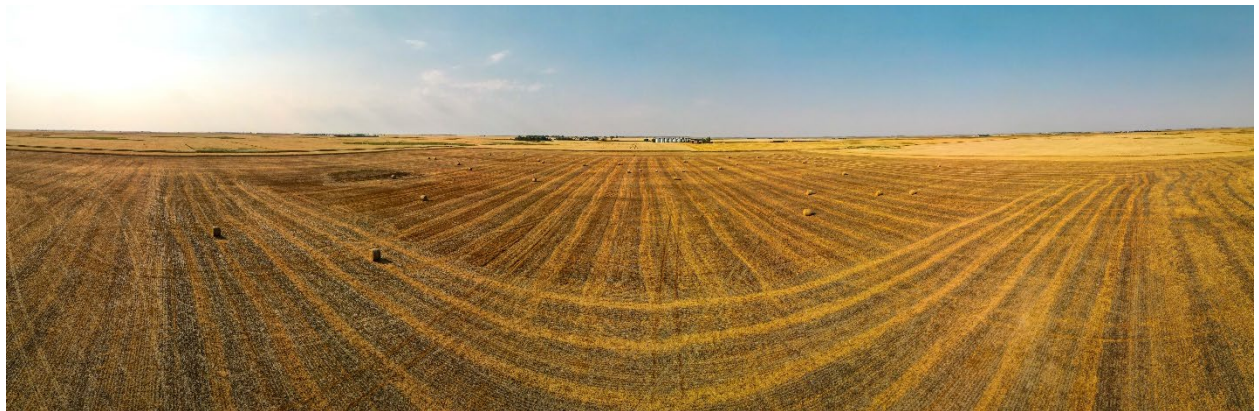


# Saskatchewan Agricultural Drought Preparedness Plan



## Executive Summary



Droughts are predicted to become more frequent with climate change, but the onset of drought is difficult to predict. Outside of drought periods, drought planning is often not prioritized on the farm because of other more pressing concerns and because of the regional nature of watershed management. During drought periods, producers and industry are often consumed with managing the immediate impacts. Long-range planning with partners can help producers and rural communities to proactively consider definitive outcomes using mitigation and adaptation strategies. Regional and provincial plans can also be integrated with District Official Community plans.

In Saskatchewan, it is widely known that drought can have huge economic implications, particularly in the agriculture sector. Therefore, it is important to plan for drought in order to be prepared when it does occur. The purpose of this drought preparedness plan is to evaluate current and future drought risks and outline an approach to mitigating and, where necessary, adapting to the effects of agricultural drought while minimizing financial and environmental losses. The plan will outline preparedness, monitoring, and response and recovery approaches while enabling producers to understand their drought vulnerability and ensure that they are aware of the tools and data available to them to better prepare, make decisions and respond.

This plan breaks down the types of drought management actions and lists potential actions which may be taken depending on drought stage. The drought stages used in this plan are: adequate moisture conditions, a moderate moisture deficit, or a severe moisture deficit. Actions are assigned to appropriate entities to ensure clarity amongst the various groups involved.

There are also several appendices to the report describing Saskatchewan's drought history, policy considerations, climate change considerations, and drought resources for the agriculture community.

## Acronyms Used in this Document

<b>AAFC</b>	Agriculture and Agri-Food Canada
<b>ADF</b>	Agriculture Development Fund
<b>Agri-ARM</b>	Agriculture-Applied Research Management
<b>ADOPT</b>	Ag Demonstration of Practices and Technologies
<b>BMP</b>	Beneficial Management Practice
<b>BRM</b>	Business Risk Management
<b>CAP</b>	Canadian Agricultural Partnership
<b>CDC</b>	Crop Development Centre
<b>EFP</b>	Environmental Farm Plan
<b>ECCC</b>	Environment and Climate Change Canada
<b>FRWIP</b>	Farm and Ranch Water Infrastructure Program
<b>FSP</b>	Farm Stewardship Program
<b>GHG</b>	Greenhouse Gas
<b>Ministry</b>	Saskatchewan Ministry of Agriculture
<b>SCIC</b>	Saskatchewan Crop Insurance Corporation
<b>SSCA</b>	Saskatchewan Soil Conservation Association
<b>WSA</b>	Water Security Agency

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# Introduction

## Defining Drought

Defining drought can be difficult. For example, though droughts are natural events that humans cannot control, the ways people use water can make the consequences of a natural water scarcity like drought even worse (NDMC 2019) or, conversely, can lessen the impacts of drought. The types of conditions that constitute a drought will vary amongst different water user groups.

Conceptual definitions of drought offer a general idea or concept of drought. A conceptual definition of drought related to farming could be:

*Drought is a protracted period of deficient precipitation resulting in extensive damage to crops, and a consequential loss of yield from cropland, as well as forage and hayland.*

Conceptual definitions may also be important in establishing drought policy. That is why scientists describe drought conceptually, as an idea or concept; and operationally, by how drought functions or operates in ways that can be measured.

An operational definition for agriculture might compare daily precipitation values to evapotranspiration rates to determine the rate of soil moisture depletion, then express these relationships in terms of drought effects on plant behaviour (i.e., growth and yield) at various stages of crop development. A definition such as this one could be used in an operational assessment of drought severity and impacts by tracking meteorological variables, soil moisture, and crop conditions during the growing season, and continually re-evaluating the potential impact of these conditions on final yield.

The climatological community has defined four types of drought:

- 1) meteorological drought;
- 2) hydrological drought;
- 3) agricultural drought; and
- 4) socioeconomic drought.

Meteorological drought happens when dry weather patterns dominate an area. Hydrological drought occurs when low water supply becomes evident, especially in streams, reservoirs, and groundwater levels, usually after many months of meteorological drought. Agricultural drought happens when crops become affected. Socioeconomic drought relates the supply and demand of various commodities to drought. Meteorological drought can begin and end rapidly, while hydrological drought takes much longer to develop and then recover (NOAA 2019). Socioeconomic drought can last longer than hydrologic drought and can have a larger impact on society than any of the other three types of drought. This plan is focused on agricultural drought only.

## Agricultural Drought in Saskatchewan

Drought can be one of the costliest natural disasters to affect an area. The drought of 2001-2002 resulted in agricultural production losses in Saskatchewan of \$1.6 billion (Wittrock, et al., 2018). The main impact of drought on the agriculture industry is a decrease in yields on cultivated land, hay land, and pasture. Lower yields translate to lower income for producers. However, the impact can be more wide-spread than yields, and can include:

- Ranchers being forced to sell cattle due to a lack of water or forage;
- Cattle losses due to poor water quality;
- Increased risk of grass fires;
- Higher costs of feed;
- Grain handling companies moving lower volumes, resulting in less profit; and,
- A reduction in producer spending on inputs the following year, which reduces the profitability of input suppliers.

Agricultural producers continue to demonstrate their resilience to drought-related challenges with support from government. For the Saskatchewan Ministry of Agriculture, enabling the sector's long-term resiliency, including its resilience to climate-related risks, is a priority. Government enables producers to manage risk and proactively mitigate and recover from the effects of agricultural drought in several ways. Examples of activities and programs which support producers include Business Risk Management programming, environmental stewardship programming, research, monitoring, and coordination of response actions. Historically, progress in genetics, innovative technologies, government programs, and advances in land use management have also helped to decrease the impacts of drought.

While producers have demonstrated their ability to recover from drought in the past, it is important to continually plan for the future. Climate change could affect the frequency and severity of droughts. Government's current approach to drought management addresses current risks, but may need to be re-evaluated once the implications of climate change are better understood.

## Saskatchewan Drought Preparedness Plan

### Partner Organizations

The Saskatchewan Drought preparedness plan is a collaborative cross-government initiative. Involved agencies include:

- Ministry of Agriculture;
- Ministry of Parks, Culture and Sport;
- Ministry of Environment;
- Water Security Agency;
- Saskatchewan Research Council;
- Agriculture and Agri-Food Canada;
- Ministry of Government Relations; and
- Saskatchewan Public Safety Agency.

## Purpose

The Saskatchewan Drought preparedness plan considers historical trends, evaluates current and future drought risks, and outlines an approach to mitigating and adapting to the effects of agricultural drought while minimizing financial and environmental losses.

## Plan Goals

The drought preparedness plan and associated government and industry actions enable proactive:

- Preparedness;
- Monitoring;
- Response; and
- Recovery approaches.

Saskatchewan's agricultural producers understand their vulnerability to drought risks and have access to and use the knowledge and tools necessary to better prepare themselves.

## Drought Management Actions

The actions listed in the Ministry's Drought Preparedness Plan can be broken down into several categories. These categories correspond to specific types of risk management actions.

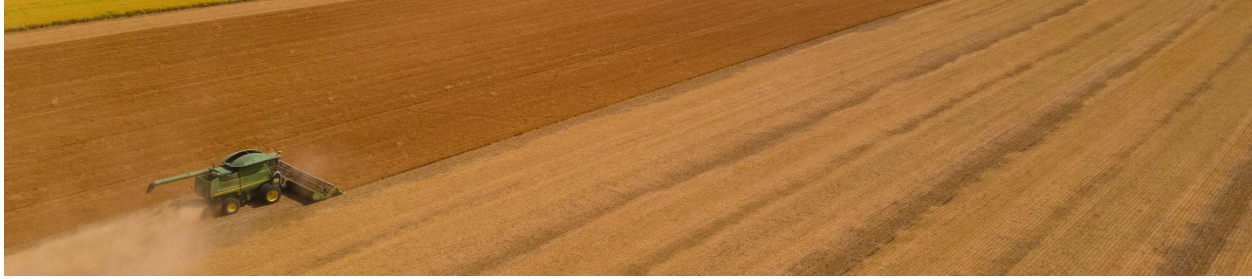
**Preparedness**—actions which can be taken before a drought occurs to mitigate risks. These actions are taken year-round by those in the agriculture industry, even during times when drought is not a concern. Preparedness actions may include outreach and extension, research, and program promotion and implementation.

**Monitoring**—ongoing actions, which are especially important during the growing season. Monitoring actions help the agriculture community to understand environmental conditions affecting production. Monitoring products include the Ministry of Agriculture's [Crop Report](#) and Agriculture and Agri-Food Canada's (AAFC) [Drought Watch](#) website.

**Response and Recovery**—actions which occur during or after a severe moisture deficit or drought. These actions help the agriculture community to recover and reduce negative effects on the industry. Response and recovery actions can include expediting program applications and evaluating emergency program options.

## Stages of Drought Response

Actions in this action plan are classified according to three moisture level categories. These moisture levels are:



### **Adequate Moisture**

Adequate moisture conditions are categorized as D0 (abnormally dry) or a short period of D1 (moderate drought) in the Canadian Drought Monitor. Soil moisture levels and annual precipitation are near the yearly average. Soils are moist and would allow for germination and/or crop growth. Adequate subsoil moisture reserves are available. Crop development and production is near normal and yield prospects are normal or above normal. Hay and pasture lands are productive and are not exhibiting signs of stress and pastures are supplying excess or adequate feed supplies. Surface water is available for irrigation and livestock.

### **Moderate Moisture Deficit**

A moderate moisture deficit is categorized as D2 (severe drought), D3 (extreme drought) or several consecutive months of D1 (moderate drought) as depicted in the Canadian Drought Monitor. Soil moisture and levels and annual precipitation is below average. Soil is dry and seed germination and/or crop growth may be curtailed. Limited subsoil moisture is available and crop development is behind and production is below average. Yield loss is a possibility. Hay and pasture lands are showing signs of moisture stress and feed supplies are becoming a concern. Pastures are providing generally adequate feed but still less than normal. Surface water levels are decreasing and livestock water quality is deteriorating.

### **Extreme Moisture Deficit**

An extreme moisture deficit is categorized as D4 (exceptional drought) or several consecutive months of D3 (extreme drought) in the Canadian Drought Monitor. Soil moisture levels and annual precipitation are well below average. Growth has stopped or nearly stopped and plants are showing visible signs of moisture stress. Under these conditions, plants will quickly suffer irreparable damage. There is little to no subsoil moisture available and crops are experiencing severe stress. There is a heavy or extreme degree of loss to yield potential which can be caused by excess moisture, drought, disease, etc. Hay and pasture lands are not productive and feed supplies are a major concern. Pastures are providing marginal or no feed compared to what is expected for the time of year and supplemental feeding is required to maintain livestock. Livestock water is limited due to a lack of surface water/poor surface water quality. Below normal moisture conditions persist for multiple years. Producers' domestic water supplies may be threatened from a quality or quantity perspective.

Extent of drought will also be taken into consideration when considering which actions to implement. Actions may be taken at the rural municipality level or up to province-wide. A cross-government committee will take the above conditions into consideration when assessing moisture conditions in the province.



# Drought Management Action Plan

Drought management actions and the responsible entities are listed below in the preparedness, monitoring, and response and recovery sections. All actions are classified according to the stage of drought response. These stages are adequate moisture conditions, moderate moisture deficit, and extreme moisture deficit.

## Preparedness

Taking steps towards drought preparedness before a drought actually occurs can help streamline processes and minimize impacts when drought does strike. Ministry programming can help producers prepare themselves for future drought risks. These programs and the steps government is taking to increase uptake in these programs are outlined below.

The province has recently announced its plans to expand its capacity for irrigation by up to 500,000 acres over the next 10–15 years. The expected increase in GDP from this irrigated land base will help to mitigate the socio-economic impacts of future droughts in the province.

### **GOAL: PRODUCERS ARE FINANCIALLY RESILIENT TO DROUGHT RISKS**

Under *Adequate Conditions* or *Moderate* or *Extreme* Moisture Deficits:

- The ministry:
  - Provides other Risk Management programs such as the Agricultural Skills and Knowledge (ASK) Program.
- The ministry and SCIC:
  - Provides Business Risk Management programs.
  - Promotes available Business Risk Management programs.
  - Reviews Business Risk Management programs.
- Producers:
  - Participate in Business Risk Management and other Risk Management Programs.
  - Make informed choices about crop types and inputs and on-farm infrastructure.
  - Ensure hay stockpiles are adequate and pastures are not overgrazed to the extent possible.

### **GOAL: ENVIRONMENTAL STEWARDSHIP PROGRAMS ENABLE PRODUCER RESILIENCE TO DROUGHT**

Under *Adequate Conditions* or *Moderate* or *Extreme* Moisture Deficits:

- The ministry:
  - Provides the Farm and Ranch Water Infrastructure Program.
  - Provides the Farm Stewardship Program.
  - Provides the Irrigation Program.
  - Promotes and increase uptake in Environmental Stewardship Programs and best practices.
  - Provides resources to develop an Environmental Farm Plan.
- The ministry and Saskatchewan Water Security Agency (WSA):

- Expand irrigation capacity around Lake Diefenbaker by 500,000 acres.
- Producers:
  - Participate in Environmental Stewardship Programs as necessary to increase on-farm resilience to drought as outlined above.
  - Participate in irrigation programming where feasible/appropriate to better equip cropland to be resilient to drought.

**GOAL: RESEARCH PROVIDES THE AGRICULTURAL COMMUNITY WITH THE TOOLS NECESSARY TO INCREASE RESILIENCE TO DROUGHT**

*Under Adequate Conditions or Moderate or Extreme Moisture Deficits:*

- The ministry:
  - Offers the Strategic Field Program for the evaluation of practices and technologies.
  - Provides agricultural drought research funding through the ADF.
  - Offers the Agri-ARM program for demonstration of research activities.
  - Offers the ADOPT program to accelerate the transfer of knowledge to producers.
  - Provides extension and technology transfer services to the agriculture community on advancements in research.
- The ministry and University of Saskatchewan:
  - Conducts research projects linked to the diversification of crop production at the Crop Development Centre.
- The ministry (Crop Protection Lab):
  - Provides diagnostic services to help growers identify and manage pests that affect production.
- Producers:
  - Actively adopt new crop varieties and technologies on-farm to enhance operational drought resilience.
  - Proactively monitor crops for pests and disease throughout the growing season.

**GOAL: PRODUCERS AND GOVERNMENT ARE AWARE OF THE DROUGHT MITIGATION TECHNIQUES AND TOOLS AVAILABLE TO THEM**

*Under Adequate Conditions or Moderate or Extreme Moisture Deficits:*

- The ministry:
  - Provides drought management tips and information on Saskatchewan.ca
  - Provides assistance with testing livestock water supplies for quality.
  - Helps to inform producers on the drought risks associated with climate change and how to manage them.
- The ministry and SCIC:
  - Provides technical assistance (i.e. assistance with water testing, feed rationing) and program information to producers looking to increase drought preparedness.
- The ministry and the Government of Saskatchewan:
  - Promotes the development of sustainable water supplies.
- The ministry and WSA:
  - Understands program and policy tools which have been used to mitigate the effects of drought in the past.
- Rural municipalities:

- Establish and maintain Emergency Management Plans.

## Monitoring

This category of the drought action plan focuses on ongoing ministry efforts to provide information on climatic conditions in the province. Compiling quality data and understanding conditions on the ground is important for drought preparedness. It can also be important for understanding the severity and duration of a drought. The ministry monitors moisture conditions during the growing season in a variety of ways. There are also several external data sources the ministry uses to monitor moisture.

Within the province, there are over 200 volunteer crop reporters. These reporters are asked to file a weekly report starting in April and ending in October or November. Each week's report has questions specific to the time of year. Questions about rainfall and topsoil moisture are consistently asked throughout the year. Other questions include progress on seeding or haying, crop conditions, harvest progress, and growth stage. Quality-controlled weather-monitoring data is also provided by AAFC directly to the Ministry of Agriculture. The ministry maps the crop reporter and AAFC data and publishes it weekly in the [Crop Report](#).

SCIC receives data from Environment and Climate Change Canada (ECCC) and Weather Innovations Incorporated weather stations across the agricultural region of the province. These stations measure precipitation and temperature during the growing season and are the basis for weather-based programs offered by SCIC.

The ministry has a moisture monitoring committee which brings together agrologists working in the areas of crops and livestock, soils, forage, and policy. The WSA and Agriculture and AAFC are also involved. The purpose is to bring together professionals from all areas of the province to provide regular information on the moisture conditions affecting their area of work.

In addition to the various monitoring initiatives undertaken by the ministry and SCIC, there are several other networks which the agriculture community has access to. These include the Community Collaborative rain, Hail and Snow Network ([CoCoRaHs](#)), AAFC's [Canadian Drought Monitor](#), and the AAFC [Drought Watch](#) website.

### **GOAL: QUALITY MOISTURE MONITORING INFORMATION IS COLLECTED BY GOVERNMENT**

Under *Adequate Conditions* or *Moderate* or *Extreme* Moisture Deficits:

- The ministry:
  - Holds regular moisture monitoring meetings (e.g. monthly or bi-weekly) with experts from across the ministry, SCIC, WSA, and AAFC.
  - Develops regular reports using input from the moisture monitoring meetings to provide to the minister of agriculture.
  - Maintains a network of volunteer crop reporters.
  - Collects weekly drought monitoring information from the volunteer crop reporters during the growing season including rainfall, topsoil moisture, hay and pasture topsoil moisture, and minimum and maximum temperature
  - Publically posts the crop reporter data weekly on the Government of Saskatchewan website.

- SCIC:
  - Monitors data from network of weather stations and use the data to assess programs and use resources effectively
- AAFC:
  - Maintains the Drought Watch website to provide timely information on weather and climate relevant to the agricultural sector in Canada.
  - Updates the Canadian Drought Monitor monthly on the Drought Watch website using input from the Ministry of Agriculture.
- WSA:
  - Monitors water supply reservoirs and report on available water supplies.
- Producers:
  - Access and evaluate trend data using existing tools available through AAFC and the ministry.

Under *Moderate or Extreme* Moisture Deficits:

- The ministry:
  - Holds additional moisture monitoring meetings (e.g. shift to weekly) as needed if drought conditions are present.
- The ministry and SCIC:
  - Provides moisture monitoring data to AAFC for consideration under the Federal Livestock Tax Deferral Program throughout the growing season.

**GOAL: THE AGRICULTURAL COMMUNITY IS AWARE OF CURRENT MOISTURE CONDITIONS AND FIRE RISK ACROSS THE PROVINCE**

Under *Adequate Conditions or Moderate, or Extreme* Moisture Deficits:

- The ministry:
  - Publishes weekly crop report data including rainfall, topsoil moisture, hay and pasture topsoil moisture, and minimum and maximum temperature on the ministry’s website.
  - Publishes supplementary media articles or social media posts outlining the current moisture situation.
- The Saskatchewan Public Safety Agency:
  - Maintains the Government of Saskatchewan [wildfire web page](#).
- Rural municipalities:
  - Establish fire bans or restrictions as required.
- First Nations:
  - Establish fire bans or restrictions as required.

## Response and Recovery

Drought response and recovery actions are important for the recovery of the agricultural community after a drought event. Recovery actions can be taken during all stages of moisture stress, from the early stages to the multi-season drought events. If appropriate steps are taken, economic and environmental consequences can be mitigated to a certain extent, and time spent returning to normal production can be minimized. All options for assisting producers are considered by the ministry during a period of dry conditions, and appropriate response actions are implemented. It is important to note that response

actions are a last resort, and producers should implement appropriate preparedness actions so that reliance on response actions is minimized.

### **GOAL: PRODUCERS ARE FINANCIALLY RESILIENT TO THE EFFECTS OF DROUGHT**

Under *Adequate Conditions or Moderate or Extreme* Moisture Deficits:

- The ministry and SCIC:
  - Continues to provide the CAP suite of BRM programming.

Under *Moderate or Extreme* Moisture Deficits:

- The ministry:
  - Works with the federal government to assess conditions and consider designations under the Federal Livestock Tax Deferral.
- SCIC:
  - Expedites processes for grazing livestock on tame forage lands which are typically baled and for using annual crop acres for grazing or livestock feed.

Under *Extreme* Moisture Deficits:

- The ministry:
  - Initiates a request for assessment to the federal government under the AgriRecovery disaster relief framework which would compensate producers for up to 70 per cent of extraordinary costs. Provide the information necessary to complete the assessment.
- The ministry and SCIC:
  - Administers the AgriRecovery program if an agreement with the federal government is reached.

### **GOAL: PRODUCERS ARE AWARE OF AND HAVE ACCESS TO SUPPLEMENTAL GRAZING AND FEED SOURCES**

Under *Moderate* Moisture Deficits:

- The ministry:
  - Ensures that all available Crown grazing lands that have adequate fencing and water sources have been advertised for short-term permit.
  - Requests for the minister of agriculture to approve emergency use of Crown lands. This allows producers to sub-lease their pasture, graze non-owned cattle on the lease, harvest hay on the lease, and sell hay from the lease with permission from Lands Branch.
  - Works with the Ministry of Parks, Culture and Sport to identify whether there are any Parks lands which could be made available for grazing. Promote the availability of these lands.
  - Promotes Ministry of Highways lands which are available for haying.

### **GOAL: PRODUCERS HAVE ACCESS TO EMERGENCY PROGRAMS AND ASSISTANCE OPTIONS TO MINIMIZE DROUGHT IMPACTS**

Under *Moderate or Extreme* Moisture Deficits:

- The ministry:

- Considers notifying community pastures of the option to temporarily limit hunting access (following Lands Branch authorization).
- SCIC:
  - Examines Crop Insurance coverage options and ensures timely claim processing in drought-stricken areas.
- SPSA
  - Communicates with the general public, including the agricultural community, on how to protect against fire risks.

Under *Moderate* Moisture Deficits:

- The ministry:
  - Convenes a ministry and SCIC drought response team and considers representation from Water Security Agency and Ministry of Environment.

Under *Moderate* or *Extreme* Moisture Deficits:

- In the event of drought-related emergencies, escalates the matter to the ministry Emergency Planning Officer who may consider further escalation to SPSA and the provincial Emergency Operations Centre.

**GOAL: PRODUCERS ARE AWARE OF THE EMERGENCY DROUGHT RESPONSE TOOLS AVAILABLE TO THEM**

Under *Moderate* or *Extreme* Moisture Deficits:

- The ministry:
  - Focuses extension efforts (including workshops, field days) on drought mitigation techniques.
- The ministry and SCIC:
  - Promotes the Farm Stress Line using ministry communications vehicles.
  - Launches targeted campaigns to promote the Agriculture Knowledge Centre general inquiry line as a resource to producers.
  - Emphasizes media describing drought mitigation tools available to producers.



## Appendix A: Saskatchewan's Drought History

Southern Saskatchewan has been more frequently affected by droughts than the northern areas of the province. The most significant droughts in recent decades occurred from 1929 to 1937, in 1961, from 1983 to 1988, and from 2001 to 2002. It could be argued that the drought in the 1980s was more severe with respect to rainfall than the Dirty Thirties, but the impacts were less due to improved soil conservation methods, new and different crop varieties which performed better in dryer conditions, better economic conditions, and government programs. While Saskatchewan has recently been in a wet cycle, localized dry conditions have occurred in the past few years. During the growing season of 2018, a large area of the southwest region experienced reduced crop yields and dry pasture conditions.

In the mid-1930s, the *Prairie Farm Rehabilitation Act* was put in place by the federal government to assist in land reclamation, soil conservation and water management strategies. Early programs included construction of water sources, expansion of irrigation districts and shelterbelt plantings. Permanent cover programs have been put in place to encourage farmers to seed drought-prone land to forage.

The severe drought during the 1980s resulted in an era of ad hoc programs for farmers. Programs put into place in the 1980s, 1990s, and early 2000s covered crop yield loss, livestock feed, water shortages, conservation planning, financial counseling and interest-free loans. AAFC began administering the Federal Tax Deferral Program for farmers who are forced to sell breeding stock due to drought.

The [Saskatchewan Soil Conservation Association](#) (SSCA) was formed in 1987, by a group of producers who saw the need to increase the public's awareness of soil conservation and to share soil conservation information with others. While the SSCA has promoted a variety of soil and water conservation practices, their most notable accomplishment has been their success in helping Saskatchewan growers successfully adopt low disturbance direct seeding (no-till) systems.

## Appendix B: Policy Considerations

### [The Canadian Agricultural Partnership](#)

The Canadian Agricultural Partnership is a five-year, \$388 million investment by federal and provincial governments in strategic initiatives for Saskatchewan agriculture which began on April 1, 2018. Much of the ministry's programming is funded under this partnership. The Partnership also provides funding for a suite of Business Risk Management (BRM) programs which help producers to manage financial risks to their operations.

### [25 Year Water Security Plan](#)

The WSA leads the management of the province's water resources to ensure safe drinking water sources and reliable water supplies for economic, environmental and social benefits for Saskatchewan people. The WSA will ensure Saskatchewan manages its water supply to support growth while protecting and enhancing water quality in its lakes and rivers and responding effectively to floods and droughts. In 2012, the WSA published an integrated provincial water plan. A number of goals and action items were published in the 25 Year Saskatchewan Water Security Plan. One of the activities was to develop a coordinated provincial drought response plan that includes monitoring, preparedness, response and recovery approaches.

### [Saskatchewan's Plan for Growth](#)

The Saskatchewan Plan for Growth emphasizes the importance of agriculture for Saskatchewan's economy and includes ambitious targets to grow agri-food exports, increase crop production, and expand irrigation. The plan notes that Saskatchewan has an obligation to increase the sustainability of our agriculture sector.

### [The Statements of Provincial Interest](#)

The Statement of Provincial Interest states that the province has an interest in supporting and promoting a sustainable and dynamic agricultural sector that optimizes the use of agricultural land for growth opportunities and diversification in primary agricultural production and value added agribusiness.

### [Provincial Climate Change Strategy](#)

*Prairie Resilience: A Made in Saskatchewan Climate Change Strategy* commits the provincial government to "track and report across all areas of focus to convey progress in making our province more resilient to climate change." The Climate Resilience Measurement Framework includes 25 indicators in five key areas, to measure progress in the face of a changing global climate. The Ministry of Agriculture will report to the Ministry of Environment annually on five of the measures.



## Appendix C: Drought and Climate Change

Drought planning requires consideration of not only what has occurred in the past but also what is predicted to occur in the future. Climate change will change the way we think about drought. Temperatures for all seasons on the prairies have increased and are predicted to continue increasing. Table one below illustrates the long term temperature trend on the prairies from 1948 to 2016. Precipitation is predicted to remain highly variable with an increasing number of extreme precipitation events. Table two shows the predicted distribution shift of weather, and shows that more extreme weather events will become “the new normal.”

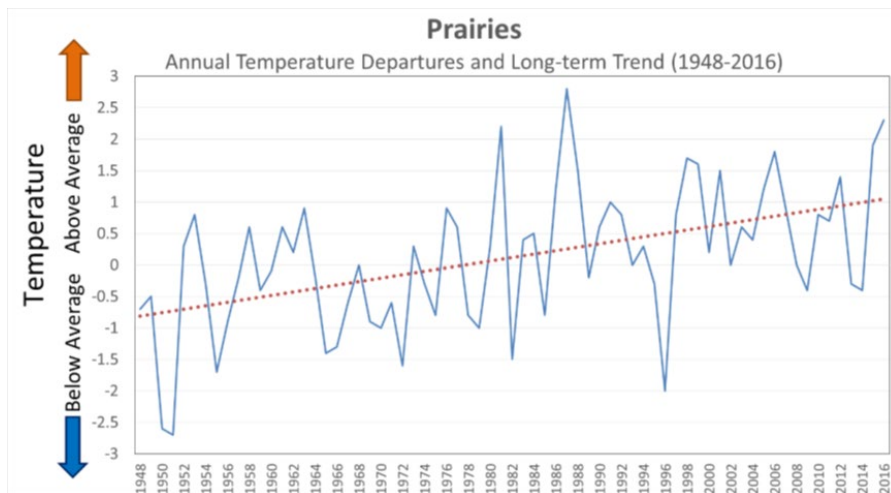


Figure 1. Long-term Prairie Temperature Trend

Source: Wittrock, 2017



Figure 2. Change in distribution of extreme weather events.

Source: Gordon 2014

## Appendix D: Resources

AAFC Drought Watch Webpage	<a href="http://www.agr.gc.ca/eng/programs-and-services/drought-watch">www.agr.gc.ca/eng/programs-and-services/drought-watch</a> Information on weather and climate relevant to the agricultural sector in Canada.
Canadian Cryospheric Information Network	<a href="https://ccin.ca/">https://ccin.ca/</a> Tracking moisture conditions over winter
Canadian Forest Fire Weather Index (FWI) System	<a href="https://cwfis.cfs.nrcan.gc.ca/maps/fm3?type=fwih">https://cwfis.cfs.nrcan.gc.ca/maps/fm3?type=fwih</a> Features current fire weather conditions and forecasts
CAP Webpage	<a href="http://www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers/canadian-agricultural-partnership-cap">www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers/canadian-agricultural-partnership-cap</a> Information on agricultural programming available to producers through the Ministry of Agriculture.
Climatedata.ca	<a href="https://climatedata.ca/">https://climatedata.ca/</a> Provides high-resolution climate data to aid with decision-making.
CoCoRaHS Website	<a href="http://www.cocorahs.org">www.cocorahs.org</a> Weather information from a network of volunteers working together to measure and map precipitation across Canada and the U.S.
Crop Report Webpage	<a href="http://www.saskatchewan.ca/crop-report">www.saskatchewan.ca/crop-report</a> Information on growing conditions during the growing season.
ECCC Weather	<a href="https://weather.gc.ca/">https://weather.gc.ca/</a> Environment and Climate Change Canada weather information.
Fish & Wildlife Development Fund Webpage	<a href="https://fwdf.ca/">https://fwdf.ca/</a> Information about Fish & Wildlife Development Fund lands.
Glacier Media WeatherFarm	<a href="https://weatherfarm.com/">https://weatherfarm.com/</a> Local weather information.
Ministry of Agriculture Emergency Plan	<a href="http://insider/Emergency-Plan.pdf">http://insider/Emergency-Plan.pdf</a>
North American Drought Monitor Webpage	<a href="https://droughtmonitor.unl.edu/nadm/Home.aspx">https://droughtmonitor.unl.edu/nadm/Home.aspx</a> Cooperative effort between drought experts in Canada, Mexico, and the U.S. to monitor drought across the continent.
Open Government Portal	<a href="https://open.canada.ca/data/en/dataset?q=hydrometric">https://open.canada.ca/data/en/dataset?q=hydrometric</a> Provides hydrometric monitoring data.
SCIC Website	<a href="http://www.scic.ca">www.scic.ca</a> Information on agricultural insurance options.
Water Security Agency (WSA)	<a href="https://www.wsask.ca/">https://www.wsask.ca/</a> Surface water quality, lake levels, runoff forecasts, and well records.
Wildfire in Saskatchewan	<a href="https://www.saskatchewan.ca/residents/environment-public-health-and-safety/wildfire-in-saskatchewan">https://www.saskatchewan.ca/residents/environment-public-health-and-safety/wildfire-in-saskatchewan</a> Information on wildfires and fire prevention.

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