Water Conservation Indicator

This indicator was developed to assess water conservation efforts in Saskatchewan.

Indicator	
Water Conservation	**Status:** A water conservation program was initiated by the Saskatchewan Watershed Authority in 2008. This program applies to all watersheds in Saskatchewan. **Trend:** Water use in Saskatchewan declined between 1997 and 2007.

The issue
Water resources are limited. To ensure sustainable water use, Saskatchewan needs to adopt water conservation practices. Some of the benefits of efficient water use include improving water quality, maintaining aquatic ecosystems, sustaining economic growth, and protecting drinking water resources.

The Saskatchewan Watershed Authority has implemented a water conservation program that promotes a wide range of water conservation tools, including: 1) communication and educational tools; 2) operational and maintenance tools; 3) economic and financial tools; and 4) institutional support.

Water Conservation Indicator in Saskatchewan

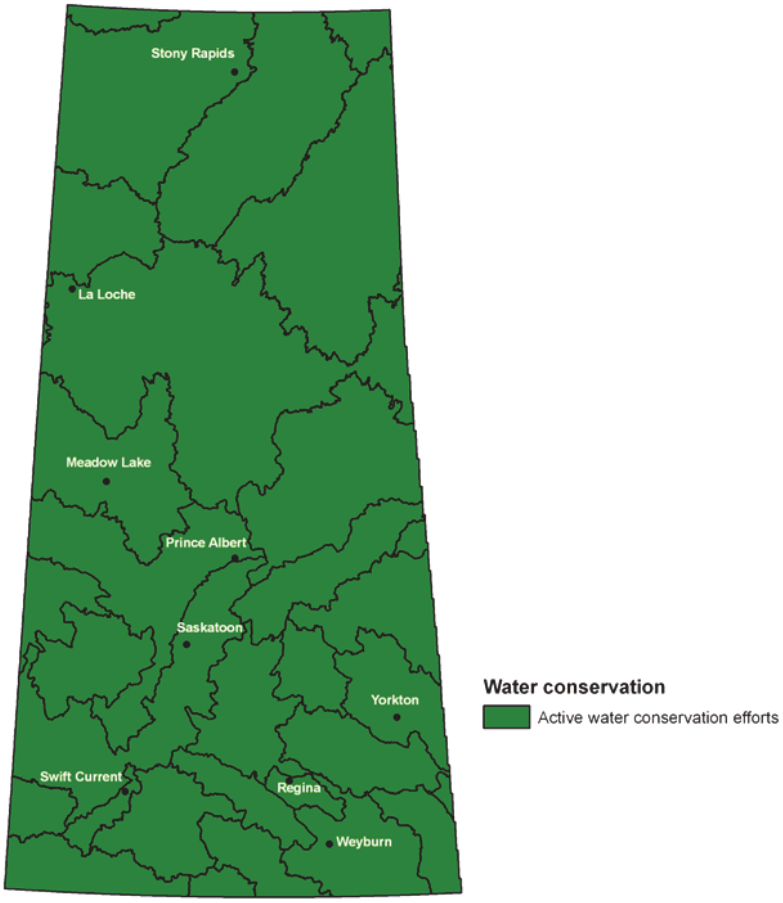

Figure 125. Water conservation efforts by watershed.

Programs to promote water conservation are occurring in all watersheds in Saskatchewan.

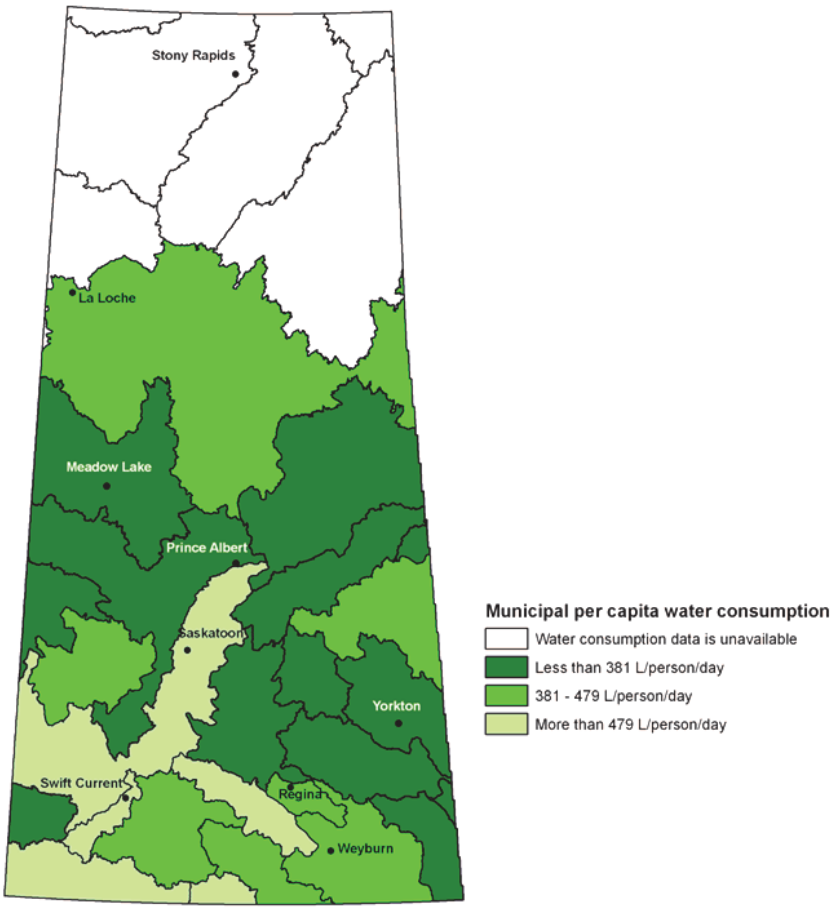

Figure 126. Estimate of per capita daily water consumption (residential, business and municipal use) by watershed: 2007.

For 2007, municipal per capita water consumption is rated as less than 381 litres/person/day for 11 watersheds, between 381 and 479 litres/person/day for seven watersheds, and as more than 479 litres/person/day for five watersheds.

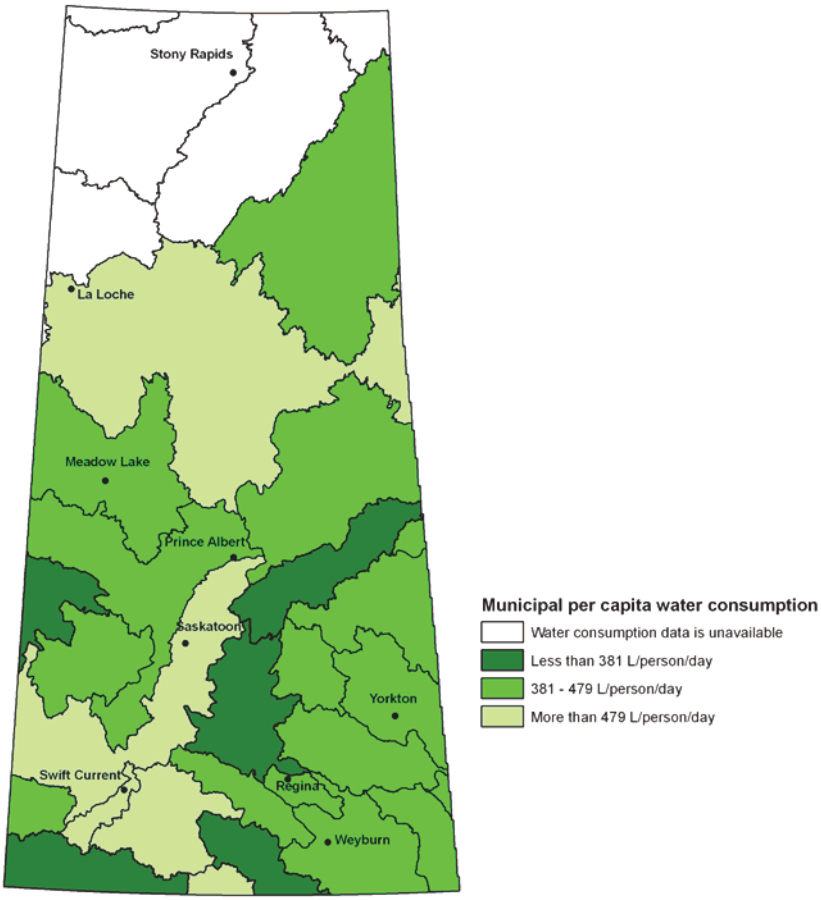

Figure 127. Estimate of per capita daily water consumption (residential, business and municipal use) by watershed: 1997.

For 1997, municipal per capita water consumption is rated as less than 381 litres/person/day for five watersheds, between 381 and 479 litres/person/day for 14 watersheds, and as more than 479 litres/person/day for five watersheds.

Nineteen of the twenty-three watersheds in which water consumption data is available for both 1997 and 2007 had, on average, a 12% decrease in per capita water consumption between 1997 and 2007. The Battle River, Moose Jaw River, Big Muddy Creek, and Milk River Watersheds were the only four watersheds that had an increase in per capita water consumption, with 3%, 10%, 16%, and 39% increases, respectively.

In 2007, average domestic water consumption in Saskatchewan was 445 litres/person/day, a decrease of 30 litres/person/day (6.5%) compared to 1997, when average domestic water consumption was 475 litres/person/day. In 2007, the average domestic water consumption in Saskatchewan was three times what is used in the United Kingdom in 2006. , The average domestic water consumption for that year in the United Kingdom was 148 litres per person per day (Department for Environment, Food and Rural Affairs 2008). Saskatchewan's 2007 average per capita water consumption of 445 litres/person/day was similar to that of Calgary, Alberta, which had an average per capita water demand in 2008 of 422 litres per day.

Examples of water conservation measures employed in Saskatchewan include:

1) **Providing educational information on water conservation to the public**
   Experts within industry have stated that water conservation is a generational shift in attitudes. It is important to start educational/extension activities at an early stage of any water conservation plan.

   In early 2007, the Saskatchewan Watershed Authority launched a public awareness campaign with the theme "The #1 Water Saving Device Is You". This campaign aimed to raise the public's awareness for the need to conserve water, and appeared as radio, TV, print, billboard and web banner advertisements.

   In 2009, the Saskatchewan Watershed Authority developed an online "Water Wise" quiz. This quiz asks respondents a number of questions regarding domestic water use. Once completed, the quiz provides an estimate of the annual amount of domestic water the respondent uses, and compares it to a Water Wise annual water usage value. The Water Wise annual water usage reflects the utilization of water saving methods and devices. The "Water Wise" quiz can be accessed at: http://www.swa.ca/WaterConservation/default.asp?type=WaterWiseQuiz.

   The Saskatchewan Environmental Society, in partnership with the Saskatchewan Watershed Authority, published a booklet entitled *Water Use In Your Home*: *What you need to know to use less and spend less* (Saskatchewan Environmental Society 2009). Funding support for the booklet was provided by the Ministry of Environment through the Go Green Fund. The booklet provides information on how homeowners can conduct an in-home water audit and ways of reducing indoor and outdoor water use. As of February 2009, this booklet was being distributed throughout the province. The booklet can also be accessed online at: http://www.swa.ca/WaterConservation/Documents/Consevation_booklet_web.pdf.

   In February 2009, SaskWater, Saskatchewan's commercial Crown water utility, in partnership with the Saskatchewan Watershed Authority, kicked off an educational campaign called *Save a drop. Save a lot.* This campaign ran through the 2009 calendar year. Initiatives undertaken through the campaign include:
   - Leading up to World Water Day (March 22, 2009), SaskWater advertised water conservation tips through television advertising, and issued a news release about World Water Day. Brochures promoting the *Save a Drop. Save a Lot.* program were distributed to all of SaskWater's municipal customers and associations (198 clients). These clients buy water wholesale from SaskWater and then distribute it to their customers.

- Billboards geared towards educating SaskWater customers and the general public on water conservation were placed in Davidson, Hague and Belle Plaine.
- Save Water Kits were mailed out to SaskWater's approximately 200 single end users. These customers have a direct connection to a SaskWater pipeline for their home/property. These kits have also been used as prizes during Engineers Without Borders workshops. The Save Water Kit includes a water efficient shower head, an aerator for the kitchen sink, two bathroom sink aerators, a fill cycle diverter for the toilet, toilet leak detection tablets, and a flow meter bag.
- Publication of an online brochure promoting tips for outdoor and indoor water conservation (http://www.saskwater.com/Conservation/pdfs/WaterConservationTips.pdf).
- Sponsorship of Engineers Without Borders workshops, run by students from both the University of Regina and the University of Saskatchewan chapters. The purpose of these workshops is to provide information to high school students on the importance of water throughout the world. Between February and May 2009, approximately 1,200 students participated.
- A poster contest geared to grade five students. Approximately 70 Grade Five classrooms in 40 of SaskWater's client communities received brochures and leaky tap pens, and were offered the opportunity to create a poster on water conservation and participate in the contest. SaskWater received submissions from 12 schools and chose a winner from each of the schools to be used in the 2010 SaskWater calendar.

2) Promoting the purchase and use of water efficient fixtures

In January 2009, the Government of Saskatchewan initiated the Provincial Toilet Replacement Rebate Program. This program, which is funded through the Go Green Fund and administered by the Saskatchewan Watershed Authority, provides a rebate of $50.00 for the purchase of a toilet that uses 6 litres or less per flush (including dual flush models) when it replaces a higher-volume toilet in single family dwellings and multiple-unit complexes (up to a maximum of three toilets per home or unit). The program will operate for four years, ending December 2012, and is expected to result in the replacement of 200,000 toilets during this period. Replacing this number of toilets will save approximately 15,000,000 litres of water per day and reduce 20,000 tonnes of CO_2 emissions per year.

Approximately 30% of the residential water used in homes is for flushing toilets. Although water-conserving toilets have been on the market for a number of years, inefficient toilets are still available and are usually less expensive to purchase. Canada has not amended national codes to ban toilets which use 13 litres or more per flush.

3) Establishing water conservation partnerships

To encourage water conservation in Saskatchewan, the Saskatchewan Watershed Authority has entered into water conservation agreements with two of Saskatchewan's Crown utilities:

- An agreement was signed with SaskWater on November 28, 2007, through which the Saskatchewan Watershed Authority provided SaskWater with funding to be utilized for their *Save a Drop. Save a Lot.* campaign between January 1, 2008 and January 1, 2010. The funding was used to provide educational information on water conservation to residents of Saskatchewan.
- An agreement was signed with SaskEnergy Inc. on August 13, 2007, through which SaskEnergy agreed to offer a $50.00 incentive (to be matched by the federal government) to replace older inefficient toilets with new water efficient models through the EnerGuide for Houses Program. . The program is designed as a supplement to the ecoEnergy Retrofit Initiative.

In 2008, the Saskatchewan Watershed Authority initiated the Community Initiatives Water Conservation Program (CIWCP). The CIWCP is a one-time seed funding program designed to help interested urban communities develop a customized water conservation program tailored for their specific needs. It is expected that each community will use these funds to initiate a specific program which will result in a measurable reduction in per capita water use over time. It is further expected that lessons learned in each community will help other Saskatchewan communities design their own programs and be able to duplicate their success. Partnering communities have provided educational workshops on the practice of xeriscaping, implemented municipal leak detection programs, and developed water conservation educational material for the public.

To increase uptake of the Provincial Toilet Replacement Rebate Program, the Saskatchewan Watershed Authority is currently partnering with 28 municipalies. Residents of these municipalities who have applied to and been approved for the Provincial Toilet Replacement Rebate Program may apply for further rebates from their municipal government. The communities who are water conservation partners include the Village of Abbey, Village of Abernethy, Town of Assiniboia, Town of Battleford, Town of Birch Hills, Village of Buena Vista, Village of Carievale, Town of Carnduff, Town of Colonsay, Rural Municipality of Edenwold, Village of Elbow, Village of Englefeld, Town of Gull Lake, City of Humboldt, Town of Kerrobert, Town of Kipling, Town of Langham, Town of Lampman, Town of Lumsden, Resort Village of Manitou Beach, Town of Oxbow, Town of Rouleau, Town of Star City, Town of Strasbourg, Town of Unity,Village of Viscount, Village of Welwyn, and Town of White City (Saskatchewan Watershed Authority 2009b).

4) Universal metering

Employed with a volume-based pricing structure, water metering is a good water conservation practice, as it provides a measure of consumers' actual water use. According to the 2004 Municipal Water Use Survey, of the Saskatchewan municipalities that responded to the survey, 98.2% of residential clients and 98.9% of business clients served by municipal water systems were metered. According to the results of the survey, the Province of Saskatchewan had the highest percentage of residential clients that were metered in the country (Environment Canada 2004).

5) **Water accounting**

Water accounting is necessary for more efficient allocation and use of water. Water accounting helps to determine:

- how much water is in the system (supply);
- who is using the water (allocation and use); and
- what the water is being used for (purpose).

In 2007, the Saskatchewan Watershed Authority initiated the Battle Creek Conservation Pilot Study in the Milk River Watershed, part of the Missouri River Basin. The purpose of this study was to improve the knowledge and understanding of water resources for irrigation projects within the Battle Creek sub-basin. The first step was to determine if the Water Right Licences previously issued within this study area were still valid (i.e. the current landowner was the one listed on the Water Right Licence), whether the projects were still functioning, and whether the information on file was still current in regards to operational water needs. In cases where the landowner remained the same, the Water Right Licence was reissued as either a term licence requiring reissuance at a defined date or a non-term licence attached to the respective land title. With the Registration of a Notice against the land title involved, the Saskatchewan Watershed Authority will be notified by the Information Services Corporation of Saskatchewan of any changes to the title. On projects where landowners had changed, a new application and fee needed to be submitted for a Water Right Licence and Approval to Operate Works prior to the issuance of a new Approval. Regularly updated information on water allocation for the Battle Creek enables the Saskatchewan Watershed Authority to confirm the water allocation volumes with greater accuracy (Gord Hagen 2009, Personal Communication; and Duncan Spenst 2009, Personal Communication).

6) **Water loss control**

Water distribution systems naturally deteriorate over time, resulting in water loss. The amount of water loss from these systems is typically 20 to 30% (Cheong 1991). By conducting a water audit, communities can determine water loss that may be due to water distribution system leaks, and can minimize water quality breaches caused by contaminants entering the system through these leaks (Hunaidi et al. 2004).

In February 2009, at the Saskatchewan Urban Municipalities Association's (SUMA) 104th Annual Convention, SaskWater held a leak detection workshop which was open to administrators and operators, SUMA convention delegates and non-delegates. There were 40 people in attendance at the workshop, 17 of whom represented current SaskWater clients and 23 representing groups that were not SaskWater clients. The workshop covered a number of leak detection methods and proactive steps to find leaks, including acoustic surveys, hydrant audits and correlation surveys. SaskWater has also recently trained five staff to work with municipalities in detecting leaks.

7) **Costing and pricing**
Water rate structures can promote conservation by communicating the true cost of water to the consumer through price incentives. The true cost of treated water includes the cost of operating the utility, the cost to the utility when it must increase its water supply to meet growing demand, and the social and environmental costs caused by the water withdrawal. A typical example of a water rate structure that encourages conservation is an increasing rate structure (where if an excessive volume of water is used, the unit price for the additional water is increased) compared to a stable rate structure (where water cost the same per cubic metre regardless of how much is used).

8) **Developing, in conjunction with industry associations, industry recommended practices (IRPs)**
To reduce the demand for fresh water in oil and gas production, the Canadian oil and gas industry has adopted alternatives or innovative practices, including:
   - recycling and reusing almost all of the water used in conventional oil recovery;
   - recycling about 90% of the water used in oil sand projects;
   - using brackish ground water that is not suitable for drinking or agriculture;
   - enhancing the recovery of oil from older wells using carbon dioxide, instead of water; and
   - using combustion instead of steam to liquefy bitumen in the oil sands (Canadian Association of Petroleum Producers 2008).

   EnCana Corporation is enhancing the recovery of oil from older wells using carbon dioxide in its Weyburn project.

To promote sustainable irrigation through research and demonstration projects, the Canada-Saskatchewan Irrigation Diversification Centre was established 1998. Some of the water use efficiencies being used by irrigation districts in Saskatchewan include:

- **Conversion from flood irrigation to pivot irrigation systems**.
  The South Saskatchewan River Irrigation District (SSRID) would like to have all the acres converted to pivot irrigation to save water and reduce operation and maintenance costs. This District has been lobbying government for a program to do so. Currently, the main canal is in the process of being rehabilitated to reduce seepage and water loss. The SSRID is also looking at a conversion program which would convert lateral canals to pipelines, which would also reduce seepage and water use.

- **Installation of low pressure pivot sprinkler systems on new projects**.
  Improvements in nozzle design allow the use of low pressure systems which will still provide an effective watering area without runoff. All new irrigation systems are now designed in this manner.

- **Conversion of high pressure systems to low pressure systems**.
  The Environmental Farm Plan, administered by the Provincial Council of Agricultural Development and Diversification Boards Inc. (PCAB), provides irrigators with a grant to convert high pressure systems to low pressure systems.

  The Saskatchewan Ministry of Agriculture's Irrigation Branch is encouraging irrigation scheduling (i.e. watering only when water is needed) by all irrigators. The Ministry is providing this service via on-farm visits and also by encouraging irrigators to use the Alberta Irrigation Model Management, an online tool which helps to determine the most effective time to water. The Ministry has also published an Irrigation Scheduling Manual (Bill Vavra 2009, Personal Communication).

To promote water conservation for hog operations, the Saskatchewan Ministry of Agriculture has developed a fact sheet, available online at: http://www.agriculture.gov.sk.ca/Water_and_ILOs.

Indicator		
Water Conservation	=	Water conservation efforts occurring within the watershed

Rating Scheme

Water Conservation Efforts
Gap = No water conservation efforts are reported within the watershed.
Present = At least one water conservation effort is reported within the watershed.

Data Source: The water consumption data were obtained from the Saskatchewan Watershed Authority's Community Consumption Database. Population information was obtained from the Saskatchewan Ministry of Health's Covered Population Reports for 1997 and 2007(Government of Saskatchewan 1997 and 2007b).

Data Quality/Caveats: The population data in the Community Consumption Database were not available for all communities (e.g. provincial parks). Per capita water consumption calculations were only calculated for communities with a population greater than zero (some provincial parks and recreational areas have a population of zero). Total water consumption values are only for the communities that report to the Community Consumption Database. Therefore, the total water consumption values are not for the entire population in the watershed, as many rural residents rely on private wells which do not report to the Community Consumption Database.

Data Discussion: Irrigation data are often available for the largest irrigation projects, as shown for the three large irrigation districts in the South Saskatchewan River Basin. SaskWater's new metering and billing database may have some potential for this indicator.

Consideration must be given to drought situations that may create a false measurement of any conservation. If water supplies are adequate, irrigation will increase during meteorological drought, thereby falsely indicating reduced conservation. When water supplies are inadequate or during periods of adequate or surplus growing season precipitation, irrigation water use will be lower, falsely indicating increased water conservation efforts. Time-series analysis of water consumption may eliminate or at least reduce these errors. With municipal conservation, attention must be paid to whether source water is surface or ground water, and also the accuracy of actual watershed source (i.e. some communities within a watershed may receive source water from an adjacent watershed).

Watershed Education Indicator

This indicator reports on the number and type of watershed-related educational programs delivered to school-aged youth.

Indicator	
Watershed Education	**Status:** Watershed education programs are active in all watersheds in Saskatchewan. **Trend:** Watershed education programs continue to be offered in Saskatchewan. Since the 2007 *State of the Watershed Report*, additional participants have taken part in these programs, and a new program (Saskatchewan Envirothon) has been added.

The issue

Environmental education, awareness and training encourage and enhance people's participation in activities aimed at conservation, stewardship and management of the environment, essential in achieving sustainable development. Programs focused on watershed education can raise the awareness of watershed issues and change the values and beliefs that people have related to watershed resources. This attitudinal change prefaces behavioural change; people generally try to be consistent in their attitudes and behaviours. The success of a watershed education program is measured through increased awareness of watershed issues and behavioural change to support improvements in watershed condition.

Watershed Education Indicator in Saskatchewan

Some of the ongoing watershed education programs initiated in Saskatchewan include:

1) Project WET (Water Education for Teachers) and Project WILD are complementary environmental education programs. They provide teaching methods and instructional resource materials for educators to use in promoting an awareness and understanding of healthy ecosystems, stewardship of water resources and responsible environmental citizenship.

   The primary audiences for these environmental education programs are classroom teachers and pre-service teachers. Saskatchewan Ministry of Education recognizes and authorizes the use of these materials in teaching the Core Science curriculum from Grades 1 to 12. All of the materials for these programs are directly linked to the science curriculum. These instructional resource materials also support the provincial social studies, mathematics, language arts, fine arts, health, and practical and applied arts curricula.

The Saskatchewan Native Prairie Curriculum Project is another program developed for teachers to deliver to students in Grades 1-5. The curriculum units also compliment the learning objectives of the Saskatchewan Core Curricula.

Table 9. Environmental education events for Saskatchewan school-aged youth (4-18 years-old) and teacher/parent supervisors: July 2008 to May 2009.

Program	Number of events	Number of participants
Native Prairie Curricula	1	14
Project WET	2	16
Project WET - Splash!	10	620
Project WILD	3	36
WILD- Below Zero	1	8
Totals	**17**	**694**

Table 10. Professional development programs for educators in Saskatchewan: July 2008 to May 2009.

Workshop type	WET	Project WET - Splash!	WILD	WILD- Below Zero	Number of events	Number of participants
Number of workshops (1 day)	11	1	11	4	27	
Participants	220	3	214	63		500
Number of workshops (0.5 day)	1	3	1	-	5	
Participants	20	57	20	-		97
Totals					**32**	**597**

Note: Almost all facilitators are certified to present more than one program.

2) Project Webfoot is Ducks Unlimited Canada's (DUC) curriculum-based wetland education program for students of all ages. Project Webfoot offers a wide variety of wetland and environmental education programs and resources to help students learn about wetlands, conservation and the environment, both inside and outside the classroom. In Saskatchewan, most Project Webfoot programs are delivered to Grades 1 to 8 students and were first offered during the 1999-00 school year. Class presentations and/or wetland field trips are conducted by DUC staff or education contractors. There is also a component of Project Webfoot that provides students and their teachers with a wetland resource kit which is mailed to them at their school.

Table 11. Ducks Unlimited Canada's Project Webfoot: September 1999 to June 2009.

School years	Year of program	Number of students / classes	Number of adults (teachers, teaching assistants, parents)
2008/09	Year 10	16,238/ 670	1,564
2007/08	Year 9	10,233/ 492	1,173
2006/07	Year 8	8,774/ 891	890
2005/06	Year 7	9,404/ 873	873
2004/05	Year 6	9,400/ 913	1,013
2003/04	Year 5	8,562/ 375	1,049
1999/2002	Years 1 to 4	20,319/ 967	2,097
Total		**82,930/ 5,181**	**8,659**

In addition to Project Webfoot, Ducks Unlimited also has the Greenwing Program. The Greenwing Program is a membership-based program geared to school aged youth. Membership in the Greenwing Program includes a certificate of membership, a subscription to either *Puddler* magazine (aged 12 and under) or C*onservator* magazine (12-17 years old), and a copy of the *Marsh World* wetland guidebook.

3) The Saskatchewan Prairie Conservation Action Plan (PCAP) delivers the Cows, Fish, Cattle Dogs & Kids Game Show, a fun and educational game show about riparian areas, to students from Grades K to 6. The game show teaches students about riparian areas and decision-making related to ranch management and cows through the rolling of a dice and answering questions (topics include Cows, Water, Fish, Vegetation, Wildlife and Climate Change) to "moooove" their cow "home to the ranch." At the end of the game, they are left with the message to "Eat Canadian Beef!" The Game Show also illustrates how ranchers, farmers, and urban dwellers need to work cooperatively to maintain these important "green zones". Support from a number of funders allows PCAP to offer the game show free of charge.

The Cows, Fish, Cattle Dogs and Kids Game Show was developed by environmental educators in Alberta and was adapted for use in Saskatchewan. The game show is delivered annually to:

- Grade 3 to 6 students at Agri-Ed events in Saskatoon at Fall Fair;
- Grades K to 6 students at Agribition in Regina as part of PCAP's Eco-Extravaganza (Eco-X); and
- Grades 3-6 students attending schools within Saskatchewan's Prairie Eco-zone as part of the Owls & Cows Tour.

The Cows, Fish, Cattle Dogs and Kids Game Show was also delivered through PCAP's Prairie to Pavement, a two-year pilot program for Grades K-6 students that ran from 2007 to 2009.

Table 12. Prairie Conservation Action Plan Cows, Fish, Cattle Dogs and Kids Game Show: April 1999 to March 2009.

School year	Number of schools	Number of students
1999-2000*	10	800
2000-2001*	38	1,726
2001-2002*	104	5,892
2002-2003*	172	9,667
2003-2004	133	8,974
2004-2005	101	2,688
2005-2006	141	6,577
2006-2007	114	6,006
2007-2008	79	6,706
2008-2009	81	6,981
Total	**973**	**56,017**

* Participation numbers listed in Table 12 do not include students that participated in the game show delivered at the Agri-Ed event at Agribition.

4) To promote watershed stewardship, the Partners FOR the Saskatchewan River Basin offers the Water Watchdog Program to stewardship groups in Manitoba, Saskatchewan, and Alberta. The Water Watchdog Program is a hands-on program geared to young people (7-14 years old) involved in such organizations as Girl Guides, 4-H, Junior Forest Rangers, stewardship groups, and summer camps. The program incorporates a field trip to a local stream or lake to assess local water quality and riparian conditions. An estimated 200 different Prairie water bodies have been monitored by Water Watchdog groups. At least 1,800 adults have worked as Water Watchdog volunteer facilitators.

Table 13. Total participants in the Water Watchdog Program for Alberta, Saskatchewan and Manitoba: 2001-2008.

Year	Number of participants
2001	580
2002	1,635
2003	8,550
2004	2,400
2005	560
2006*	350
2007	381 kits distributed (7,165 participants)
2008	244 kits distributed (1,960 participants)
Total	**23,200****

* Total until August 1, 2006.
** Saskatchewan residents account for over 40% of the total participants.

In addition to the Water Watchdog Program, Partners FOR the Saskatchewan River Basin has developed a basin geography board game called *Moopher's Amazing Journey to the Sea*. The objective of the game is to:

- teach students about the greater Saskatchewan River Basin;
- examine how society's way of life has changed over time, by comparing drinking methods, housing, transportation, important animals and tasks;
- explain how human activities can impact watershed health; and
- promote ecological stewardship and conservation for watersheds.

Table 14. Number of *Moopher's Amazing Journey to the Sea* games distributed in Saskatchewan: 2007-2008.

Year	Number of games distributed
2007	6
2008	36
Total	**42**

The Partners FOR the Saskatchewan River Basin have also been integral in introducing the Envirothon environmental education competition to high school students in Saskatchewan. In 2006, the Partners FOR the Saskatchewan River Basin led a group of high school teachers and other interested individuals to the Manitoba Envirothon to learn how to facilitate this environmental competition. Soon after that, an organizing committee was struck and the planning for Saskatchewan's first Envirothon began. Envirothon participants gain valuable experience and knowledge in ecology and natural resource management principles and practices. Some of the topics covered include: soils, land use, aquatic ecology, forestry, wildlife, and current environmental issues (Partners FOR the Saskatchewan River Basin 2009a).

Table 15. Participants in the Saskatchewan Envirothon competition: 2007-2009.

Year	Teams	Students	Teachers	Volunteers
2007	8	42	8	15
2008	12	58	13	28
2009	14	68	19	39
Total	**34**	**168**	**40**	**82**

Watershed Education Indicator

In addition to the education programs listed above which have been initiated to promote watershed education in school aged children, there are a number of non-government organizations that have been formed to promote environmental education and stewardship in Saskatchewan. Some of these organizations include:

1) Ducks Unlimited Canada. The organization's mandate is to conserve, restore and manage wetlands and associated habitats for North America's waterfowl.
2) Partners for the Saskatchewan River Basin. The group is an alliance of governments, industry, and individuals who promote watershed sustainability through awareness, linkages and stewardship. In 2009, to educate people on the Saskatchewan River Basin, Partners for the Saskatchewan River Basin released *From the Mountains to the Sea - The State of the Saskatchewan River Basin Report* (Partners FOR the Saskatchewan River Basin 2009b). The report identifies and describes the condition of the basin.
3) The Meewasin Valley Authority. The Meewasin Valley Authority is dedicated to protecting the natural and cultural heritage resources of the South Saskatchewan River Valley.
4) The Saskatchewan River Sturgeon Management Board. The Saskatchewan River Sturgeon Management Board is a group of stakeholders from communities, First Nations, industry and government who have been working together for over a decade with the common purpose of recovering lake sturgeon stocks in part of the Saskatchewan River.
5) The Saskatchewan Wildlife Federation. The Saskatchewan Wildlife Federation participates promotes conservation of Saskatchewan's natural resources through conservation schools, youth camps and other outdoor education programs.
6) The Canadian Wildlife Federation. The Canadian Wildlife Federation is a charitable organization dedicated to promoting an appreciation of wildlife and habitat by informing and educating Canadians.
7) Nature Saskatchewan. Nature Saskatchewan is a non-profit organization that encourages an appreciation and understanding of the natural environment and the protection of Saskatchewan's diverse ecosystems through a broad range of educational programs and partnerships with organizations and landowners.

Indicator

Learning outcomes are difficult to measure. However, there are indirect predictors of learning outcomes that can be easily measured, the easiest being educational effort. The number of programs delivered to school-aged youth, or youth programs, provides a direct estimate of the number of youth exposed to watershed health-related modules. Workshop delivery measures the number of workshops delivered and the number of attending facilitators. This provides an indirect measure of the potential number of youth exposed to watershed education modules. The number of active facilitators is an even more indirect predictor of learning outcomes than workshop delivery, but it does provide insight into how workshops are delivered and perhaps how sustainable that delivery is.

Indicator		
Watershed Education Efforts	=	Watershed education programs are offered within the watershed

Rating Scheme

Watershed Education Efforts
Gap = No watershed-related educational programs are reported within the watershed.
Present = At least one watershed-related educational program is offered within the watershed.

Data Source: Information on the number of participants in Project WET, Project WILD, and Native Prairie Curricula was obtained from the Saskatchewan Watershed Authority. Information on the number of participants in the Project Webfoot program was obtained from Ducks Unlimited Canada. Information on the number of participants in the Cows, Fish, Cattle Dogs, and Kids Game Show was obtained from the Saskatchewan Prairie Conservation Action Plan. Information on the number of participants in the Water Watchdog Program and the Saskatchewan Envirothon was obtained from the Partners FOR the Saskatchewan River Basin.

Data Quality/Caveats: The watershed education data cannot be disaggregated by watershed. However, the existing data allow the educational response to be measured at the provincial scale.

Conservation Stewards Indicator

This indicator was developed to assess the uptake of stewardship programs targeting land conservation.

Indicator	
Conservation Stewards	**Status:** Stewardship information included in this indicator is taken from a number of organizations, whose programs primarily focus on conservation stewards who own/manage private land in the agricultural areas of Saskatchewan.
Conservation Easements	**Status:** Twenty-two of Saskatchewan's 29 watersheds have at least one conservation easement. **Trend:** Conservation easements have been established in two additional watersheds since the 2007 *State of the Watershed Report*.

The issue
Land management activities focused on ensuring sustainability are a key component of watershed management. As such, conservation stewards play an important role in maintaining and conserving natural areas through their activities.

Conservation Stewards Indicator in Saskatchewan

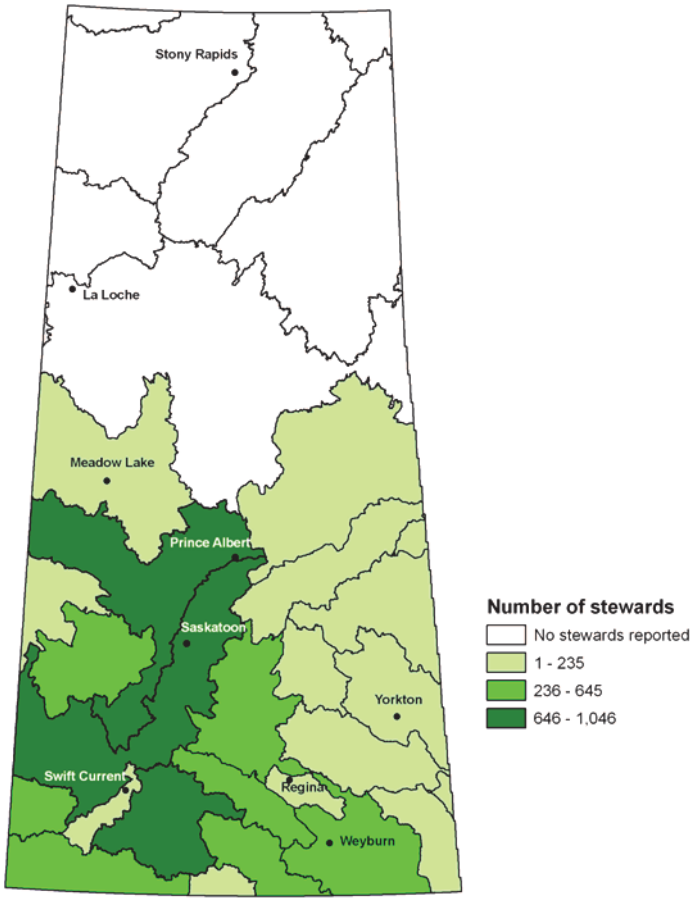

Figure 128. Number of stewards by watershed.
Note: The number of conservation stewards is the combined total of the stewards in the Prairie Stewardship Program, the Permanent Cover Programs I and II, and the Greencover Canada Programs. The number of conservation agreements in the Saskatchewan Ministry of Agriculture's Conservation Cover Program are not included in this figure as: the program is no longer in existence; this program didn't have a restriction on the number of years the land needed to be converted for; and the number of hectares that remain converted to permanent cover, through the financial assistance provided by this program, has not been updated since the program was discontinued.

The number of conservation stewards is greatest in the North Saskatchewan River, Old Wives Lake and South Saskatchewan River Watersheds (Figure 128).

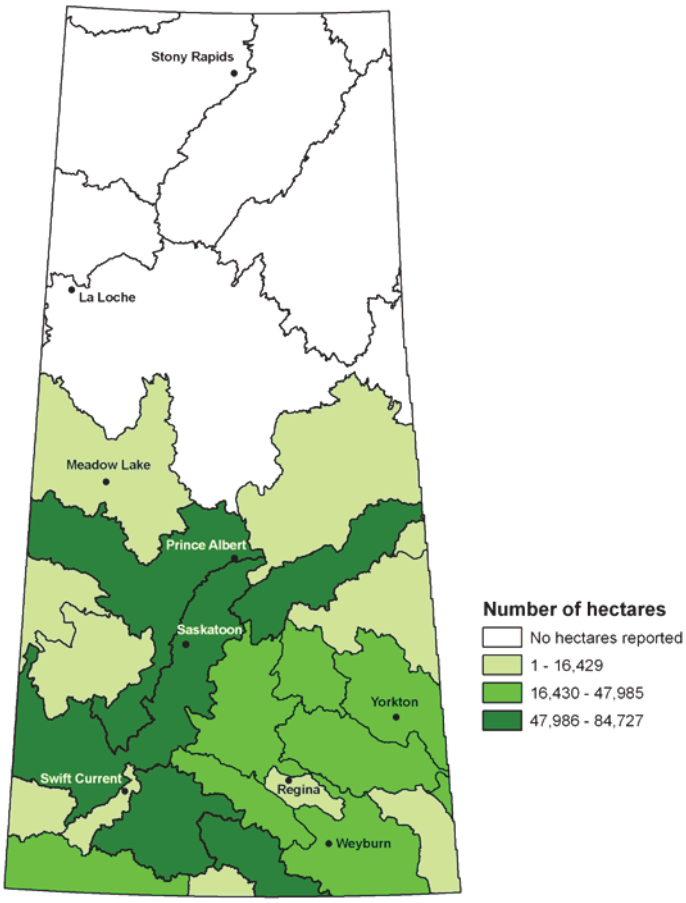

Figure 129. Number of hectares covered under conservation agreements by watershed.
Note: The number of hectares covered under conservation agreements is the combined total of the hectares in the Prairie Stewardship Program, the Permanent Cover Programs I and II, and the Greencover Canada Programs, as well as hectares conserved through conservation steward agreements with Ducks Unlimited Canada. The number of hectares converted under the Saskatchewan Ministry of Agriculture's Conservation Cover Program are not included in this figure as: the program is no longer in existence; this program didn't have a restriction on the number of years the land needed to be converted for; and the number of hectares that remain converted to permanent cover, through the financial assistance provided by this program, has not been updated since the program was discontinued.

The number of hectares covered under conservation agreements is greatest in the Big Muddy Creek, Carrot River, North Saskatchewan River, Old Wives Lake and South Saskatchewan River Watersheds.

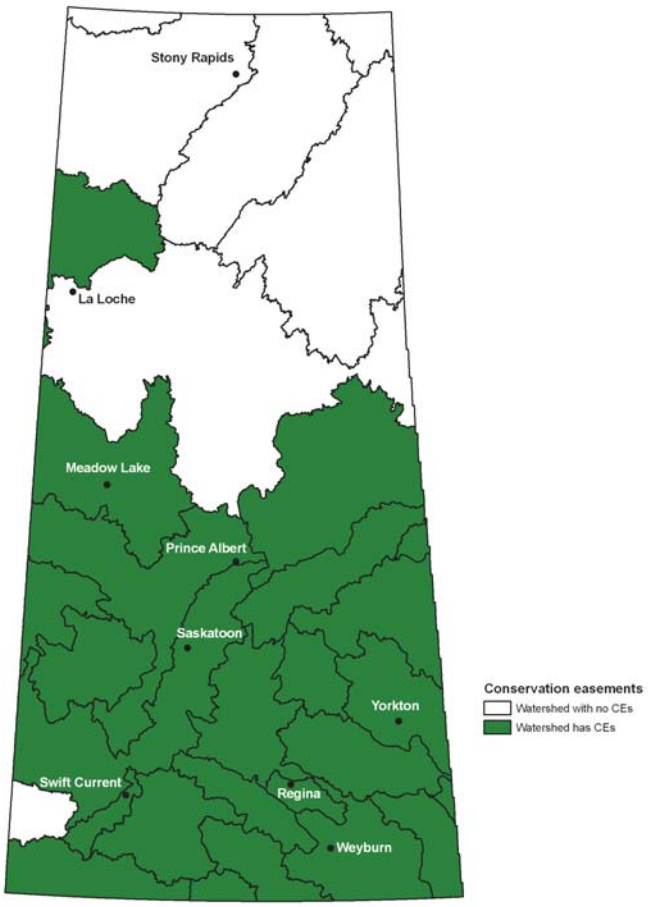

Figure 130. Conservation easement status by watershed: August 2006.

Twenty-two of Saskatchewan's 29 watersheds have at least one conservation easement in place. A conservation easement is a voluntary legal agreement between a landowner and a qualified conservation agency to protect, enhance, or restore a piece of land for environmental, archaeological or historic purposes. Under this agreement, the landowner continues to own and manage the land with benefits to both the landowner and the environment. A conservation easement allows a landowner to preserve their property's conservation values, and at the same time receive income tax benefits. The following conservation agencies are able to hold conservation easements in Saskatchewan:

- Ducks Unlimited Canada;
- Home Place Conservancy of Saskatchewan, Inc.;
- Meewasin Valley Authority;
- Nature Conservancy of Canada (Saskatchewan Region);
- Nature Saskatchewan;
- Rocky Mountain Elk Foundation;
- Saskatchewan Archaeological Society;

- Saskatchewan Ministry of Environment;
- Saskatchewan Parks and Recreation Association;
- Saskatchewan Stock Growers Association;
- Saskatchewan Watershed Authority;
- Saskatchewan Wildlife Federation;
- Wakamow Valley Authority; and
- Wascana Centre Authority.

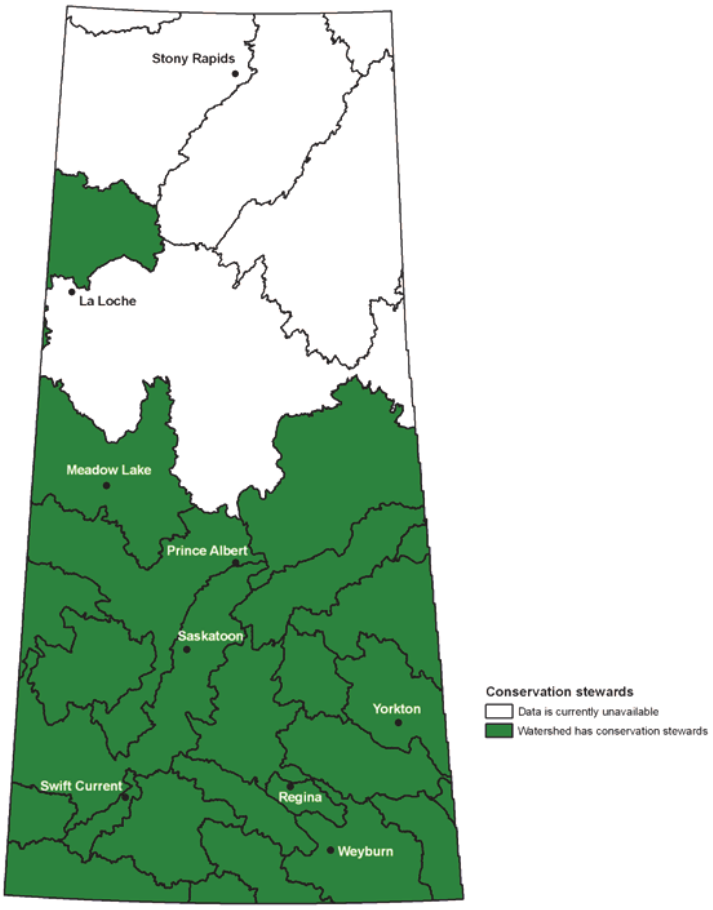

Figure 131. Conservation stewards by watershed.

Currently, information regarding conservation steward activity is available for 23 of Saskatchewan's 29 watersheds.

Stewardship information included in this indicator is taken from a number of organizations, whose programs primarily focus on conservation stewards who own/manage private land in the agricultural areas of Saskatchewan. Therefore, there are currently no private conservation stewards or hectares covered by conservation agreements for the northern watersheds. It should also be noted that approximately 65% of Saskatchewan is Crown land, and much of the Crown land is in the northern and central part of the province (Saskatchewan Environment 2006d). Stewardship information from other organizations and agencies will be included in this indicator as the data become available.

This indicator includes stewardship information on:

1) Voluntary stewards who have made a voluntary verbal stewardship agreement under the Prairie Stewardship Program, a partnership program coordinated by the Saskatchewan Watershed Authority. Through the voluntary agreement, the stewards agree to maintain and protect their native prairie and/or riparian areas to the best of their ability.

Table 16. Number of voluntary stewards and land area covered by the voluntary stewardship agreements under the Prairie Stewardship Program.

Year	Number of Stewards	Hectares of Prairie	Hectares of Wetland	Kilometres of Stream
Pre-2006	1,430	255,854	10,499	618
2006	44	5,917	405	45
2007	59	2,655	219	37
2008	48	4,974	801	48
Total	**1,581**	**269,400**	**11,924**	**748**

2) Conservation stewards who signed contracts with Agriculture and Agri-Food Canada - Prairie Farm Rehabilitation Administration (AAFC-PFRA) under the Permanent Cover Programs I and II and the Greencover Canada Programs. The total number of stewards that have signed agreements under the Permanent Cover Programs I and II and the Greencover Canada Program Land Conversion Component as of July 2009 is 6,352, resulting in a total of 250,292 hectares being converted to permanent cover.

   The Permanent Cover Program I (PCP I) was announced by AAFC-PFRA in 1989 as a three-year program to reduce the risk of soil erosion on marginal lands that had high erosion potential. The Permanent Cover Program II (PCP II), an extension to the program, was delivered between 1991 and 1993. In both the PCP I and PCP II programs applicants entered into long-term contracts for 10 or 21 years to ensure that the conversion of marginal land to permanent cover was long-lasting. The original 10 year terms have all expired for both the PCP I and PCP II programs. All remaining active contracts in PCP I and PCP II are for 21 year terms (Kent Barrett 2009, Personal Communication).

   The Greencover Canada Program was initiated in 2001 under the Agricultural Policy Framework, a joint strategy developed by the federal, provincial and territorial Ministers of Agriculture. Land use agreements signed under the Greencover Canada Program are 10-year commitments to maintain the land in perennial cover, which come into effect once the perennial cover is established and inspected.

3) Hectares that have been conserved through conservation steward agreements with Ducks Unlimited Canada. Since 1938, Ducks Unlimited Canada has partnered with landowners in Saskatchewan to conserve and restore wetland and upland habitats. Conservation efforts have focused on an array of programs, including forage programs and large wetland projects.

Table 17. Ducks Unlimited Canada's Project Summary for Saskatchewan.

Securement Method	Total hectares
Grazing projects	184,629
Prairie forage program	55,985
Large wetland projects	158,292
Total	**398,906**

4) Conservation stewards who signed land use agreements with the Saskatchewan Ministry of Agriculture under the Conservation Cover Program. Between 2001 and 2003, the Conservation Cover Program (CCP) provided financial assistance to 21,034 producers, resulting in the conversion of 533,148 hectares of marginal cropland to perennial cover. Information from this program in Figures 128, 129 or 131 because: this program is no longer in existence; this program didn't have a restriction on the number of years the land needed to be converted for; and the number of hectares that remain converted to permanent cover, through the financial assistance provided by this program, has not been updated since the program was discontinued.

Table 18. Number of land use agreements signed under the Conservation Cover Program between 2001 and 2003.

Year	Agreements	Hectares converted
2001	10,792	105,066
2002	6,226	164,311
2003	4,016	263,779
Total	**21,034**	**533,148**

5) Stewards who have entered into voluntary landowner stewardship agreements with Nature Saskatchewan through the Operation Burrowing Owl, Shrubs for Shrikes, Rare Plant Rescue and Plovers On Shore programs. All four of these programs aim to protect habitat, increase the public's awareness and knowledge of the species, and to monitor the population of the species over time.
    - Operation Burrowing Owl, initiated in 1987, currently includes 432 landowners who have voluntarily agreed to conserve 61,929 hectares of grassland habitat for Burrowing Owls and other prairie wildlife.
    - Shurbs for Shrikes, initiated in 2003, includes 65 participants who are voluntarily conserving 2,637 hectares of Loggerhead Shrike habitat.
    - Rare Plant Rescue, launched in 2002, includes 61 participants conserving over 10,927 hectares for 15 endangered and threatened plant species in Saskatchewan.
    - Plovers On Shore, initiated in 2008, that includes 65 voluntary stewards who are conserving 17.2 kilometres of shoreline for Piping Plovers (Margaret Skeel 2009, Personal Communication).

In addition to the programs listed above which have been initiated to specifically promote land conservation on private lands, there are a number of watershed stewardship groups, cottage associations and volunteer stewardship organizations that have been formed in Saskatchewan to promote environmental stewardship of varying scopes. Some of these groups include:

- The Assiniboine Watershed Stewardship Association (http://www.assiniboinewatershed.com/):
- The Lower Souris Watershed Committee Inc. (http://www.lowersourisriverwatershed.com/);
- The Moose Jaw River Watershed Stewards (http://www.mjriver.ca/);
- The North Saskatchewan River Basin Council (http://www.nsrbc.ca/);
- The Redberry Lake Biosphere Reserve (http://www.redberrylake.ca/);
- The South Saskatchewan River Watershed Stewards Inc. (http://www.southsaskriverstewards.ca/);
- The Swift Current Creek Watershed Stewards Inc. (http://www.sccws.com/):
- The Wascana Upper Qu'Appelle Watersheds Association Taking Responsibility, Inc. (WUQWATR); and
- The Wood River Riparian Authority (http://www.woodriverriparian.ca/).

A number of the projects these watershed groups have been involved with include:

- administering Agri-Environmental Group Plans and promoting Beneficial Management Practices within their respective watersheds;
- developing educational programs;
- partnering with other organizations to encourage watershed conservation, such as a partnership between the Assiniboine Watershed Stewardship Association and Ducks Unlimited Canada to offer a forage/wetland restoration program;
- decommissioning old water wells;

- hosting field days and workshops to discuss fish barriers such as culverts and low level crossings, water quality, riparian areas and off site watering systems;
- mailing out information to watershed residents on a variety of topics, including source water protection, ground water and aquifers, storm sewer awareness, and SaskSpills;
- placing watershed signage alongside select highways;
- conducting surveys to gather data related to the health of riparian areas, the population dynamics of birds, the barriers to fish passage along waterways, ecological goods and services, and knowledge and perceptions of watershed residents on source water and source water protection issues;
- collecting hazardous waste; and
- habitat stewardship for Species at Risk.

Indicator		
Conservation Stewards	=	Number of conservation stewards per watershed
Hectares Under Conservation Agreements	=	Number of hectares under conservation agreements per watershed
Conservation Easements	=	Number of conservation easements per watershed

Rating Scheme

Conservation Stewards
Gap = No conservation stewards are reported in the watershed.
Present = At least one conservation steward is reported in the watershed.

Conservation Easements
Absent/Gap = No conservation easement in the watershed.
Present = At least one conservation easement in the watershed.

Hectares Under Conservation Agreements
Gap = No hectares are reported under conservation agreements in the watershed.
Present = At least one hectare under conservation agreements is reported in the watershed.

Data Source: The number of conservation stewards who made a voluntary stewardship agreement as part of the Saskatchewan Watershed Authority's Prairie Stewardship Program was obtained from the Saskatchewan Watershed Authority's Landowner Information Database. The number of conservation stewards who signed contracts under the Permanent Cover and Greencover Canada Programs was obtained from Agriculture and Agri-Food Canada – Agri-Environment Services Branch. The number of hectares conserved under conservation stewardship agreements with Ducks Unlimited Canada was obtained from Ducks Unlimited Canada. The number of conservation stewards who signed contracts under the Conservation Cover Program was obtained from the Saskatchewan Ministry of Agriculture.

Data Discussion: The intention of this indicator is to map, by watershed, all of the agreements and hectares covered by the different land stewardship programs in Saskatchewan. Through the cooperation and collaboration of various organizations, data on additional programs with conservation stewards that will be included in this indicator is currently being obtained.

Stewardship Workshops Indicator

This indicator identifies stewardship workshops that are happening in Saskatchewan.

Indicator	
Stewardship Workshops	**Status:** Stewardship workshops on a variety of topics continue to provide valuable information to participants in Saskatchewan. **Trend:** This is an ongoing initiative by a number of organizations.

The issue

The management practices of landowners are critically important to ensuring healthy watersheds. Given this importance, it is of great value to provide landowners with the best available information on effective strategies for managing their land in a sustainable fashion. This includes workshops to provide stewards with information on Beneficial Management Practices (BMPs), hands-on training to better understand land management through range and/or riparian assessments, and to showcase the management efforts of specific landowners through field tours.

Stewardship Workshops Indicator in Saskatchewan

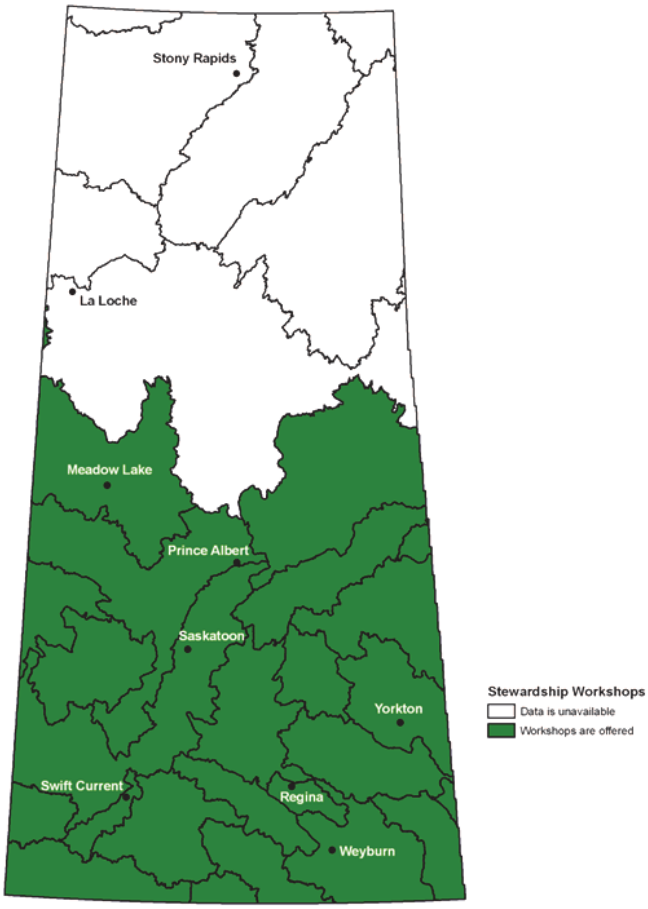

Figure 132. Stewardship workshop activity by watershed.

Stewardship workshops are actively being offered and attended in 22 of the 29 watersheds in Saskatchewan.

Stewardship workshop information included in this indicator is from a number of organizations, whose programs primarily focus on the agricultural areas of Saskatchewan. Therefore, there is currently no information on stewardship workshops in the northern watersheds, which have very little to no agricultural activities.

The stewardship workshops included in this indicator are:

1) *The Prairie Stewardship Workshops*. To increase the public's awareness of the importance, value, and function of riparian and native prairie ecosystems, the Saskatchewan Watershed Authority, in partnership with other agencies, initiated the Prairie Stewardship Program in 2002. The Prairie Stewardship Program is an amalgamation of the Saskatchewan Wetland Conservation Corporation's (now the Saskatchewan Watershed Authority) Native Prairie Stewardship and Streambank Stewardship programs. Both the Native Prairie Stewardship and Streambank Stewardship Programs were initiated in 1997.

The Prairie Stewardship Workshops include:

- Field tours to view demonstration projects managed by landowners. Examples of demonstration projects include grazing management systems, perennial forage establishment, and corral/wintering site modifications.
- Range and pasture schools to provide stewards with hands-on training in range or riparian assessments. These workshops provide landowners with detailed information on plant identification, ecology and management of riparian and upland ecosystems.

Table 19. Number of Prairie Stewardship Program field days/town hall meetings/workshops and attendance between April 2002 and March 2009.

Event	Year	Number of Events	Attendance
Town hall meetings/field days	2002	19	470
Workshops/town hall meetings/field days	2003	17	444
Workshops/town hall meetings	2004	21	542
Workshops/town hall meetings	2005	7	155
Workshops/town hall meetings/field days	2006	69	1,849
Workshops/town hall meetings/field days	2007	57	1,875
Workshops/town hall meetings/field days	2008	37	1,590
Workshops/town hall meetings/field days	2009	35	1,364
Total		**262**	**8,289**

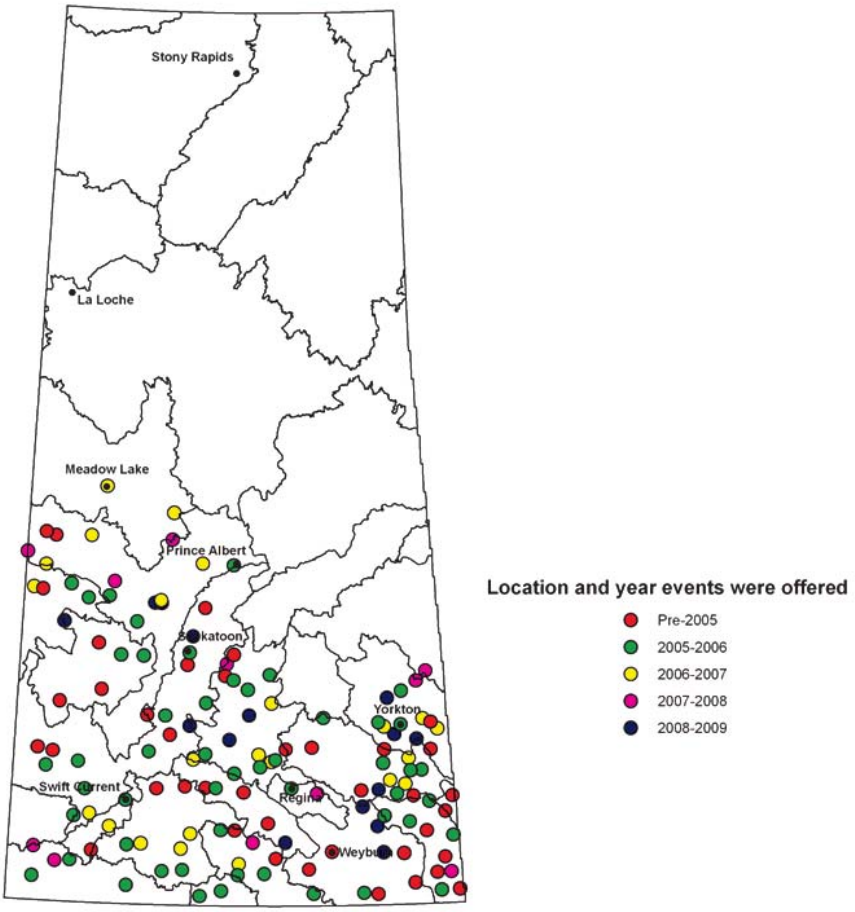

Figure 133. Locations of stewardship workshops/field days/town hall meetings delivered through the Prairie Stewardship Program between March 2001 and March 2009.

2) *The Environmental Farm Plan Workshops*. To promote Beneficial Management Practices (BMPs), Agriculture and Agri-Food Canada initiated the Environmental Farm Plan Program under the Agricultural Policy Framework (APF). In Saskatchewan, the Environmental Farm Plan Program is delivered by the Provincial Council of Agriculture Development and Diversification Boards for Saskatchewan Inc. (PCAB), in partnership with the Saskatchewan Ministry of Agriculture and Agriculture and Agri-Food Canada. The Environmental Farm Plan Program is comprised of a series of two workshops (Workshop I and Workshop II) delivered by PCAB-trained facilitators, followed by a peer review process. The purpose of the Environmental Farm Plan is to increase the awareness of agricultural producers to some of the risks agricultural land use practices can place on the environment, and to encourage producers to adopt Beneficial Management Practices to reduce these environmental risks.

The Environmental Farm Plan Program began in Saskatchewan in September 2004. As of February 11, 2009 there have been 1,104 Workshop I's with 13,958 participants involved, and 1,058 corresponding Workshop II's with 10,577 participants. A total of 10,287 Environmental Farm Plans have gone through peer review and have been endorsed. It is estimated that 23% of all producers in Saskatchewan that have gone through the workshops have completed action plans [Provincial Council of Agriculture Development and Diversification (ADD) Boards for Saskatchewan Inc. (PCAB) 2009].

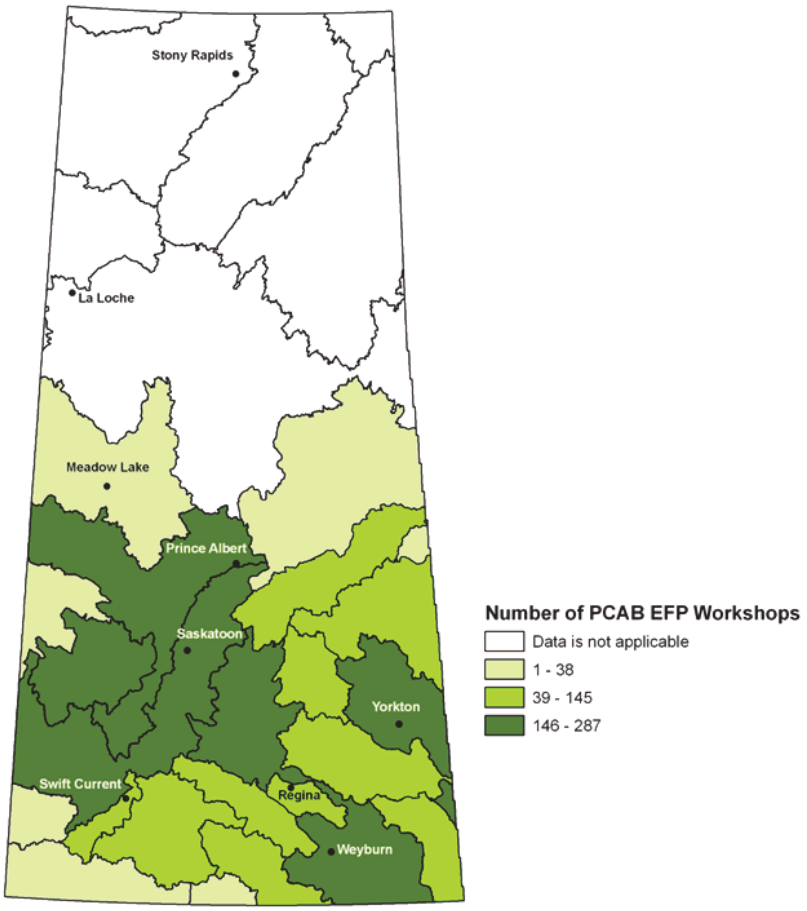

Figure 134. Number of Provincial Council of Agriculture Development and Diversification Boards for Saskatchewan Inc. (PCAB) Environmental Farm Plan Workshops by watershed, between March 2005 and July 2009.

3) *The Saskatchewan Soil Conservation Association Workshops*. The Saskatchewan Soil Conservation Association (SSCA) is a non-profit, producer-based organization that actively promotes soil conservation in Saskatchewan through conferences, workshops, a quarterly newsletter, producer networking opportunities, and soil conservation extension materials. The SSCA hosts two conferences annually. In February, the SSCA hosts a Direct Seeding Conference geared to producers, and in December they host a conference geared to crop advisors in the livestock and grain sectors. In addition to the two annual conferences, SSCA staff are guest speakers at 90 to 100 workshops each year. As guest speakers they provide information on topics such as crop residue management, crop rotations, weed control, soil fertility, equipment selection and retrofitting, and forages in rotation.

   The Saskatchewan Soil Conservation Association's Direct Seeding Conference is held in either Saskatoon or Regina in February. Approximately 650 people attend the conference. Of the 650 attendees at the most recent conference, 500 of the participants were farmers and the remainder of the participants were crop advisors (agrologists and agronomists), academics, and representatives from the agricultural manufacturing sector. Farmers come from all over the province to attend the conference, although historically more farmers from the north attend the conference when it is in Saskatoon, while more farmers from the south attend the conference when it is held in Regina.

4) *Manure Management Workshops*. A meeting in November 1998 brought together the three Prairie provinces to discuss opportunities for cooperating on research, development and extension activities in the area of manure management and livestock development. The Saskatchewan Ministry of Agriculture published their Strategy for Manure Management in early 1999 (at www.agr.gov.sk.ca under livestock/pork/manure management). As a result of this coordinated effort, a number of events and workshops were held between 1998 and 2006 relating to manure management and, more broadly, environmental management of livestock operations. *The Agricultural Operations Act* requires certain intensive livestock operations (subject to size and proximity to surface water bodies) to develop and obtain approval for manure management plans. The Saskatchewan Ministry of Agriculture's crop specialists are available to provide advice on crop nutrient requirements.

5) *The Living by Water Workshops*. These workshops have been developed and delivered by Nature Saskatchewan to Saskatchewan residents since 1998. The purpose of the workshops is to educate the public about shoreline issues such as reducing erosion, the benefits of riparian buffers, and how these practices can improve water quality and provide wildlife habitat. Beginning in 2009, Nature Saskatchewan now provides *Living by Water* CDs, complete with canned PowerPoint presentations and speakers notes for six different workshop topics, to interested stewardship groups. These CDs supply the information needed for stewardship groups to conduct their own workshops. The six workshop topics include:
   - Learning About Your Shoreline;
   - Shoreline Landscaping and Erosion Control;
   - Agriculture, Our Cottage and Us: How We Can Make A Difference;
   - Shoreline Construction;
   - Septic Systems; and
   - Water Supplies.

Nature Saskatchewan also offers workshops to rural landowners, including participants in the Stewards of Saskatchewan programs (Operation Burrowing Owl, Rare Plant Rescue, Shrubs For Shrikes and Plovers On Shore), to raise awareness about conservation. The workshops, initiated in 2003, are sometimes delivered together with other conservation organizations and provide information on topics including beneficial management practices for Species at Risk such as the Burrowing Owl and Loggerhead Shrike, the mutual benefits of biodiversity to land managers and wildlife, common conservation myths, and the natural history of the local area. Topics covered by a partnering agency might include information on local invasive plant species, Environmental Farm Plans, and other conservation programs available to land managers.

6) *The Crop Management Field Day*. The Crop Management Field Day has been managed by the Indian Head Agricultural Research Foundation since 1996. Field days consist of demonstration and research plot tours and presentations. Approximately 150-300 producers from North America attend each year.

Indicator		
Stewardship Workshops	=	Number of stewardship workshops per watershed

Rating Scheme

Stewardship Workshops
Gap = Stewardship workshops are either not offered or information is not available about the workshops in the watershed.
Present = Stewardship workshops are offered in the watershed.

Data Source: Locations of stewardship workshops delivered by the Saskatchewan Watershed Authority are from the Authority's Landowner Information Database. Information about the Environmental Farm Planning Workshops was provided by the Provincial Council of Agriculture Development and Diversification Boards for Saskatchewan inc. (PCAB). Saskatchewan Soil Conservation Association workshop information was provided by Juanita Polegi (2005, Personal Communication).

Data Discussion: The intention of this indicator is to include and map all of the stewardship workshops by watershed. Through the cooperation and collaboration of various organizations, data on additional workshops to be included in this indicator is still being obtained.

Beneficial Management Practices Indicator

This indicator assesses the adoption of Beneficial Management Practices by watershed.

Indicator	
Beneficial Management Practices	**Status:** The adoption of Beneficial Management Practices has been well received in Saskatchewan. **Trend:** Increased education and funding for Beneficial Management Practices has lead to an increased number of adopted BMPs in the province.

The issue
Beneficial Management Practices (BMPs) are practical, non-regulatory approaches designed to effectively minimize the environmental impacts that result from human activities on the landscape. BMPs are typically applied to address risks from non-point pollution sources. Within Saskatchewan, a major focus of BMP promotion is directed toward minimizing the impact of agricultural activities on the environment.

Beneficial Management Practices Indicator in Saskatchewan

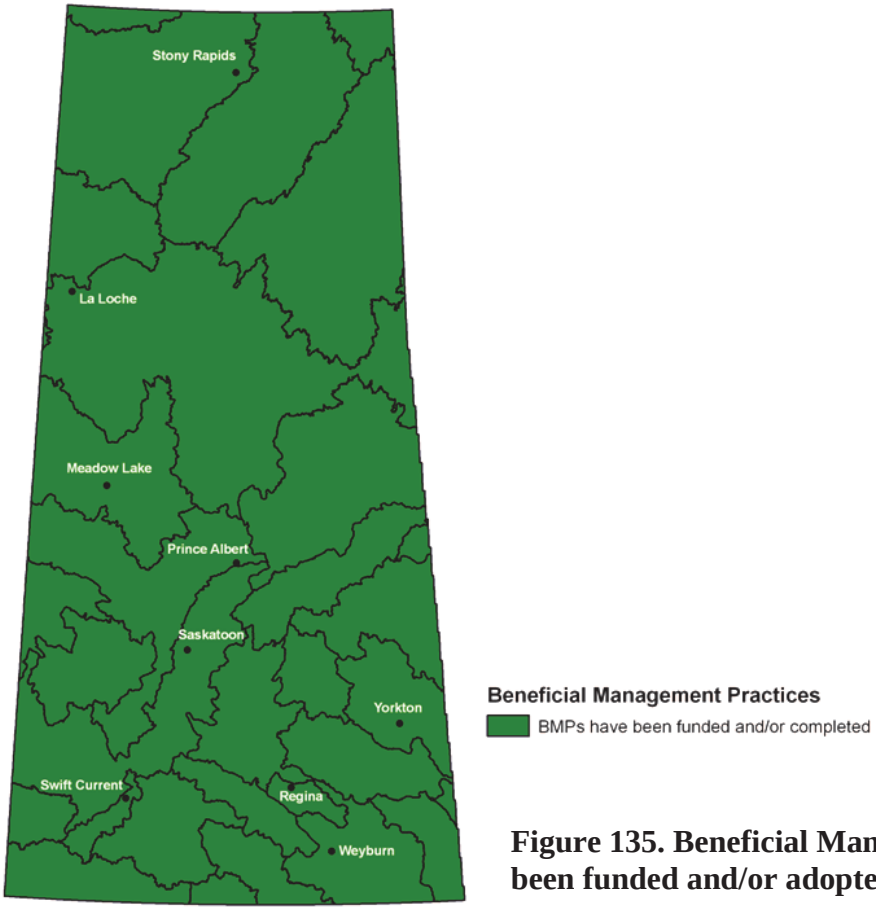

Figure 135. Beneficial Management Practices that have been funded and/or adopted by watershed.

BMPs and/or programs that fund and promote BMPs have been funded and/or completed in all of Saskatchewan's watersheds between March 2005 and 2009.

Some of the programs that fund and promote BMPs include:

1) *The Go Green Fund*. The Go Green Fund is a financial commitment from the Government of Saskatchewan to assist Saskatchewan's people, communities, non-government organizations and businesses address the province's most important environmental issues. The fund invests in projects that contribute to the following objectives:
   - reduction and/or avoidance of greenhouse gas emissions;
   - conservation of water supplies;
   - maintenance and/or restoration of water quality to meet established standards;
   - biodiversity conservation;
   - reduction of waste; and
   - increasing the understanding and acceptance of the need to address environmental issues (Government of Saskatchewan 2009b).

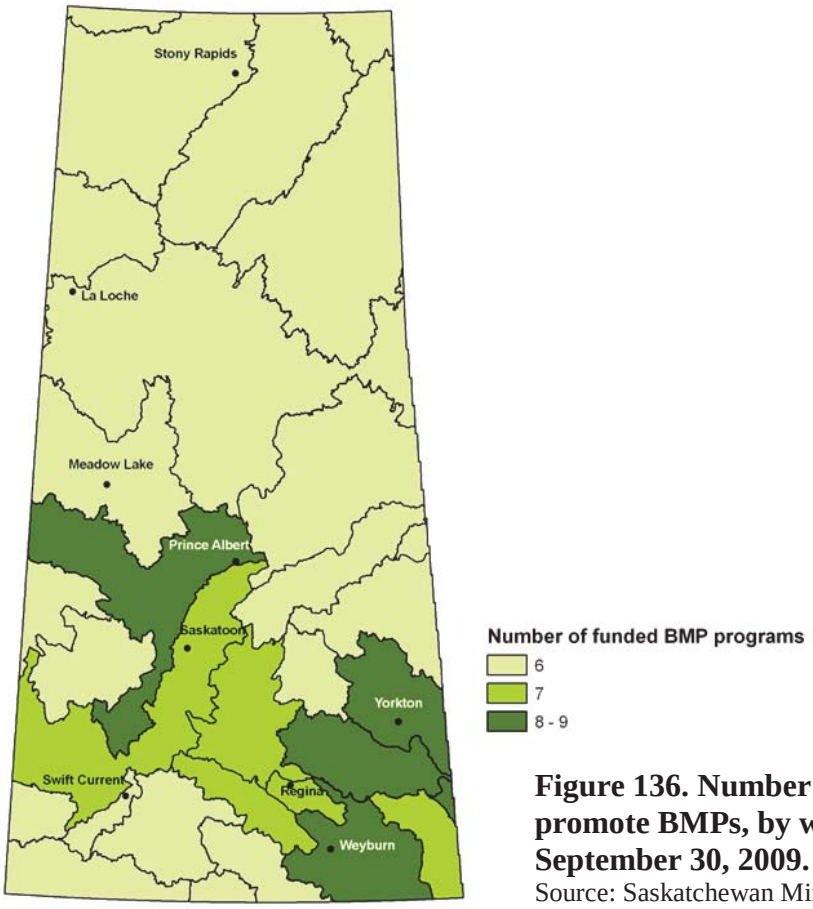

Figure 136. Number of Go Green funded programs that promote BMPs, by watershed, between March 2006 and September 30, 2009.
Source: Saskatchewan Ministry of Environment

Between March 2006 and September 2009, the Go Green fund provided financial support for six province-wide water quality and water conservation programs, and 11 other water quality and water conservation programs that were directed to a specific community or watershed. All 17 of these programs promote the adoption of BMPs. Some of the programs that received Go Green funding included:

- implementing watershed and aquifer protection plans (province-wide);
- the Provincial Toilet Replacement Rebate Program (province-wide);
- a feasibility study for a regional water system;
- source water protection strategies;
- the Healthy River Ecosystem Assessment System;
- aquifer awareness and education; and
- water conservation initiatives.

Agricultural BMPs

In 2006, no-till technologies were used on 60.2% of the land prepared for seeding in Saskatchewan, compared to 38.7% in 2001. Conservation tillage decreased 7% between 2001 and 2006. In 2001, conventional tillage was used on approximately 28.8% of the land prepared for seeding, compared to 21.5% of land in 2006 (Statistics Canada 2006).

In Saskatchewan, there are a number of programs that are promoting agricultural Beneficial Management Practices, including:

1) The Saskatchewan Soil Conservation Association (SSCA). The SSCA is a non-profit, producer-based organization that actively promotes soil conservation in Saskatchewan through conferences, workshops, a quarterly newsletter, producer networking opportunities, and soil conservation extension materials.

2) The Saskatchewan Agriculture Applied Research Management Program. Established in 1998 in cooperation with the Saskatchewan Soil Conservation Association, Agriculture and Agri-Food Canada and the Saskatchewan Ministry of Agriculture, the program promotes precision farming through the development of demonstration projects.

3) The Prairie Stewardship Program. The goal of the program is to promote stewardship of riparian and native prairie ecosystems. To participate in the program, landowners voluntarily conserve these areas through a verbal stewardship agreement. The Saskatchewan Watershed Authority provides stewards with technical and administrative assistance to help them adopt agricultural BMPs. BMPs completed through this program include:
    - Enhancing Wildlife Habitat and Biodiversity;
    - Wintering Site Management;
    - Riparian Area Management;
    - Land Management for Soils at Risk and Species at Risk.

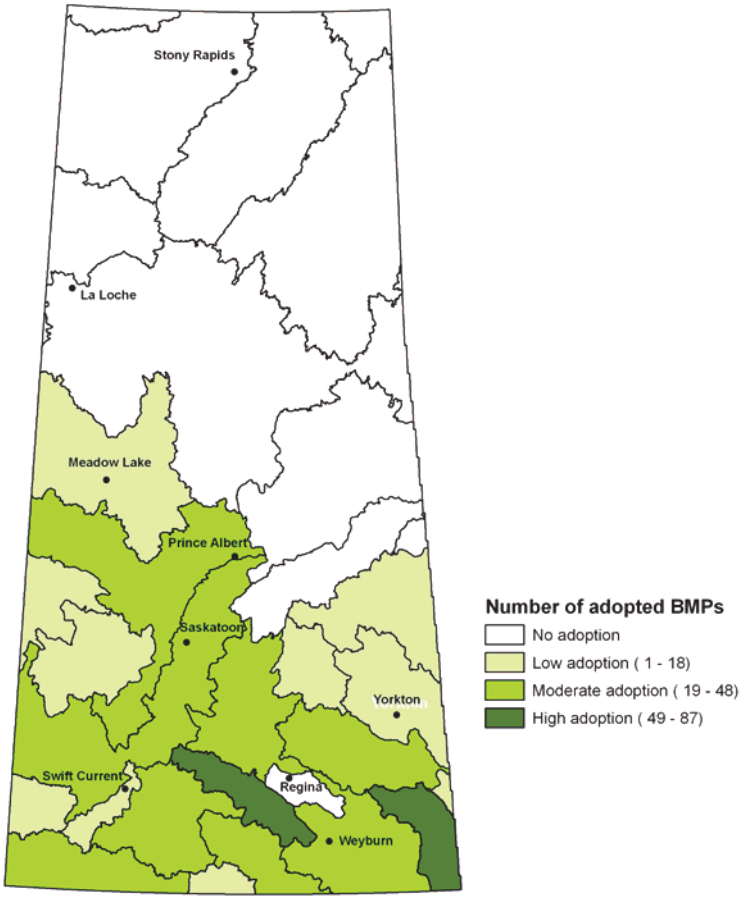

Figure 137. Number of BMPs adopted through the Prairie Stewardship Program, by watershed, between January 1, 2005 and December 31, 2008.

Between January 1, 2005 and December 31, 2008, 402 agricultural BMPs were adopted through the Prairie Stewardship Program in 19 watersheds. Of these 19 watersheds, stewards had adopted fewer than 19 BMPs in nine watersheds, between 19 and 49 BMPs in eight watersheds, and more than 48 BMPs in the Lower Souris River and Moose Jaw River Watersheds.

4) The Canada-Saskatchewan Farm Stewardship Program (CSFSP). The CSFSP was established in 2001 under the Agricultural Policy Framework (APF). The objective of the program is for producers to reduce some of the risks associated with agricultural land use practices by adopting BMPs. With the help of an advisor, producers are encouraged to complete an Environmental Farm Plan. In the Environmental Farm Plan, producers identify the environmental risks associated with their current land use practices, and the eligible BMPs that would help to reduce these environmental risks. Once their Environmental Farm Plans are completed, producers can apply for financial assistance to implement the identified BMPs. The program will pay between 30% and 50% of the eligible costs of implementing their plans, up to a maximum dollar amount.

   The program began in Saskatchewan on March 31, 2005 and received applications for funding until March 31, 2008. As the program was well received, it was extended between April 1, 2008 and March 31, 2009. Between 2005 and March 31, 2009 the program was delivered by Agriculture and Agri-Food Canada – Prairie Farm Rehabilitation Administration (AAGC-PFRA). On April 1, 2009 the Provincial Council of Agriculture Development and Diversification (ADD) Boards for Saskatchewan Inc. (PCAB) took over the delivery of this program.

   As of April 2009, the Beneficial Management Practices that are eligible for funding under the Canada-Saskatchewan Farm Stewardship Program include:
   - Integrated Pest Management Planning
   - Integrated Pest Management for Insects, Vertebrates and Non-vertebrate Pests
   - Integrated Pest Management for Invasive Species
   - Native Plant Re-establishment
   - Irrigation Management Planning
   - Irrigation Equipment Modification
   - Low Disturbance Placement of Seed and Fertilizer
   - Chaff Collectors and Chaff Spreaders
   - Precision Farming Applications – GPS
   - Protecting Marginal High-Risk Soils
   - Shelterbelt Establishment
   - Decommissioning Abandoned Wells
   - Protecting Existing Wells
   - Agricultural Products Safe Storage and Handling
   - Pesticide Application Systems (drift reduction technology)
   - Information Collection and Monitoring
   - Manure Nutrient Planning
   - Manure Storage Improvements
   - Manure Storage Increases
   - Manure Application Equipment and Technologies
   - Modifying and Re-vegetating Waterways
   - Planting Vegetation to Protect Streambank and Shoreline Areas
   - Improved Stream and Creek Crossings
   - Relocation of Livestock Confinement Facilities
   - Fencing to Protect the Environment

- Fencing to Prevent Damage by Big Game Wildlife
- Utilizing Portable Windbreaks and Shelters
- Remote Water Systems
- Farmyard Runoff Control

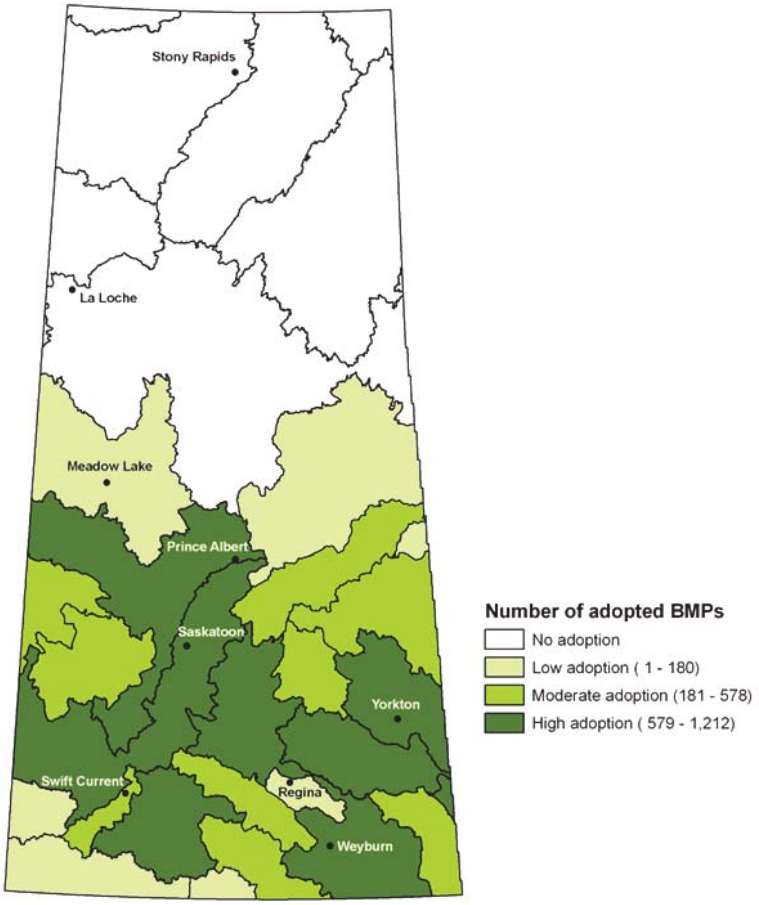

Figure 138. Number of BMPs adopted through the Canada-Saskatchewan Farm Stewardship Program, by watershed, between March 2005 and January 22, 2009.
Source: Agriculture and Agri-Food Canada 2009

Between March 2005 and January 22, 2009, 10,430 agricultural BMPs were adopted in 22 watersheds through the Canada-Saskatchewan Farm Stewardship Program when it was delivered by Agriculture and Agri-Food Canada – Prairie Farm Rehabilitation Administration. Of the 22 watersheds where BMPs have been adopted, five watersheds had fewer than 181 total BMPs adopted, nine watersheds had between 181 and 578 BMPs adopted, and seven watersheds had more than 579 BMPs adopted.

The agricultural Beneficial Management Practices adopted by producers through the Canada-Saskatchewan Farm Stewardship Program, by watershed, between March 2005 and January 22, 2009 (Figure 138) include:

- Improved Manure Storage and Handling
- Manure Treatment
- Manure Land Application
- In-Barn Improvements
- Runoff Control
- Enhancing Wildlife Habitat and Biodiversity
- Wintering Site Management
- Product and Waste Management
- Water Well Management
- Riparian Area Management
- Erosion Control Structures (Riparian)
- Erosion Control Structures (Non-Riparian)
- Land Management for Soils at Risk
- Improved Cropping Systems
- Cover Crops
- Relocation of Livestock Confinement and Horticultural Facilities
- Improved Pest Management
- Nutrient Recovery from Waste Water
- Irrigation Management
- Shelterbelt Establishment
- Invasive Alien Plant Species Control
- Habitat Conservation/Enhancement for Species at Risk
- Preventing Wildlife Damage
- Nutrient Management Planning
- Integrated Pest Management Planning
- Grazing Management Planning
- Soil Erosion Control Planning
- Biodiversity Enhancement Planning
- Irrigation Management Planning
- Riparian Health Assessment

In an attempt to further understand the effect BMPs have on the receiving environment in Saskatchewan, the following research has been or is in the process of being initiated:

- In 2006, to assess water quality-land use linkages in a number of small agricultural watersheds with contrasting land cover types, the Saskatchewan Watershed Authority, in cooperation with the Saskatchewan Ministry of Agriculture, initiated the Agricultural Land Use (Paired Watershed) Study in the Lower Souris River Watershed. The study collects information and data on land cover (cropping), land use (fertilizer application rates), livestock stocking rates and densities, riparian health assessments, hydrology, surface water quality, and benthic macroinvertebrates. Water quality parameters measured include nutrients, major ions, bacteriological test, general water quality [pH, dissolved oxygen (DO), temperature], organics, chlorophyll *a*, suspended solids, and select and trace metals.
- Agriculture and Agri-Food Canada, in partnership with a number of other agencies in Saskatchewan, are attempting to establish a Watershed Evaluation of Best Management Practices (WEBS) research site in the province. This would be one of a series of research sites across Canada that evaluate the effectiveness and economics of agricultural BMPS regarding water quality. The proposed WEBS research site in Saskatchewan is near Moosomin, in the Pipestone Creek sub-basin. The project will investigate the impact of seeding perennial forage, wetland restoration, nutrient management and winter site management on water quality.

Indicator		
Beneficial Management Practices	=	Number of Beneficial Management Practices per watershed

Rating Scheme

Beneficial Management Practices
Gap = Beneficial Management Practices are either not implemented or information is not available about the BMPs in the watershed.
Present = Beneficial Management Practices are implemented in the watershed.

Data Source: Information about the number of Go Green Funded programs that promote BMPs was provided by the Saskatchewan Ministry of Environment. Information about the number of adopted BMPs through the Prairie Stewardship Program was provided by the Saskatchewan Watershed Authority. Information about the number of adopted BMPs through the Canada-Saskatchewan Farm Stewardship Program was provided by the Agriculture and Agri-Food Canada - Agri-Environmental Services Branch.

Watershed and Land Use Planning Indicator

This indicator identifies watersheds in Saskatchewan that are involved in developing land and resource management plans.

Indicator	
Watershed and Land Use Planning	**Status:** Currently, 20 of the 29 watersheds in Saskatchewan are involved in land use planning. **Trend:** Three additional watersheds have been added to the land use planning process since the 2007 *State of the Watershed Report*.

The issue
Integrated resource management is a process of managing both the environment and the land use activities to achieve the goal of sustainable development. The goal of integrated resource management is to account for economic and social welfare without compromising ecosystem sustainability (Global Water Partnership 2000).

Watershed and Land Use Planning Indicator in Saskatchewan

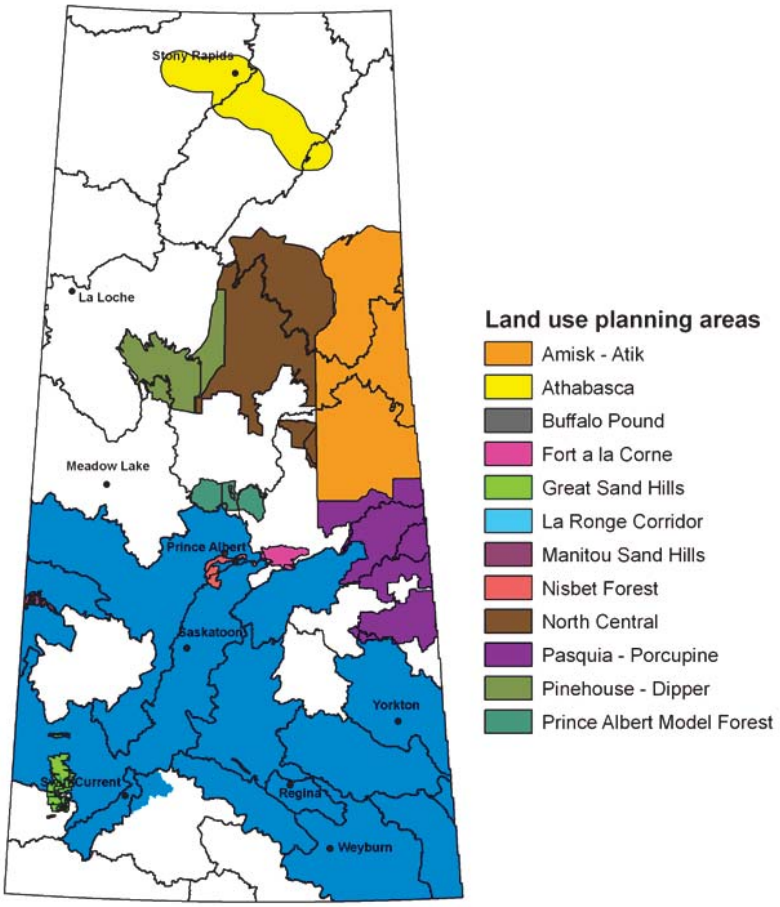

Figure 139. Watershed and land use planning initiatives in Saskatchewan.

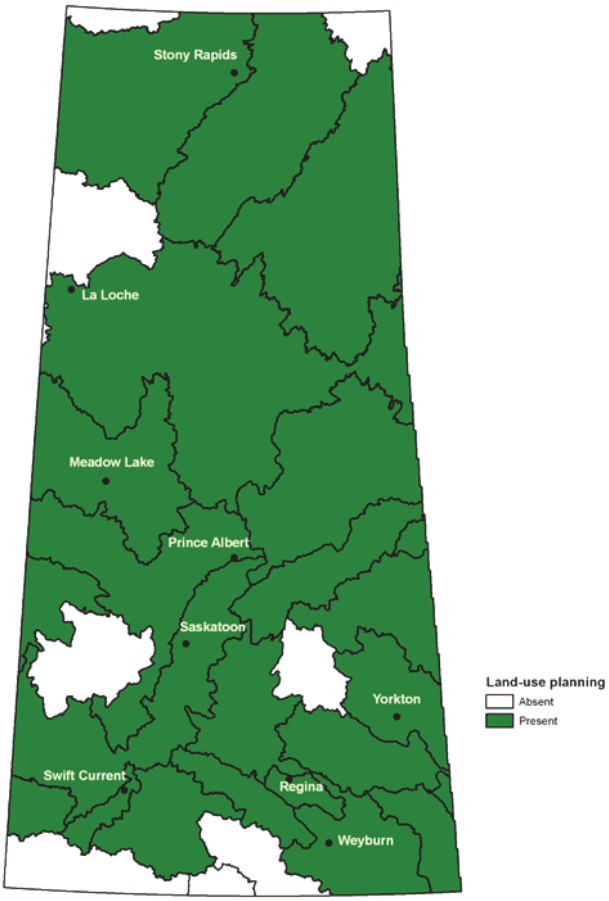

Figure 140. Watershed and land use planning initiatives in Saskatchewan by watershed.

Twenty-one of Saskatchewan's watersheds are currently involved or have been involved in watershed and land use planning initiatives.

The two main watershed and land use planning initiatives in Saskatchewan are:

1) The Saskatchewan Watershed Authority's Watershed and Aquifer Planning program, which was initiated in 2002 to achieve the Authority's mandate of protecting and maintaining sustainable source water quantity and quality. The planning process is a multi-stepped process designed to identify and integrate existing land use interests (including environmental, economic, social, and cultural interests). The process is facilitated by a specialized group of planning staff from the Authority. The purpose of the planning process is to develop a watershed and aquifer source water protection plan for land and resource management within the planning area.

Steps in the planning process include:

- the establishment of a watershed advisory committee(s) made up of stakeholders such as residents, producers, land managers, industry, municipalities, and individuals in the natural resource field;
- the establishment of a technical committee made up experts in such fields as agriculture, biology, geology, hydrology and engineering;
- the development of a background report to improve the public's understanding of the watershed or aquifer and the factors that impact its health;
- the development of the source water protection plan;
- the implementation of the source water protection plan; and
- monitoring and assessment of the activities (Saskatchewan Watershed Authority 2002).

The watershed and aquifer planning process has been implemented in thirteen watersheds. A total of eight source water protection plans have been completed. These plans include:

- the Assiniboine River Watershed Source Water Protection Plan;
- the Lower Souris River Watershed Source Water Protection Plan;
- the Moose Jaw River Watershed Source Water Protection Plan;
- the North Saskatchewan River Watershed Source Water Protection Plan (which includes Battle River);
- the South Saskatchewan River Watershed Source Water Protection Plan;
- the Swift Current Creek Watershed Protection Plan (which includes a portion of the Old Wives Lake Watershed);
- the Upper Qu'Appelle River and Wascana Creek Watersheds Source Water Protection Plan; and
- Yorkton Area Aquifers Source Water Protection Plan.

To promote the implementation of these source water protection plans, the Saskatchewan Watershed Authority provides financial assistance to support local watershed stewardship groups that were formed to lead implementation of the respective plans. These watershed stewardship groups include:

- The Assiniboine Watershed Stewardship Association (http://www.assiniboinewatershed.com/).
- The Lower Souris Watershed Committee Inc. (http://www.lowersourisriverwatershed.com/).
- The Moose Jaw River Watershed Stewards (http://www.mjriver.ca/).
- The North Saskatchewan River Basin Council (http://www.nsrbc.ca/).
- The South Saskatchewan River Watershed Stewards Inc. (http://www.southsaskriverstewards.ca/).
- The Swift Current Creek Watershed Stewards (http://www.sccws.com/).
- The Wascana Upper Qu'Appelle Watersheds Association Taking Responsibility, Inc. (WUQWATR) (http://www.wuqwatr.ca/).

The watershed and aquifer planning process has also been initiated in the Carrot River, Lower Qu'Appelle River, and Upper Souris River Watersheds.

2) The Saskatchewan Ministry of Environment's land use planning on Crown lands. The purpose of the land use planning process is to identify and integrate existing land use interests (including environmental, economic, social, and cultural interests), resolve conflicts, and develop land and resource management plans for Crown lands within the planning area. Steps in the land use planning process include:

- plan initiation;
- information and issue gathering;
- meetings;
- draft plan preparation;
- draft plan review;
- plan revision and approval; and
- plan implementation.

Through this planning process, background information is collected on existing uses and environmental constraints. This information is used, along with extensive consultation with stakeholders, in the development of a management plan. At present, the Saskatchewan Ministry of Environment is involved in 13 land use planning processes in various stages of completion:

- Land use plans have been approved for the Amisk-Atik, Great Sand Hills, La Ronge Corridor, Manitou Sand Hills, Pasquia-Porcupine, and Prince Albert Model Forest planning areas. These land use plans cover over 7 million hectares of Crown lands.
- Land use planning processes are ongoing in the Buffalo Pound, Clearwater, Fort a la Corne, Missinipe, Nisbet Forest, Pinehouse Dipper planning areas. There are more than 7 million additional hectares of land within these planning areas.

Indicator		
Watershed and Land Use Planning	=	Watershed or land use planning is occurring within the watershed

Rating Scheme

Watershed and land use planning
Present = Watershed or land use planning is occurring in the watershed.
Absent/Gap = No watershed or land use planning is occurring within the watershed.

Data Source: The location of and information on land-use planning in Saskatchewan was obtained from the Saskatchewan Watershed Authority and the Saskatchewan Ministry of Environment.

Water Quality Monitoring and Management Indicator

This indicator reports on the government-led water quality monitoring and management programs in Saskatchewan.

Indicator	
Water Quality Monitoring and Management	**Status:** Federal and provincial governments are actively monitoring and managing water quality in Saskatchewan. **Trend:** Additional water quality monitoring programs have been initiated in Saskatchewan in the past two years.

The issue
Good quality water is fundamental for sustainable socio-economic development, and is essential for healthy ecosystems and human survival. Water quality monitoring and management programs in Saskatchewan exist for a number of purposes. Some programs were established to conduct long-term monitoring at permanent stations, while others are short-term and have been developed to address a specific issue. The objectives and purposes of the water quality monitoring programs determine what chemical, physical and/or biological parameters are assessed.

Water Quality Monitoring and Management Indicator in Saskatchewan

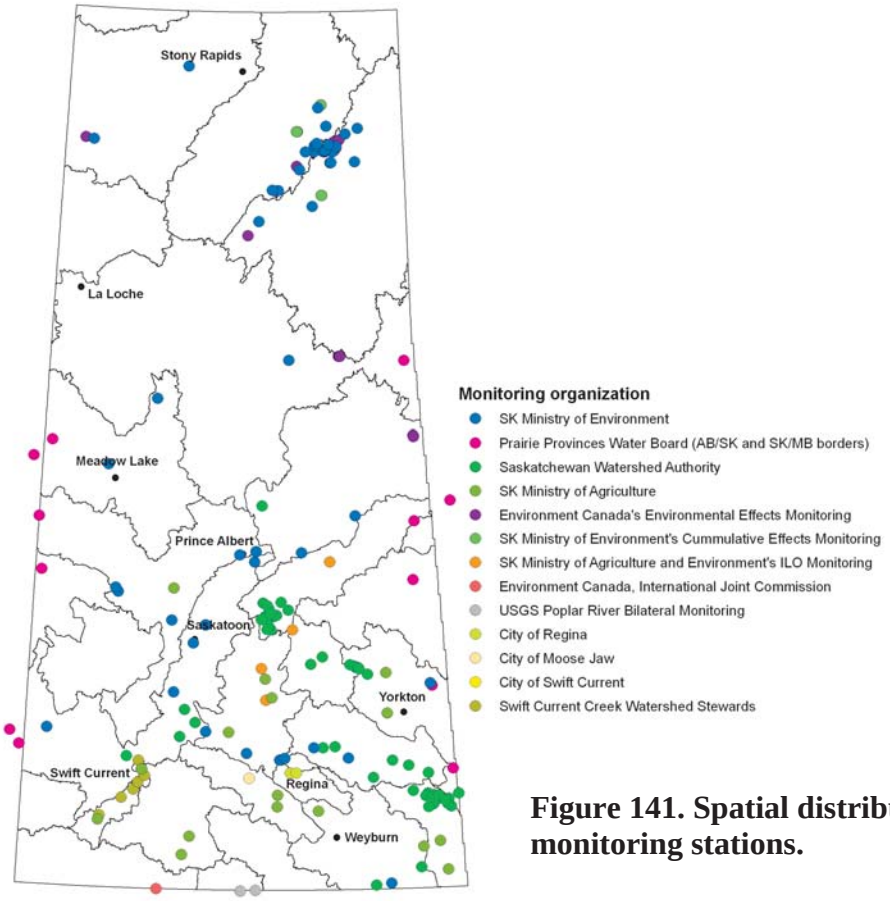

Figure 141. Spatial distribution of water quality monitoring stations.

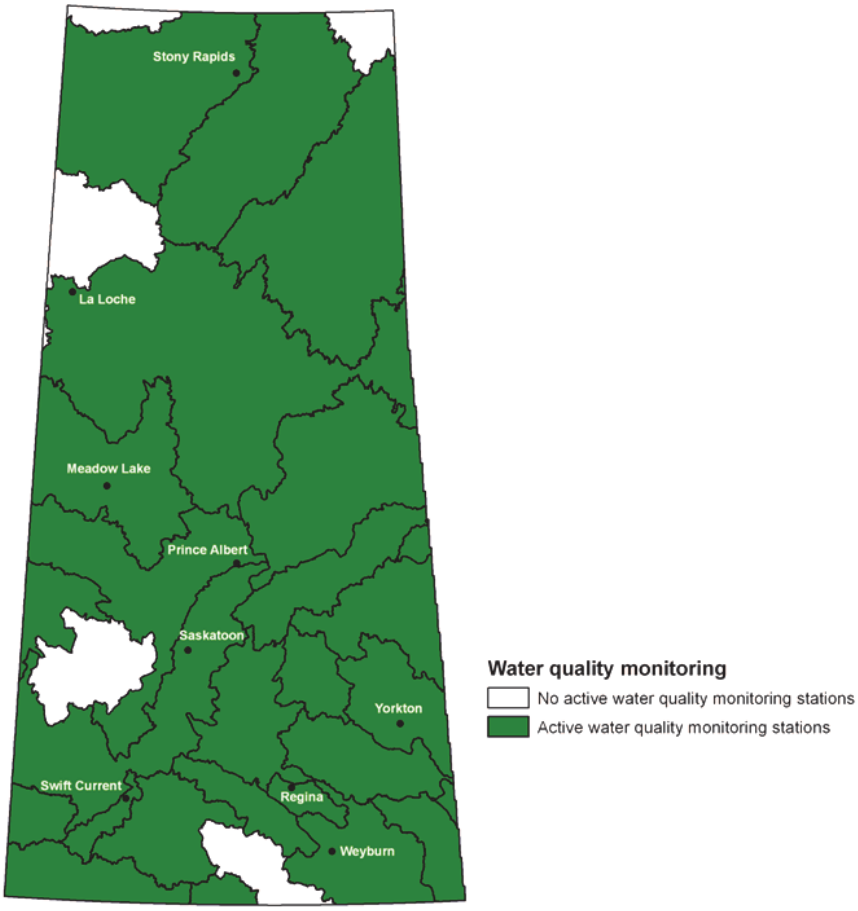

Figure 142. Water quality monitoring by watershed.

Water quality sampling, conducted by government-run water quality monitoring programs, occurs in 24 of Saskatchewan's 29 watersheds. Some of the ongoing water quality monitoring programs initiated in Saskatchewan by the federal and provincial governments include:

Surface Water Quality Monitoring Programs

1) The Saskatchewan Ministry of Environment's Surface Water Monitoring Program. The purpose of the Surface Water Quality Monitoring Program is to determine the water quality of select watercourses; quantify the loading of pollutants from point sources; assist in the establishment of total maximum daily loading of pollutants; estimate the natural background conditions of the watercourses; and allow temporal and spatial comparisons of water quality (Saskatchewan Environment 2005g).

   In 2005, as part of the Saskatchewan Ministry of Environment's Surface Water Monitoring Program, 22 primary monitoring stations were actively sampled at least eight times. Prior to

1997, water quality samples were collected at 18 primary stations and a number of secondary locations. Between 1997 and 2005, limited water quality monitoring was conducted at the primary sites. As of 2005, this program is monitoring eleven of Saskatchewan's 29 watersheds. The water quality parameters measured include nutrients, major ions, bacteriological tests, general water quality [pH, dissolved oxygen (DO), temperature], organic carbon, chlorophyll *a*, suspended solids, and select pesticides and trace metals.

2) The Prairie Provinces Water Board's Monitoring Program. The purpose of Prairie Provinces Water Board's (PPWB) water quality monitoring is to ensure that water quality at inter-provincial boundaries is maintained at acceptable levels.

   The Prairie Provinces Water Board monitors water quality along the 11 major eastward flowing rivers that cross inter-provincial boundaries between the three Canadian Prairie provinces. The monitoring is conducted by Environment Canada at 12 long-term water quality monitoring sites located along the Alberta-Saskatchewan and Saskatchewan-Manitoba borders. Eight of the sites are monitored monthly, one site is monitored once every two months, and three sites are monitored quarterly. Water samples are collected and analyzed for a range of parameters and compared with the PPWB's site-specific water quality objectives listed in Schedule E of the Master Agreement on Apportionment. Water quality parameters measured include nutrients, major ions, bacteriological tests, general water quality [pH, dissolved oxygen (DO), temperature], organics, chlorophyll *a*, suspended solids, and select pesticides and trace metals.

3) The Saskatchewan Watershed Authority's River and Lake Water Quality Monitoring. The Saskatchewan Watershed Authority conducts water quality monitoring at thirteen locations on rivers and lakes in Saskatchewan. Water quality monitoring is conducted six times a year at the following sites: Pasqua Lake, Echo Lake, Crooked Lake, and Round Lake. Seasonal and compliance water quality monitoring is conducted on the Souris River, Rough Bark Creek, Moose Mountain Creek, the Rafferty and Alameda Reservoirs, and Lake Diefenbaker. The water quality parameters measured are the same as the Saskatchewan Ministry of Environment's Surface Water Monitoring Program's parameters. These include nutrients, major ions, bacteriological tests; general water quality [pH, dissolved oxygen (DO), temperature], organic carbon, chlorophyll *a*, suspended solids, and select pesticides and trace metals.

   In addition to discrete water quality monitoring, the Saskatchewan Watershed Authority is also involved in continuous water quality monitoring of the Qu'Appelle River. This project was initiated to support provincial co-management agreements with First Nations and to further develop an understanding of the relationships between flow and water quality in the Qu'Appelle River. The objectives are to better understand changes in water quality by relating continuous measurements with traditional sampling and flow measurements. The continuous monitoring is conducted using YSI data sondes. Water quality parameters measured include dissolved oxygen, conductivity, temperature, pH, turbidity, and chlorophyll *a*. The purpose of the continuous monitoring program is to compare data from continuously gathered water samples with discrete samples collected at specific time intervals (e.g. monthly in the summer) to evaluate the effectiveness/representativeness of the current sampling program and to develop calibration curves for other water quality parameters. Data from the continuous monitoring will be used to develop in-stream flow requirements, monitor water quality, determine the efficacy of wastewater treatment, and allow the construction of frequency distribution curves to determine

the percentage of time that concentrations exceed Provincial Interim Surface Water Quality Objectives. The data will also be a major tool for assisting with the development of mixing zone objectives.

4) The Saskatchewan Ministry of Agriculture's Baseline Environmental Monitoring of Lower Order Streams in Saskatchewan (BEMLOSS) program. In 2008, the Saskatchewan Ministry of Agriculture initiated a monitoring program to examine water quality in streams that arise within Saskatchewan and are located in regions where agricultural group plans have been established. The Saskatchewan Watershed Authority conducted water quality sampling and reporting on the water quality at sixteen sites. These streams were chosen because they are lower order streams than the rivers monitored by the Saskatchewan Ministry of Environment (Primary Sites) or the Prairie Provinces Water Board. The objective of the study was to conduct long-term water quality monitoring of these sites to determine how land use, land use changes and water quality are interconnected. Because of their smaller size, these streams are be more closely linked to land use influences than are larger rivers (Saskatchewan Watershed Authority 2008a). Water quality parameters measured include nutrients, major ions, bacteriological tests, general water quality [pH, dissolved oxygen (DO), temperature], organic carbon, chlorophyll *a*, suspended solids, and pesticides and trace metals. Macroinvertebrate sampling was also conducted at each of these sites.

5) The Swift Current Creek Watershed Monitoring Project. In 2004, the Swift Current Creek Watershed Stewards initiated this monitoring project to assess the health of the Swift Current Creek Watershed using the Water Quality Index and bioassessment. Water quality parameters measured include nutrients, major ions, bacteriological tests, general water quality [pH, dissolved oxygen (DO), temperature], organic carbon, chlorophyll *a*, suspended solids, and pesticides and trace metals. The bioassessment methods used, include fish surveys, benthic macroinvertebrate surveys and riparian assessments.

Ground Water Quality Monitoring Programs

6) The Saskatchewan Watershed Authority's Rural Water Quality Advisory Program. The purpose of the Rural Water Quality Advisory Program (RWQAP) is to address concerns over the safety of rural water compared with water from urban centers; address the lack of awareness of potential health and aesthetic issues; improve quality of life; and develop a provincial database of rural water quality. The RWQAP has been operating provincially since November 1997. The program provides a full consultative service to anyone relying on a private water supply. As of December 2005, the RWQAP had sampled the private water supply, wells and dugouts of over 3,000 clients. Approximately 90% of the samples collected under the RWQAP were ground water, and 10% of the samples were from private surface water supplies. Water quality parameters measured include nitrate, major ions, bacteriological tests, general water quality [pH, dissolved oxygen (DO), temperature], organics, suspended solids, and trace metals.

Water Quality Monitoring Programs to Address Potential Environmental Impacts

7) Environment Canada's Environmental Effects Monitoring Program. The purpose of the Environmental Effects Monitoring Program is to assess if the effluent from pulp and paper mills and metal mines are having an environmental effect on the receiving waterbodies. The information collected and analyzed will ultimately determine if the environmental protection regulations for these sectors are effective.

   The Pulp and Paper Environmental Effects Monitoring (EEM) Program has been operating since 1992. Within the program water quality, effluent quality, and biological (aquatic benthic invertebrates, fish population and demographic data, and fish tissue) samples are collected. Water quality parameters measured include, nutrients (total nitrogen, total phosphorus, and total organic carbon), general water quality [pH, temperature, dissolved oxygen (DO), electrical conductivity, and hardness] (Environment Canada 2005).

   The Metal Mining Environmental Effects Monitoring (EEM) Program has been operating since 2002. The development of this program began in 1993 with a multi-stakeholder program entitled Assessment of the Aquatic Effects of Mining in Canada (AQUAMIN). The AQUAMIN report provided Environment Canada with recommendations on how to develop the Metal Mining EEM Program (Dumaresq et al. 2002). Within the Metal Mining EEM Program, water quality, effluent quality, and biological (aquatic benthic invertebrates, fish population and demographic data, and fish tissue) samples are collected. Water quality parameters measured include nutrients (nitrate, ammonia and total phosphorus), general water quality (pH, temperature, and total suspended solids), major ions, select trace metals, and the radionuclide 226Ra (Environment Canada 2002b).

8) The Saskatchewan Ministry of Agriculture and the Saskatchewan Ministry of Environment's Intensive Livestock Operations' Monitoring Program. In 1998, the Saskatchewan Ministry of Agriculture and the Saskatchewan Ministry of Environment initiated this monitoring program to assess potential impacts from intensive livestock operations on the environment. The purpose of the program was to establish a baseline of the surface water quality of these watercourses.

   The program focused on eight regions in Saskatchewan where intensive hog operations were spreading manure near watercourses. Sampling sites included: the Dellwood Brook/Burr C&D ditch in the Upper Qu'Appelle River Watershed; Lanigan Creek in the Upper Qu'Appelle River Watershed; Duck Creek/Meadowbank Creek in the Lake Winnipegosis Watershed; and Leather River/Sweetwater Creek in the Carrot River Watershed. Surface water quality data from adjacent watercourses were collected annually during spring runoff. Water quality parameters measured include nutrients, major ions, bacteriological tests, general water quality [pH, dissolved oxygen (DO), temperature], organics, chlorophyll *a*, suspended solids, and select pesticides and trace metals.

   Based on analysis of the data collected from these monitoring stations between 1998 and 2003, no trend in surface water quality was observed in watercourses adjacent to areas where manure was spread. To ensure water quality is not impacted by intensive livestock operations (ILOs), additional ongoing water quality sampling and analysis will continue (Low 2003).

9) The Saskatchewan Ministry of Environment's Cumulative Effects Monitoring Program. The purpose of the Cumulative Effects Monitoring (CEM) Program is to assess if uranium mines are having a cumulative effect on the environment in northern Saskatchewan.

The program was initiated in 1994 in response to the joint Federal-Provincial Panel on Uranium Development in Northern Saskatchewan. The program collects water quality samples, sediment chemistry and physical properties, fish samples, and passive air samples. The water quality parameters measured include major ions, general water quality [pH, dissolved oxygen (DO), temperature, specific conductivity, sum of ions], total alkalinity, total hardness, total suspended solids, major ions, trace metals and radionuclides (lead-210; polonium-210; and radium-226) (Canada North Environmental Services 2009).

10) In 2007, the Saskatchewan Watershed Authority initiated a water quality monitoring program in the Basin Lake/Lenore Lake watershed in response to high water levels in several of the lakes within the basin. The aim of this monitoring was to better understand water quality dynamics within the watershed, thereby increasing the available scientific information with which to assist in management decision making. In the lakes, water quality parameters measured include nutrients, major ions, general water quality [pH, dissolved oxygen (DO), temperature], organic carbon, chlorophyll *a*, total suspended solids, and trace metals. In the streams within the basin, salinity and general water quality [pH, dissolved oxygen (DO), temperature] are measured.

11) In 2007, earthen berms were constructed at several locations along and near the shoreline of Fishing Lake to provide permanent residences and cabins with protection from high water levels. Preceding and during berm construction, a water quality monitoring program was established. As a consequence of berm construction and continued high water levels, there remains concern about the quality of the water both within and downstream of Fishing Lake. This monitoring program continues to assess water quality in Fishing Lake and several downstream lakes. Surface water quality parameters measured include nutrients, major ions, bacteriological tests, general water quality [pH, dissolved oxygen (DO), temperature], organic carbon, chlorophyll *a*, total suspended solids, water clarity, and trace metals.

Indicator		
Water Quality Monitoring and Management	=	Water quality monitoring is actively occurring within the watershed

Rating Scheme

Water Quality Monitoring and Management
Absent/Gap = No water quality monitoring is actively occurring within the watershed.
Present = Water quality monitoring is actively occurring within the watershed.

Data Source: The locations and information on water quantity monitoring programs were obtained from the respective government departments involved in the water quality monitoring programs.

Water Quantity Monitoring and Management Indicator

This indicator reports on the government led water quantity monitoring and management programs in Saskatchewan.

Indicator	
Water Quantity Monitoring and Management	**Status:** Water quantity continues to be monitored at 308 hydrometric stations by the federal and provincial governments. **Trend:** The number of hydrometric stations has remained constant over the past two years.

The issue
Reliable long-term water quantity data is essential for addressing water management issues. The collection and analysis of water quantity data allows educated decisions on water allocations and ecological flow to be made. Programs assessing water quantity have been esablished in Saskatchewan for a number of reasons. Some programs assess water quantity as part of international or inter-provincial agreements, while others are used to assess water quantity for provincial allocation and supply purposes.

Water Quantity Monitoring and Management Indicator in Saskatchewan

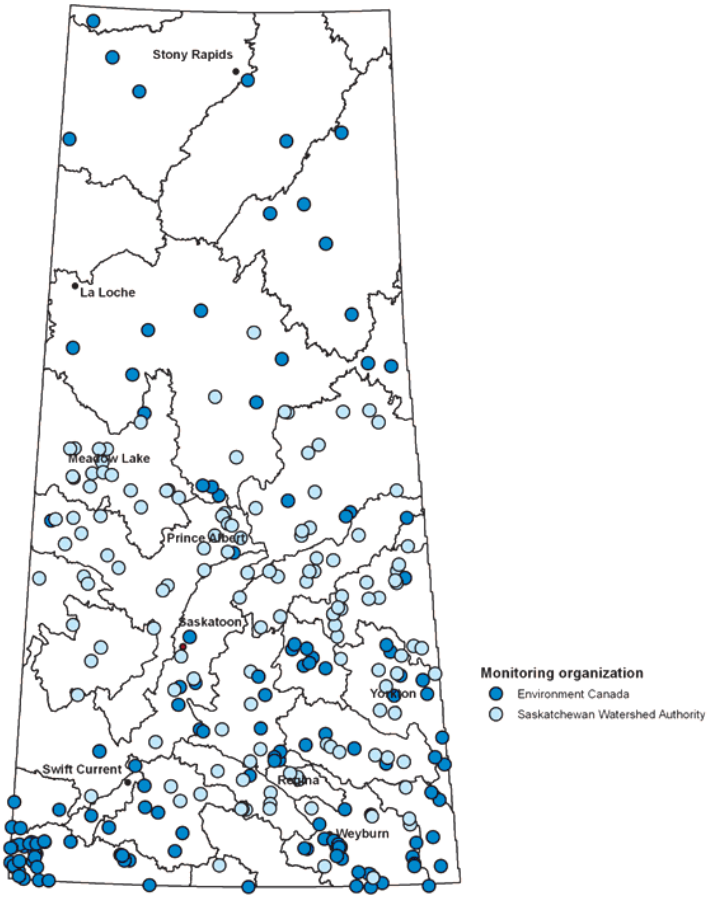

Figure 143. Spatial distribution of hydrometric station locations by monitoring organization.

Environment Canada, through the Water Survey of Canada, and the Saskatchewan Watershed Authority actively monitor 308 hydrometric stations in Saskatchewan.

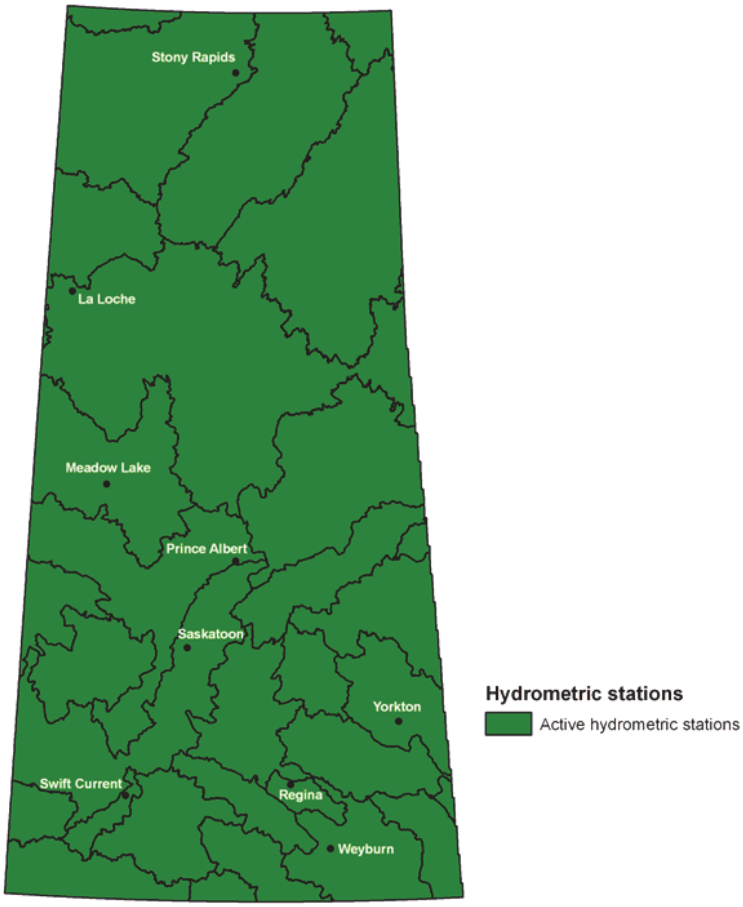

Figure 144. Water quantity monitoring by watershed.

Water quantity monitoring is active in all 29 watersheds in Saskatchewan. The water quantity in three watersheds is monitored outside of Saskatchewan's borders. These three watersheds include: Big Muddy Creek, which is monitored by the United States Geological Survey as part of the transboundary agreement; Kasba Lake, which is monitored by a station in Nunavut by Environment Canada; and the Athabasca River, which is monitored by Environment Canada along the Clearwater River in Alberta.

Ongoing federal and provincial water quantity monitoring and management programs include:

1) Environment Canada's Water Survey of Canada. The Water Survey of Canada is a cooperative initiative introduced in 1908 by the federal and provincial governments. The purpose of the Water Survey of Canada is to collect, analyze and publish information on water resources in Canada. Data are primarily collected using hydrometric stations. In Saskatchewan there is a network of 277 active hydrometric stations, of which 150 are monitored by Environment Canada and 127 are monitored by the Saskatchewan Watershed Authority. The Authority operates the stations as a contributing partner to the national database. Each hydrometric station records water level data on a continuous basis, either using a mechanical (analogue) recorder or an electronic recorder, or data logger. Data are used to calculate the rate of flow, or discharge, of a river, or the water level of a lake.

2) The Prairie Provinces Water Board's Monitoring Program. The Prairie Provinces Water Board reports on the water quantity at 14 locations along the 11 major eastward flowing rivers that cross inter-provincial boundaries between the three Canadian Prairie provinces. The purpose of the program is to ensure that the waters from eastward flowing rivers in the Prairie provinces are shared equitably. In 1948, the governments of Alberta, Saskatchewan, Manitoba and the federal government all signed the Prairie Provinces Water Board Agreement. The purpose of the agreement was to resolve inter-provincial conflicts between upstream uses and downstream needs. In 1969, the Master Agreement on Apportionment was signed by the same governments. The Master Agreement on Apportionment states that "Alberta and Saskatchewan may each take up to one half of the natural flow of water originating within its boundaries and one half of the flow entering the province. The remainder is left to flow into Manitoba" (Prairie Provinces Water Board n.d.).

3) The Saskatchewan Watershed Authority's Provincial Streamflow Forecast. Using hydrometric data, the Saskatchewan Watershed Authority River Forecast Centre prepares monthly provincial streamflow forecasts for Saskatchewan. These forecasts describe the current stream flow and water levels in the province and provide forecasts of expected flow conditions and lake levels (http://www.swa.ca/WaterManagement/ProvincialForecast.asp). Data from 158 hydrometric stations are used for this initiative, including the 127 stations the Saskatchewan Watershed Authority monitors as part of the Water Survey of Canada and the additional 31 stations the Authority monitors that are not part of the Water Survey of Canada.

4) The Saskatchewan Watershed Authority's Observation Well Network. The Observation Well Network was established in 1964 by the Saskatchewan Research Council to monitor ground water in Saskatchewan. The purpose of the network is to provide long-term information on the impacts of ground water withdrawals on the water levels of aquifers throughout Saskatchewan.

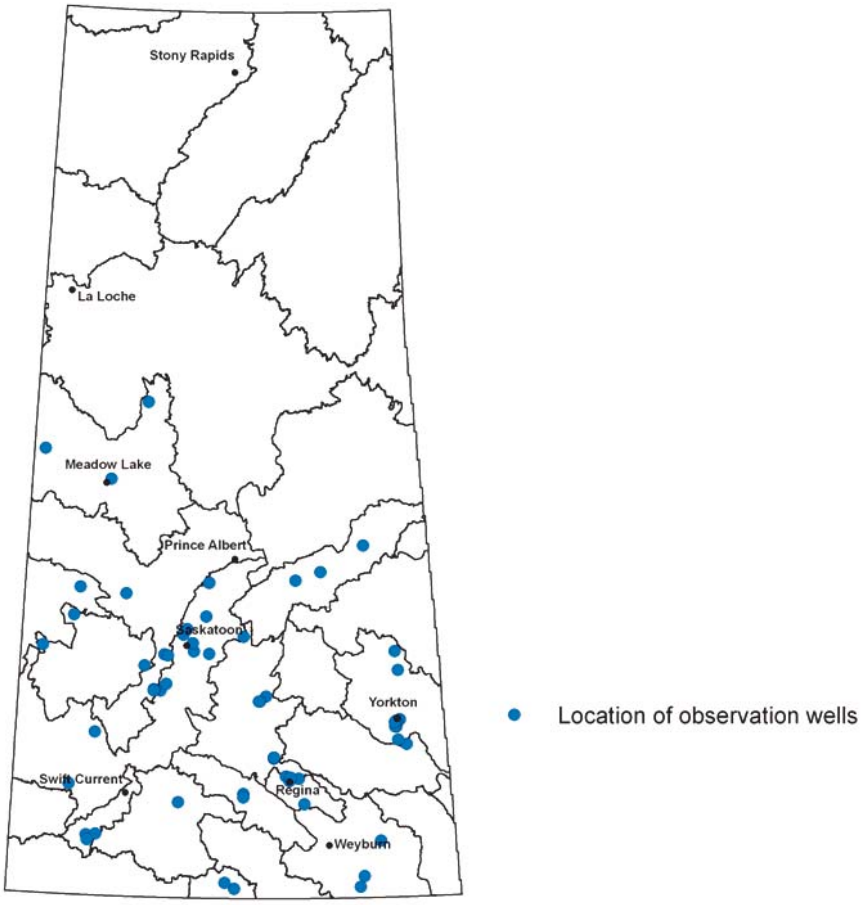

Figure 145. Spatial distribution of the Observation Well Network.

Figure 145 illustrates the spatial distribution of the Observation Well Network. The range of fluctuations in ground water levels is still not well understood, as less than 40 years of monitoring information has been collected.

In 1988, the Saskatchewan Watershed Authority initiated a second observation network to monitor water levels in areas of high development, such as the Regina and Yorkton area aquifer systems. Water level measurements from observation wells located throughout Saskatchewan are in digital format. These water level measurements are illustrated as hydrographs.

There are 72 observation wells located throughout Saskatchewan, and currently 70 of these are actively monitored. Of the 72 wells, 54 were previously monitored by the Saskatchewan Research Council (SRC), and 18 were monitored by the Saskatchewan Watershed Authority. As of April 1, 2005 the Saskatchewan Watershed Authority assumed responsibility for the observation wells operated by SRC. To date, the Authority is responsible for the 72 active observation wells located throughout Saskatchewan. Hydrographs from these wells are updated bi-annually. A brief description and information for each observation well can be obtained through the Saskatchewan Watershed Authority's website (http://www.swa.ca/WaterManagement/ground water.asp?type=ObservationWells).

The Saskatchewan Watershed Authority assists the public with general enquiries related to ground water and water wells. Potential water bearing zones are interpreted using past drilling information, water chemistry, and the geology and ground water resource maps. The information provides general guidance to the public for the water supply potential at a given location.

In addition to monitoring programs, there have been numerous investigations and reports written on water quantity in Saskatchewan. Some of these investigations and reports include:

- The Saskatchewan Rural Water Mapping initiative, initiated by Agriculture and Agri-Food Canada - Prairie Farm Rehabilitation Administration (AAFC-PFRA);
- *Annual Unit Runoff on the Canadian Prairies* (Bell 1994);
- *The Distribution and Variability of Runoff in Alberta, Saskatchewan and Manitoba* (Durrant and Salway 1964);
- *Report on Median Annual Unit Runoff for the Prairie Provinces* (Mowchenko 1978);
- *Magnitude and Frequency of Peak Flows and Flow Volumes in Saskatchewan* (Aaston 1986); and
- numerous reports produced by the Prairie Provinces Water Board related to stream flow, water use and deficiencies in Canada's three Prairie provinces (http://www.mb.ec.gc.ca/water/fa01/fa01s56.en.html).

Indicator		
Water Quantity Monitoring and Management	=	Water quantity monitoring is actively occurring within the watershed.

Rating Scheme

Water Quantity Monitoring and Management
Absent/Gap = no active hydrometric stations exist in the watershed.
Present = At least one active hydrometric station exists in the watershed.

Data Source: The locations and information on water quantity monitoring programs were obtained from the respective government departments involved in the monitoring programs.

Data Quality/Caveats: In the 2007 *State of the Watershed Report* it was reported that there were 323 active hydrometric stations in the province. This number was an inaccurate number; the actual number of active hydrometric stations was 309, as the Prairie Provinces Water Board (PPWB) does not monitor their own hydrometric stations but instead rely on data from Environment Canada. Therefore, the 14 stations attributed PPWB in the 2007 report were already accounted for in the stations monitored by Environment Canada.

Protected Areas Indicator

This indicator was designed to identify watersheds in Saskatchewan that have met the Province's target of having 12% of its area recognized as contributing to the Representative Areas Network.

Indicator	
Protected Areas	**Status:** The Saskatchewan Ministry of Environment continues to pursue additional candidate representative areas in ecoregions in Saskatchewan that are under-represented. **Trend:** No new land area has been added to Saskatchewan's Representative Areas Network since the 2007 *State of the Watershed Report*.

The issue

Protected areas function by restricting or prohibiting, through legal means, certain types of activities that cause ecological damage. Combined with conservation, sustainable use and restoration, protected areas are essential components for biodiversity conservation strategies (Convention on Biological Diversity n.d.). Therefore, an important component in conserving Saskatchewan's biodiversity and natural resources is the designation of protected areas. There are a number of reasons protected areas have been established in Saskatchewan, including, recreation, tourism, education, and an ecosystem approach to preserving the ecological integrity of a geographic region that has national and international significance.

Protected Areas Indicator in Saskatchewan

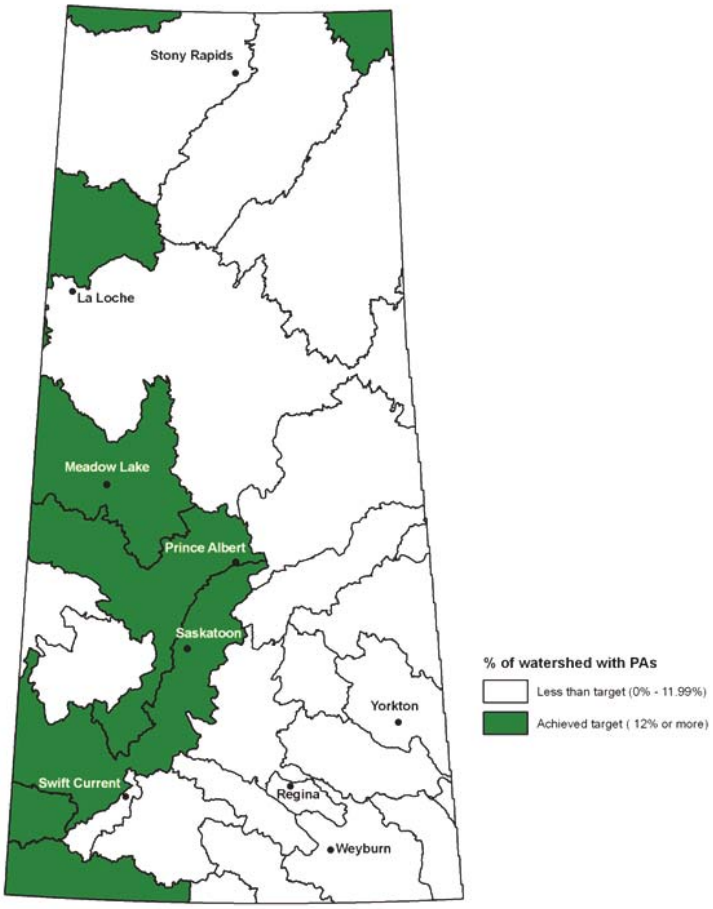

Figure 146. Percent of watershed with protected areas that are part of Saskatchewan's Representative Areas Network: 2006.

All 29 watersheds have at least one protected area that is part of Saskatchewan's Representative Areas Network. Eight of the 29 watersheds have protected areas that comprise 12% or more of the watershed area. The remaining 21 watersheds have protected areas that cover less than 12% of their area. No new representative area designations have been added since 2004, so the area reported in the 2007 *State of the Watershed Report* remains the same for this current report.

At the 1992 Earth Summit in Rio de Janeiro, world leaders agreed upon a strategy for sustainable development. Canada was the first industrialized country to ratify the Convention on Biological Diversity, one of two binding agreements signed at the Earth Summit. Canada's response to the Convention on Biological Diversity was the development of the *Canadian Biodiversity Strategy*, which was released publicly in 1995 (Biodiversity Convention Office 1995).

In 1998, in response to the *Canadian Biodiversity Strategy*, the Saskatchewan Biodiversity Interagency Steering Committee was established. The purpose of the committee was to oversee the development of a biodiversity action plan for Saskatchewan.

The Saskatchewan Ministry of Environment initiated the Representative Areas Network Program in 1997. The purpose of the program is to conserve areas of land and water within Saskatchewan that are representative of a unique part of the province's 11 ecoregions.

The following is a list of protected area designations that are part of the Representative Areas Network in Saskatchewan:

- Canadian Heritage River;
- Ecological Reserve;
- Game Preserve;
- Migratory Bird Sanctuary;
- National Historic Park;
- National Historic Site;
- National Park;
- National Wildlife Area;
- Agriculture and Agri-Food Canada – Agri-Environment Services Branch Community Pasture;
- Protected Area (Cultural Resource and Natural Area);
- Provincial and Municipal Heritage Property;
- Provincial Community Pasture;
- Provincial Historic Park;
- Provincial Historic Site;
- Provincial Natural Environment Park;
- Provincial Recreation Park;
- Provincial Recreation Site;
- Provincial Wilderness Park;
- RAMSAR;
- Regional Park;
- Urban Park;
- Wildlife Development Fund Land;
- Wildlife Habitat Protection Land; and
- Wildlife Refuge (Lawton 1994).

The Saskatchewan Ministry of Environment continues to pursue additional candidate representative areas in ecoregions in Saskatchewan that are under-represented. Progress is being made in a number of areas, particularly where land use planning exercises are underway in the Nisbet Forest, Missinipe, and Pinehouse-Dipper areas. Candidate representative areas have been identified within the land use plans for these areas. In addition, discussions are ongoing with First Nations and local stakeholders with respect to a candidate site in the Cree Lake area that is not part of a land use plan. It is anticipated that some of these noted sites may be designated in the next year or two (Marlon Klassen 2009, Personal Communication).

In 1999, the Government of Saskatchewan released a progress report entitled *Conserving Saskatchewan's Biodiversity* (Government of Saskatchewan 1999). The report summarized Saskatchewan's existing and upcoming policies, plans and programs that support the *Canadian Biodiversity Strategy*. Each of Saskatchewan's initiatives were grouped into one of the *Canadian Biodiversity Strategy's* five goals, which are:

- to conserve biodiversity and use biological resources in a sustainable way;
- to improve our understanding of ecosystems and increase our resource management capability;
- to promote an understanding of the need to conserve biodiversity and use biological resources in a sustainable manner;
- to maintain or develop incentives and legislation that support conservation of biodiversity and the sustainable use of biological resources; and
- to work with other countries to conserve biodiversity, use biological resources in a sustainable manner and equitably share the benefits that arise from the utilization of genetic resources.

To further understand the status of biological resources in Saskatchewan, the Saskatchewan Research Council identified, categorized, and ranked the potential threats to biodiversity in Saskatchewan. The result was a review document entitled *Threats to Biodiversity in Saskatchewan* (Saskatchewan Research Council 1999). The findings in this review document highlight habitat loss/alteration, fragmentation, and invasive alien species as the most prevalent threats to terrestrial biodiversity, and habitat loss/alteration, fragmentation, and pollution as the most prevalent threats to aquatic biodiversity.

In 2004, Saskatchewan's Biodiversity Interagency Steering Committee released *Caring for Natural Environments: A Biodiversity Action Plan for Saskatchewan's Future 2004-2009* (Government of Saskatchewan 2004). The final action plan incorporated the feedback received from the first and second phase of public consultation, and included a revised vision for biodiversity conservation, six principles for an action plan, and highlighted the 15 priority objectives and associated actions that were grouped into the five goals of the *Canadian Biodiversity Strategy* (Biodiversity Convention Office 1995). The focus of the action plan was to encourage all sectors of government to conserve biodiversity and promote the sustainable use of natural resources through an ecosystem-based management approach. Proposed governmental actions included the improvement of policies and programs, planning and management systems, and access to information. As stated in *Saskatchewan's Biodiversity Action Plan* (Government of Saskatchewan 2004), the province is committed to achieving a target of 12% of the province being recognized as contributing to the Representative Areas Network.

Public consultation was an important component in the development of *Saskatchewan's Biodiversity Action Plan*. The first phase of public consultation on biodiversity was the preparation of the discussion paper entitled *Conserving Saskatchewan's Natural Environment: Framework for a Saskatchewan Biodiversity Action Plan* (Government of Saskatchewan 2000). Public consultation during this phase consisted of meetings with the public and various interest groups, as well as a series of staff workshops with government department and agencies. The second phase of public consultation was through public feedback on the document entitled *Conserving Saskatchewan's Natural Environment: A Proposed Saskatchewan Biodiversity Action Plan* (Government of Saskatchewan 2002).

In May 2007, a letter from 1,500 scientists was released by the International Boreal Conservation Campaign to promote conservation in North America's Boreal Forest. The scientists raised concerns that the amount of land in Canada's boreal forest under protected status (less than 10 percent) was inadequate and needed to be increased. The scientists encouraged the adoption and implementation of the vision outlined in the Boreal Forest Conservation Framework. The Boreal Forest Conservation Framework, developed by industry, First Nations, and conservation organizations, promotes sustainable resource management that will facilitate the maintenance of the ecological and cultural integrity of the boreal forest.

Indicator		
Percent of Watershed with Protected Areas	=	$\frac{\text{Area of protected areas within a watershed (ha)}}{\text{Total watershed area (ha)}}$

Rating Scheme

Percent of Watershed with Protected Areas
Less than target = Less than 12% of the watershed is covered by protected areas.
Met target = At least 12% of the watershed is covered by protected areas.

Data Source: Shapefiles used to create this indicator are from the Government of Saskatchewan's Representative Area Network Geodatabase.

Data Quality/Caveats: Protected areas that are part of Saskatchewan's Representative Areas Network (RAN) include: ecological reserves; protected areas; special management areas; provincial parks; national parks; parkland reserves; recreation sites; *Wildlife Habitat Protection Act* lands; national wildlife areas; wildlife refuges; provincial community pastures; migratory bird sanctuaries; Agriculture and Agri-Food Canada – Agri-Environment Services Branch's community pastures; provincial community pastures; Ducks Unlimited Canada land; and conservation easements. Although conservation easements are part of the Representative Areas Network, they are only available as a point shapefile. Therefore, the area of land covered by conservation easements is currently not included in the Government of Saskatchewan's Representative Area Network Geodatabase or the indicator calculations used to develop Figure 146.

Legislative Tools, Strategies, Policies, and Guidelines Indicator

This indicator was designed to identify legislative tools, strategies, policies and guidelines that have been developed for Saskatchewan to address and mitigate the environmental impacts that are encountered due to human activities.

The issue
Legislative tools, strategies, policies and guidelines establish and promote procedures and protocols that have been created to regulate and manage human activity. The focus of this indicator is to provide information on Saskatchewan legislation and associated documents that have been created to reduce the potential environmental impact of those activities.

Legislative Tools, Strategies, Policies, and Guidelines Indicator in Saskatchewan

Legislative Tools, Strategies, Policies, and Guidelines related to Human Settlement

The Planning and Development Act, 2007, is the primary legislation controlling community planning in Saskatchewan. This Act establishes both planning authorities and districts and their functions; outlines the purpose and content of development plans and zoning bylaws; and describes the appointment and purpose of a Development Appeals Board and the dedication of lands requirement by land owners.

The Cities Act regulates and provides legislative power to cities within Saskatchewan.

The Municipalities Act regulates and provides legislative power to Rural Municipalities, Towns, Villages and Resort Villages within Saskatchewan.

The Northern Municipalities Act regulates and provides legislative power to Northern Municipalities, settlements, Hamlets and Villages within Saskatchewan.

Legislative Tools, Strategies, Policies, and Guidelines related to Roads

The Planning and Development Act, 1983, is the primary legislation controlling community planning in Saskatchewan. This Act establishes both planning authorities and districts and their functions; outlines the purpose and content of development plans and zoning bylaws; and describes the appointment and purpose of a Development Appeals Board and the dedication of lands requirement by land owners.

The Highways and Transportation Act, 1997 and *Regulations*, administered by the Saskatchewan Ministry of Highways and Infrastructure, deals with highways, public improvements, transportation and transportation systems.

Area Transportation Planning Committees were initiated by the Saskatchewan Ministry of Highways and Infrastructure to assist in the planning of transportation systems in Saskatchewan. The first committee was established in 1995. Committee members include representatives from rural and urban

municipalities, Regional Economic Development Authorities, the Saskatchewan Urban Municipalities Association (SUMA), the Saskatchewan Association of Rural Municipalities (SARM), the Saskatchewan Ministry of Highways and Infrastrcuture, and other major stakeholder groups in the area (http://www.highways.gov.sk.ca/docs/programs_services/ATPC/Area_Trans_Comm.asp).

Legislative Tools, Strategies, Policies, and Guidelines related to Ground and Surface Water

The Conservation and Development Act and *Regulations*, administered by the Saskatchewan Watershed Authority, facilitate and explain the necessary procedures to establish conservation and development areas. Conservation and development areas allow for flood control, drainage, and multipurpose works to be constructed, operated and maintained for the benefit of agricultural lands and wildlife.

The Drainage Control Regulations, administered by the Saskatchewan Watershed Authority, establish a permit system for the operation and construction of drainage projects.

The Ground Water Regulations, administered by the Saskatchewan Watershed Authority, control exploration for and use of ground water through the establishment of a permit system. The Regulations set out requirements that the owner and driller must comply with, including registering machinery, submitting drilling records, well disinfection and construction methods, test hole abandonment procedures, and licensing and use of ground water.

The Reservoir Development Area Regulations, administered by the Saskatchewan Watershed Authority, describe the regulatory requirements to obtain a development permit for constructing, moving, or using a structure or land within a reservoir development area for the purpose of lake and shoreline development.

The Saskatchewan Watershed Authority Act, 2005, administered by the Saskatchewan Watershed Authority, established the Saskatchewan Watershed Authority in October 2002. The Act mandates that the Authority: manage and protect Saskatchewan's source water, watersheds and related lands; promote water conservation; regulate water development and water use; and promote research and conservation programs related to the aforementioned activities.

The Water Power Act, administered by the Saskatchewan Watershed Authority, provides regulations for the development of power plants for the purpose of commercial energy generation where energy is generated from flowing or falling water.

The Watershed Associations Act, administered by the Saskatchewan Watershed Authority, permits a Watershed Association to be formed by two or more agencies for the purpose of planning, operating, constructing, improving, and maintaining projects to protect or develop land and water resources at a watershed level.

The Prairie Farm Rehabilitation Act established the Prairie Farm Rehabilitation Administration (PFRA) in 1935. The act mandates that PFRA develop and deliver soil and water conservation and development programs.

The Saskatchewan Wetland Policy was developed in 1995 by a consortium of provincial agencies. This policy is implemented by provincial government departments and agencies, and led by the Saskatchewan Watershed Authority. The objective of the policy is to "promote the sustainable management of wetlands on public and private lands" (Lynch-Stewart et al. 1999).

The Saskatchewan Watershed Authority is continuing its policy work regarding wetland conservation, and is currently collaborating with the Ministry of Environment in this area. The Authority has also been working to revise its policy regarding drainage management. To promote an approach that balances environmental, economic and social interests, the policy development has included ongoing discussions with many interested organizations, including agriculture, industry, and conservation groups, and Aboriginal, local, and federal governments.

The Interim Surface Water Quality Objectives (Saskatchewan Environment 2006a) were developed to address general and specific objectives for surface water quality objectives, and general objectives for effluent discharges and effluent mixing zones. General water quality objectives provide a minimum level of protection for general users. Specific water quality objectives pertain to water quality requirements for protecting aquatic life and wildlife, recreational uses, and agricultural uses (crop irrigation and livestock watering). Although the objectives are geared towards surface water quality, they are also applicable to ground water.

Saskatchewan's Safe Drinking Water Strategy was developed by the Government of Saskatchewan and announced in April 2002. The strategy outlined the Province's plan to protect and enhance drinking water quality and supplies in a sustainable manner (http://www.se.gov.sk.ca/environment/protection/water/Water_report_April_2003.pdf).

Legislative Tools, Strategies, Policies, and Guidelines related to Aquatic Fragmentation

The *Navigable Waters Protection Act* and *Regulations*, administered by Transport Canada, regulate the construction of works in navigable waters.

The *Fisheries Act*, administered by Fisheries and Oceans Canada, protects fish habitat through the regulation of impediments to fish migration, the disturbance of fish habitat, and the discharge of deleterious substances in water frequented by fish.

The *Fisheries Regulations*, administered by Fisheries and Oceans Canada under the *Fisheries Act*, promote the sustainable management of fisheries in Saskatchewan by: administering a licensing program; managing the allocation of fish resources; and controlling aquaculture and the marketing, stocking and importation of fish.

The Policy for the Management of Fish Habitat, developed by Fisheries and Oceans Canada in 1985, applies to habitat that directly or indirectly supports Canada's freshwater and marine fisheries.

The Shore Primer contains guidelines that were developed by Fisheries and Oceans Canada for assisting waterfront residents with the development and management of a healthy waterfront.

Fisheries and Oceans Canada has also developed numerous fact sheets for Saskatchewan related to fish habitat (http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/index_e.asp).

Legislative Tools, Strategies, Policies, and Guidelines related to Wastewater

The Water Regulations, 2002, administered by the Saskatchewan Ministry of Environment under *The Environmental Management and Protection Act, 2002*, regulate the operations and reporting of municipal water treatment and wastewater treatment facilities.

The Plumbing and Drainage Regulations, administered by the Saskatchewan Ministry of Health through the local health authority, regulate private sewage systems.

Legislative Tools, Strategies, Policies, and Guidelines related to Agriculture

The Agricultural Operations Act, administered by the Saskatchewan Ministry of Agriculture, sets forth regulations for nuisance provisions and intensive livestock provisions.

The Irrigation Act, 1996, administered by the Saskatchewan Ministry of Agriculture, sets out guidelines to promote environmentally-sustainable irrigation in Saskatchewan.

The *Fertilizers Act* and *Regulations* are administered by the Canadian Food Inspection Agency. Some of the activities that the Canadian Food Inspection Agency is involved with include: registration of fertilizers; review of fertilizer product safety, efficacy, and labelling; monitoring for active ingredients and contaminants in the market place; administering the Canadian Fertilizer Quality Assurance Program (CFQAP); and inspection and enforcement.

The Hazardous Substances and Waste Dangerous Goods Regulations, administered by the Saskatchewan Ministry of Environment, control the storage and handling of designated Hazardous Substances and Waste Dangerous Goods and the decommissioning of Hazardous Substances and Waste Dangerous Goods storage facilities.

The Environmental Spill Control Regulations, administered by the Saskatchewan Ministry of Environment, outline the types of spills that these regulations apply to and the procedure that must be followed if a spill occurs, including how the spill must be reported, the remedial action that must be taken, and the disposal of the spilled pollutant.

Growing Forward: The New Agricultural Policy Framework is an agricultural strategy developed by federal, provincial and territorial Ministers of Agriculture. The policy addresses agriculture and how it relates to: business risk management; the environment; food safety and quality; continuous learning; and science and innovation.

All pesticides imported into, sold, or used in Canada are regulated under the *Pest Control Products Act* and *Regulations*, administered by the Pest Management Regulatory Agency (PMRA) of Health Canada. Some of the activities the PMRA is involved with include registering pest control products, re-evaluating registered products, and setting maximum residue limits under the *Food and Drugs Act* (Health Canada 2003). In November 2006, the *Pest Control Products Sales Information Reporting Regulations were published under the Pest Control Products Act.* These Regulations require registrants of pesticides to annually report product sales information to Health Canada. This information will be used by Health Canada to assist in developing risk indicators to better assess health and environmental risks associated with pesticide use.

Within the Province of Saskatchewan, the Saskatchewan Ministry of Agriculture regulates, under *The Pest Control Products (Saskatchewan) Act* and *Regulations, 1995*, the sale, use, storage, transportation and disposal of registered pesticides. *The Hazardous Substances and Waste Dangerous Goods Regulations* and *The Environmental Spill Control Regulations* under *The Environmental Management and Protection Act, 2002*, are administered by the Saskatchewan Ministry of Environment.

Legislative Tools, Strategies, Policies, and Guidelines related to Oil and Gas

The Mineral Resources Act, 1985 administered by the Saskatchewan Ministry of Energy and Resources, applies to all exploration, development, conservation or management of provincial mineral resources.

The Oil and Gas Conservation Act and *The Oil and Gas Conservation Regulations, 1985,* administered by the Saskatchewan Ministry of Energy and Resources, are designed for many purposes. One objective of the regulations includes protecting the environment and environmentally sensitive areas with regards to drilling, operations and well abandonment of the oil and gas industry. The Regulations also outline when a spill must be reported.

The Pipelines Act, 1985, and *The Pipelines Regulations, 2000*, are administered by the Saskatchewan Ministry of Energy and Resources. The *Pipeline Regulations* require the reporting of certain spills of a minimum volume from licensed pipelines. The pipeline spill numbers and volumes are included in the Upstream Oil and Gas Sites Spill Database.

The Seismic Exploration Regulations, 1999, administered by the Saskatchewan Ministry of Energy and Resources, outline the requirements a company interested in seismic exploration must complete, including: applying for a license to conduct seismic exploration; submitting a preliminary plan of the program for approval prior to commencing field operations; following the restrictions on seismic exploration; restoring property that has been damaged by the seismic exploration activities; and proper handling of explosives. Preliminary proposals for all seismic projects are reviewed by the Saskatchewan Ministry of Environment. Proposals are jointly reviewed by the Saskatchewan Ministry

of Agriculture if the proposed project affects Crown agricultural land. The Saskatchewan Ministry of Environment applies the following legislation when reviewing a proposal:

- *The Environmental Assessment Act*;
- *The Wildlife Habitat Protection Act*;
- the *Fisheries Act (Saskatchewan) 1994*;
- *The Forest Resources Management Act*;
- *The Provincial Lands Act*;
- *The Environmental Management and Protection Act, 2002*; and
- *The Wildlife Act, 1998*.

The Hazardous Substances and Waste Dangerous Goods Regulations, administered by the Saskatchewan Ministry of Environment, control the storage and handling of designated Hazardous Substances and Waste Dangerous Goods and the decommissioning of Hazardous Substances and Waste Dangerous Goods storage facilities.

The Environmental Spill Control Regulations, administered by the Saskatchewan Ministry of Environment, outline the types of spills that these regulations apply to and the procedure that must be followed if a spill occurs, including how the spill must be reported, the remedial action that must be taken, and the disposal of the spilled pollutant.

The PCB Waste Storage Regulations, administered by the Saskatchewan Ministry of Environment, outline how PCBs must be stored and the storage facility requirements.

The Saskatchewan Upstream Petroleum Industry Storage Standards, adopted by the Saskatchewan Ministry of Energy and Resources, has many purposes. One of these purposes includes outlining the environmental protection measures that the industry must abide by to ensure that the storage of materials produced, generated and used by the industry are environmentally sound.

The Guidelines for the Construction and Monitoring of Oily Byproduct Storage Structures, adopted by the Saskatchewan Ministry of Energy and Resources, deal with the environmental considerations that must be incorporated in the construction, operation and maintenance of hydrocarbon-contaminated solid and liquid storage structures.

The Application of Oily Byproducts to Municipal Roads Guidelines outlines the environmental issues that must be taken into account to ensure the application of these byproducts on roads is done in an environmentally sensitive manner.

The Upstream Waste Management Guidelines, prepared for the Saskatchewan Petroleum Industry – Government Environment Committee (SPIGEC), were designed to minimize the impact of upstream waste material on the environment. The guidelines outline the proper handling, storage, treatment, transport and disposal of industrial waste produced by the upstream oil and gas industry.

The Spill Site Reclamation Guidelines provide operators with a guide to restoration methods that reduce the environmental impact of crude oil, salt water and emulsion spills.

The Upstream Contaminated Sites Remediation and Environmental Site Assessment Guidelines provide a standardized approach to the identification, environmental assessment and remediation of contaminated sites caused by the upstream oil and gas industry.

The Drilling Waste Management and Frac Fluid and Sand Disposal Guidelines pertain to the environmentally appropriate management of drilling waste and Frac fluids and sands.

The Interim Draft Industrial Landfilling Requirements for Wastes Generated from Upstream Oil and Gas Industry deal with reducing and properly handling wastes generated from the upstream oil and gas industry.

Legislative Tools, Strategies, Policies, and Guidelines related to Mining

The Mineral Resources Act, 1985 administered by the Saskatchewan Ministry of Energy and Resources, applies to all exploration, development, conservation or management of provincial mineral resources.

The Mineral Industry Environmental Protection Regulations, 1996, administered by the Saskatchewan Ministry of Environment through *The Environmental Management and Protection Act, 2002*, control the construction, operation, closure and decommissioning of a pollutant control facility. This applies where a pollutant control facility is an area used for the collection, containment, storage, transmission, treatment or disposal of pollutants associated with mining operations or mineral operations.

The *Metal Mining Effluent Regulations and Guidelines*, administered by Fisheries and Oceans Canada under the *Fisheries Act*, apply to all metal mines, except gold mines using cyanidation, that have been in operation prior to February 1977. “The Regulations impose limits on releases of cyanide, metals, and suspended solids, and prohibit the discharge of effluent that is acutely lethal to fish. The Regulations also require metal mines to conduct Environmental Effects Monitoring programs to identify any adverse effects of their effluent on fish, fish habitat, and the use of fisheries resources” (Canada-Yukon Business Service Centre 2003).

The Seismic Exploration Regulations, 1999, administered by the Saskatchewan Ministry of Energy and Resources, outline the requirements a company interested in seismic exploration must complete, including: applying for a license to conduct seismic exploration; submitting a preliminary plan of the program for approval prior to commencing field operations; following the restrictions on seismic exploration; restoring property that has been damaged by the seismic exploration activities; and proper handling of explosives. Preliminary proposals for all seismic projects are reviewed by the Saskatchewan Ministry of Environment. Proposals are jointly reviewed by the Saskatchewan Ministry of Environment and Saskatchewan Ministry of Agriculture if the proposed project affects Crown agricultural land. The Saskatchewan Ministry of Environment applies the following legislation when reviewing a proposal:

- *The Environmental Assessment Act*;
- *The Wildlife Habitat Protection Act*;
- the *Fisheries Act (Saskatchewan) 1994*;
- *The Forest Resources Management Act*;
- *The Provincial Lands Act*;
- *The Environmental Management and Protection Act, 2002*; and
- *The Wildlife Act, 1998*.

To promote best management practices for mineral exploration, the *Mineral Exploration Guidelines for Saskatchewan* were developed. The guidelines are intended to assist government and industry in the application and approval process for mineral exploration activities on land administered by the Saskatchewan Ministry of Environment. These guidelines provide information on best management practices to assist proponents in reducing the environmental impacts of planning, initiating and completing a mineral exploration program (Saskatchewan Mineral Exploration and Government Advisory Committee 2005).

Legislative Tools, Strategies, Policies, and Guidelines related to Forestry

The Forest Resources Management Act, administered by the Saskatchewan Ministry of Environment, promotes the sustainable management of forested lands through, in part, the protection of watersheds and forests.

The Government of Saskatchewan announced in the spring of 2009 that it is adopting a results-based model for environmental regulation. This model will promote innovative tools in environmental management to improve environmental protection.

"In developing and implementing this results-based regulatory model, the Saskatchewan Ministry of Environment will move forward on a number of initiatives, including:

- streamlining, consolidating and modernizing environmental legislation, starting with *The Environmental Management and Protection Act*, *The Environmental Assessment Act* and *The Forest Resources Management Act*;
- developing a Saskatchewan Environmental Code that will set the framework for improved environmental management through clear statements of desired environmental outcomes and standards;
- reorganizing the Ministry to better deliver the requirements of results-based regulation;
- providing an electronic platform for environmental information and program delivery, including web-based environmental applications and reporting. This will mean a streamlined application process and transparency in reporting results; and
- continuing to engage the public, First Nations and Métis and stakeholders in consultation as the design and implementation of the new regulatory framework move forward" (Government of Saskatchewan 2009a).

Legislative Tools, Strategies, Policies, and Guidelines related to Landfills

The Environmental Management and Protection Act, 2002, administered by the Saskatchewan Ministry of Environment, regulates landfills in Saskatchewan. This Act regulates and controls the disposal of deleterious substances and activities that are harmful to air, land and water resources.

The Municipal Refuse Management Regulations, administered by the Saskatchewan Ministry of Environment, were created in 1986 specifically for the management of the municipal landfill program. These Regulations, in conjunction with *The Environmental Management and Protection Act, 2002*, regulate and permit municipal landfills in Saskatchewan.

The Clean Air Act and *Regulations*, administered by the Saskatchewan Ministry of Environment, regulate and control air emissions through the issuance of permits to operate industrial sources, fuel-burning equipment, and/or incinerators. The Regulations mandate that operators with permits cannot exceed the maximum established air contaminant concentrations and require operators to report accidental discharge of air emissions.

The Hazardous Substances and Waste Dangerous Goods Regulations, administered by the Saskatchewan Ministry of Environment, control the storage and handling of designated Hazardous Substances and Waste Dangerous Goods and the decommissioning of Hazardous Substances and Waste Dangerous Goods storage facilities.

The Litter Control Act and *Regulations*, administered by the Saskatchewan Ministry of Environment, prohibit the act of littering, establishes fees for individuals caught littering, and enables the establishment of recycling depots for designated containers.

The Used Oil Collection Regulations, administered by the Saskatchewan Ministry of Environment, regulate the implementation of a Used Oil Material Recycling Program.

The Waste Paint Management Regulations, administered by the Saskatchewan Ministry of Environment, regulate the implementation of a Paint Recycling Program.

The Scrap Tire Management Regulations, administered by the Saskatchewan Ministry of Environment, regulate the implementation of a Scrap Tire Management Program.

The Waste Electronic Equipment Regulations, administered by the Saskatchewan Ministry of Environment, regulate the implementation of a province-wide e-waste recycling program.

The Interim Draft Industrial Landfilling Requirements for Wastes Generated from Upstream Oil and Gas Industry deal with reducing and properly handling wastes generated from the upstream oil and gas industry.

The Guidelines for Submission of Application for a Waste Processing Facility, administered by the Saskatchewan Ministry of Energy and Resources, provides guidelines on how to submit an application for a waste processing facility.

Legislative Tools, Strategies, Policies, and Guidelines related to Industrial Waste

The Clean Air Act and *Regulations*, administered by the Saskatchewan Ministry of Environment, regulate and control air emissions through the issuance of permits to operate industrial sources, fuel-burning equipment, and/or incinerators. The Regulations mandate that operators with permits cannot exceed the maximum established air contaminant concentrations and require operators to report accidental discharge of air emissions.

The Environmental Management and Protection Act, 2002, administered by the Saskatchewan Ministry of Environment, regulates and controls the disposal of deleterious substances and activities that are harmful to air, land and water resources.

The *Fish Toxicant Regulations*, administered by Fisheries and Oceans Canada under the *Fisheries Act*, deal with the discharge of deleterious substances that are fish toxicants.

The *Pulp and Paper Effluent Regulations*, regulated by Environment Canada under the *Fisheries Act*, require pulp and paper mills to conduct an Environmental Effects Monitoring program (EEM). The Environmental Effects Monitoring program consists of a number of monitoring surveys, including:

- *The Fish Survey* (biological monitoring survey);
- *The Benthic Invertebrate Community Survey* (biological monitoring survey);
- *Fish Usability* (biological monitoring survey);
- *Alternative Monitoring Methods*;
- *Sublethal Toxicity Testing*; and
- *Environmental Supporting Variables*.

The *Metal Mining Effluent Regulations*, regulated by Environment Canada under the authority of the *Fisheries Act*, require metal mines to conduct an Environmental Effects Monitoring program (EEM). The Environmental Effects Monitoring program consists of a number of monitoring surveys, including:

- *The Fish Survey* (biological monitoring survey);
- *The Benthic Invertebrate Community Survey* (biological monitoring survey);
- *Fish Usability* (biological monitoring survey);
- *Alternative Monitoring Methods*;
- *Sublethal Toxicity Testing*; and
- *Environmental Supporting Variables*.

The Upstream Waste Management Guidelines, prepared for the Saskatchewan Petroleum Industry – Government Environment Committee (SPIGEC), were designed to minimize the impact of upstream waste material on the environment. The guidelines outline the proper handling, storage, treatment, transport and disposal of industrial waste produced by the upstream oil and gas industry.

The Drilling Waste Management and Frac Fluid and Sand Disposal Guidelines pertain to the environmentally appropriate management of drilling waste and Frac fluids and sands.

The Interim Draft Industrial Landfilling Requirements for Wastes Generated from Upstream Oil and Gas Industry deal with reducing and properly handling wastes generated from the upstream oil and gas industry.

Legislative Tools, Strategies, Policies, and Guidelines related to Invasive Species

The Fisheries Act (Saskatchewan), 1994, regulated by the Saskatchewan Ministry of Environment, prohibits the introduction of fish species except in accordance with any license or any provisions of this Act or the *Fisheries Act* or the *Fisheries Regulations*.

The Noxious Weeds Act, 1984, and *The Noxious Weeds Regulations*, regulated by the Saskatchewan Ministry of Agriculture is the provincial legislation that gives municipalities the power to enforce the management of noxious weeds by land owners.

The Noxious Weeds Designation Regulations provides a list of plants designated as noxious weeds in Saskatchewan.

Legislative Tools, Strategies, Policies, and Guidelines related to Species at Risk

The *Species at Risk Act (2002)*, regulated by Environment Canada, addresses the protection, recovery, and management of wildlife species that have been designated as being of special concern.

The Wildlife Act, 1998, regulated by the Saskatchewan Ministry of Environment, addresses the protection of wildlife and wild species at risk in the province of Saskatchewan. Some of the issues covered in the Act include: harvesting, licensing, prohibitions and prosecutions, enforcement, and offences and penalties related to the protection of wildlife and species at risk.

The Wildlife Habitat Protection Act, regulated by the Saskatchewan Ministry of Environment, regulates the protection and management of Crown lands for wildlife habitat purposes.

The Accord for the Protection of Species at Risk, regulated by Environment Canada, was agreed upon in 1996 by Canada's federal, provincial and territorial governments. The accord outlines a national commitment to designate species-at-risk, protect their habitats and develop recovery plans (Environment Canada 2002a).

Legislative Tools, Strategies, Policies, and Guidelines related to Environmental Protection

The Conservation Easement Act, administered by the Saskatchewan Ministry of Environment, enables conservation easements to be acquired through agreements between specified grantors and holdees for the purpose of the protection, enhancement and rehabilitation of biodiversity and air, land and water quality.

The Ecological Reserves Act, administered by the Saskatchewan Ministry of Environment, facilitates the protection of unique and representative natural ecosystems by appointing Crown land as an ecological reserve.

The Environmental Assessment Act, administered by the Saskatchewan Ministry of Environment, outlines the environmental assessment and review process any project defined as a "development" must undergo to assess the impact of the development on the environment and to ensure developments in Saskatchewan are sustainable.

The Environmental Management and Protection Act, 2002, administered by the Saskatchewan Ministry of Environment, regulates and controls the disposal of deleterious substances and activities that are harmful to air, land and water resources.

The Litter Control Act, administered by the Saskatchewan Ministry of Environment, prohibits the act of littering, establishes fees for individuals caught littering, and enables the establishment of recycling depots for designated containers.

The Natural Resources Act, administered by the Saskatchewan Ministry of Environment, regulates the planning, construction, operation and management of any parks or renewable natural resources in Saskatchewan.

The Parks Act, administered by the Saskatchewan Ministry of Environment, enables the administration, disposition, establishment and management of parks and park land reserves in Saskatchewan.

The *Canadian Environmental Assessment Act* and *Regulations*, regulated by Environment Canada. The *Canadian Environmental Assessment Act* is triggered when the Canadian government is the proponent of the project; provides financial assistance to the project; grants an interest in land where the project will occur; or exercises a regulatory duty.