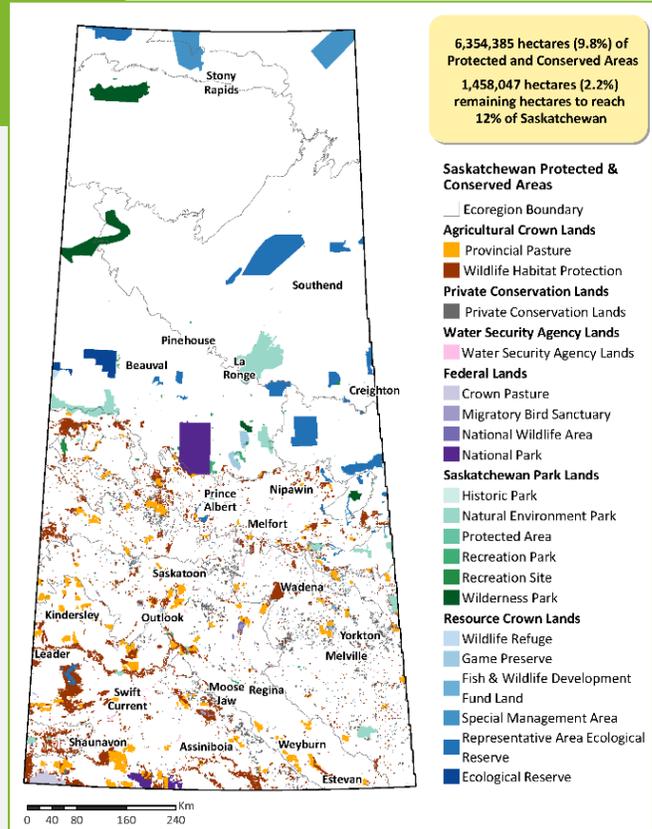


Figure 6: Total protected area (in hectares) in Saskatchewan from 2017 to 2021, using the revised methodology. The value for 2021 is the current status.





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, and water resource management. This also means increasing capacity for renewable energy generation and building more energy-efficient buildings.

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

Measure 6

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

This measures the number of culverts on the national highway system that are upgraded or replaced to meet the new provincial flood standard (800 mm in diameter), as an indicator of the province's efforts to upgrade vulnerable roadway locations.



Target

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

Status

In fiscal year 2020-2021, a total of 314 culverts on the national highway system met the new flood standard (Figure 7).

How does the measure contribute to building resilience?

Culverts provide a critical function in moving water from one side of roads and highways to another. This function 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 climatic changes. A reliable transportation infrastructure supports economic growth, emergency services, and quality of life for Saskatchewan residents.

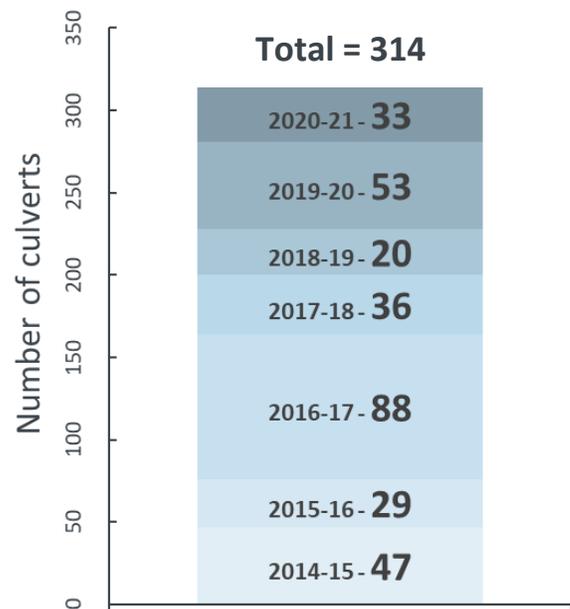


Figure 7: Culverts on the national highway system upgraded/replaced to meet new provincial standard, by fiscal year



Measure 7

Saskatchewan's renewable energy generation capacity

This measures the amount of electrical generation capacity by 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.

Status

In 2020, approximately 26 per cent of SaskPower's electrical generation capacity was composed of renewable energy sources. A total of 1,297 megawatts (MW) of electricity was available from renewable energy sources—an **increase of 103 MW from 2019**. Additional contracts with Manitoba Hydro comprised much of the increase in renewable energy since 2019.

How does the measure contribute to building resilience?

Increasing Saskatchewan's renewable energy generation capacity lowers the province's GHG emissions. Increased diversification of energy sources also increases resilience by growing the ability to manage peak demands and service disruptions.

The province is expecting to have steady increases in renewable capacity over the next five years. Sources of this increase include hydropower import, 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	2019	2020
Renewables	1,194 MW (24.3%)	1,297 MW (25.9%)
Hydropower (incl. imports)	889 MW	989 MW
Wind	241 MW	241 MW
Energy recovery	64 MW	67 MW*
Non-renewables	3,721 MW	3,702 MW
Natural gas	2,191 MW	2,172 MW**
Coal	1,530 MW	1,530 MW
TOTAL	4,915 MW	4,999 MW

*Increase from net metering generation and PGPP solar.

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



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. Data are available for 2019, representing a data lag of about one year.

Target

By 2030, reduce GHG emissions from Saskatchewan's electricity sector to 7.11 Mt CO₂e (50¹⁸ per cent reduction from 2005 levels).

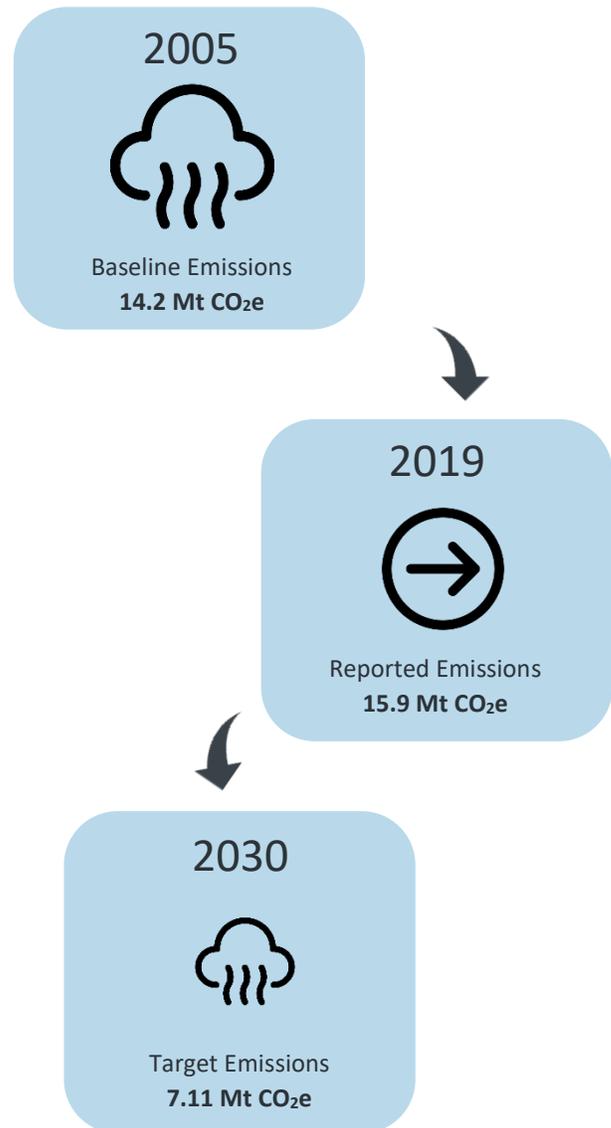
Status

Emissions on a sector-wide basis in 2019 decreased slightly from the previous year and was 12 per cent higher than 2005, the baseline year¹⁹. GHG emissions from the sector have plateaued after gradual increases over the past 13 years. Meanwhile, overall electricity production has increased by 27 per cent since 2005, from 20.6 terawatt-hours to 26.2 terawatt-hours in 2019.

GHG emissions for 2020 are being finalized and are expected to be approximately 20 per cent lower compared to 2019 emissions. This indicates that the electricity system is becoming more efficient. The trend in emissions is anticipated to decrease with the retiring of conventional coal-fired generation and the addition of renewable energy capacity through to 2030.

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 therefore contributes significantly to reducing the province's overall GHG emissions.



¹⁸ 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.

¹⁹ 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. 2020 emissions information will be available in June 2021 and published in SaskPower's 2020-21 annual report.



Measure 9

Total amount of energy savings from SaskPower's Energy Efficiency and Conservation Program

This measures the amount of energy savings from SaskPower's various demand-side management programs. The peak demand metric (in megawatts, or MW) measures the reduction in peak electricity demand and the energy savings metric (in gigawatts per hour, or GWh) measures the volume of energy saved. Data are available for 2019-20, representing a data lag of about one year.



Target

The target for fiscal year 2019-2020 was a 6 MW peak demand reduction and a 45 GWh in energy savings from demand-side management (DSM) programs.

Status

In fiscal year 2019-20, SaskPower reduced peak power demand by 6.7 MW and 46 GWh energy. SaskPower has therefore achieved the target of this measure under the DSM program.

The focus of this measure will shift to energy savings from internal energy management, Rural Rebuild Program, and smart technologies (see *Program Highlight*). Targets for energy savings from these programs are now in development and will be established during 2021-2022.

How does the measure contribute to building resilience?

Peak power demand refers to the highest rate of electricity usage. Improvements in energy efficiency and conservation help to mitigate the strain on generation and distribution systems during peak demand. Adopting energy efficiency focused programs, like SaskPower's internal energy management program, is one strategy employed by the provincial energy provider for this purpose. Historically, the energy and generation capacity savings acquired through DSM programs have provided SaskPower the ability to defer the need for new generation.



Program Highlight

Adapting to Saskatchewan's changing energy demand

SaskPower's business needs and customer interests are changing, and SaskPower's DSM programs are evolving in response. Generation capacity will need to be built to replace older generating facilities and meet environmental regulations. As a result, the need to purchase generation capacity from customers through DSM is no longer required in the short- to medium-term. SaskPower is repositioning its efforts to a broader range of program areas, including internal energy management, Rural Rebuild Program, and smart technologies. These changes will continue to build resilience by achieving internal efficiencies and through energy savings that will result in lowering the province's GHG emissions.



Measure 10

Area of SaskPower power line right-of-way widened

This measures SaskPower's vegetation management to protect its facilities and other values at risk of wildfire and fallen trees, which may result in power outages. The measure includes right-of-way for both transmission and distribution lines.



Target

By 2030, 10 per cent of right-of-way (ROW) are cleared per year to maintenance standard. In 2020, SaskPower managed a total of 21,785 hectares (at 30 metres width) of wildfire management plan areas. Therefore, the annual target area is 2,178.5 km², or 10 per cent of the total managed area.

Status

In 2020, 1,630 hectares (7.5 per cent) of ROW areas were cleared to reduce the risk of wildfire and to ensure reliability of service (Figure 8). The annual rate of clearing ROW areas is 75 per cent of the target rate.

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 therefore important to prevent wildfires and outages and increase the resilience of the province's electrical system to climate change impacts. These efforts also help ensure reliable service delivery to residents and industries. SaskPower is focusing its efforts on the rights-of-way in fire management plan areas where vegetation management is a priority.

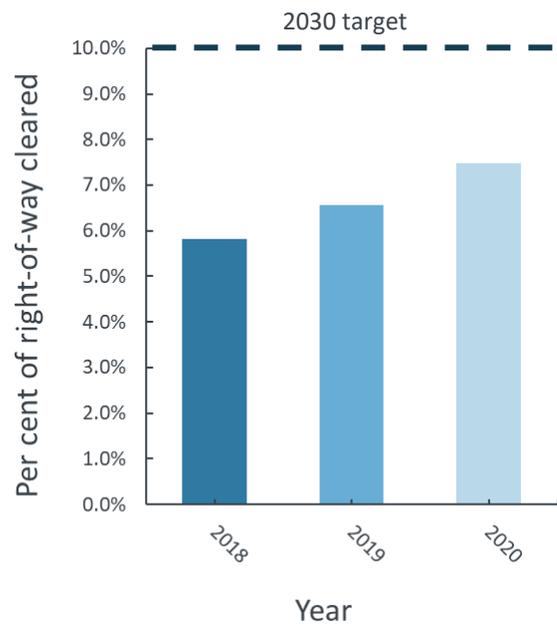


Figure 8: Per cent of managed right-of-way cleared from 2018 to 2020. The 2030 target (10 per cent cleared per year) is shown for comparison.



2030



Target to clear **10% of managed right-of-way** annually



Measure 11

Total energy consumption for Saskatchewan government-owned buildings

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



Target

By 2020, reduce energy consumption to 1.494 GJ/m² (gigajoule per square metre).

Status

Since 2014, significant reductions in total energy consumption of government-owned buildings have already been made. **In 2020, the total energy consumed by government-owned buildings was 1.199 GJ/m², which is lower than the 2020 target of 1.494 GJ/m².** The total energy consumed by government buildings was below the target in 2019 and 2020 (Figure 9)²⁰.

The target for this measure has been met. The Ministry of SaskBuilds and Procurement (SBP) is now reviewing a new target for this measure. A preliminary plan is a reduction of at least 30 per cent in energy consumption by 2030, based on 2020 energy consumption.

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 energy efficiency of buildings.

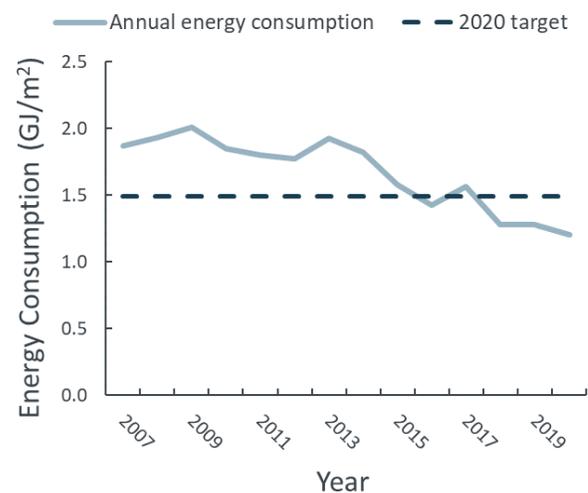


Figure 9: Annual energy consumption from government-owned buildings.

New preliminary target

30% reduction in energy consumption
by 2030
from 2020 rates



²⁰ A number of government-owned buildings are subject to estimated meter reading and billing, which can cause an over-recording of consumption prior to adjustments being made. As a result, a margin of error of approximately 3% to 5% exists in the 2018 and 2019 data.



Program Highlight

LEED® and BOMA certification: Enhancing the energy efficiency of Saskatchewan buildings

As part of the Ministry of SaskBuilds and Procurement's (SBP) sustainability efforts, the ministry adheres to environmental standards and strives to achieve environmental certifications on new builds and major renovations. Leadership in Energy and Environmental Design (LEED®) is a certification program internationally accepted as a benchmark for the design, construction and operation of high-performance green buildings. The Building Owners and Managers Association Building Environmental Standards (BOMA BEST) program is the Canadian industry standard for commercial building sustainability certification. As such, *Measure 11* tracks the number of buildings in government's portfolio that have achieved certifications.

For a building to qualify and receive BOMA BEST certification, it must meet or exceed environmental performance across a number of key areas including: water and energy conservation; waste diversion; hazardous products management; and indoor air quality. As of March 31, 2021, SBP had 47 buildings in its portfolio recognized by BOMA for environmental property management.

In 2020-21, the ministry continued to focus on environmental sustainability in all new construction and major renovation projects in accordance with LEED® standards. LEED® is a voluntary, consensus-based standard for developing high-performing, sustainable buildings with reduced environmental impact. The program is an internationally recognized third-party certification program that promotes an approach focused on sustainability in key areas such as: human and environmental health, sustainable site development, water and energy efficiency, material selection, and indoor environmental quality.

At the end of 2020-21, SBP has achieved LEED® certification on eight buildings throughout the province. These buildings include:

- Pine Grove Women's Correctional Centre (Gold Certification)
- Century Plaza (Silver Certification)
- Meadow Lake Courthouse (Silver Certification)
- Melville Saskatchewan Crop Insurance Building (Silver Certification)
- Prince Albert Provincial Correctional Centre (new living unit) (Silver Certification)
- Regina Correctional Centre (Silver Certification)
- Cooper Place
- Roy Romanow Provincial Laboratory

An additional five buildings have been designed to LEED® standards and are being either being constructed (two) or in the planning phase (three).



Measure 12

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 CO₂e, based on energy consumed (i.e., both electricity and natural gas) and is estimated from billing information.



Target

By 2020, reduce GHG emissions to 85,489 tonnes CO₂e.

Status

The total GHG emissions for 2020 was 91,069 tonnes CO₂e (Figure 10). Total emissions are lower than 2019, which were 99,458 tonnes of CO₂e. An additional 5,780 tonnes of CO₂e is required to reach the 2020 target.

The target for this measure is currently under review. SaskBuilds and Procurement (SBP) is currently proposing a reduction of at least 30 per cent of GHG emissions from government-owned building by 2030, based on 2020 emissions. This may be accompanied by additional and complementary programming to further reduce GHG emissions from buildings within SBP's portfolio.

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. Further, reducing emission helps to take lead on improvements that can be applied to buildings in other sectors.

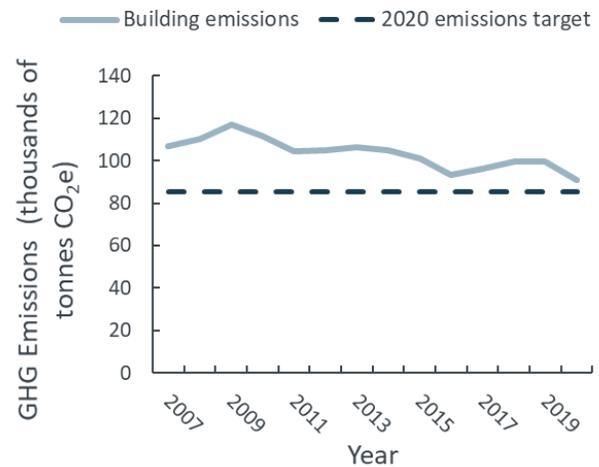


Figure 10: Annual greenhouse gas emissions from government-owned buildings





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, oil and gas, and forestry.

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

14. Emissions intensity of Saskatchewan's economy (GHGs per unit of GDP)

15. Saskatchewan's realized net farm income

16. Percentage of cultivated land in difference types of crops

17. Incorporation of natural forest disturbance patterns in provincial forest harvest designs

Measure 13

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

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



Target

By 2025, reduce GHG emissions to 6.4 Mt CO₂e. This is equivalent to a 4.5 Mt CO₂e reduction from 2015 emissions.

Status

The amount of GHG emissions emitted from oil and gas operations **decreased to 5.3 Mt CO₂e in 2020, falling below the 6.4 Mt CO₂e target** (Figure 11).

The COVID-19 pandemic substantially impacted this measure. Due to unprecedented price drops for oil in April 2020 and the resulting decrease in oil production, the associated gas production also decreased. However, **approximately 70 per cent of the decrease from 2019 levels is due to emissions reduction projects implemented by the upstream oil industry** (i.e., those companies who extract and produce raw materials). As oil production begins to recover, this measure will likely increase, as well. However, with the aid of the Oil and Gas Emissions Management Regulations and Methane Action Plan, it is anticipated that the relative amount of GHG emissions will steadily decrease.

How does the measure contribute to building resilience?

This contributes to resilience by reducing the carbon footprint from oil and gas operations. This also contributes to reducing overall provincial GHG emissions (see *Measure 14*).

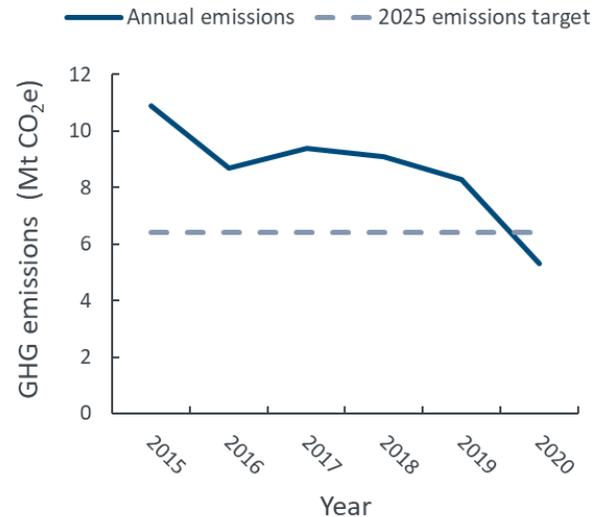


Figure 11: Annual greenhouse gas emissions generated from oil production.

Program Highlight

Reducing GHG emissions in Saskatchewan's oil and gas sector

With the implementation of Saskatchewan's Methane Action Plan, Saskatchewan continues to work with the oil and gas industry to meet provincial GHG emissions reduction targets. The plan facilitates the use of a results-based system that supports adoption of innovative 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 make oil and gas more efficient and emit less include the Power Generation Partner Program with SaskPower, and the Flare Gas Agreement with SaskPower and the First Nations Power Authority.



Measure 14

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



This measure reveals if CO₂e reductions are a result of gains in efficiency or a loss of production. Data are available up to 2019, representing a data lag of about one year.

Target

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

Emissions intensity is the amount of GHGs 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', which is a form of GDP that factors out inflation to reveal changes in production over time.

Status

From 2007 to 2019, GHG emissions intensity dropped by 13 per cent²¹, while the province's GDP increased 24 per cent during the same period (Figure 12). Saskatchewan's GHG emissions intensity peaked in 1996 at 1,123 tonnes of CO₂e per million (chained 2012) dollars but has been trending downward ever since. In 2019, GHG emission intensity was 864 tonnes of CO₂e per million chained 2012 dollars, which is the lowest since records began in 1990.

It is anticipated that other programs and regulations introduced by Saskatchewan's *Prairie Resilience* 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.

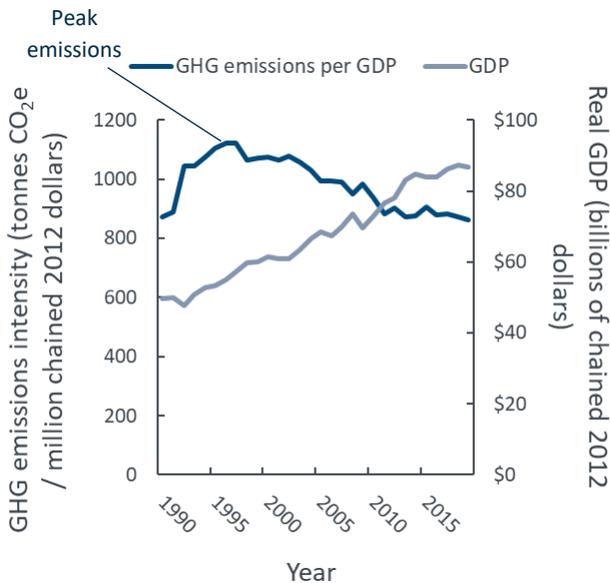


Figure 12: Saskatchewan's greenhouse gas emissions intensity, 1990 to 2019.

Source: *Environment and Climate Change Canada's National Inventory Report (2021)* and *Statistics Canada*¹⁶

How does the measure contribute to building resilience?

This measure investigates the effectiveness of climate change policies. If GHG emissions fall alongside GDP, policies are addressing climate change at the expense of provincial prosperity. If GHG emissions rise with GDP, then climate change is not addressed. Lasting prosperity and resilience are achieved when provincial GHG emissions fall and provincial GDP rises.

²¹ The gross domestic product (GDP) and GHG data were obtained from Statistics Canada and ECCC websites, respectively. The most recent data for GHG emissions is for 2019 since there is a standard two-year delay for the National Inventory Report data processing.



Measure 15

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 are available up to 2019, representing a data 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

Although realized net farm income has declined slightly in recent years due to trade tensions and disruptive weather, there has been **no drastic decline in Saskatchewan's five-year average of realized net farm income**, scoring as a 34 per cent decrease in 2019 compared to the five-year average (Figure 13)²².

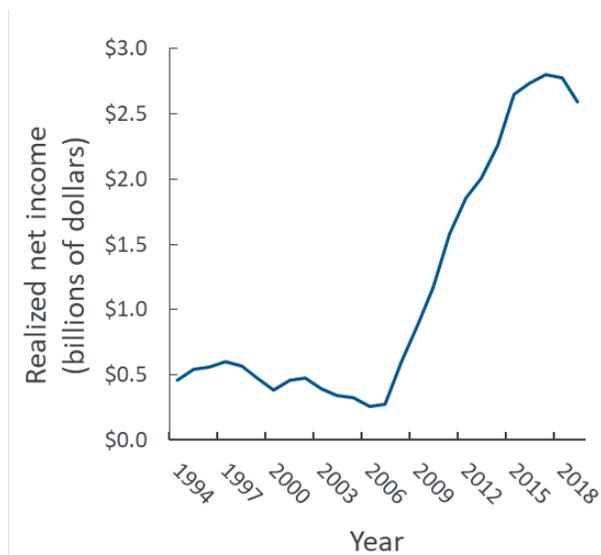


Figure 13: Realized net farm income (five-year average) in Saskatchewan from 1994 to 2019.

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

How does the measure contribute to building resilience?

Agriculture remains a key economic driver in our province. Reduced volatility in realized net farm income is an indicator of the agricultural sector's resilience, from both a production and financial perspective.

Joint programs with the province and Agriculture and Agri-Food Canada help limit the volatility of a farmer's income. These include AgriInsurance, which includes fire insurance (under the Forage Rainfall Insurance Program), AgriInvest, AgriStability, the 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—for example, research in drought-resistant crops.

AgriInvest and the Western Livestock Price Insurance Program are just a few programs available to help safeguard farm income.



²² 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 16

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 2020, 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 (Figure 14). However, they have not exceeded 50 per cent of the total area since 2008, when cereal cultivation reached 52 per cent. In 2020, cereals made up approximately 48 per cent of the cultivated land area (7.4 million hectares or 18.3 million acres), oilseeds made up 32 per cent (5.0 million hectares or 12.3 million acres), pulses and soybeans made up 17 per cent (2.7 million hectares or 6.6 million acres), and summer fallow made up 2 per cent (341,000 hectares or 0.8 million acres).

How does the measure contribute to building resilience?

Coverage of one crop type exceeding 50 per cent of 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 of an impact on farm- and provincial-level productivity if a broader range of crops are cultivated, thereby reducing the volatility of farm revenue (e.g., *Measure 15*).

In addition to mitigating financial risk, crop diversification supports resilience by enhancing soil health and assisting with managing pests and diseases. The addition of pulses to crop rotations also helps reduce GHG emissions (see *Measure 14*) through reduced fertilizer use.

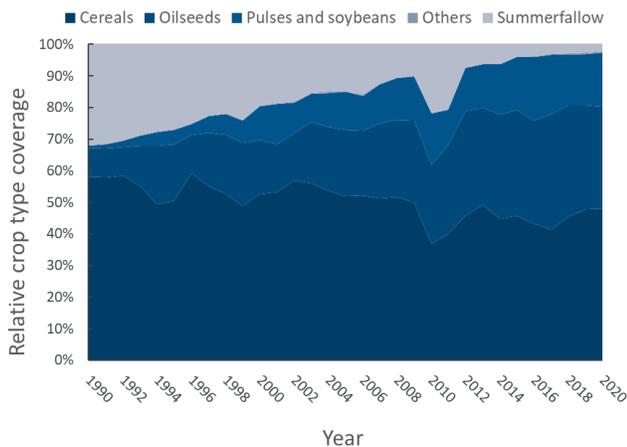


Figure 14: Crop diversity across Saskatchewan from 1990 to 2020.

Source: Statistics Canada Table 001-0017. Others include buckwheat, corn, hemp and



Measure 17

Incorporation of natural forest disturbance patterns in provincial forest harvest design

This measure highlights the requirement within Saskatchewan's forest management plans for forest harvesting to emulate the natural forest patterns created by wildfires.



Target

Since April 2019, 100 per cent of forest harvest designs incorporate natural disturbance patterns.

Status

As of March 2020, all forest harvest designs incorporate natural forest patterns, reaching the target for this measure.

The Ministry of Environment tracks the number of forest management plans (FMP) reporting on aspects of natural forest patterns, including event and patch size, the amount of old and very old seral stage stands, and residual stand structure. In 2019, six (five approved, one draft) FMPs included 20-year tactical plan maps that incorporate natural forest pattern concepts. While one FMP is in development, a tactical plan for the forest area has been developed and natural forest disturbance concepts are operationally considered.

How does the measure contribute to building resilience?

Natural disturbances are critical in maintaining healthy and biologically diverse forests. Implementing management practices that simulate natural disturbance helps maintain diverse landscapes and the natural balance of young and old forests.

All six forest management plans include **natural forest pattern concepts** in their harvest designs.



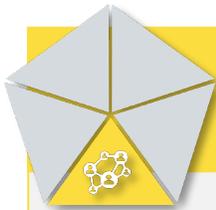
Program Highlight

Maintaining forest quality during forestry harvest

In 2017, Saskatchewan finalized the *Forest Management Planning Standard*. This Standard requires the development of Values, Objectives, Indicators, and Targets (or VOITs; see *Measure 4*), which are often based on the natural state of the management area.

In 2020, 90 forest management plan VOITs were assessed to help ensure adherence to strategic plans.





Community Preparedness

Community Preparedness refers to the resilience of Saskatchewan communities to climate change impacts. It includes provision of necessary information to the public, responding 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.

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

19. Percentage of total and local communities with emergency preparedness and response plans

20. Number of wildfire community pre-plans completed for “at-risk” northern communities

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

Measure 18

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



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

Target

By 2030, 100 per cent of communities in Saskatchewan that are considered at risk of flooding have access to modernized flood maps. Communities are prioritized such that the benefits of modern flood mapping and the relative vulnerability to flooding compensate the costs associated with mapping²³.

Status

Currently, four communities at risk of recurrent flood damage have access to modern flood maps.

In 2019-2020, the Water Security Agency (WSA) partnered with Public Safety Canada to obtain preliminary flood maps for 21 communities in the province. The WSA began review, revision and endorsement of these flood maps in 2020-21.

The onset of the pandemic significantly delayed this project, with the effect of a three-month delay in receipt of the deliverables. Additional strains on internal resources further delayed the review and endorsement phase of the project. It is anticipated that WSA will complete review and endorsement of community flood map studies over the course of 2021-22, followed by provision of these maps to the communities in 2022-23.

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 assist with the completion of official community plans, direct

development planning, develop emergency flood plans, or guide the construction of flood-protection works. Knowing what regions 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.

It is important to note that the development of modern flood maps might not be the most effective strategy to mitigate flood risk in some communities, and other strategies may be more applicable in these instances. In addition, data and model limitations can impact the accuracy and accessibility of developing these maps (see *Program Highlight*).

To complement modern mapping initiatives, the WSA is working to complete desktop studies, including imagery analysis, and is holding consultations with communities to finalize the number of communities at risk of flooding and that would benefit from flood mapping. This is anticipated by September 2021.



²³ The Water Security Agency is currently working with 21 priority communities to develop modern flood maps. The total number of communities for the target of this measure is in the process of being forecasted, with an estimate expected for later in 2021.



Program Highlight

Flood mapping applications, challenges, and additional approaches to prevent and protect against floods in the Prairies

Flood mapping enables communities to make informed decisions regarding their relative flood risk and incorporate these into community planning. For example, flood maps that delineate the flood way and flood fringe for a number of flood frequencies (e.g., 1:25, a flood magnitude that is expected to occur once in a 25-year period, or 1:100, a 100-year period) up to the provincial regulatory standard (i.e., 1:500, a 500-year period) are an important analytical tool for enabling communities to develop zoning bylaws to restrict development in flood-prone areas. Delineating multiple flood frequencies also supports informed emergency construction and development planning.

However, the application of flood mapping can be limited, especially within the prairie context. Firstly, modern flood mapping techniques and hydraulic modelling are expensive, resulting in the need to prioritize based on relative vulnerability and increase in benefit. Second, most existing models do not accurately capture the unique prairie hydrology, making it difficult to assess potential hazards. Saskatchewan communities face circumstances that do not always include threats from streams, rivers or lakes, which are the systems typically modelled and mapped. Rather, the flat topography is prone to extreme precipitation events that inundate the landscape or advance floodwaters overland. This is challenging to model, and modern flood maps are not always useful in the Saskatchewan context.

This combination of factors makes it difficult to assess which communities will benefit the most from mapping. Therefore, flood mapping initiatives need to be complemented by additional policies and programming to mitigate and prepare for floods.

Saskatchewan's Emergency Flood Damage Reduction Program assists citizens with implementing measures to prevent or reduce damages due to imminent flooding. The program supports communities to take a proactive approach to reducing flood risk. This is done through providing funding for flood mapping in addition to risk assessments, permanent flood protection works, and mitigation planning projects.

Measure 19

Percentage of Saskatchewan communities with emergency preparedness and response plans



This measures the percentage of Saskatchewan communities that have completed emergency preparedness and response plans.

Target

By 2024-25, 80 per cent of Saskatchewan communities have emergency preparedness and response plans²⁴.

Status

Based on a 2018 survey conducted by the Ministry of Government Relations, in collaboration with the Municipalities of Saskatchewan and the Saskatchewan Association of Rural Municipalities, **about 238 communities indicated having an emergency preparedness plan**. Over 700 communities, including municipalities and First Nations, were invited to participate in the survey, and only 290 responded. Because of the low response rate, the Saskatchewan Public Safety Agency (SPSA) is developing a more robust methodology to assess the number of communities with emergency preparedness plans as well as supporting communities to develop plans (see *Program Highlight*).

Due to gathering restrictions resulting from the COVID-19 pandemic, the Saskatchewan Public Safety Agency (SPSA) has not been able to meet with communities to generate and approve new emergency preparedness plans. In lieu of this, SPSA staff have been updating training to provide to communities for when gatherings restrictions are lifted.

How does the measure contribute to building resilience?

Standardized emergency preparedness plans help Saskatchewan communities respond to emergencies in a timely, efficient, and coordinated manner. Plans enable agencies to locate resources and equipment required for emergency operations to inform citizens of dangers, how to avoid them, and quickly arrange assistance when needed. Together, this can reduce the human and financial impacts of emergencies and support recovery process.

Program Highlight

Working with communities to support emergency preparedness

Saskatchewan's *Emergency Planning Act* (1989) requires municipalities to establish emergency plans. As part of its mandate, the SPSA works with community authorities to assess and prioritize risks, and develop unique emergency plans to support emergency mitigation, preparedness, response, and recovery.

The SPSA is currently undertaking a review to determine if the current community planning and preparedness programming is meeting stakeholder needs and legislative responsibilities. The SPSA is also exploring opportunities to strengthen collaboration. Such programming, like helping and educating rural and urban municipalities, and First Nations on emergency preparedness, can support the development, testing, and enabling of emergency plans. This also contributes to tracking progress towards this measure.

²⁴ The measure has changed slightly from past reports. This is to allow for internal alignment and more consistent terminology used within the SPSA. Further, the number of total communities for this target is under development. An estimate is anticipated in time for the 2022 report.



Measure 20

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 86 at-risk communities have wildfire operational pre-plans completed. These communities were identified by the Ministry of Environment through a community wildfire risk assessment and were noted as situated at the wildland-urban interface with moderate to high-risk to wildfires.

Status

In 2019-2020, 11 wildfire community pre-plans were completed, resulting in **a total of 62 at-risk communities (72 per cent) with wildfire community pre-plans**. New pre-plans were developed for Little Swan, McBride Lake, Parr Hill Lake, Red Earth, Shoal Lake, Somme, Weeks, Wollaston, Beauval, Patuanak, and the Hudson Bay area.

How does the measure contribute to building resilience?

Community pre-plans help with wildfire suppression delivery 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, and fire operations that can be utilized in the event that 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 in advance of wildfire impacts.

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 ²⁵	86
Number of communities with operational pre-plans (as of March 31, 2020)	62 (72%)
Remaining number of communities with pre-plans needed	24 (28%)



¹⁹ 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 is developing a new community risk assessment process, which will take several years to complete, and Saskatchewan is following its development for potential adoption.



Measure 21

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. The previous target for completion was 1,547 hectares by the year 2028, with the rate of at least three community fuel management mitigation projects per year. The metric has been increased dramatically to at least 15 communities per year because of added funding secured from the federal government's Disaster Mitigation and Adaptation Fund, which commenced in 2019-20.

Status

As of March 2020, the Saskatchewan Public Safety Agency (SPSA) and the Ministry of Environment completed fuel management for **978 hectares of Crown land in the provincial forest**. This is an increase of increase of 75 hectares from the previous year. These were conducted across seven communities, including Peter Pond Road (Prince Albert west), Kriti Lake (Prince Albert north), Lower

Fishing Lake, Candle Lake, Ramsey Bay at Weyakwin Lake, Lac la Plonge subdivision and Little Bear Lake.

How does the measure contribute to building resilience?

Vegetation and wildfire fuel management projects enhance effectiveness of wildfire suppression when communities are threatened by wildfire. 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 to wildfire by mitigating the risk of severe wildfire. The Saskatchewan Community Wildfire Risk Assessment identifies all Crown land locations requiring fuel management projects, as well as sets priorities for project completion.

Tracking areas managed for fuel load on Crown land

Date	Crown land with fuel management
As of March 31, 2019	903 hectares
As of March 31, 2020	978 hectares
Target over 2020-2028	1,270 hectares

Program Highlight

Reducing wildfire fuel load in First Nation communities

Since 2015, a partnership with SPSA, 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 climate change impacts. It ensures that residents are healthy and have stable jobs to provide for their needs and families. The measures under this area centre on the amount of water available and consumed by communities, as well as monitoring the potential risk of exposure to vector-borne illnesses.

- 22. Number of communities reliant on water supplies vulnerable to drought
- 23. Average municipal water consumption per capita and total municipal water consumption
- 24. Number of communities (with suitable habitat) where active surveillance for West Nile Virus and other mosquito-borne diseases occurs
- 25. Number of active surveys at suitable habitat sites for Lyme disease and other tick-borne diseases



Measure 22

Number of communities reliant on water supplies vulnerable to drought

This measures the number of municipalities that may experience water supply shortages due to low precipitation in the previous fall and winter.



Target

Decrease the number of communities reliant on water supplies vulnerable to drought.

Status

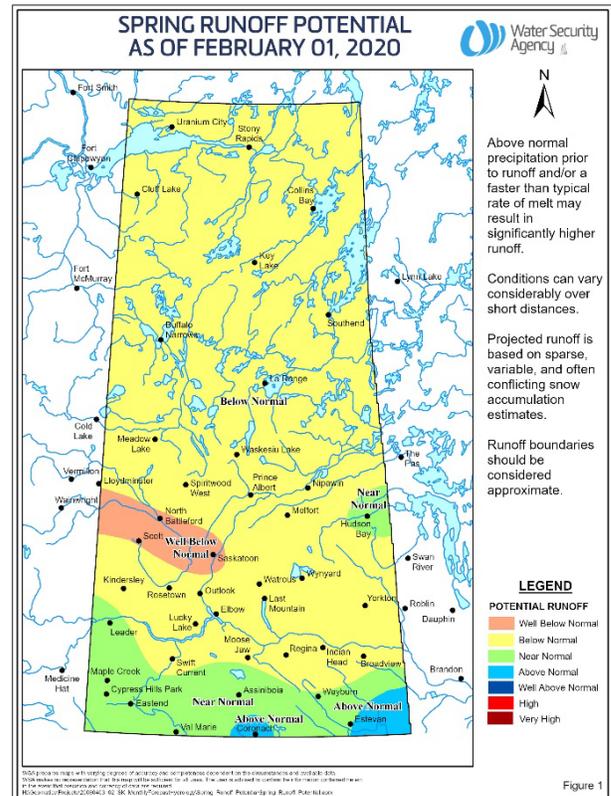
In spring 2020, a total of 36 Saskatchewan communities had water supplies that were considered vulnerable to drought ('below normal' or well below normal' in the map on the right). This is an increase from 16 communities in spring 2019. The increase is largely due to lower snow accumulation during the previous winter, resulting in lower anticipated spring runoff.

Based on a phone survey conducted by the Water Security Agency (WSA), 24 vulnerable communities have a water conservation plan in place, and 12 communities indicated they have a back-up water supply. Three communities reported concerns with annual water supply because their primary water sources decreased to below half full.

How does the measure contribute to building resilience?

Every year, the WSA produces a spring runoff potential map, showing areas that have received below-normal precipitation throughout the previous fall and winter. Any community with a surface water source in the regions identified as receiving 'below normal' precipitation is evaluated for its capacity to meet projected water demand.

Identifying the communities that may experience water supply shortages allows the province to highlight areas of potential concern. Further, the



province and municipalities can cooperate on plans if drought conditions persist. Coupled with this measure are activities to help municipalities understand drought susceptibility and to support planning and preparing for drought by securing alternative source supplies.

Due to the sensitivity of this measure to precipitation and the capacity of communities to adapt to lower water supply (e.g., by switching to alternative water sources), the WSA is considering additional indicators to better measure drought resilience.



Measure 23

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 are available up to 2019. Thus, there is a lag of one year for available data.

Target

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

Status

Per capita municipal water use decreased in 2019, with residents using an average of 331 litres per person per day, compared to 353 litres per capita per day in 2018 (Figure 15). The total municipal water use also decreased from 133 million cubic metres in 2018 to 127 million cubic metres in 2019, or by approximately 6.2 million cubic metres over that period.

In the last 30 years, the total municipal water consumption remained relatively stable. Per capita rates declined over the same period. This suggests that water use is becoming more efficient. The decline in per capita rates could have resulted from technological investments (e.g. new water mains and high efficiency plumbing fixtures) and behavioural influences on water use.

How does the measure contribute to building resilience?

Declining trends in per capita use indicate gains in water use efficiency. Total use, when compared with per capita use, can provide an indication of how water conservation efforts support population and economic growth even under water resource constraints.

Greater water use efficiency can support the sustainability of a water source and of the

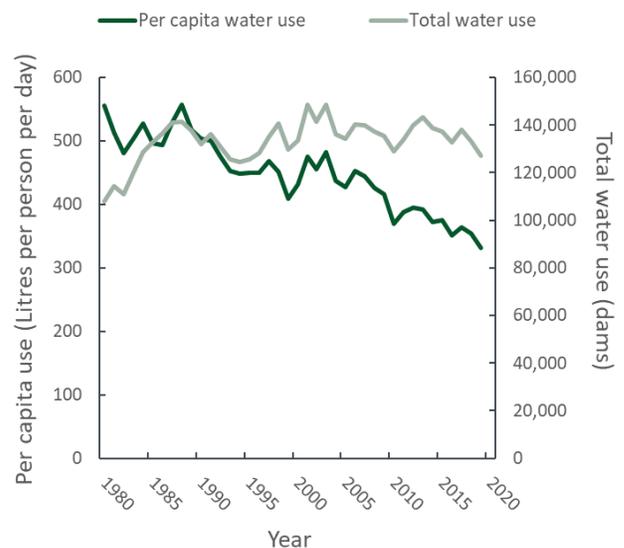


Figure 15: Per capita municipal water use and total municipal water use across Saskatchewan from 1980 to 2019 (1 dam = 1,000,000 litres).

infrastructure used to provide water. Using less water helps in reducing GHG emissions as less energy is needed to pump and treat water. This may also buffer against impacts to water resources where climate change may affect the reliability (i.e., water quality or quantity) of municipal water sources.

Water Security Agency continues to promote responsible water use through public education, partnerships and a variety of 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.



Measure 24

Number of communities (with suitable habitat) where active surveillance for West Nile Virus and other mosquito-borne diseases occurs



This measures Saskatchewan's monitoring capacity for West Nile Virus and other mosquito-borne diseases.

Target

By 2020, increase to 20 communities where active surveillance for West Nile Virus (WNV) and other mosquito-borne diseases occurs.

Status

As of 2020, permanent and flexible mosquito traps are set up in 20 communities throughout central Saskatchewan to the agricultural portion of southern Saskatchewan, thereby meeting the target. These traps monitor for *Culex species* (*Culex tarsalis*, *Culex restuans*, and *Culex territans*), which are mosquitoes that carry WNV. In 2019 and 2020, surveys did not detect any mosquitoes carrying WNV.

Because the risk of WNV has decreased in recent years, the surveillance program will not expand during the summer of 2021. **The tentative 2021 target for this measure is to continue surveillance in the 20 communities.** If the risk of WNV is low early in the season, the number of communities may be decreased.

How does the measure contribute to building resilience?

Warmer temperatures accompanying climate change could lead to increased presence of vector-borne diseases because the insect vector can reproduce more effectively and survive longer. While the threat in Saskatchewan for vector-borne illnesses, like WNV, is minimal, surveillance programs are important as early warning systems, particularly as risk can increase with climate change.

This allows for proactive control of insect populations and communicating risk to the public.

WNV can be an annual risk between June and September in Saskatchewan. Risk is highest in the southern portions of the province. However, WNV risk may increase in more northerly agricultural-forested transition areas during very warm years and with climate change. The Ministry of Health typically provides weekly risk assessments, website updates, and WNV prevention messages between June and September.

20/20

surveillance sites for West-Nile Virus established in 2020

Program Highlight

Monitoring recreational water quality

The Ministry of Health also 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. Collected water samples are tested and results are reported weekly from July to early September. Bacteriological tests for *Escherichia coli* are analyzed at the Roy Romanow Provincial Laboratory. Samples are also screened for cyanobacteria (blue-green algae) or their toxins (e.g., microcystins). Cyanobacterial toxins can affect the liver and nervous systems of animals (e.g., dogs, cattle, and humans) and can result in severe illness or death. The public is advised to avoid swimming and other in-water activities at recreational areas when test results indicate poor water quality.



Measure 25

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

By 2020, complete 60 surveys for tick-borne diseases at 51 sites. Sites include areas of most likely exposure to Lyme disease for human or domestic animal. Sites also include “sentinel” sites, which are sampled multiple times a year, and new locations where blacklegged ticks are detected through passive surveillance. These include parks, recreation and historic sites, and select ecological reserves.

Status

As of 2020, the province has conducted 59 (out of 60) surveys at 51 sites for Lyme disease and other tick-borne diseases. The final survey could not be completed due to poor weather conditions in late October. The surveillance program for tick-related illnesses will be expanded for 2021. **The 2021 target for Measure 25 is 64 surveys at 55 sites.**

The Ministry of Health is renewing this measure, to set new long-term targets for monitoring risk of vector-borne illnesses, beyond 2021. Because the risk of Lyme disease is of continued interest, the upcoming target will likely monitor the incidence of tick-borne illnesses.

How does the measure contribute to building resilience?

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

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

Program Highlight

eTick: Crowd-sourcing tick surveillance

To improve passive tick surveillance in Saskatchewan, on April 1, 2020, the Ministry of Health collaborated with researchers at the University of Saskatchewan to launch *eTick*, a new digital tick identification platform.

The platform identifies ticks using photographs submitted by citizens. Anyone who encounters a tick can simply submit photographs via *eTick*. Experts will identify the tick and provide a prompt response with information on the species, guidance in the event of a tick bite, and associated health risks (if any). The platform also provides a publicly available, interactive map identifying the location of tick submissions. This allows residents to learn more about the presence of ticks in an area they live in or plan to visit, allowing them to take necessary precautions in areas with high numbers of blacklegged ticks. The platform also increases tick surveillance more broadly, allowing for more efficient monitoring of risk and testing for pathogens. For more information, visit www.eTick.ca.



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 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 (WUI) 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, or 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 provision of 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 (CO₂e): a term for describing different GHGs in a common unit. CO₂e signifies the amount of CO₂ that would have the equivalent global warming impact. A quantity of GHG can be expressed as CO₂e by

multiplying the amount of the GHG by its global warming potential (GWP). For example, given a GWP of 25 for methane(CH₄), if 1 kg of CH₄ is emitted, this can be expressed as 25 kg of CO₂e (1 kg CH₄ * 25 = 25 kg CO₂e).

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 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 for their families.

Land under permanent cover: land cultivated with long-term crops that are 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: the maintaining of the integrity of land, water, and forests in Saskatchewan. Management of natural systems determines not only the ecosystem's resilience to climate change but also 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 sequestration of carbon in soils, forests, and wetlands.

4R nutrient stewardship: a nutrient management plan that supports effective and efficient application of fertilizer. 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 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

Agri-ARM	Agriculture Applied Research Management
BMP	Beneficial management practices
BOMA	Building Owners and Managers Association
CO₂	Carbon dioxide
CO₂e	Carbon dioxide equivalent
DSM	Demand-side management
ECCC	Environment and Climate Change Canada
FMP	Forest management plan
GDP	Gross domestic product
GHG	Greenhouse gases
GJ/m²	Gigajoule per square meter
GWh	Gigawatts per hour
LEED	Leadership in Energy and Environmental Design
mm	Millimeter
Mt	Million (or mega) tonnes
MW	Megawatts
N₂O	Nitrous oxide
NFP	Natural forest pattern
NIR	National Inventory Report
OGEMR	<i>The Oil and Gas Emissions Management Regulations</i>
PGPP	Power Generation Partner Program
RMs	Rural municipalities
RNFI	Realized net farm income
ROW	Right-of-way
SBP	Saskatchewan Builds and Procurement
SPSA	Saskatchewan Public Safety Agency
SOM	Soil organic matter
VOITs	Values, Objectives, Indicators, and Targets
WNV	West Nile Virus
WSA	Water Security Agency
WUI	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.

Date published: May 2021