



Climate Resilience in Saskatchewan

2020 Report

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Minister's Message



Dustin Duncan
Minister of Environment

In 2018, the Government of Saskatchewan released Saskatchewan's Climate Resilience Measurement Framework, a commitment in the province's *Prairie Resilience* climate change strategy, and the first of its kind in Canada. I am pleased to now provide the 2020 Resilience Report, which fulfills the government's commitment to track and report on the framework annually.

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 out goals to build a strong economy, strong communities and strong families; these key measures demonstrate how we are supporting a healthy, resilient environment that will support this vision of a strong Saskatchewan.

We continue to see positive trends in many of the resilience measures. The number of measures that are considered in good status has increased from 15 in the 2019 report to 18 (72 per cent), and no measures are classified with a poor status. The Introduction section highlights some of the positive trends and indicators measured in 2020, while the full report explains the province's many initiatives and improvements on the resilience measures.

As you will read in the report, *resilience is the ability to cope with, adapt to and recover from stress and change*. To further understand the context for Saskatchewan's resilience-based approach, please see the province's full climate change strategy, *Prairie Resilience*, at saskatchewan.ca/climate-change.

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ability to cope
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Summary of 25 Resilience Measures

Measures	Target	Current Status ¹	Increasing ↑ Maintained ↔ Decreasing ↓ Trend ²	Good ● Fair ● Poor ●
Natural Systems				
1. Total area of agricultural land under permanent cover in Saskatchewan	Maintain at 8.06 million hectares (19.93 million acres)	Information same as reported in 2019 resilience report. New data will be available from Census Agriculture in 2021.	Slight decrease in 2011 and 2016, but increases in 2001 and 2006	↔
2. Total amount of soil organic matter accumulated in cultivated land	Maintain at 5.60 million tonnes (Mt) soil organic matter per year	4.5 Mt of soil organic matter accumulated in 2018.	Decreased ³	↓
3. Percentage of agricultural land area with 4R nutrient stewardship plan	By 2025, 25% of Saskatchewan's cropland under 4R designation	Approximately 0.3% in 2019	Maintained	↔
4. Number of Forest Management Plans (FMPs) that incorporate Values, Objectives, Indicators, and Targets (VOITs) related to forest age class distribution for the licence area	By 2020, 100% of approved FMPs will contain a VOIT that identifies approved age class profile target, by area on the managed forest land base	Five of six FMPs (83%) as of February 2020. The remaining FMP, currently in development, is expected to be completed and approved in 2020.	Increasing	↑
5. Total protected areas in Saskatchewan	By 2020, 7,809,629 hectares (12%) are protected	6.4 million hectares (9.8%) protected in 2019	Increasing	↑
Physical Infrastructure				
6. Total number of provincial culverts on the national highway system meeting new provincial flood standard	Increase the total number of culverts on the national highway system meeting new provincial flood standard	Total of 281 as of fiscal year 2019-20	Increasing (cumulative)	↑
7. Renewable energy generation capacity	By 2030, up to 50% of electricity generated from renewable energy sources	24.3 % in 2019 ⁴	Maintained	↔
8. Total greenhouse gas (GHG) emissions from electricity sector	By 2030, 8.52 Mt CO ₂ e GHG emissions from electricity sector (40% reduction from 2005 levels)	16.05 million tonnes CO ₂ e emissions (comparable to 2017) ⁵	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 expected in 2019-20	11 MW peak power demand reduction and 55 GWh energy savings in fiscal year 2018-19 ⁶	Maintained	↔
10. Area of SaskPower powerline rights-of-way (ROW) widened	By 2030, 10% of ROW cleared to maintenance standard per year	6.6% of ROW widened in wildfire management areas in 2019	Slight increase	↑
11. Total energy consumption for government-owned buildings ⁷	By 2020, reduce energy consumption to 1.494 GJ/m ²	1.282 GJ/m ² in 2018 and in 2019 ⁸ (exceeded target in 2018 and in 2019)	Decreased ⁴	↓
12. Total GHG emissions from government-owned buildings	By 2020, reduce GHG emissions to 85,489 tonnes CO ₂ e	99,458 tonnes CO ₂ e emissions in 2019	Maintained	↔

¹ Some measures have lag in data availability.

² Trend indicates whether values are increasing, decreasing or maintained, and if status is good (e.g. a downward arrow in green is reflected for a decreasing trend in GHG emissions; for area of fuel management, a green upward arrow indicates increasing area managed for wildfire, and is considered good status (green) since it increases resilience).

³ The amount of soil organic matter accumulated through reduction in summer fallow and improved tillage practices has been largely maintained. Due to a reported reduction in area of tame forage between the 2011 and 2016 Agriculture Censuses, this measure demonstrates a significant drop in 2018.
















⁴ SaskPower has increased its capacity from renewables, as well as commissioned Chinook Power Station and expanded the North Battleford Generating Station. Addition of Chinook Power Station increases power grid resilience.

⁵ SaskPower's GHG emissions on a sector-wide basis in 2018 remained comparable to the previous year and 13 % higher than the baseline year (2005). The electricity system is becoming more efficient and emissions will decrease through 2030.

⁶ 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 customer adoption of new technologies that lower the province's GHG emissions.

⁷ "Government-owned buildings" refers to executive government buildings only; excludes Crown buildings.

⁸ These numbers are subject to 3% to 5% error as the utility provider is still using estimated meter reads at some locations.

Measures	Target	Current Status ¹	<div> <div> Increasing ↕ Maintained ↔ Decreasing </div> <div> Good Fair Poor </div> <div>    </div> </div>	Trend ²
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)	8.3 Mt CO ₂ e in 2019	Decreased	
14. Emissions intensity of Saskatchewan's economy (GHGs per unit of GDP)	Continued decrease in the emissions intensity of Saskatchewan's economy	883 tonnes CO ₂ e per million of GDP (chained 2012 dollars) in 2018	Decreasing	
15. Realized net farm income (RNFI)	No greater than 50% decrease in RNFI from the previous five-year average	\$1.95 billion in 2018 (30% less than the previous five-year average)	Maintained < 50% decrease in RNFI from the previous five-year average	
16. Percentage of cultivated land in different types of crops	No one crop type to rise above 50% of the cultivated area	No one crop type above 50% in 2019	Maintained crop diversity	
17. Incorporation of natural forest disturbance patterns in provincial forest harvest design	Since April 2019, 100% of forest harvest designs incorporate natural disturbance patterns	Six of six forest management plans (100%) as of March 2020	The target has been reached	
Community Preparedness				
18. Flood mapping completed for communities at risk of flooding and where benefits validate the costs	By 2030, 100% of communities at risk of flooding and where appropriate, have access to flood mapping	Four communities as of March 2019 <i>The Water Security Agency (WSA) partnered with Public Safety Canada to obtain preliminary flood maps for 21 communities in 2019-2020. WSA will review and rework where necessary, and endorse these in 2020-2021.</i>	Increasing	
19. Number of communities with a standardized and ratified emergency preparedness plan	Target to be set in 2021-2022	The Saskatchewan Public Safety Agency will be reviewing community planning and preparedness function.	No trend available	
20. Number of wildfire operational pre-plans completed for "at-risk" northern communities	By 2036, all 86 at-risk communities have wildfire operational pre-plans completed	Completed 51 pre-plans (59%) as of March 2019. Additional two pre-plans completed for Hudson Bay and Cumberland House.	Increased	
21. Total Crown land with wildfire fuel management work completed	By 2028, complete fuel management for remaining 644 hectares adjacent to communities. <i>(With funding secured from the Disaster Mitigation & Adaptation Fund that commenced in 2019-20, target is expected to be completed by 2028 rather than 2030.)</i>	Completed 903 hectares as of March 2019	Increased	
Human Well-Being				
22. Number of communities reliant on water supplies vulnerable to drought	Decrease the number of communities reliant on water supplies vulnerable to drought	Fewer communities vulnerable to drought in 2019 (more precipitation during the year and one community moved to a groundwater supply)	Decreased	
23. Average municipal water consumption per capita and total municipal water consumption as a measure of water use efficiency	Efficient use of water by municipal populations as characterized by a decrease in per capita water consumption and a stable or reduced rate of increase in total consumption relative to population growth	353 litres/person/day and about 133 million m ³ in 2018	Increased water use efficiency <i>In the past 30 years, general stability in total municipal use with a marked decrease in per capita use</i>	
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	18 communities as of 2019	Increased	
25. Number of active surveys at suitable habitat sites for Lyme disease and other tick-borne diseases	By 2020, 60 surveys at 51 sites	54 surveys at 48 sites as of 2019	Slight increase	

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.

Saskatchewan's government-wide *Climate Resilience Measurement Framework* was released in November 2018 to track and annually report on 25 resilience 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 on progress. These measures provide a picture of how Saskatchewan is strengthening its ability to prepare for the impacts of a changing climate.

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. The first annual resilience report was released in April 2019, presenting the baselines and targets for each measure. This second report continues with reporting on status and trends for each measure.

Overall, there are positive trends in the resilience measures. The measures in good status increased from 15 (60 per cent) in the 2019 report, to 18 (72 per cent) in this year's report. Similar to the 2019 report, there are no measures with poor status. Further, almost all the measures under economic sustainability, community preparedness and human well-being are in good standing. Resilience measures that are considered fair include some under natural systems (e.g. agricultural land area with 4R nutrient stewardship plan) and physical infrastructure (e.g. renewable energy generation capacity). Saskatchewan continues to work with Fertilizer Canada to support further adoption and tracking of 4R practices in Saskatchewan's cropland. SaskPower's planned investments will further its renewable energy generation capacity and operational efficiency, which will both contribute to reducing GHG emissions through 2030.

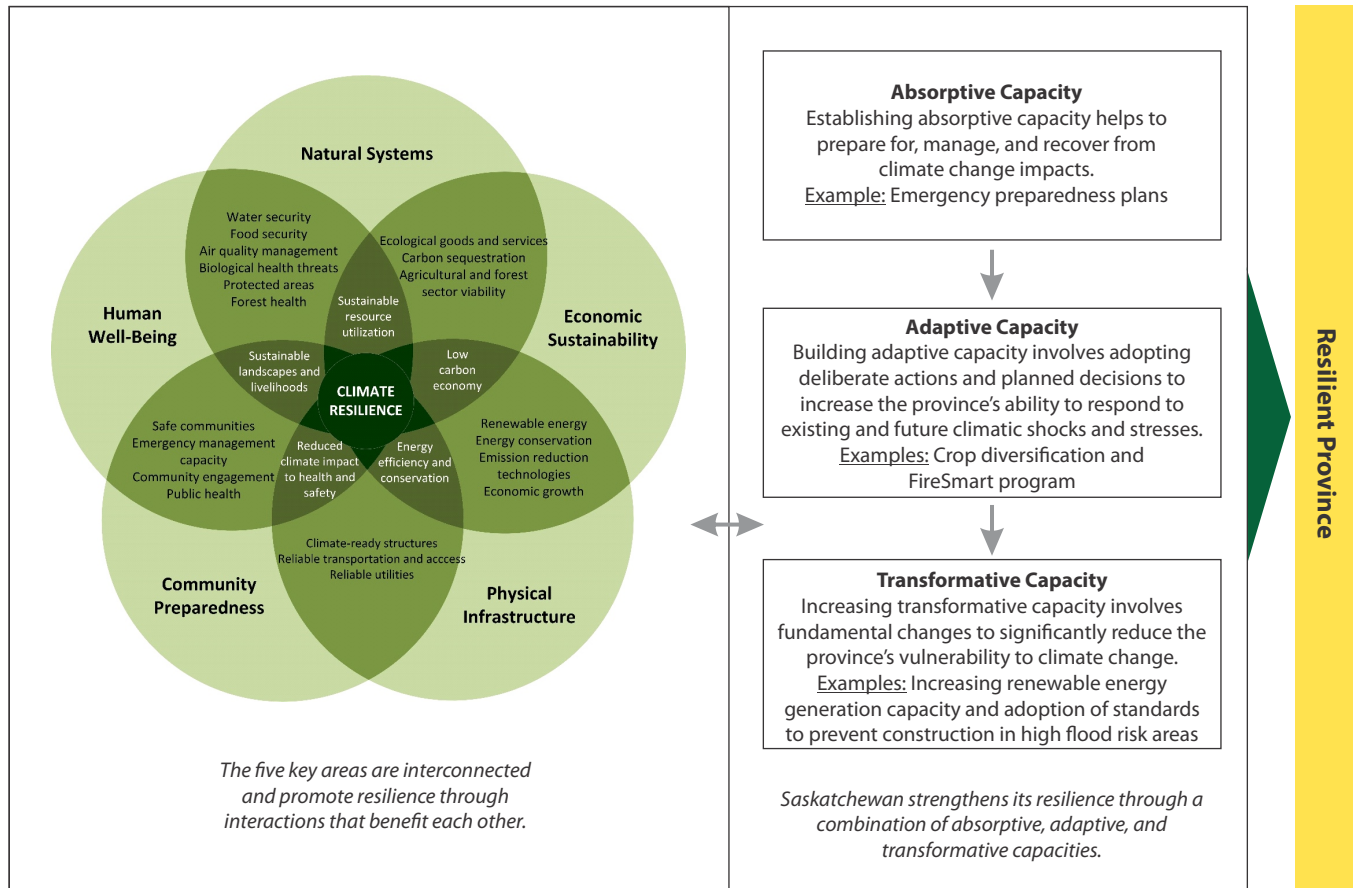
Other highlights in the 2020 report include:

- In 2019, the province **added around 700,000 hectares of protected areas**, increasing Saskatchewan's total protected areas to 6.4 million hectares. This covers 10 per cent of the province's total land base and includes representation from each of the province's 11 ecoregions.
- Since April 2019, **all forest harvest designs in Saskatchewan incorporate natural disturbance patterns**.
- In the last two fiscal years, **an additional 81 culverts were upgraded/replaced to meet the new provincial flood standard**. This helps ensure the province's transportation network is more resilient to extreme weather events.
- The energy consumption in our provincial government-owned buildings continued to decrease, as a result of increasing operational efficiency. **In 2018 and 2019, Saskatchewan surpassed its 2020 energy consumption reduction target.**
- In 2019, Saskatchewan continued to increase the area of Crown land with wildfire fuel management work. This reduces the risk of wildfire to northern communities. **Completion of wildfire fuel management for the remaining areas is expected by 2028, earlier than the original target of 2030.**

How is Saskatchewan building its resilience to climate change?

Saskatchewan takes a system-wide approach to mitigate and adapt to the effects of climate change. This includes improving the resilience of the province's natural landscapes, physical infrastructure, economy, communities and people.

All five resilience areas are interconnected and interdependent. For example, growth in the province's economy has far-reaching benefits to the community and well-being of people in Saskatchewan. Managing the province's natural landscape provides multiple benefits, including support for economic growth and provision of ecological goods and 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 GHG emissions. These types of interconnections are further highlighted in sections that describe how a measure contributes to resilience.



Five key areas and measures

The framework includes five key areas to increase resilience.

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, fuel, water, air purification, carbon storage and maintenance of wildlife habitat. Natural systems also inherently support mitigation through sequestration of carbon in soils, forests and wetlands.

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.






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.

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.

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 resilience measures in the five key areas

Natural Systems	Physical Infrastructure	Economic Sustainability	Community Preparedness	Human Well Being
				
<ol style="list-style-type: none"> 1. Total area of agricultural land under permanent cover in Saskatchewan 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 (FMPs) that incorporate Values, Objectives, Indicators, and Targets (VOITs) related to forest age class distribution for the licence area 5. Total protected areas in Saskatchewan 	<ol style="list-style-type: none"> 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 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-ways widened 11. Total energy consumption for Saskatchewan government-owned buildings 12. Total GHG emissions from Saskatchewan government-owned buildings 	<ol style="list-style-type: none"> 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 different types of crops 17. Incorporation of natural forest disturbance patterns in provincial forest harvest design 	<ol style="list-style-type: none"> 18. Flood mapping completed for communities at risk of flooding and where benefits validate the costs 19. Number of communities with a standardized and ratified emergency preparedness plan 20. Number of wildfire operational pre-plans completed for "at risk" northern communities 21. Total Crown land with wildfire fuel management work completed 	<ol style="list-style-type: none"> 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



Natural Systems

Measure 1.

Total area of agricultural land under permanent cover in Saskatchewan

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

How the measure contributes to building resilience

Lands in grass, especially on marginal lands, are more resilient against drought and flood events than lands in annual cropping. Grasslands contribute to carbon sequestration and provide habitat for wildlife, which helps maintain biodiversity, especially on native prairie. Permanent cover also helps buffer against the spread of weeds.

What is the target for this measure?

Maintain at 8.06 million hectares (19.93 million acres).

What is the status of this measure?

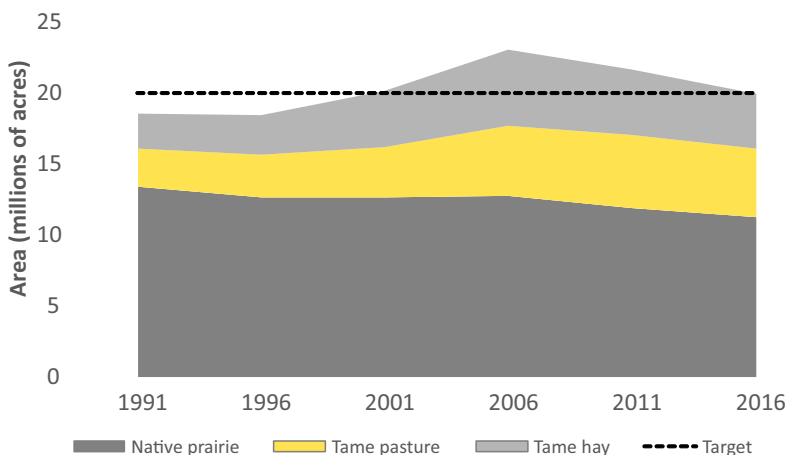
As of 2016, there are 8.06 million hectares (19.93 million acres) of agricultural land under permanent cover.

Saskatchewan's total area of agricultural land under permanent cover (includes native prairie, tame pastures and tame hay) 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.

The data for this measure is available every five years from Statistics Canada's Census of Agriculture. The most recent information is from the 2016 census.

The Ministry of Environment continues to make progress in the use of satellite imagery to differentiate the total area of native grassland from tame-dominated grasslands within the province. A mapping product is close to completion for the mixed grassland ecoregion, and will provide a better estimate of the amount and location of native and tame-dominated grassland. This mainly marginal land is important for providing environmental goods and services such as carbon sequestration and preservation of biodiversity.

Total area of agricultural land under permanent cover



From April 2018 to January 2020, there were 19,121 hectares (47,300 acres) seeded under permanent tame and native forage BMPs.

Source of data: Natural land and tame pastures, Census of Agriculture, Tame Hay and Beef Cows annual surveys

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.

Measure 2.

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

This measures the amount of SOM accumulated in Saskatchewan's cultivated lands as a result of various agricultural practices, such as reduction in summer fallow, changes in tillage practices, and conversion of cropland to forage.

How the measure contributes to building resilience

SOM improves soil quality through increased water infiltration and retention, soil stability and nutrient retention, which leads to higher agricultural productivity. Soil organic carbon, the carbon component of soil organic matter, represents the carbon dioxide (CO₂) sequestered in the soil.

What is the target for this measure?

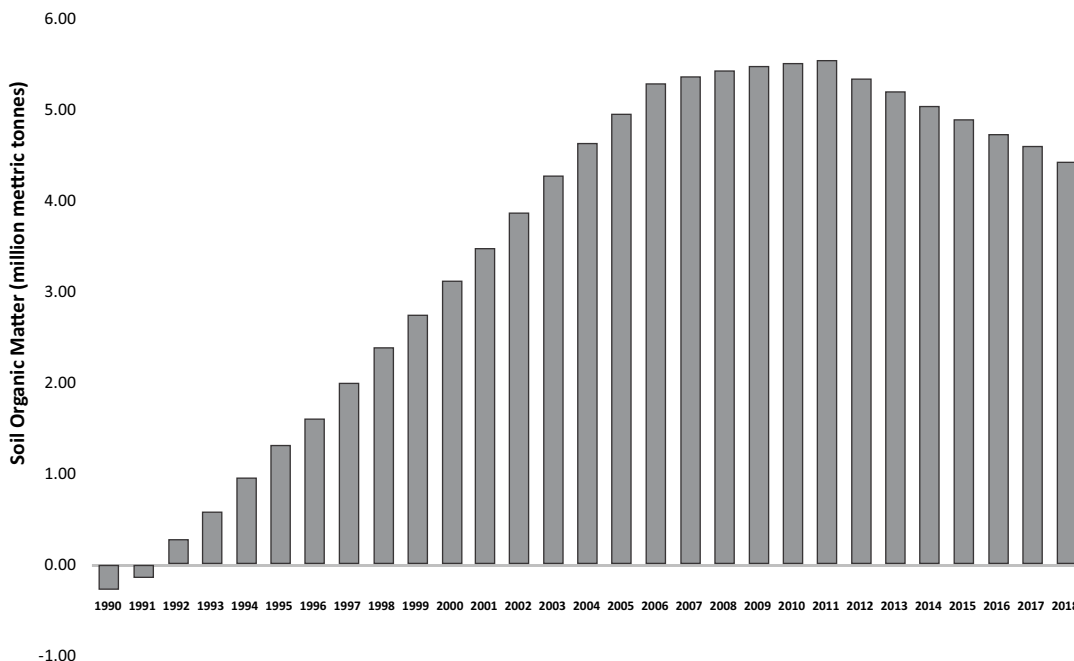
Maintain accumulation at 5.60 million tonnes (Mt) soil organic matter per year.

What is the status of this measure?

Saskatchewan's innovative production practices such as zero-till and reduced summer fallow, as well as investments in research and development, have supported farmers in adding organic matter in the soil every year. Soil sequestration rates have increased and **Saskatchewan farmers have since early 2006 and up to 2014, sequestered at least 5.0 Mt of SOM annually.** Data for this measure are obtained through the National Inventory Report from Environment and Climate Change Canada (ECCC). In 2019, ECCC took into consideration data from the 2016 Census of Agriculture which reported that land under tame forage and hay dropped by 445,150 hectares (1.1 million acres) between 2011 and 2016. These tame acres would have likely been brought back into annual crop production which accumulates less soil organic matter than grassland. While decreases in tame forage and hay acres are largely market-driven, 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.

There is a two-year time lag between the occurrence of emissions and the completion of inventories, hence the most recent data is for 2018 (released in spring 2020). Values are adjusted by ECCC every year to reflect the latest information.

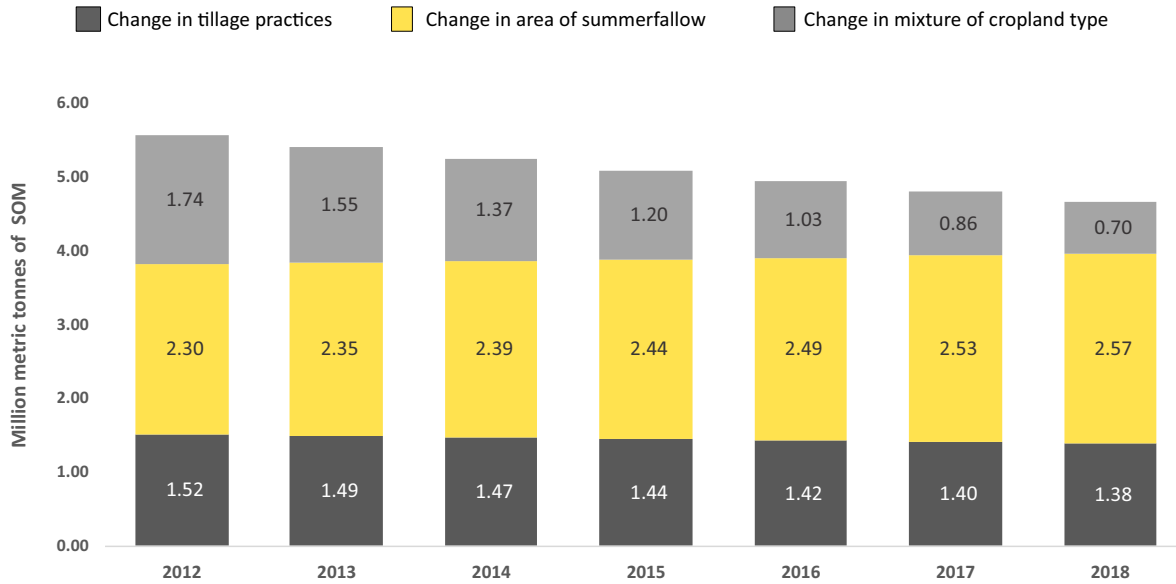
Soil organic matter added to Saskatchewan cultivated soils 1990 - 2018



Source: National Inventory Report, Environment and Climate Change Canada (ECCC). Data is adjusted every year to reflect the latest information available. Carbon sequestered in soil can be expressed as tonnes of soil organic matter (SOM) or tonnes of CO₂ equivalent (CO₂e). One tonne of SOM is roughly equivalent to two tonnes of CO₂e. SOM is selected for this measure because it provides a more comprehensive depiction of the overall soil productivity.

While a significant drop was recorded for SOM accumulations from tame forage and hay acres (*shown as change in mixture of cropland type in the figure below*), SOM accumulations from reductions in the area of summer fallow and improved tillage practices have been largely maintained.

Soil organic matter accumulated in Saskatchewan's cultivated land (2012-2018)



Measure 3.

Percentage of agricultural land area with 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).

How the measure contributes to building resilience

The 4R nutrient stewardship plan helps ensure protection of the environment and has the capacity to reduce GHG emissions from fertilizer use. The adoption of 4R nutrient stewardship allows farmers to achieve efficiency while helping to maintain the health of the soil, air and water.

What is the target for this measure?

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

What is the status of this measure?

As of 2019, approximately 0.3 per cent of the province's agricultural land is under 4R designation. This is a slight decrease in the area (from 0.4 per cent in 2018), but the values for 2019 are more accurate. The values reported for 2018 were based on watersheds that overlap with neighbouring provinces.

Saskatchewan's agricultural land area under 4R designation

Watersheds	Acres
Total 4R Designation	47,154 ha (116,730 acres)
Total crop acres in Saskatchewan	15,102,180 ha (37,318,300 acres)
% Saskatchewan acres under 4R designation (2019)	0.31%

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



Saskatchewan's partnership with Fertilizer Canada will continue to support more environmentally responsible cropland by implementing the 4R principles. The 4R concept is featured at Agri-ARM (Applied Research Management) field sites across the province, to demonstrate methods for reducing nitrous oxide emissions. In 2019, a Saskatchewan 4R Nutrient Stewardship Advisory Committee that includes industry stakeholders and the scientific community was established. The committee will help promote 4R practices in Saskatchewan through an annual work plan

Measure 4.

Number of Forest Management Plans (FMPs) that incorporate Values, Objectives, Indicators, and Targets (VOITs) related to forest age class distribution for the licence area

Saskatchewan's Forest Management Planning Standard requires forestry companies/licensees to develop VOITs describing the desired future state or condition of values (e.g. forest age class distribution) that contribute to sustainable forest management.

This measure tracks the number of FMPs that incorporate a VOIT related to the forest age class distribution for the licence area. Specifically, the licensee shall harvest according to the approved age class profile target, by area, on the Managed Forest Land Base (MFLB). MFLB refers to the forested subset of a forest company's gross licence area where forest management activities are conducted. The MFLB covers both timber and non-timber values, such as wildlife, biodiversity and recreational opportunities.

How the measure contributes to building resilience

Maintaining key forest attributes that are ecologically important, such as age class distribution, helps maintain an intact forest landscape. Further, 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.

What is the target for this measure?

By 2020, 100 per cent of approved FMPs will contain a VOIT that identifies approved age class profile target, by area, on the managed forest land base.

What is the status of this measure?

Saskatchewan's Forest Management Planning Standard was finalized in 2017. This included a requirement for the licensee to establish a VOIT that identified age class for the managed forest land base.

In 2019, five out of six licence areas that have FMPs either approved or under development have an approved age class target. The remaining FMP, currently in development, will contain an age class target and is expected to be completed and approved in 2020.

Five forest management plans approved

These plans incorporate Values, Objectives, Indicators and Targets (VOITs) related to forest age class distribution.

One forest management plan under development

Measure 5.

Total protected areas in Saskatchewan

This measures the increase in protected areas in Saskatchewan as an indicator of progress toward fulfilling the provincial commitment of protecting 12 per cent of its terrestrial and aquatic ecosystems. 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.

How the measure contributes to building resilience

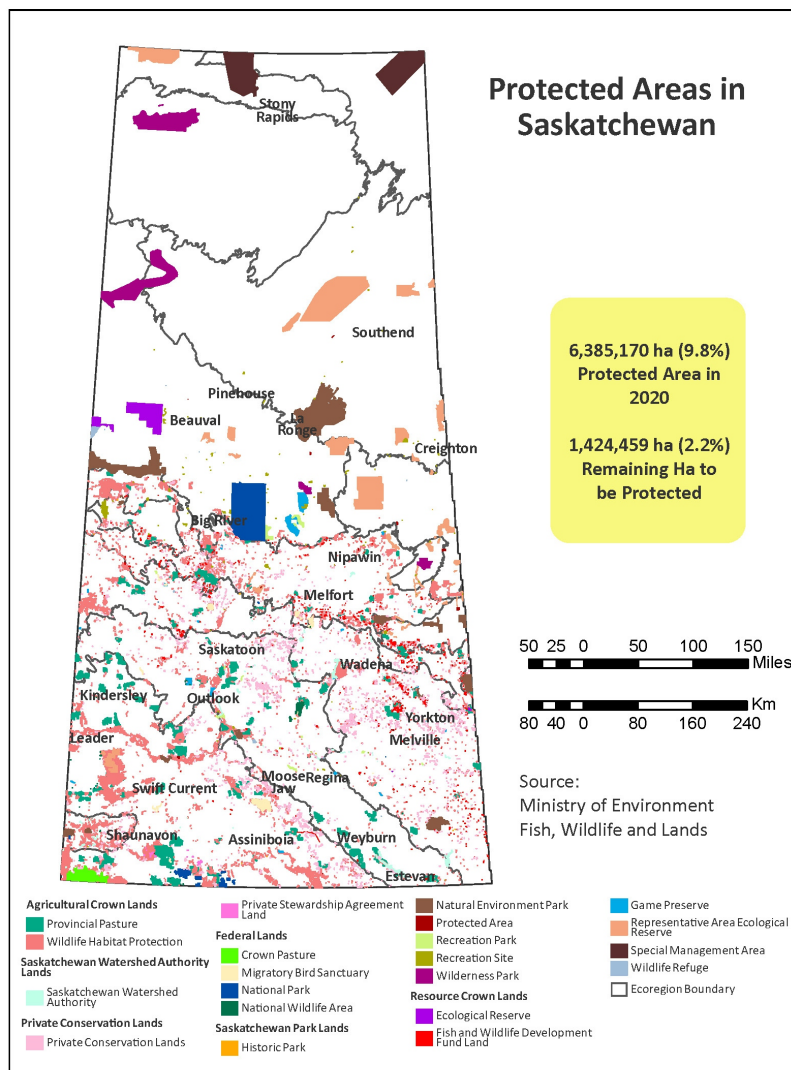
Protected areas serve a number of functions: ecological benchmarks to better monitor natural response to climate change impacts; genetic reservoirs and refuges for species at risk; and maintenance of culturally and traditionally important sites.

What is the target for this measure?

By 2020, 7,809,629 hectares (12 per cent) are protected.

What is the status of this measure?

As of January 2020, there were approximately 6.4 million hectares of protected areas in Saskatchewan (9.8 per cent of the province's total land base), with representation from each of the province's 11 ecoregions. Recent work in acquiring new private conservation lands has contributed to around 53,000 hectares of protected land.



New protected area designations are currently being assessed for their potential to recognize biodiversity conservation in areas where establishing traditional protected areas may be challenging. These designations include, Other Effective Area-based Conservation Measures and Indigenous Protected and Conserved Areas. Saskatchewan is developing a Roadmap to 12 Per Cent, which will evaluate available protection tools and detail a plan to achieve protected and conserved area goals for the province.

There are challenges in adding significant numbers of hectares to the protected areas. In the agricultural areas of the province, a large portion of the land is privately owned and additions to the protected areas are achieved in small quantities. In northern Saskatchewan, even though Crown land dominates, many interests must be considered and weighed to achieve a balance between conservation and economic development.

The greatest risks to achieving the target are increasing land use pressures (e.g. industrial development, urban growth and recreation) that either decrease the ecological value of the land or take up lands fully so they are not representative of a natural landscape. These notwithstanding, the province continues to work towards achieving its target of protecting 12 per cent of its total land base.



Physical Infrastructure

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, as an indicator of the province's efforts to upgrade vulnerable roadway locations.

How the measure contributes to building resilience

Culverts provide a critical function in moving water from one side of the roads and highways to another, protecting the surface infrastructure and preventing road washouts. 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 is key to economic growth and quality of life for Saskatchewan residents.

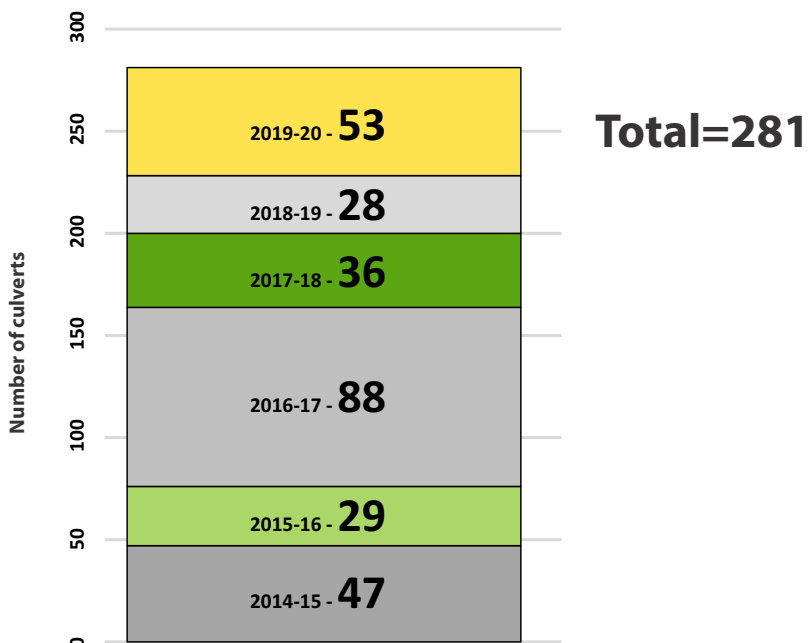
What is the target for this measure?

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

What is the status of this measure?

In 2014, the province adopted a new provincial flood standard for culverts on the national highway system, increasing the minimum culvert diameter from 600 mm to 900 mm. **As of fiscal year 2019-2020, the Government of Saskatchewan had a total of 281 culverts on the national highway system that meet the new flood standard.**

Number of 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.

How the measure contributes 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.

What is the target for this measure?

By 2030, up to 50 per cent of electrical generation capacity from renewable energy sources.

What is the status of this measure?

In 2019, 24.3 per cent of SaskPower's electrical generation capacity was comprised of renewable energy sources.

A total of 1,194 megawatts (MW) of electricity was generated from hydro (including imports), wind and geothermal, landfill gas, flare gas, waste heat recovery, and net metering, an increase of 55 MW of renewable energy from 2018.

The province is expecting to have steady increases in renewable capacity over the next five years. Additional contracts with Manitoba Hydro will start in 2020, along with continued growth in net metering, wind projects and solar projects.

Type of energy generation	2018	2019
Renewables	1,139 MW (25.4%)	1,194 (24.3%)
Hydro (including imports)	889 MW	889 MW
Wind	221 MW	241 MW
Energy recovery	29 MW	64 MW
Non-renewables	3,354 MW	3,721 MW
Natural Gas	1,824 MW	2,191 MW
Coal	1,530 MW	1,530 MW
TOTAL	4,493 MW	4,915 MW

In addition, SaskPower added non-renewable capacity from natural gas, generated at the Chinook Combined Cycle Gas Turbine located near Swift Current. With the anticipated retirements of Boundary Dams 4 and 5 in the next six years, there is a need to bring this capacity now to serve future load requirements. In addition, the Chinook Combined Cycle Gas Turbine will accommodate intermittent renewables, reduce GHG emissions, and reduce operating costs.



The Western Lily wind power facility built in Grenfell in 2019 sells power to SaskPower. The facility has a capacity of 20 megawatts, which is enough to power approximately 8,000 homes.

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 40 per cent from 2005 levels by 2030.

How the measure contributes to building resilience

The electricity sector contributed approximately 20 per cent of Saskatchewan's total GHG emissions in 2017. Reducing emissions in the electricity sector therefore contributes significantly to the province's overall GHG emissions reduction.

What is the target for this measure?

By 2030 achieve 8.52 Mt CO₂e GHG emissions from Saskatchewan's electricity sector (40 per cent reduction from 2005 levels).

What is the status of this measure?

In 2018, emissions from the electricity sector remained comparable to the previous year. Until 2018, the general trend was a gradual increase of 1.85 Mt CO₂e since 2005, with some years decreasing due to hydro power generation. Final data for 2019 emissions will become available in June 2020, and it is projected that 2019 emissions have decreased from 2018 levels. Meanwhile, overall electricity production has increased since 2005, by 23 per cent, from 20.6 terawatt-hours to 25.7 terawatt-hours in 2018-19. Saskatchewan's electricity system is becoming more efficient and the trend will continue with added renewable capacity brought on-line through 2030.

Since January 1, 2018, the province – through its *Management and Reduction of Greenhouse Gases (General and Electricity Producer) Regulations* – has imposed a GHG emissions limit on coal and gas-fired electricity generators in Saskatchewan. Further, SaskPower continues to increase its renewable capacity (as demonstrated in measure 7), support low-emission technologies, and modernize its electricity grid. These actions are central to meeting the targeted emissions reduction.

Based on a 40 per cent reduction from 2005 emissions



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. 2019 emissions information will be available in June 2020 and published in SaskPower's 2020 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 (DSM) 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.

How the measure contributes to building resilience

Adopting DSM programs can increase resilience for both the utility sector and customers. DSM has reduced the strain on generation and distribution systems during peak demands and can lower the large costs associated with building and maintaining new electrical generating capacity. Also, customers are able to use energy more efficiently, thereby reducing their GHG emissions and energy costs.

What is the target for this measure?

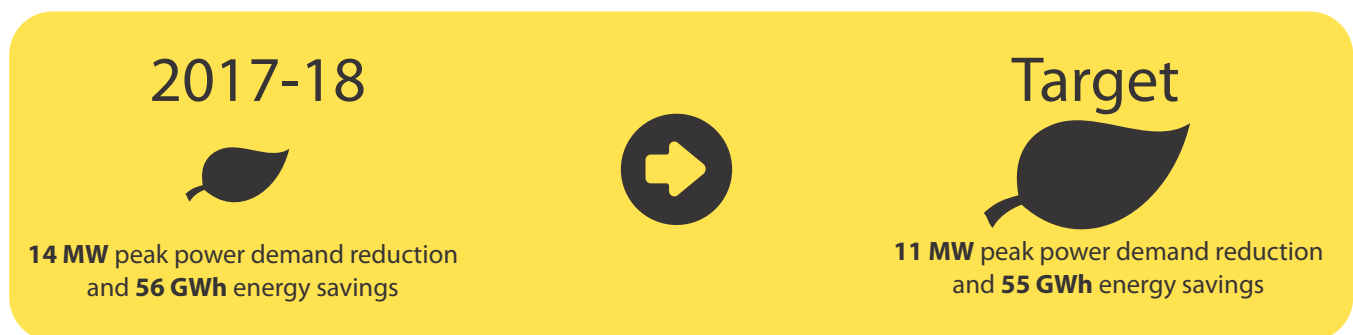
The target for fiscal year 2019-2020 is a six MW peak demand reduction and 45 GWh energy savings. SaskPower is repositioning its efforts to a broader range of program areas, including internal energy management, energy efficiency tools and advice, customer generation, electric vehicles and smart technologies. These changes will continue to contribute to building resilience by achieving internal efficiencies, and by encouraging and supporting customer adoption of new technologies to lower the province's GHG emissions.

What is the status of this measure?

In fiscal year 2018-19, SaskPower reduced peak power demand by 11 MW and saved 55 GWh of energy.

Historically, the energy and generation capacity savings acquired through DSM programs have provided SaskPower the ability to defer the need for new generation. SaskPower's business needs and customer interests are changing and as a result SaskPower's DSM programs are evolving. 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. Also, customers are looking to new options such as self-generation to help manage their electricity costs. Customers are also able to access incentives from federal carbon-tax funded programs to adopt energy efficiency technologies.

Energy savings from SaskPower's Energy Efficiency and Conservation Program



Reducing peak power demand, which refers to the highest rate of electricity usage, reduces strain on the system.

Measure 10.

Area of SaskPower power line rights-of-way (ROW) widened

This measures SaskPower's vegetation management to protect its facilities and other values at risk of wildfire. This measure includes ROW for both transmission and distribution lines.

How the measure contributes to building resilience

Trees in Saskatchewan cause about 1,000 power outages a year and can also cause fires when they come in contact with power lines. Vegetation management is therefore important to prevent wildfires and outages. 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.

What is the target for this measure?

By 2030, 10 per cent of rights-of-way are cleared to maintenance standard per year.

What is the status of this measure?

In 2019, SaskPower managed a total of 21,785 hectares (at 30 metres width) of wildfire management plan areas. Of these, **1,431 hectares (6.6 per cent) ROW were cleared to reduce the risk of wildfire and to ensure reliability of service.** This reflects an increase of 165 hectares of ROW widened from the previous year.



SaskPower staff regularly monitor potential risk from vegetation overgrowth and encroachment.

Measure 11.

Total energy consumption for Saskatchewan government-owned buildings

This measures energy consumption in all provincial government-owned and operated buildings, and provides an indication of the province's success in maximizing operational efficiencies while minimizing environmental impacts.

How the measure contributes to building resilience

Maximizing operational efficiencies for Saskatchewan's government-owned buildings increases resilience by reducing GHG emissions and energy costs.

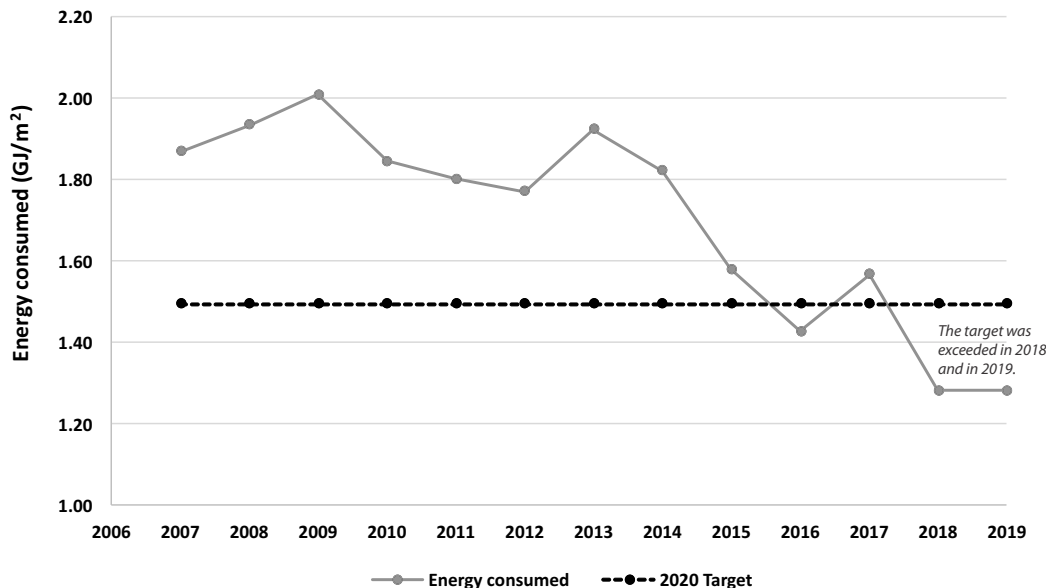
What is the target for this measure?

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

What is the status of this measure?

Since 2014, significant reductions in total energy consumption of government-owned buildings have already been made. **In 2018 and in 2019, total consumption was 1.282 GJ/m², which is lower than the 2020 target of 1.494 GJ/m².**

Energy consumption of government-owned buildings



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 three to five per cent exists in the 2018 and 2019 data.

Saskatchewan continues to show leadership by ensuring that **all new construction projects are built as part of a nationally-recognized environmental building certification program called LEED** (Leadership in Energy and Environmental Design). These business designs include LED lighting, energy-efficient windows, the use of solar thermal technology to heat water, and co-generated electricity, which simultaneously produces electrical and heat energy from one fuel source.

The province also operates **45 buildings that are recognized by BOMA Building Environmental Standards**, the industry benchmark for properties managed in an environmentally-sustainable manner. These buildings consume 17.5 per cent less energy on average than all buildings in Canada (national average).

Measure 12.

Total greenhouse gas emissions from Saskatchewan government-owned buildings

This measures reduction in GHG emissions from provincial government-owned and operated buildings. This is measured in tonnes of CO₂e based on energy consumed (both electricity and natural gas), which is estimated from billing information.

How the measure contributes to building resilience

Reducing GHG emissions in government-owned and operated buildings contributes to the province's overall emissions reduction.

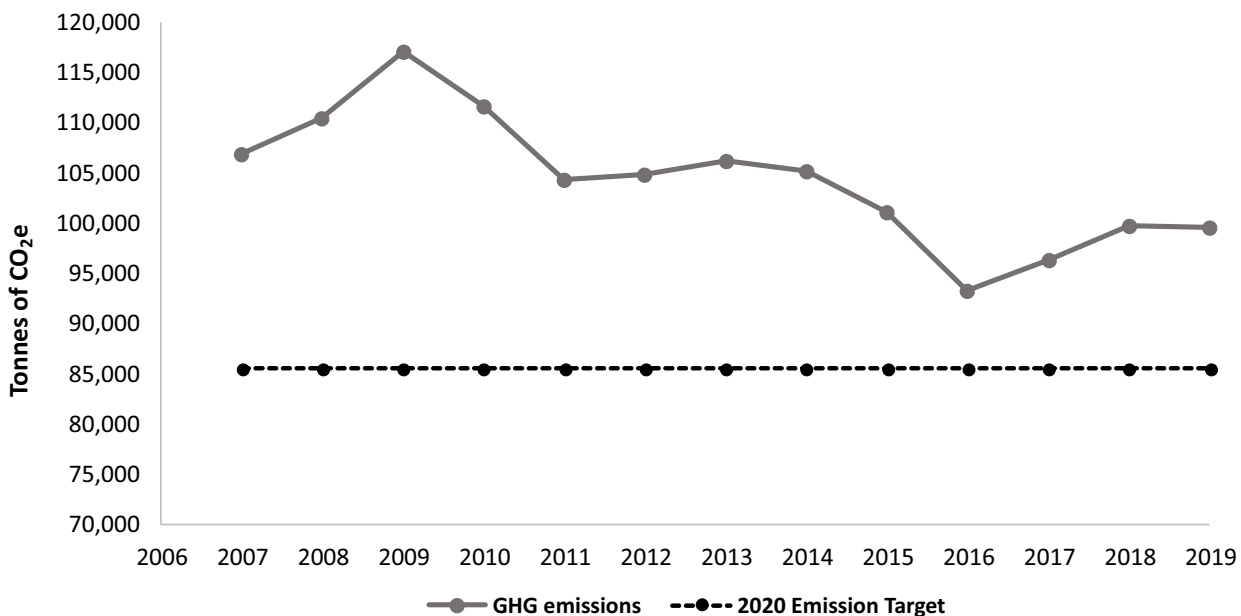
What is the target for this measure?

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

What is the status of this measure?

The total GHG emissions for 2019 was 99,458 tonnes CO₂e, which is slightly lower than in 2018 (99,729 tonnes of CO₂e). The total area of government-owned buildings increased by 11,582 m² in 2019 (911,693 m² in 2019 compared with 900,111 m² in 2018), but emissions were lower as a result of the province's increased operational efficiency.

GHG Emissions from executive government-owned buildings



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 three to five per cent exists in the 2018 and 2019 data.



Economic Sustainability

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.

How the measure contributes to building resilience

This contributes to reducing the carbon footprint from oil and gas operations and to the overall GHG emissions reduction in the province (measure 14).

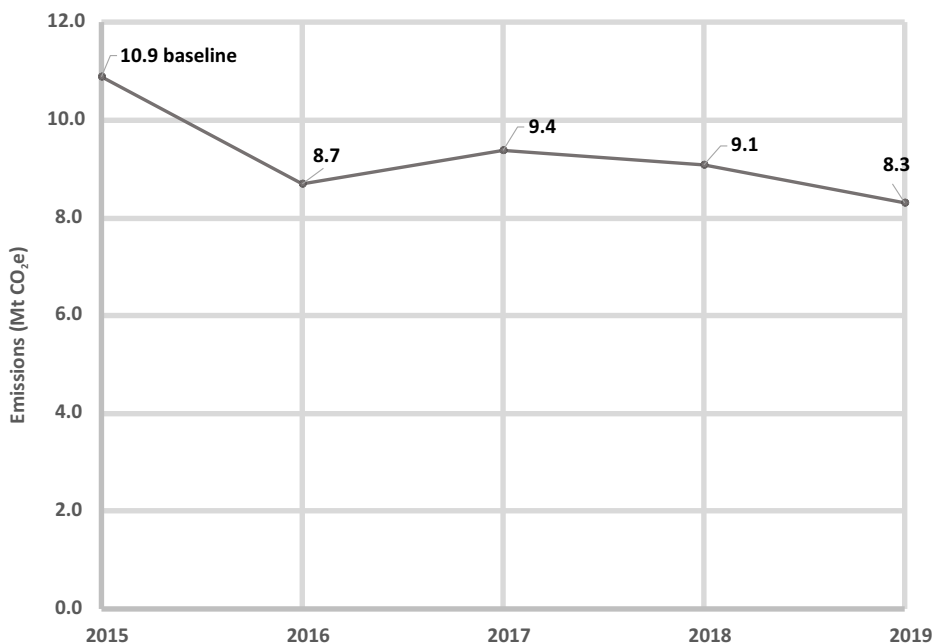
What is the target for this measure?

By 2025, reduce GHG emissions to 6.4 Mt CO₂e (4.5 Mt CO₂e reduction from 2015 emissions).

What is the status of this measure?

The amount of GHG emissions from gas produced in association with oil decreased to 8.3 Mt CO₂e in 2019 (from 9.1 Mt CO₂e in 2018). The implementation of *The Oil and Gas Emissions Management Regulations* (OGEMR) will reduce the 2015 emission levels (10.9 Mt of CO₂e) by more than 40 per cent by 2025 (at 6.4 Mt of CO₂e). Saskatchewan also launched programs that complement OGEMR, including SaskPower's Power Generation Partner Program (PGPP), and the SaskPower and First Nations Power Authority Flare Gas Agreement. PGPP will enhance the upstream oil and gas industry's ability to produce electricity for sale to SaskPower for projects that utilize methane from oil production as the primary fuel source. The PGPP has a 50 MW allocation of new electricity production capacity, with the option for SaskPower to increase the program to a total of 75 MW.

GHG emissions from gas produced in association with oil



SaskPower has partnered with the First Nations Power Authority to secure 20 MW of flare gas projects, helping reduce the carbon footprint of oil and gas operations.

Measure 14.

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

This measure outlines the province's exposure to CO₂e reduction policies, and helps determine if CO₂e reductions are a result of efficiency gains or loss of production.

How the measure contributes to building resilience

Balancing Saskatchewan's economic growth with the commitment to reduce GHG emissions ensures the province is able to grow and prosper, and that people's jobs and livelihoods are supported.

The measure tracks Saskatchewan's GHG emissions intensity, which is the amount of CO₂e per a fixed value of economic activity. This is measured by one million chained 2012 dollars, where a chained dollar is an adjusted value to factor in inflation. This allows for comparisons between quantities produced across time.

What is the target for this measure?

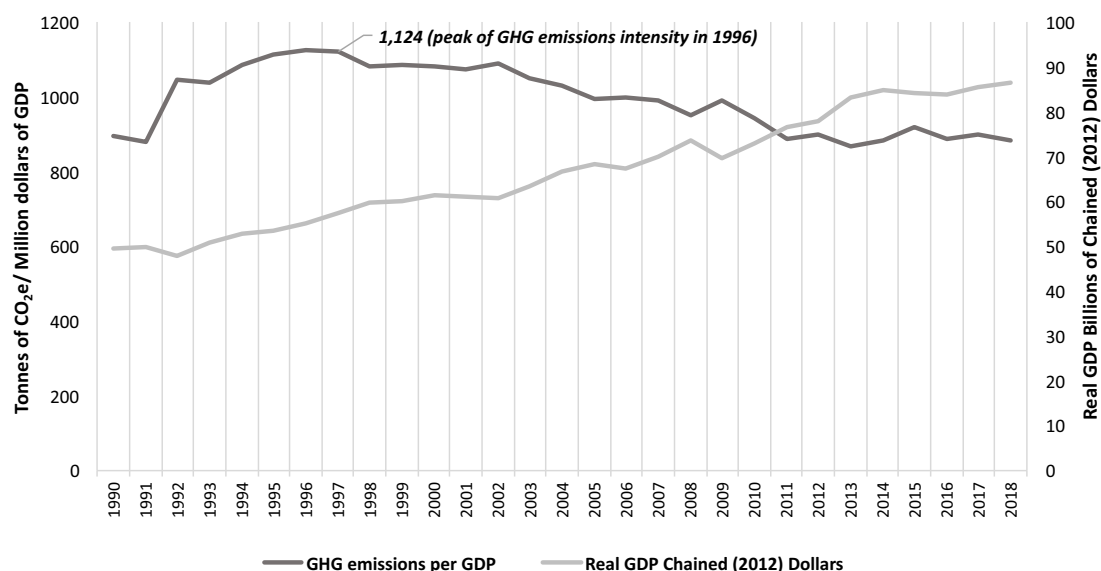
Continued decrease in the emission intensity of Saskatchewan's economy.

What is the status of this measure?

Saskatchewan's GHG emissions intensity peaked at 1,124 tonnes of CO₂e per million dollars of economic activity in 1996 but has been on a downward trend since. The all-time low in the last 10 years was in 2013 at 869 tonnes of CO₂e per million dollars of economic activity. **From 2007 to 2018, GHG emissions intensity in Saskatchewan dropped by 11 per cent**, while the province's gross domestic product (GDP) value (expenditure-based) increased by 24 per cent during the same period.

It is anticipated that the different programs and regulations introduced by Saskatchewan as components of *Prairie Resilience* will drive down Saskatchewan's emissions intensity in the long term. These include: regulations for coal-fired electricity producers; expanding renewable energy sources; regulations for the upstream oil and gas sector; output-based performance standards for Saskatchewan's large industrial emitters; and energy efficiency improvements.

Saskatchewan GHG emissions per GDP



The GDP and GHG data were obtained from Statistics Canada and Environment and Climate Change Canada websites, respectively. The most recent data for GHG emissions is for 2018, 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.

How the measure contributes 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.

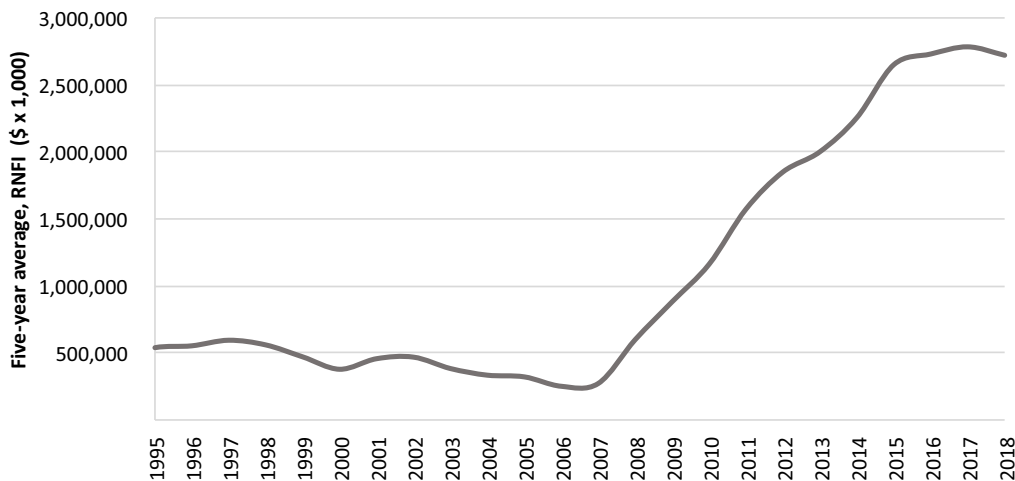
What is the target for this measure?

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 in comparison to the previous five years.

What is the status of this measure?

There has been no drastic decline in Saskatchewan's five-year average of realized net farm income in the last 10 years. Since 2015, the five-year average realized net farm income has stabilized at around \$2.7 billion.

Five-year average of realized net farm income (RNFI)



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

Realized net income = net cash income – depreciation + income in kind

Net cash income = farm cash receipts – cash expenses

Farm cash receipts = market receipts from crops and livestock + government program payments

The province and Agriculture and Agri-Food Canada's joint programs help limit the volatility of a farmer's income. These include AgrilInsurance, which comprises fire insurance (under the Forage Rainfall Insurance Program), AgrilInvest, 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.

Measure 16.

Percentage of cultivated land in different types of crops

The crop diversity target measures the mix of crops in Saskatchewan. A measure of one crop type above 50 per cent would suggest more potential risk from drought, pests and diseases than a broader mix of crops. With this measure, crop types will be organized under the categories of cereals, oilseeds, pulses and soybeans, and summer fallow.

How the measure contributes to building resilience

Diversification of crops enhances soil health, assists with managing pests and diseases, and manages financial risk. The addition of pulses to crop rotations also helps reduce GHG emissions (measure 14) through reduced use of fertilizer.

What is the target for this measure?

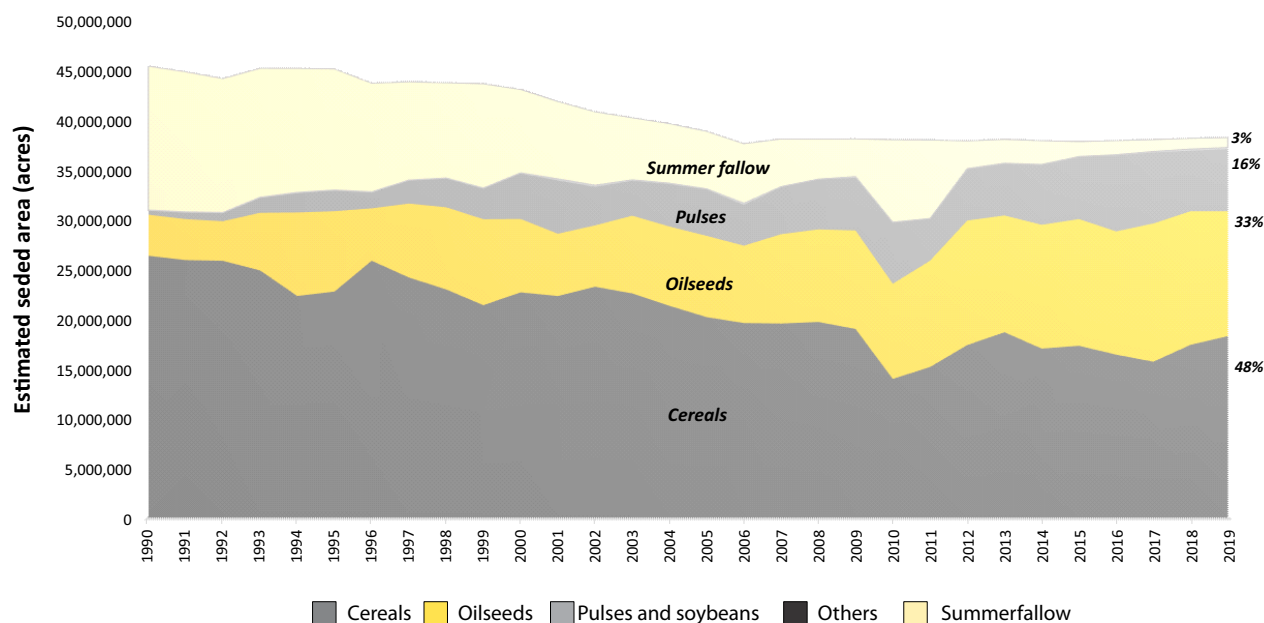
No one crop type to rise above 50 per cent of the cultivated area.

What is the status of this measure?

In 2019, there was no crop type that made up more than 50 per cent of the cultivated area.

Cereals have consistently made up the largest cultivated land area, but have not made up more than 50 per cent since 2008, when cereal cultivation reached 52 per cent. In 2019, cereals made up approximately 48 per cent of the cultivated land area (7.4 million hectares; 18.28 million acres), oilseeds made up 33 per cent (5.09 million hectares; 12.57 million acres), pulses made up 16 per cent (2.54 million hectares; 6.27 million acres), and summer fallow made up three per cent (405,000 hectares; 1.0 million acres).

Crop types by seeded area



Source: Statistics Canada Table 001-0017. Others include buckwheat, corn, hemp and mixed grains, and made up < 1 per cent of cultivated land area in 2019.

Measure 17.

Incorporation of natural forest disturbance patterns in provincial forest harvest design

This measure highlights the requirement within Saskatchewan's Forest Management Plans (FMPs) for forest harvesting to emulate the natural forest patterns (NFPs) created by wildfires.

How the measure contributes to building resilience

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

What is the target for this measure?

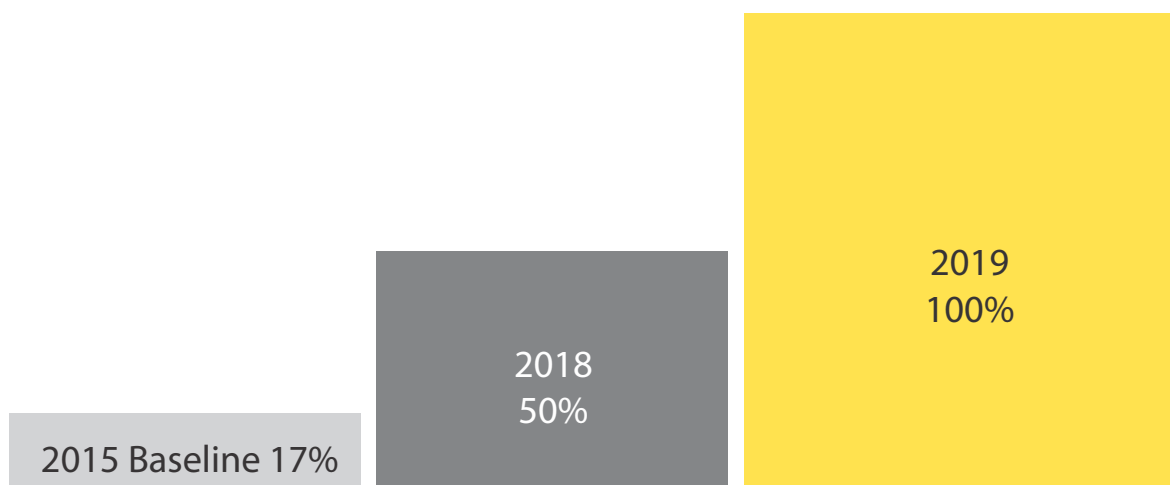
Since April 2019, 100 per cent of forest harvest designs incorporate natural disturbance patterns.

What is the status of this measure?

The Ministry of Environment tracks the number of Forest Management Plans 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 2017, the Forest Management Planning Standard was finalized as part of Saskatchewan's Environmental Code. This included a requirement for the licensee to establish specific Values, Objectives, Indicators, and Targets (VOITs; measure 4) that incorporated NFP concepts, and to develop 20-year tactical plan maps in adherence to these concepts.

As of March 2020, all forest harvest designs incorporate natural forest patterns, reaching the target for this measure. In 2019, forest industry licensees with finalized Forest Management Plans (five of six) all included VOITs and 20-year tactical plan maps that incorporate NFP concepts such as harvest event size, mixed wood regeneration, old and very old seral stage retention, as well as retention of residual stand structure. While there is one remaining FMP in development, a tactical plan for the forest area has been developed and NFP concepts are being operationally considered.

Forest harvest design incorporate natural forest patterns (NFPs)





Community Preparedness

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 modern flood-mapping, that have access to flood maps.

How the measure contributes 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 enable these communities to initiate more active mitigation measures to protect infrastructure and property from costly recurrent flood damage, to reduce flood recovery time and costs, and to reduce or eliminate stress and suffering of the citizenry. For example, flood maps that delineate the flood way and flood fringe for a number of flood frequencies (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 (1:500, a flood magnitude that is expected to occur once in a 500-year period), are an important analytical tool for enabling communities to develop zoning bylaws to restrict development from flood-prone areas, and to undertake emergency construction and development planning.

What is the target for this measure?

By 2030, 100 per cent of communities in Saskatchewan identified as being at risk of flooding and that will benefit from modern flood-mapping, have access to flood maps.

What is the status of this measure?

Currently, only four communities at risk of recurrent flood damage have access to modern flood maps to assist with completion of official community plans, direct development planning, develop emergency flood plans or guide the construction of flood-protection works. In 2019-2020, the Water Security Agency partnered with Public Safety Canada to obtain preliminary flood maps for 21 communities in the province. The Water Security Agency will review, rework where necessary, and endorse these flood maps in 2020-2021, and provide them to the communities.

Since modern flood-mapping and hydraulic modeling are expensive to complete, and Saskatchewan communities face flood risk as a result of flood hazards unique to prairie hydrology, it is currently unknown which communities will benefit from flood maps. Saskatchewan communities face circumstances that do not always include threats from streams, rivers or lakes that are typically modelled and mapped, rather; the flat topography is prone to extreme precipitation events that inundate the landscape or advance floodwaters on a community overland. Since topographic relief is not the main determining factor around floodwater behaviour under such circumstances, modern flood maps are not always useful in the Saskatchewan context. The Water Security Agency 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 that would benefit from flood mapping, by March 2021.

Also, Government of Saskatchewan's **Emergency Flood Damage Reduction Program** assists citizens with implementing measures to prevent or reduce damages due to imminent flooding. The province's **Flood Damage Reduction Program** helps communities take a proactive approach to reducing flood risk, by providing funding for risk assessments, permanent flood protection works, mitigation planning, and flood mapping projects.

Measure 19.

Number of communities with a standardized and ratified emergency preparedness plan

This measures the number of Saskatchewan communities that have completed emergency preparedness plans.

How the measure contributes to building resilience

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

What is the target for this measure?

Target to be set in 2021-2022.

What is the status of this measure?

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

In 2020-21, the SPSA will review the community planning and preparedness function (e.g. helping and educating rural municipalities (RMs), municipalities and First Nations communities to develop, test and enable emergency plans). The objective of the review is to determine if the current community planning and preparedness function is meeting stakeholder needs and legislative responsibilities, and to explore opportunities to strengthen the function.

In 2018, the Ministry of Government Relations, in collaboration with the Saskatchewan Urban Municipalities Association (now Municipalities of Saskatchewan) and the Saskatchewan Association of Rural Municipalities, conducted a community survey to determine the number of municipalities and First Nations communities that have an emergency preparedness plan. **The survey went to more than 700 communities. However, only 290 responded, of which 238 indicated having an emergency preparedness plan.**

Measure 20.

Number of wildfire operational pre-plans completed for at-risk northern communities

This measures the number of “at-risk”¹⁰ communities in Saskatchewan's wildland-urban interface (WUI) that have community pre-plans. These communities are rated with moderate to high risk of wildfire.

How the measure contributes to building resilience

The operational 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, values-at-risk such as infrastructure and buildings, and fire operations that can be utilized in the event that a wildfire threatens those wildland-urban interface values. Wildfire risk assessment and planning also enables communities to identify hazards and prioritize efforts to address higher risks and more vulnerable areas or populations, well in advance of wildfire impacts to the area.

What is the target for this measure?

By 2030, all 86 “at-risk”¹⁰ communities have wildfire operational pre-plans completed.

What is the status of this measure?

In 2018-19, wildfire operational pre-plans were completed for Hudson Bay and Cumberland House, resulting in a total of 51 at-risk communities (59 per cent) with wildfire operational pre-plans.

The Ministry of Environment previously conducted a community wildfire risk assessment and identified 86 communities in the WUI that have moderate to high risk from wildfires (classified as at-risk communities).

Number of communities with wildfire community risk assessment	104
Total number of communities identified as at-risk (moderate and high risk)	86
Number of communities with operational pre-plan (as of March 31, 2018)	51 (59%)
Remaining number of operational pre-plans needed	35 (41%)

¹⁰ Communities in the wildland-urban interface rated with moderate or high risk of wildfire. The rating is based on community wildfire risk assessments previously conducted by the Ministry of Environment. Natural Resources Canada has been tasked with developing a new community risk assessment process which will take several years to complete.

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

How the measure contributes 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, lowering wildfire risks to the community, thus increasing a community's resilience to wildfire.

What is the target for this measure?

The current target is to complete all wildfire fuel management within 90 communities, for a total of 1,547 hectares, by 2028. The previous target for completion was the year 2030, and the short-term target was at least three community mitigation projects (fuel management) per year. The **metric has been increased dramatically to at least 15 communities per year** through funding secured from the federal government's Disaster Mitigation and Adaptation Fund, which commenced in 2019-20.

What is the status of this measure?

Between 2000 and March 2019, the Ministry of Environment completed fuel management for 903 hectares of Crown land in the provincial forest, an increase of 103 hectares from the previous year. The Saskatchewan Community Wildfire Risk Assessment identifies all Crown land locations requiring fuel management projects, as well as priority for project completion.

Date	Area of Crown Land with fuel management
As of March 31, 2018	800 hectares
As of March 31, 2019	903 hectares
2019-2028	Target: complete additional 644 hectares for a total of 1,547 hectares

A partnership with First Nations and Indigenous Services Canada since 2015 has resulted in mitigation work now completed in most First Nations communities, and is being used as a template for Canada-wide mitigation programs funded by the federal First Nation Emergency Management Mitigation program beginning in 2019.



Human Well-Being

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.

How the measure contributes to building resilience

Identifying the communities within the southern half of Saskatchewan that may experience water supply shortages allows the province to highlight areas of concern and coordinate with municipalities on plans if drought conditions persist. Coupled with this measure are activities to help municipalities understand drought susceptibility, plan and eventually prepare by securing alternative source supplies.

What is the target for this measure?

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

What is the status of this measure?

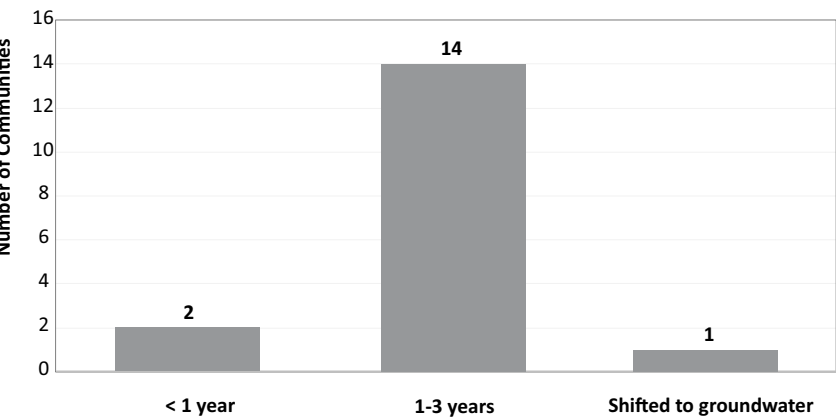
Every year, the Water Security Agency (WSA) produces a spring runoff potential map, showing areas that have received below-normal precipitation throughout the previous fall and winter. Any community with a surface water source in the regions identified as having 'below normal' or 'well below normal' precipitation over that time period is evaluated for its capacity to meet projected water demand. In future years, WSA's examination of drought susceptibility will be expanded to cover the entire southern half of the province.

In spring 2019, a total of 16 Saskatchewan communities had water supplies that were considered vulnerable to drought ('below normal' or 'well below normal' in the map on the left). This is in comparison to 26 communities in spring 2018. The reduction in the number of communities vulnerable to drought is mainly due to more communities receiving normal precipitation in the previous fall and winter.



WSA conducted a phone survey to ask these communities about how long their reservoir would last with no additional precipitation and if they predicted any water quality concerns. Fourteen communities responded that their water reservoir is enough for more than a year. Thirteen communities (81 per cent) have a water conservation plan that can be enacted if needed, and six communities (38 per cent) have a backup water supply. Further, one community shifted to groundwater supply, which is less vulnerable to drought than surface water.

Duration of water supply for communities vulnerable to drought*



*Vulnerability to drought is based on spring runoff potential and the nature of the water source for the community. Communities that received below normal precipitation throughout the previous fall and winter are considered vulnerable.

Number of communities vulnerable to drought

16

Number of communities with water conservation plan

13

(81%)

Number of communities with back up water supply

6

(38%)

Source: Spring run-off potential map is produced by the Water Security Agency (WSA). Information on water supply is based on community self-assessments. WSA staff conducted phone interviews with 16 communities.

Measure 23.

Average municipal water consumption per capita and total municipal water consumption

The per capita use of water is generally considered to be a measure of water use efficiency. When combined with per capita use, total use can provide an indication of how conservation efforts support growth even under resource constraints. For example, where per capita use declines, while the total use remains constant, water is made available for growth (population, commercial, industrial, etc.) without increasing the overall consumption.

How the measure contributes to building resilience

Declining trends in per capita use indicate gains in water use efficiency, often associated with conservation programs, and can lead to overall improvement in the sustainability of a water source and of the infrastructure used to provide water. Using less water helps in reducing GHG emissions as energy savings are realized from having to pump and treat less water. This may also buffer against impacts to water resources where climate change may affect the reliability (quality or quantity) of municipal water sources.

What is the target for this measure?

Increase water use efficiency shown as a decrease in per capita municipal water consumption.

What is the status of this measure?

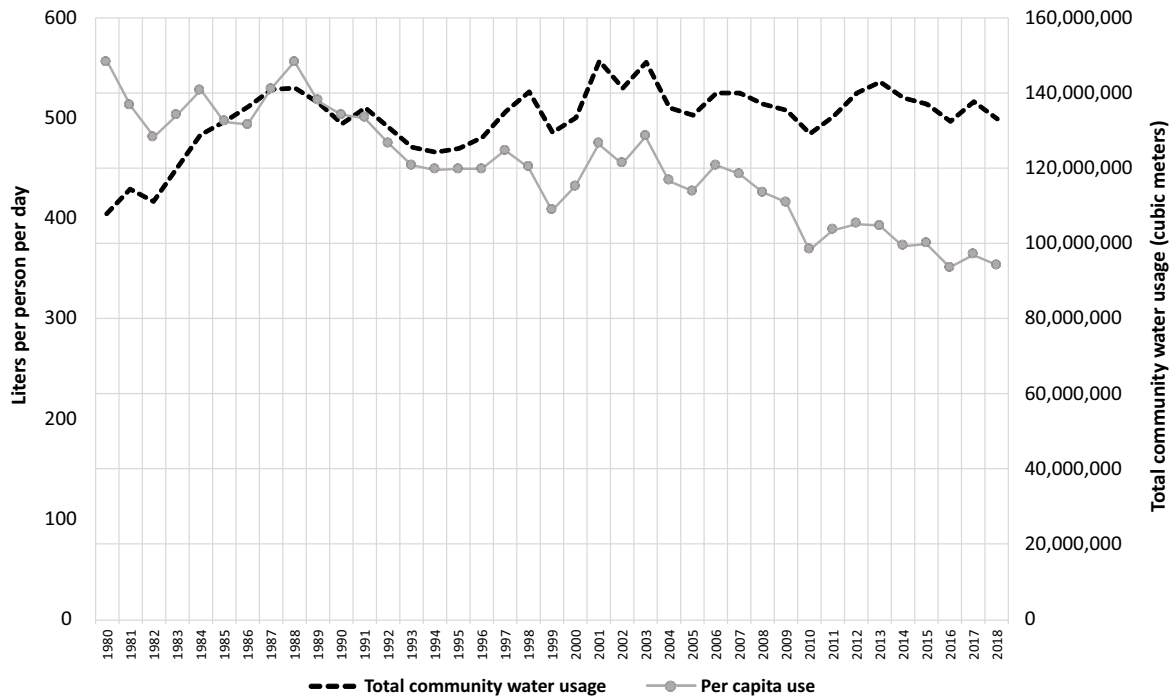
Saskatchewan water usage decreased in 2018¹¹, with residents using an average of 353 litres per capita per day (versus 364 litres per capita per day in 2017). The total volume of community water usage also decreased during the same period by 4.7 million cubic metres.

Further, in the last 30 years, the total community water consumption showed general stability, but with a general decrease for usage rates (litre per capita). The decline in usage rates use could have resulted from technological investments (e.g. new water mains and high efficiency plumbing fixtures) and behavioural influences on water use.

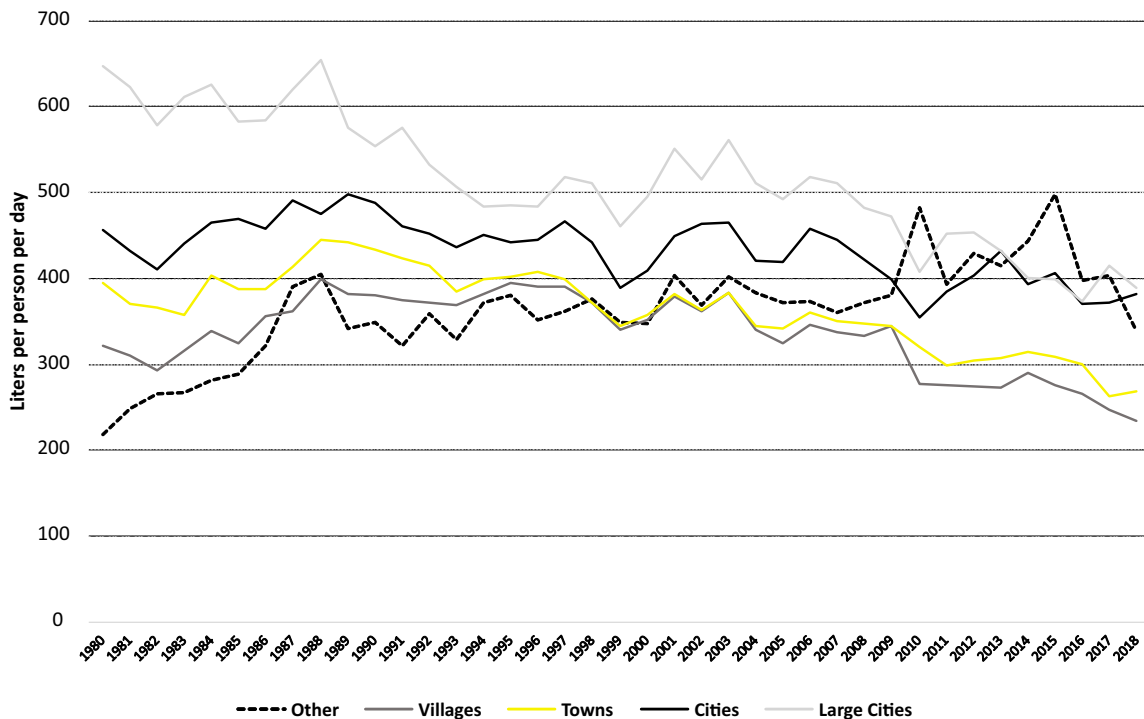
Usage rates in smaller communities are more variable, with the smallest communities trending to increasing usage. This is likely due to improvement in the security of their water supplies, or the transition to other water treatment technologies with higher raw water requirements (e.g. reverse osmosis).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

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

Community water usage and rates, 1980 - 2018



Water usage by population size, 1980-2018



Community population sizes:

Large Cities >50,000; **Cities** < 50,000 but > 5,000; **Towns** < 5,000 but > 500; **Villages** < 500 but > 100; and, **Other** < 100 (e.g. villages, hamlets, unincorporated areas, rural pipeline associations, etc.)

Source: Annual water use is self-reported to WSA by municipalities with licensed distribution systems. Population numbers are taken primarily from Ministry of Health, and secondarily from Census Canada data.

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 (WNV) and other mosquito-borne diseases.

How the measure contributes to building resilience

Warmer temperatures may increase the survival of insect vectors – those that transmit illnesses to humans. This can result in increased incidence of vector-borne illnesses such as West Nile Virus. Establishing surveillance sites helps the province monitor the risks of these illnesses, which allows the provision of better information to the public and for adaptive measures to control the population of insect vectors.

What is the target for this measure?

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

What is the status of this measure?

As of 2019, permanent mosquito traps have been set up in 18 communities throughout the agricultural portion of southern Saskatchewan to monitor *Culex tarsalis* – this is the mosquito that carries WNV. The Ministry of Health is on track to meet the target of 20 sites in 2020.

Surveillance sites as of 2019:	18		Remaining surveillance to be established by 2020:	2
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West Nile Virus is an annual risk between June and September for Saskatchewan residents. The risk is highest in the southern portions of the Prairie provinces. However, WNV risk may be increased in more northerly agricultural-forested transition areas during very warm years. The Ministry of Health provides weekly risk assessments, website updates and WNV prevention messages between June and September.

Mosquito surveillance provides the most direct indicator of the imminent risk for human infection. Rising infection rates and proportion of WNV-positive pools can provide an indicator of the severity or magnitude of a WNV outbreak. In 2019, the surveillance programs did not detect any mosquito that carries WNV.

Measure 25.

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

This measures the number of sites in Saskatchewan with active surveillance for tick-borne diseases. Sites include parks, recreation and historic sites, ecological reserves where black-legged ticks have been collected by passive surveillance, and sites of most likely exposure for human or domestic animal Lyme disease cases.

How the measure contributes to building resilience

Monitoring work informs risk messaging to the public and provides details regarding the encroachment of ticks into environments with supportive climates. Information obtained from monitoring also informs adaptive measures to control tick populations.

What is the target for this measure?

By 2020, complete 60 surveys at 51 sites.

What is the status of this measure?

As of 2019, the province has conducted 54 surveys at 48 sites for Lyme disease and other tick-borne diseases, compared with 54 surveys at 42 sites in the previous year. The exceptionally short season and poor weather conditions in 2019 did not allow for all planned sites to be surveyed. There will be three additional survey sites for 2020. Site selection is in progress and will address the target to have 51 sites.

Active survey sites as of 2019: **48**

Additional active
survey sites by 2020: **3**

Active surveillance for the black-legged 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 U.S. The active tick surveillance program aims to assess the risk of Lyme disease in Saskatchewan by checking for black-legged ticks and determining if they have become established in any areas of the province, and determining what fraction carry the bacteria responsible for Lyme disease or other tick-borne diseases.

Glossary

Absorptive capacity: ability of a system to prepare for, mitigate or recover from climate change impacts using predetermined coping responses in order 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, known shocks and short-term stresses.

Adaptation: in human systems, this refers to the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit 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: ability of a system to adjust, modify or change its characteristics and actions in order to better respond to existing and anticipated future climatic shocks and stresses.

At-risk communities: communities in Saskatchewan's wildland-urban interface (WUI) rated to have moderate to high risks of wildfires, based on Saskatchewan's Community Wildfire Risk Assessment.

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 that persists for an extended period, typically decades or longer. Climate change may be due to

natural internal processes or external forces, or to persistent anthropogenic, or human-caused, changes in the composition of the atmosphere or in land use.

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 risks of flood, drought and wildfires, establishing emergency preparedness/management plans, and adopting appropriate standards and practices to reduce risks.

Carbon dioxide equivalent (CO₂e): is a term for describing different greenhouse gases in a common unit. CO₂e signifies the amount of CO₂ which 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, if 1 kg of methane (CH₄) is emitted, this can be expressed as 25 kg of CO₂e (1 kg CH₄ * 25 = 25 kg CO₂e).

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

Demand side management (DSM): refers to 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: refers to the ability to remain competitive in a global marketplace and encourage investment, while reducing greenhouse gas emissions. This includes ensuring businesses and industries enjoy the support they need to develop marketable innovations to address climate change.

Human well-being: refers to 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 do not have to be replanted for several years, land under trees and shrubs producing flowers, and nurseries (except those of forest trees, which should be classified under 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: 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 (e.g. food, fuel, water, air purification, carbon storage, and maintenance of wildlife habitat). Natural systems also inherently support mitigation through sequestration of carbon in soils, forests and wetlands.

4R nutrient stewardship: is 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: 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.

Realized net income: is 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: is the ability to cope with, adapt to, and recover from stress and change.

Summer fallow: involves keeping normally cultivated land free of vegetation throughout one growing season by cultivating and/or applying chemicals to destroy weeds, insects and soil-borne diseases and allow a buildup of soil moisture reserves for the next crop year.

Transformative capacity: 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, but rather changes the primary systems and 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.

More info?

More information about the Climate Resilience Measurement Framework and *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy* is available at saskatchewan.ca/climate-change.

