

Profile of the South Saskatchewan Region



Government
of Alberta ■

Table of Contents

Introduction	1
Alberta's Land-use Framework	1
Purpose of this Overview	2
The South Saskatchewan Region	3
Regional Overview	5
Community and Social Development	9
Population and Settlement	9
Aboriginal Communities	15
Transportation Infrastructure	16
Recreation and Parks	21
Culture and Community	27
Community Health	28
Higher Education	32
Economic Development and Prosperity	35
Agriculture	35
Energy and Minerals	45
Forestry	52
Tourism	58
Ecosystems and Environment	59
Natural Regions and Subregions	59
Water	64
Biodiversity	78
Air and Emissions	84
Land	87
Historical Resources	89

Cover Image: 6 Mile Coulee in Lethbridge

ISBN: 978-0-7785-8891-7 (Printed Edition)
978-0-7785-8892-4 (Online Edition)

Pub No. I/415

Printed November 2009

Photo Credits:
Alberta Agriculture and Food
City of Medicine Hat
Cliff Wallis
Dezene Huber
Doug Olson
Gord Court
Sean Birch
Travel Alberta

Introduction

Alberta's Land-use Framework

In response to Alberta's remarkable growth over the past 10 years, the Government of Alberta commenced a comprehensive initiative to develop a new land-use system for the province. Following consultation with a broad range of Albertans, the government released the Land-use Framework¹ for Alberta on December 3, 2008.

The Land-use Framework ushers in a new approach to managing public and private lands and natural resources to achieve Alberta's long-term economic, environmental and social goals. The framework is intended to provide the province with a blueprint for making decisions that will address Alberta's growth pressures. It is also designed to ensure good stewardship of Alberta's lands and resources, so that future generations of Albertans benefit from the province's natural beauty and prosperity, just as we do today.

The framework establishes three desired outcomes:

- a healthy economy supported by our land and natural resources;
- healthy ecosystems and environment; and
- people-friendly communities with ample recreational and cultural opportunities.

These outcomes recognize that Alberta's social, economic and environmental goals are highly integrated – how we choose to pursue one set of goals unavoidably affects the others. Achieving our objectives will therefore require trade-offs and decision-making about how, where and when Alberta's lands and resources are used for the benefit of Albertans.

To set out these important decisions, the Land-use Framework calls for the development of seven regional plans, based on seven new land-use regions. This regional approach recognizes the great diversity of Alberta's regions, while ensuring a degree of coordination between provincial-level decisions over Crown lands and municipal-level land-use decisions.

Each regional plan will set outcomes for the region. Each plan will also determine how Alberta government priorities and strategies (such as Water for Life, the Provincial Energy Strategy and the Climate Change Strategy) will align at the regional level. Once approved by Cabinet, each regional land-use plan will become the governing land-use policy for the

¹ Government of Alberta (2008), Land-use Framework. Edmonton: Alberta Sustainable Resource Development.



region; municipalities within the region will be required to ensure their municipal-level plans are consistent with provincial direction.

The southern part of Alberta has been undergoing development since the province was first settled. Today, portions of the region look dramatically different than from pre-settlement times. Much of the region's native grasslands have been converted to other land covers, and a great deal of the forested land cover has been transformed. Population growth and related growth in agriculture, resource production, and tourism and recreation demand, have resulted in a region with intensive development and competing uses for land. Added to this is the challenge of limited water resources, which could limit future growth.

Maintaining healthy ecosystems will be increasingly challenging, as this already busy region experiences further population and economic growth. Given these challenges, the Land-use Framework identified the South Saskatchewan Regional Plan as an immediate priority.

Purpose of this Overview

A Regional Advisory Council (RAC) is being established for each land-use region. Comprised of a range of stakeholders, the RAC will provide advice to the Alberta government regarding the development of the regional plan.

Land-use decisions need to consider current activities and future uses on both public and private lands. The impact of these uses on air, water, biodiversity, economic development and social development also needs to be examined in an integrated way. To accomplish this, cumulative effects management will be employed. Under this approach, the combined effect of past, present and reasonably foreseeable human activities are anticipated and managed, with the goal of ensuring that we do not exceed the carrying capacity of our natural environment.

This report is designed to provide an overview of key social, economic and environmental factors in the South Saskatchewan Region that need to be considered in developing a regional plan. The report outlines major land uses currently underway, highlights important trends and identifies additional or changing human activities that can be expected in the region. It also notes where potential land-use conflicts are likely to arise, and the possible trade-offs that may need to be reconciled.

The South Saskatchewan Region

The South Saskatchewan Region is a vast area, comprising 83,764 square kilometres, or about 12.6 per cent of Alberta's total land area.

The region is bounded by the Rocky Mountains to the west, the Canada-U.S. border to the south, the Alberta-Saskatchewan border to the east; and the northern municipal boundaries of the municipal districts of Bighorn and Rocky View, and Wheatland, Newell and Cypress counties.

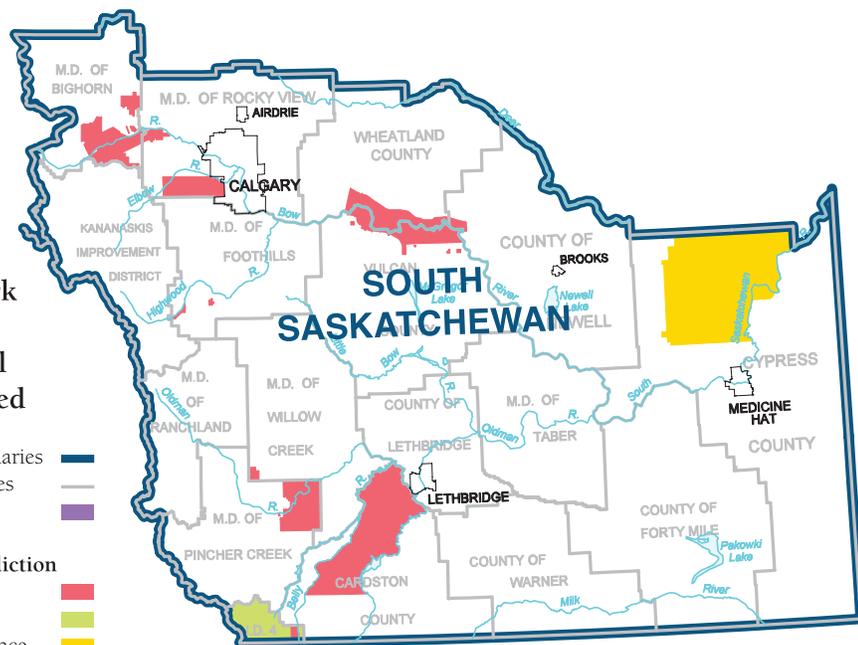
Historic landscape change has been significant in the South Saskatchewan Region, largely driven by agricultural expansion that attended the province's settlement. The construction of the national railroad, combined with federal policies aimed at settling and cultivating Western Canada, promoted the conversion of native grasslands into agricultural areas. The dry climate in the southeast portions of the province led to the development and use of irrigation techniques, which made crop production more favourable and facilitated more agricultural development. Over decades, the twin factors of population growth and agricultural development have heavily influenced the region.



Land-use Framework Planning Regions based on Municipal Districts & Watershed

LUF Planning Regions Boundaries
Municipal Districts Boundaries
Métis Settlements

Lands Under Federal Jurisdiction
Indian Reserves
National Parks
Department of National Defence



Produced by Sustainable Resource Development, Finance and Administration Division. Base Map Data Provided by Spatial Data Warehouse Ltd. ©Nov 27, 2008 Government of Alberta



Today the region is home to a diverse population and economy. Agriculture is a significant industry; the region has the most intensively developed and productive irrigation network in Canada, and contains the majority of feedlots in the province. Oil and natural gas production is also prevalent, and tourism and recreation has increased.

The many economic opportunities of the region, bolstered by the growing city of Calgary, have attracted new residents and businesses from across the country and around the world. This trend is expected to continue for the foreseeable future.

However, balancing economic growth and ecological health is an increasing challenge in the region. Ironically, the region that has experienced the greatest development also has the greatest limitations on water supplies. The region has experienced prolonged periods of drought, and in some years, demand for water outstrips supply. Access to water is the major limiting factor on the region's future growth and prosperity.

Managing land is also more complex in the South Saskatchewan Region as the majority of lands are privately owned. Population growth, particularly in the Calgary area, has led to expanded development. Rural and agricultural lands are increasingly under pressure from rural residential development, while tracts of agricultural land have been converted to facilitate the geographic expansion of Calgary. The conversion of native landscapes over time has affected biodiversity in the region; it is now home to the largest number of species at risk in Alberta.

The cumulative impact of human activity is a growing concern in the region, particularly in areas of more significant ecological importance. For example, the ecologically important Eastern Slopes, which provide southern Alberta with its water supply, are facing growing pressures from rural residential development, recreational demand and industrial development.

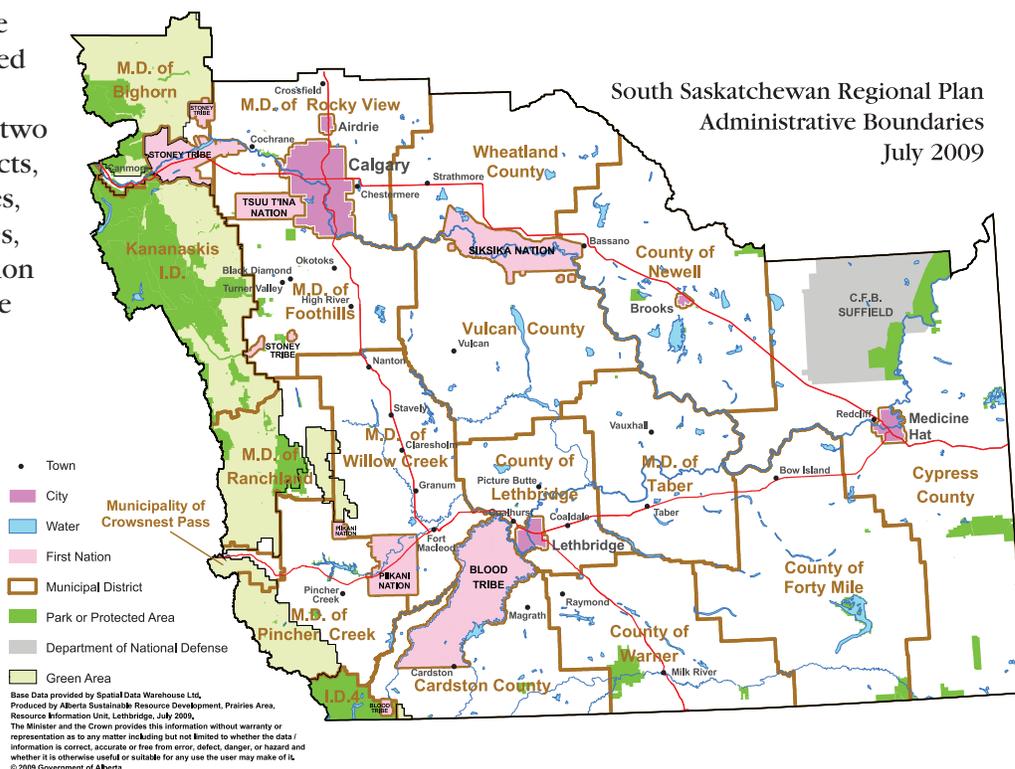
Regional Overview

The South Saskatchewan Region reaches across a variety of landscapes. In the western part of the region are the Eastern Slopes of the Rocky Mountains. These higher elevations contain landscapes with some livestock grazing potential. Forestry and oil and gas development are major land uses. These areas are also the region's main source of tourism and outdoor recreation.

As the region stretches out from the Rockies, the foothills offer resource-rich and scenic areas that are experiencing growing residential and tourism development, as well as agricultural production. Large numbers of residents live in and around the Calgary-Lethbridge corridor, along Highways 2 and 3.

The rolling foothills give way to open prairies, in which farming and ranching are dominant. In the southern and eastern areas of the region, abundant crops and livestock are produced, strengthened by a complex network of irrigation systems. Popular recreation and tourism destinations such as the Cypress Hills Interprovincial Park are also located in these areas. Throughout the region there is varied energy production, especially conventional oil, natural gas, hydroelectric and wind power.

The South Saskatchewan Region includes five cities, one specialized municipality, 15 municipal districts, two improvement districts, 29 towns, 23 villages, two summer villages, two summer villages, and seven First Nation communities on five reserves.





Calgary Metropolitan Area

With a population of more than one million people, the city of Calgary is the fourth largest city in Canada. Its population has grown rapidly over the past decade, by approximately 20,000 persons per year on average. Residents have been attracted to opportunities created by the city's diverse economic base, which has been fuelled by strong energy prices.

The growth of the city of Calgary has influenced the entire Calgary metropolitan area. Municipalities in the metro area

have welcomed thousands of new residents who wish to live outside the formal boundaries of Calgary. This has generated new residential and commercial development in these municipalities, many of which have been traditionally based in farming and ranching, along with significant oil and natural gas development. In addition, many communities in the metro area are recreation destinations for the area's growing population.

Reconciling competing land uses is therefore an increasing challenge in the Calgary metropolitan area. In anticipation of further population and economic growth, municipalities in the area have developed a Calgary Metropolitan Plan. The plan, as approved by the Alberta government, will become a "sub-regional" plan under the South Saskatchewan Regional Plan.

Southern Rockies and Foothills

The character of this region is defined by the majestic Rocky Mountains, which serve as a major source of recreation and tourism for the entire province, and the rich foothills which support substantial ranching and farming.

Attractions such as the Kananaskis Improvement District, Waterton Lakes National Park, Willow Creek Provincial Park, Beauvais Lake and Head-Smashed-In Buffalo Jump contribute to growing tourism

in nearby communities. However, the local economies of most municipalities remain strongly rooted in farming and ranching, supplemented by other resource-based industries such as oil and gas, forestry and mineral extraction. The area is also notable for its substantial wind energy production.

Prairies

Most of the South Saskatchewan Region is open tracts of western prairie, punctuated in areas by lush valleys, rolling hills and coulees. Municipalities are primarily agriculture-based, featuring both dryland and irrigated production. Complex irrigation networks run through these municipalities, supporting the production of a wide variety of agriculture and food products; dams and reservoirs forming part of the network also offer water-based recreation areas for local residents and tourists. The stable and productive nature of the area's agriculture industry has led to value-added investments in food processing. Oil and gas development is also a substantial industry in many municipalities.

This part of the region also includes the large urban centres of Lethbridge and Medicine Hat. Lethbridge serves as a diverse economic hub in the southern part of the region, located at the cross roads of four major highways. Medicine Hat's semi-arid climate makes it known for offering more hours of sunshine than anywhere else in Canada, as well as mild winters provided by Chinook winds.

CFB Suffield is also located in this part of the region. This is the largest Canadian Forces Base and one of the largest live fire training areas in the western world.

The prairie areas of the region also are home to ecologically important grasslands, which provide habitat for many unique species.

Public and Private Lands

Consistent with the province's historic settlement patterns, much of the South Saskatchewan Region is part of the designated White Area (settled) of the province. Both public lands and private lands occur in the White Area.

Privately owned lands comprise over 60 per cent of the South Saskatchewan Region. These include land owned by homeowners, agricultural producers and companies.





² In the 1970s, the Alberta government began using the phrase “public land” in place of “Crown land” when referring to land administered under the *Public Lands Act*. This was done to avoid confusion with other federal and provincial lands. “Crown land” refers to lands owned by the federal and provincial governments; for example, provincial parks administered under the *Provincial Parks Act*.

³ Grazing on public land in the Rocky Mountain Forest Reserve is administered under the *Forest Reserves Act*. Grazing on other public lands in the Green Area is administered under the *Public Lands Act*.

Public lands² in the White Area form part of the agricultural landscape. They are managed for various uses, including agriculture, recreation, soil and water conservation, and fish and wildlife habitat.

More than 30 per cent of lands in the South Saskatchewan Region are public lands. This includes the Eastern Slopes and the Rocky Mountain Forest Reserve. These are forested lands owned by the Province of Alberta. They are primarily managed for watershed protection, timber production, conservation, wildlife and fisheries, recreation and other uses. These lands are also used for agricultural grazing, where compatible with other uses.³

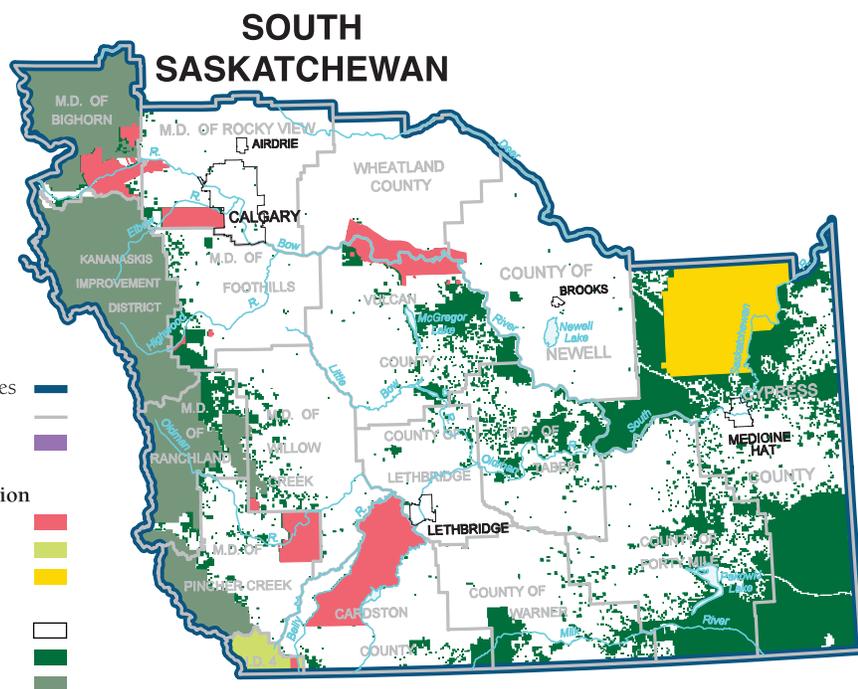
The remaining lands in the South Saskatchewan Region are owned by the federal government. Federal lands include Waterton Lakes National Park, First Nations reserves and Canadian Forces Base (CFB) Suffield.

Land-use Framework Planning Region based on Municipal Districts & Watershed

LUF Planning Regions Boundaries
Municipal Districts Boundaries
Métis Settlements

Lands Under Federal Jurisdiction
Indian Reserves
National Parks
Department of National Defence

White Area - Private Land
White Area - Public Land
Green Area - Public Land



Produced by Sustainable Resource Development, Finance and Administration Division. Base Map Data Provided by Spatial Data Warehouse Ltd. ©Nov 27, 2008 Government of Alberta

Community and Social Development

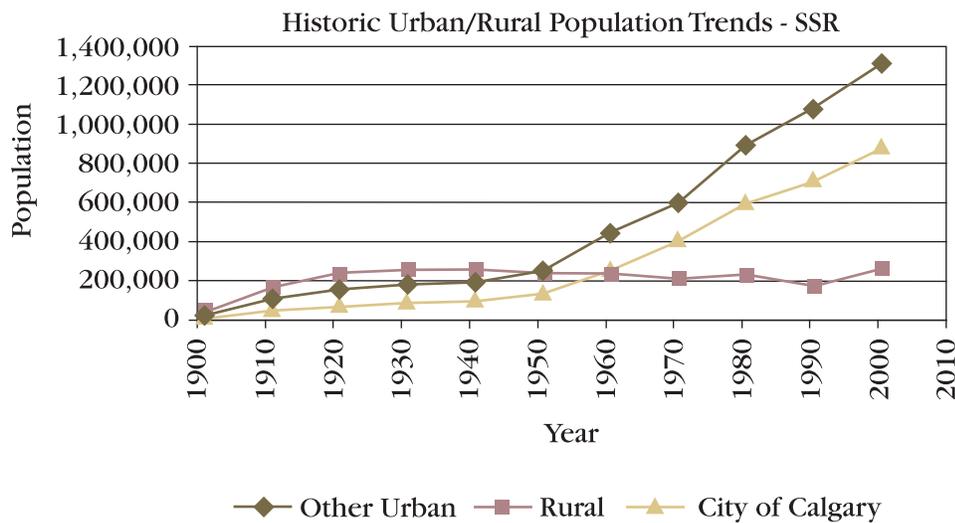
The South Saskatchewan Region has been influenced by some of the pivotal periods in Canadian history. The shape and feel of many of the region's urban and rural communities can be traced back to the construction of the national railroad and the subsequent migration of settlers into Western Canada.

Today, 45 per cent of Alberta's population lives in the region. It is a very diverse population, reflecting the many and various cultural groups that have settled in the region over the last hundred years. Economic opportunities have attracted thousands of new Albertans from other parts of Canada and from around the world. This growing population is creating greater demand for urban infrastructure, parks, recreational opportunities, transportation corridors and more.

Population and Settlement

Population Trends

While the region's rural population has remained relatively stable at about 200,000 people, urban populations have shown steady growth.





⁴ Under the Statistics Canada Census, this includes the city of Calgary, the Municipal District of Rocky View (including all smaller communities), the city of Airdrie, town of Cochrane, town of Chestermere and the village of Beiseker.

⁵ Based on data from the Statistics Canada Census and the Calgary Metropolitan Plan.

Calgary and surrounding urban centres, in particular, have experienced marked increases in population. Anchored by Calgary's diverse and growing economy, the area has attracted many new residents wishing to take advantage of economic and other opportunities.

Some urban areas around Calgary have experienced tremendous population growth in the past decade, driven by commuters and those wishing to relocate outside the city of Calgary. For example, the communities of Airdrie, Okotoks and Strathmore grew by one-third or more between 2001 and 2006. More than 30,000 people who work in the city of Calgary live outside Calgary.

Population Growth of Major Urban Centres Over 10,000 People

Urban Centre	Population in 2006	Population in 2001	Per cent Change
Calgary Metropolitan Census Area ⁴	1,079,310	951,395	13.4
Calgary (City)	988,193	879,003	12.4
Lethbridge	74,637	67,374	10.8
Medicine Hat	56,997	51,249	11.2
Airdrie	28,927	20,407	41.8
Okotoks	17,145	11,689	46.7
Cochrane	13,760	12,041	14.3
Brooks	12,498	11,604	7.7
Canmore	12,039	10,792	11.6
High River	10,716	9,383	14.2
Strathmore	10,225	7,621	34.2

Sources: Statistics Canada, 2001 and 2006 Community Profiles

Today, most of the South Saskatchewan Region's population is concentrated in and around the region's urban centres, especially cities. Around 79 per cent of the population lives in cities, and around 10 per cent live in towns. Most of the population is concentrated in and around the city of Calgary. The Calgary metropolitan area now represents approximately 80 per cent of the South Saskatchewan Region's overall population.⁵

**Population Densities in South Saskatchewan Region
by Census Division**

Census Division	Population Density, 2006 Persons per km²
6 Calgary	91.8
2 Lethbridge/Brooks	8.1
1 Medicine Hat	3.6
5 Drumheller/Vulcan*	3.0
3 Oldman/Waterton	2.7
15 Rocky Mountains*	1.2

Source: Statistics Canada, 2006 Census

*Only partially within the South Saskatchewan Region.

As shown by Statistics Canada Census Divisions,⁶ the most intense population settlement has been in the Calgary Census Division, which had a population density of 91.8 persons per square kilometre in 2006. This was a substantial increase from 2001, when the population density was 80.8 persons per square kilometre.

Urban and Residential Expansion

Consistent with the growing trend of urbanization over the past number of decades, many urban centres in the South Saskatchewan Region have expanded in geographic size. The largest increase in urban land area has been for residential development.

The city of Calgary, in particular, has grown substantially over time, through annexations of surrounding land area. In addition, new communities and “bedroom communities” outside the city of Calgary have experienced high rates of development. For instance, between 2001 and 2006, the city of Airdrie grew in land area by around 54 per cent, while the town of Cochrane grew in land area by over 80 per cent.



⁶The South Saskatchewan Region covers six Census Divisions, as defined by Statistics Canada.



⁷ Under the Statistics Canada Census, this includes the city of Calgary, Rocky View County (including all smaller communities), the city of Airdrie, town of Cochrane, town of Chestermere and the village of Beiseker.

Land Area Growth of Urban Centres Over 10,000 People

Urban Centre	2006 Land area km ²	2001 Land area km ²	Per cent change
Calgary Metropolitan Census Area ⁷	5,107.4	5,083.0	0.5
Calgary	726.5	701.8	3.5
Lethbridge	122.0	121.8	0.1
Medicine Hat	112.0	112	0
Airdrie	33.1	21.5	53.9
Okotoks	18.5	17.91	3.6
Cochrane	30.0	16.51	81.9
Brooks	17.7	17.46	1.4
Canmore	68.9	68.8	0.1
High River	14.3	11.43	24.8
Strathmore	15.6	15.59	0

Sources: Statistics Canada, 2001 and 2006 Community Profiles

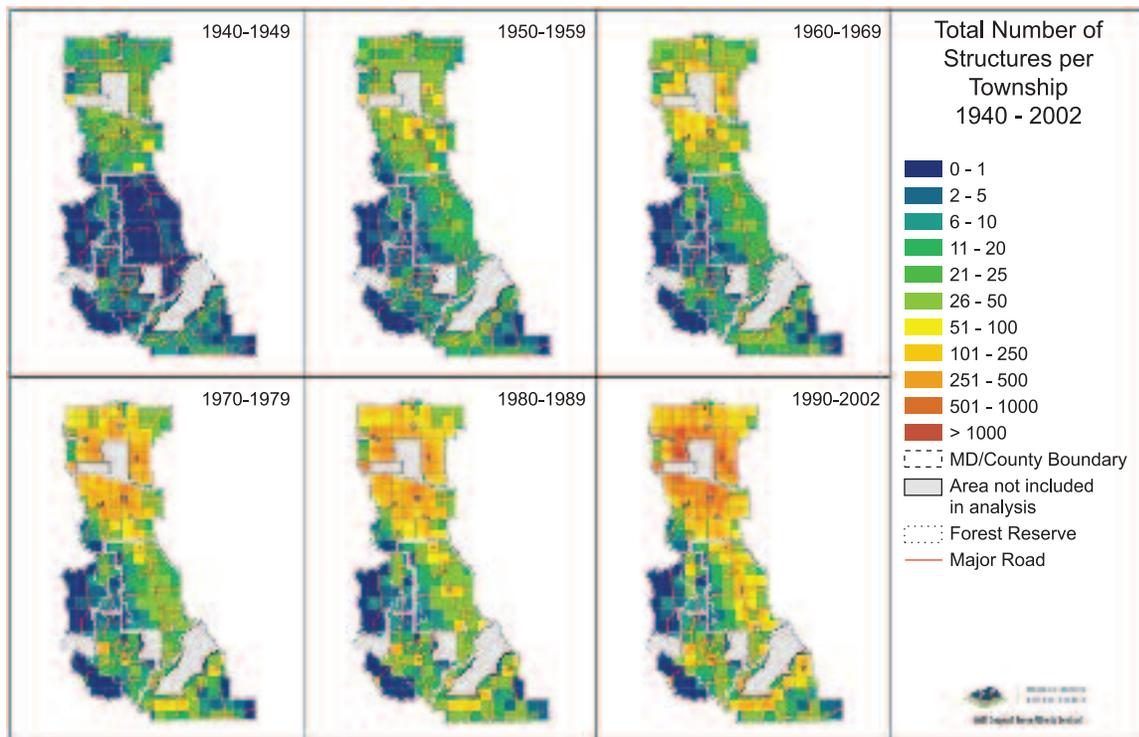
Lethbridge has grown the most since the late 1960s, when it was decided that the University of Lethbridge would be built west of the Oldman River and that West Lethbridge should be the city's next major residential growth area. Residential development in West Lethbridge started in 1974. Lethbridge subsequently annexed land on its southeast, north and west sides in 1984, almost doubling its area. In 2008, the land area of Lethbridge was 124 square kilometres; currently about 0.4 square kilometres are developed each year as new residential areas.

Originally established along the South Saskatchewan River valley, Medicine Hat expanded to the south, then later to the north of the river in the 1950s and 1960s. In the 1970s, the city expanded south of the Trans-Canada Highway. Commercial and residential growth during the 1970s was concentrated in the southeast. Today, the South Ridge and southeast areas remain the focus of residential and commercial development, respectively. Medicine Hat's land area in 2008 was 112 square kilometres.

Residential development can range in levels of dwelling density; that is, the number of dwelling units within a unit of land. High-rise multiple family units (e.g., apartment buildings and condominiums) are examples of higher dwelling density; while single-family homes on a large land base (e.g., rural residential) offer some of the lowest levels of dwelling density. Each type of residential development can have both positive and negative impacts on the community and environment.

The fastest growing residential development type in the South Saskatchewan Region is rural residential development. Given its low dwelling density, this type of residential development also exerts a large footprint on the land base.

Rural residential development occurs predominantly along the Highway 2 corridor and around urban centres. The most growth occurred between 1980 and 2002, especially around the margins of Calgary, in areas such as Okotoks, Chestermere, Rocky View County and the Municipal District of Foothills.





⁸ Miistakis Institute, University of Calgary (2003). *Spatial analysis of Rural Residential Expansion in Southwestern Alberta*. Calgary: Miistakis Institute.

Spatial analysis⁸ shows that rural residential development has also been steadily increasing along the Eastern Slopes of the Rocky Mountains in the past few decades. Throughout this area, rural residential developments are pushing into large mountain ranches and other wildlife habitats, and are contributing to the loss and fragmentation of land. This is having impacts on agriculture, forestry, biodiversity, flood control and other natural ecosystem functions. It also stands to have an impact on the quantity and quality of water supplies for the entire South Saskatchewan Region, since the Eastern Slopes is the major source of the region's water.

Future Growth

The trend of urbanization in the South Saskatchewan Region shows no signs of abating, as Alberta's economy continues to attract new residents from other parts of Canada and internationally. It is estimated that the region's population will expand by two million people by 2076; of this total, 1.6 million are expected to settle in the Calgary metropolitan area.

Consequently, urban areas may be under pressure to further expand their land areas in order to accommodate larger populations and associated residential and commercial development. A larger population may also create greater demand for rural residential developments. Both trends have implications for the environment.

With increased settlement, the demands for tourism, recreation and amenity resources will continue to increase, as will demands for natural resource development. This will place further pressures on natural landscapes and expand human reach into undeveloped areas.

The expansion of human reach, particularly the establishment of structures, such as housing and roads, impacts wildlife movement corridors and increases the interaction between wildlife and humans. Rural residential development can also result in the spread of invasive weeds, increase air and water pollution, and cause landscape alterations that impede natural ecological processes such as water and fire.

Aboriginal Communities

First Nations reserves in the South Saskatchewan Region were established through the treaty process in 1877 under Treaty 7. This treaty process was between the Crown in Right of Canada and the ancestors of the Siksika Nation, Piikani Nation, Blood (Kainai) Tribe, Tsuu T'ina Nation and Stoney Nation, which includes Bearspaw, Chiniki and Wesley Nations (referred to as First Nations).

First Nations lands are vested in the Crown and administered by the federal government. All activities that affect reserve lands, as well as those that may infringe on First Nations rights and traditional uses, require consultation with the relevant First Nation.

First Nations in the South Saskatchewan Region

First Nation	Population	Square Kilometres on Reserves
Blood (Kainai) Tribe	10,498	1395.10
Piikani (Peigan)	3,474	423.50
Siksika	6,386	718.80
Stoney (Bearspaw) Band	1,630	441.50
Stoney (Chiniki) Band	1,620	66.50
Stoney (Wesley) Band	1,478	
Tsuu T'ina Nation	1,665	282.30

Source: Indian Register Population, 2008; Alberta Aboriginal Relations



Transportation Infrastructure

Like many other aspects of the South Saskatchewan Region, the transportation corridors of the region trace their origins to the historic settlement and economic development of Western Canada. Consequently, roads and rail lines are more concentrated in the South Saskatchewan Region than in other parts of the province.

Local Roads and Highways

Roads and highways are laid out based on the township system that was used to survey and divide land for settlers.

A township is a square tract of land measuring about 9.7 kilometres (six miles) on each side. Each township is divided into 36 sections of one mile by one mile. North-south road allowances run every mile apart and east-west road allowances are spaced at two mile intervals, providing access to each section. The result is a systematic grid of connected roads across the South Saskatchewan Region. While facilitating settlement development, these roads have also added hundreds of linear features that fragment the landscape.

The majority of roadways in the South Saskatchewan Region are small local or municipal roads that provide basic land access. Urban and rural local roads are under the management (planning, design, construction, maintenance and control) of local authorities. There are approximately 47,164 kilometres of local roads within the region.

Currently there are 7,900 kilometres of provincial highway; all are managed and maintained by Alberta Transportation. Major highways in the region include:

Queen Elizabeth II (QE II) Highway

Also known as Highway 2, the QE II is the main connector between Calgary, Red Deer and Edmonton. Significant development has occurred along and around this corridor, and traffic volumes have increased substantially over time. The QE II runs through the region, between Calgary and Fort Macleod in a north-south direction;

Highway 3

This highway runs roughly east-west along the southern part of the region, from the Alberta-B.C. border through Fort Macleod, Lethbridge and Medicine Hat;

Trans-Canada Highway

Also known as Highway 1, the Trans-Canada is located within the South Saskatchewan Region. Connecting B.C., Alberta and Saskatchewan, this highway carries significant traffic volumes due to trade, tourism and recreation. Highway 1 runs generally east-west between Banff and Calgary, then travels in a southeasterly direction from Calgary to Medicine Hat and into Saskatchewan; and

Highway 4

Running southwest from Lethbridge down to the Canada-U.S. border, is the southernmost leg of the CANAMEX corridor in Alberta. It connects with U.S. Interstate 15, a key highway that connects to major U.S. cities, including Salt Lake City, Las Vegas and Los Angeles.

Traffic volumes have been increased on major transportation corridors in the South Saskatchewan Region, driven by growing trade, tourism and recreation in the region. As the population and economy expand in the future, improvements to transportation infrastructure in the South Saskatchewan Region can be expected.

In rural areas, some roads may be improved to a higher standard, including freeways, with interchanges and service roads. Many narrow gravel local roads may also be upgraded to a higher standard by the local authority.

Future development of a regional ring road around the city of Calgary will also be considered. Building on past success, the Alberta government will continue to pursue development of the Stoney Trail Ring Road within the Calgary transportation and utility corridor. The concept of a regional ring road will assist in the land-use planning of the Calgary region for many years to come.

Alberta Transportation is currently in the process of upgrading the CANAMEX trade corridor, which goes from Alberta to Mexico. In Alberta, this project includes parts of Highways 43, 16, 2, 3 and 4, between Grand Prairie and the U.S. border at Coutts.

In recent years, Highways 3 and 4 have been upgraded to a multi-lane divided expressway standard as an interim stage, prior to the development of a multi-lane divided freeway. Through the Lethbridge area, the Highway 3 and 4 trade corridors will continue to accommodate the transportation needs of the local area for many years; however, there is a long-term need for an alternative high-speed freeway route.



⁹ McKercher, Robert B., and Wolf, Bertram (1986) *Understanding Western Canada's Dominion Land Survey System*. Division of Extension and Community Relations, University of Saskatchewan.

A Landscape of Squares

To divide up Western Canada for settlement, surveyors used the Dominion Land Survey. This system was considered to be square with the world, featuring north-south and east-west lines that follow the lines of latitude and longitude.

Starting near Winnipeg, surveyors established six meridians (the Principal, Second, Third, etc.) each about four degrees of longitude apart. The Fourth Meridian later became the Alberta-Saskatchewan boundary. The western provinces were extended northward from the 49th Parallel to the 60th Parallel, a distance of about 1,220 kilometres.

Land between the meridians was then subdivided into **townships** - a square tract of land about 9.7 kilometres (six miles) on each side. Each township was divided again into 36 sections. Each section is one mile (1.6 kilometres) on a side, and contains 640 acres (259 hectares). Sections are sometimes broken down into smaller units called **legal subdivisions** of 40 acres (16.2 hectares) each; each section contains 16 legal subdivisions. Subdivisions are used for smaller divisions of land bordering on rivers and lakes, First Nations reserves, settlements, and oil and gas well spacing units.

North-south road allowances run every mile apart; east-west road allowances are spaced at two-mile intervals. These road allowances provide public access to each quarter section.

The Prairies could not have been settled without railways, so the Dominion government habitually granted large tracts of land to railway companies as an incentive to build rail lines. Odd-numbered sections of townships were often used for railway land grants. Most notably, the Canadian Pacific Railway was granted 101,000 square kilometres for the construction of its first line from Ontario to the Pacific. These sections are colloquially called **CPR sections** regardless of the railway to which they were originally granted.

Sections 11 and 29 of each township were called **school sections**. When school boards were formed, they gained title to these sections, which were then sold to fund the initial construction of schools.

The remaining quarter sections were available as **homesteads** under the provisions of the *Dominion Lands Act*. A homesteader paid a \$10 fee for a quarter section of his choice. If after three years the homesteader had cultivated 12 hectares (30 acres) of land and had built a house (often just a sod house), he or she gained title to the quarter. Homesteads were available as late as the 1950s, but the bulk of the settlement of the Prairies was from 1885 to 1914.⁹

Airports

A number of regional and municipal airports dot the landscape throughout the South Saskatchewan Region. Key cities in the region all have airport facilities, including:

- Medicine Hat Municipal Airport;
- Lethbridge County Airport;
- Brooks Airport; and
- Calgary International Airport.

The largest airport in the region is the Calgary International Airport, which is part of Canada's National Airports System. It is Canada's fourth-busiest airport by passenger traffic, serving 12.5 million passengers in 2008.

The Calgary International Airport has a \$6 billion value-added economic impact, and supports 40,000 jobs. It is strategically located at the crossroads of the QE II highway and the Trans-Canada Highway. This makes it a centre for cargo handling, and supporting logistics and warehouse distribution businesses.

The airport is currently undergoing two major expansions: the International Facilities Project, which will invest over \$1 billion to meet growing international passenger demand; and a 14,000-foot parallel runway.

The Calgary area is also home to Springbank Airport, located in the western suburb of Springbank in Rocky View County. This airport provides relief for Calgary International Airport, and is the closest certified aerodrome to Banff National Park.





Rail

There are about 2,100 kilometres of railway track in the South Saskatchewan Region. Rail is synonymous with the history of the region, playing a central role in the settlement of southern Alberta and all of Western Canada.

The Canadian Pacific Railway (CPR), with headquarters in Calgary, owns the majority of rail lines in the South Saskatchewan Region. CPR provides rail corridors between key centres in the region. Major east-west lines run through southern Alberta, connecting the province with a national network of rail lines.

One major corridor runs between Medicine Hat and Calgary, travelling through the Rocky Mountains via Banff National Park. Another major east-west corridor connects Medicine Hat with Lethbridge and on through the Crowsnest Pass.

A major north-south CPR corridor connects Calgary with Red Deer and Edmonton to the north, and Lethbridge and the Canada-U.S. border to the south.

Canadian National (CN) also operates subdivision lines in the South Saskatchewan Region. One connects Calgary northwards to Camrose and Edmonton. Another connects Calgary in a north-easterly direction towards Drumheller, where it heads east to connect with lines in Saskatchewan.

Recreation and Parks

The South Saskatchewan Region's natural, cultural and constructed recreation and tourism attractions make it Alberta's most popular tourism and recreation destination. Two natural wonders are the Canadian Rockies and the Canada Badlands, with its world-renowned dinosaur digs. The region has three UNESCO World Heritage Sites - Dinosaur Provincial Park, the Head-Smashed-In Buffalo Jump, and the Waterton-Glacier International Peace Park. Eastern irrigation reservoirs are a focus for water-based recreation.

Recreation and Tourism Demand

Popular recreation and tourism activities include walking, jogging, hiking, golfing, camping, swimming, bicycling and fishing (2008, Alberta Recreation Survey).

Demand for recreation and tourism opportunities will continue to grow with the population. However, changes in the economy, demographics, technology and land-use patterns will also significantly alter recreation and tourism demands.

About 80 per cent of the province's tourists are Albertans traveling within the province. The regional population is growing, aging and becoming more ethnically diverse, prosperous and concentrated in urban areas.

Participation in some activities is remaining constant (e.g., walking, camping and golf), (2008, Alberta Recreation Survey). Other activities are decreasing and some are experiencing growth. Over the last five years, hunting certificate sales increased 13 per cent and fishing license sales increased 19 per cent. The number of registered all-terrain vehicles more than tripled - from 19,000 in 1995 to 67,000 in 2006, and went up again to 94,000 in spring 2009. The number of registered snowmobiles has increased from 19,000 in 1995 to over 26,000 in 2006.

Technology has enabled people to get further, faster and with less effort. The development of new products (e.g., clothing, off-highway vehicles, recreational vehicles and campers) are adding pressure on the existing recreation and tourism system. Many facilities are now unable to meet evolving demands. For example, provincial campgrounds in popular destinations are at or exceeding capacity, and much of the municipal recreation infrastructure (e.g., sports facilities, swimming pools, etc.), built in the 1980s, is in need of re-investment to meet modern standards and demands.



Meanwhile, emerging and growing activities may lack infrastructure. For example, trail systems may be inadequate to manage the popularity, demand and impact of motorized recreation. Many recreation and tourism opportunities may not provide access for special needs.

Regional Supply of Recreation and Tourism

Recreation opportunities in the region occur on vacant public lands, local government lands, provincial and national parks, as well as on some private land. The public and private sectors each play a role in planning for and delivering the region's recreation and tourism system.

Federal Government

The national parks system, managed by Parks Canada, protects representative natural areas of Canadian significance for public understanding, appreciation and enjoyment. The region's two national parks, Waterton and a portion of Banff, provide intensively developed recreation areas to pristine wilderness for nature oriented and non-consumptive recreation. The two parks provide 17 campgrounds with 2,859 campsites and many kilometres of trails supporting an array of non-motorized activities. The national parks also provide opportunities for boating, climbing, cycling, fishing, horseback riding and picnicking, as well as tourism and interpretation programs.

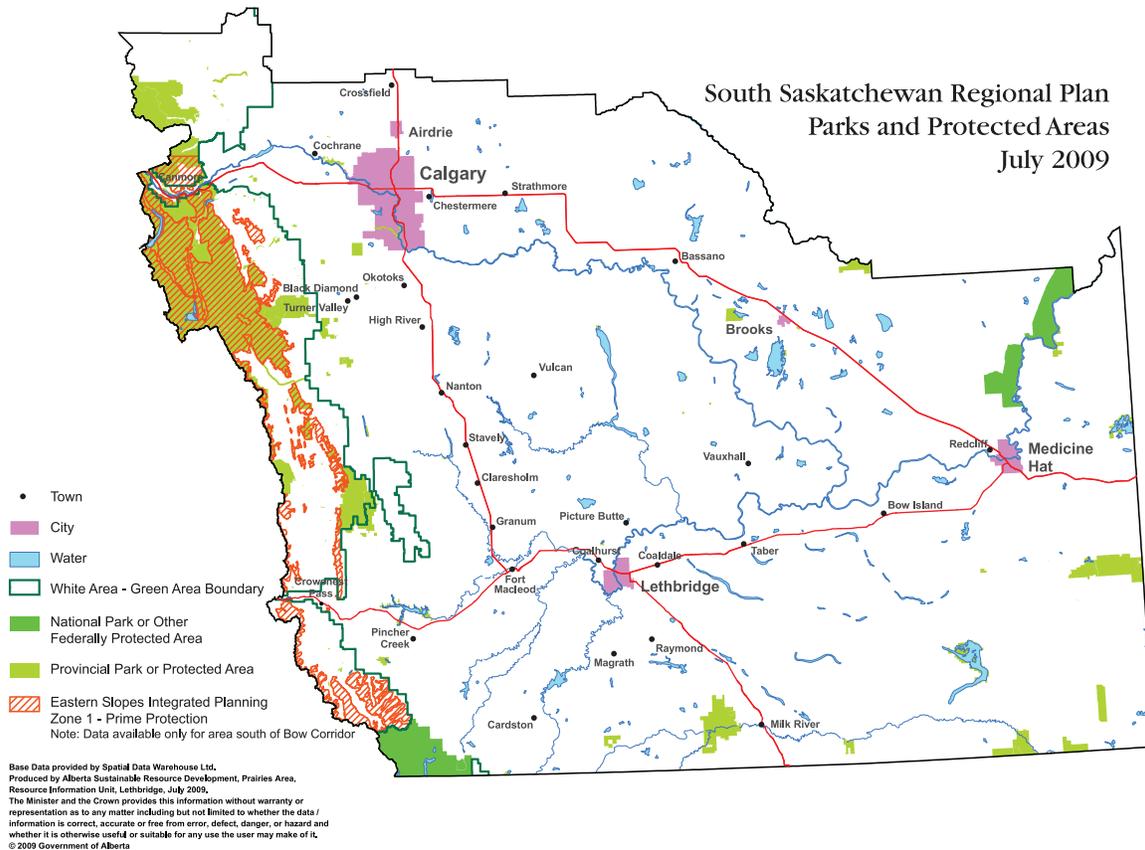
Provincial Government

The provincial government provides or supports a large percentage of the region's recreation opportunities. Many, like Kananaskis Country, are also cornerstone tourism attractions. Random opportunities include hunting and fishing, ski touring, and climbing. Backcountry campgrounds and day use areas support low-intensive activities. Nordic centres, interpretive centres and full service campgrounds meet the demand for facility-based recreation.

The vision for Alberta's provincial parks system is to inspire people to discover, value, protect and enjoy the natural world and the benefits it provides to Albertans. Diverse, year-round outdoor recreation helps visitors learn about and appreciate Alberta's natural and cultural heritage, and provides economic benefits to local

communities. Provincial parks offer a full range of recreation, from intensively developed areas and private sector-managed full-service campgrounds, to pristine wilderness.

Provincial parks and protected areas account for 4,224 square kilometres (1,631 square miles), or five per cent of the regional land base.



About 70 per cent of provincial park visits occur within the South Saskatchewan Region, with 40 per cent of provincial park visits to Kananaskis Country. Many provincial campgrounds in the region are at or already exceeding their capacity. World-class visitor programs are offered in Cypress Hills, Dinosaur and Peter Lougheed provincial parks. There are heritage appreciation programs in Beauvais Lake Provincial Park, Bow Valley, Chain Lakes, Writing-On-Stone provincial parks and in Kananaskis Country.

Outside of provincial parks, year round recreation and tourism activities on public lands include motorized recreation, camping, horseback riding, hunting, fishing, ice and rock climbing, paddling, rallies and races, wildlife watching and berry picking.



¹⁰ *Forests Act*, RSA 2000, c. F-22.

Alberta Sustainable Resource Development manages Alberta's public lands, forests, fish and wildlife. The department works with the not-for-profit sector to manage or support recreation on public lands, especially in the region's nine Forest Land Use Zones. A Forest Land Use Zone is an area of public land subject to controls under the authority of the *Forest Act*.¹⁰

The Ghost, McLean Creek, Cataract Creek, Allison/Chinook and Castle Special Management Area Forest Land Use Zones have designated trail systems and staging areas for both motorized and non-motorized use. Many of these are the most popular public land trail systems in the area, along with the Continental Divide Trail, Trans-Canada Trail, and the National Hiking Trail. Water routes are also very popular for recreation and tourism activities. Various recreation organizations operate other recreational opportunities, such as poker rallies or charitable fundraising events on an ad-hoc basis.

Agricultural disposition holders are required to provide reasonable access to the general public for recreational purposes.

Sustainable Resource Development allows the private sector to develop, enhance and provide tourism opportunities on public lands through dispositions and permits. More than 100 dispositions for recreation and tourism and 35 commercial trail riding permits are in place in the region. Other examples of dispositions include private recreational campsites, golf courses, ski hills, guest ranches, boat launches, shooting ranges, hunting and fishing lodges, recreational cottages and trails.

While some commercial recreation/tourism activities are regulated, many still occur randomly on public land. Willow Creek, Allison/Chinook, Castle, McLean Creek, Ghost/Waiparous and Sibbald Forest Land Use Zones, as well as Racehorse Creek, Dutch Creek and Porcupine Hills, are popular random recreation areas.

Local Governments

Local governments also provide extensive recreation opportunities that can include golf courses, sports fields, arenas, multiplexes, curling rinks, municipal campgrounds, walking trails and open space, municipal parks and community centres. The region has 49 municipal recreation/tourism area sites operated by municipalities or their designates.

Schools, colleges and universities also provide recreational facilities and programs, such as the Alberta Sport Development Centres in Medicine Hat College, Lethbridge and Calgary. Similarly, the Medicine Hat College and Lethbridge College provide programs and services to the residents through Be Fit for Life Centres.

A study of municipal recreation facilities in the province, including the South Saskatchewan Region, has been ongoing for a number of years. In 2006, upgrades to 132 Alberta pools, arenas and curling rinks were estimated at \$327 million in 2006 dollars, and replacement cost was estimated at \$2.8 billion. The South Saskatchewan Region has a significant number of these facilities. As the communities continue to grow, they will need to acquire enough land for recreation facility development - including outdoor fields, trails or indoor recreation facilities.

Alberta's extensive urban park system of interconnecting recreation trails was developed in the 1980s and 1990s. With current and projected increases in population, some communities have identified the need for a new urban, rural and countryside parks programs to provide a parks experience closer to home for residents.

Smaller centres have been developing their own trail systems, and most now have some level of recreation trail infrastructure to help their residents stay physically active.

More recently, urban and rural municipalities have started to connect recreation facilities or other communities by means of recreation trails. Examples include the Western Irrigation District Canal trail from Calgary to Chestermere, the Drumheller to East Coulee trail, the Black Diamond to Turner Valley trail, the Milo to McGregor Lake trail, the Municipality of Crowsnest Pass trails, and the newest addition, the Banff Legacy trail, connecting Canmore to Banff and Lake Louise. A number of these trails are proposed as part of the southern link of the Trans-Canada Trail when they are complete.

Private Sector

The private sector provides a host of recreation and tourism opportunities in the region on public lands, in provincial and national parks, on local government land and on private land. The private sector can be classified as "not-for-profit" and "for profit."

Not-for-profit providers include Scouts, Girl Guides, other camps, religious institutions, fish and game clubs, land trusts and other



community-based organizations. Some organizations manage land and enable or provide recreation and tourism opportunities. Others work with land managers to develop and operate recreation infrastructure such as trails.

For-profit recreation and tourism providers operate private campgrounds, guide and outfitting operations, resorts, golf courses and ski hills. The for-profit sector targets niche markets (e.g., heli-ski tours, paintball) and continues to respond to rapidly evolving recreation and tourism demands.

Alberta Sustainable Resource Development recently initiated the pilot Recreational Access Management Program on private lands. The program promotes and enhances hunter and angler access to private lands within two Wildlife Management Units where landowners agreed to take part. The program will compensate and assist land owners to develop access management plans and better plan and enable hunters and anglers to engage in their activities.

Recreation and Tourism Benefits

Recreation in the South Saskatchewan Region contributes to social, economic and environmental outcomes. It is part of the region's identity and social fabric.

Investment in recreation and tourism enhancements strengthen and diversify communities and economies, increase the tax base, elevate employment and boost the region's attractiveness for prospective investors and workers while enabling healthier and happier citizens.

The benefits come at a cost, felt socially in higher pressure on municipal facilities and areas, economically in higher housing costs, and environmentally in more pressure on land, wildlife and water. These implications need to be evaluated and managed.

Culture and Community

Local culture, community facilities and recreational attractions play key roles in sustaining local government, fostering development, and improving social outcomes. Culture and community spirit provide a sense of common identity for local communities and residents. Research suggests that participating in cultural activities

also reduces stress, promotes increased health, reduces mortality in populations and strengthens communities.

Culture

The South Saskatchewan Region has a wide range of cultural opportunities, facilities and services. Many areas have rich pioneering roots dating back to the original settlement of Western Canada. Economic growth and opportunities, including successive resource development booms, have brought about waves of migration and immigration throughout the last century, which have diversified and enriched the cultural fabric of the region.

International recognition of the region has also increased over time, thanks to major cultural events such as the Calgary Stampede, the 1988 Olympic Winter Games, Lethbridge's International Film Festival and the natural heritage offered by the Canadian Rockies.

Calgary is a major anchor for culture and spirit in the region. It is home to professional sports teams, including the Calgary Flames and Calgary Stampeders, and major cultural centres that include the Glenbow Museum, the Art Gallery of Calgary and the EPCOR Centre for the Performing Arts.

A variety of events draw people to the region's other communities. For instance, the Southern Alberta Summer Games, plays at the Rosebud Theatre, the Medicine Hat Jazz Fest, along with many agricultural events, rodeos and stampedes, sporting events, festivals and seasonal events.

Volunteerism

Volunteers also are vital in strengthening the cultural fabric and capacity of communities. Volunteer organizations provide important local services that meet the health, wellness, social, cultural and recreational needs of residents.

Volunteer centres around the province are dedicated to supporting the needs of volunteers, and local organizations that require volunteer assistance. Of the 25 volunteer centres in Alberta, seven are in the South Saskatchewan Region: Volunteer Airdrie, Volunteer Calgary, Volunteer Cochrane, High River Family Community and Support Services, Volunteer Lethbridge, Medicine Hat Volunteerism in Action Association and Okotoks Volunteer Services.





¹¹ Statistics Canada (2007),
*Canadian Community Health
Survey 2007.*

Community Health

As of May 15, 2008, the Alberta Health Services Board is responsible for health services delivery for the entire province. Prior to this change, the Chinook, Palliser and Calgary Regional Health Authorities were responsible for health services in the South Saskatchewan Region.

Chinook served the south-central and southwest areas of the region, including Ranchlands, Pincher Creek, and the City and County of Lethbridge. Palliser served the eastern and south-east areas of the region, including the County of Newell, Cypress County and Medicine Hat. The Calgary Health Region generally served the remaining areas of the South Saskatchewan Region. For the purposes of this report, regional health information is referenced with respect to these former authorities.

The health status of Albertans living in the South Saskatchewan Region and their communities reflects the importance of considering social, economic and environmental impacts of land use. Health status is influenced by a variety of factors, some of which include physical activity, education, income and employment.

Health Trends

The Chinook, Palliser and Calgary Health Authorities served geographic areas broader than the South Saskatchewan Region. However, some trends from 2007 provide a general idea of the health of residents of the South Saskatchewan Region:¹¹

- the incidence of low birth weight rates was higher than the provincial average for the Calgary region and lower for Chinook and Palliser. Conversely, high birth weight rates were greater than the provincial average for the Chinook region and lower for Calgary and Palliser;
- residents of Palliser were less likely than residents of other regions to self-report their health as being very good or excellent, relative to the provincial average, while Calgary and Chinook had higher and average rates of reporting, respectively;
- Palliser was one of the regions reporting a higher rate of smoking than the provincial average; Calgary and Chinook reported a lower-than-average rate;

- Calgary region had a slightly lower percentage of people in overweight and obese categories; Chinook and Palliser had average rates;
- all three regions reported average rates of heavy drinking;
- Palliser had a lower percentage of active or moderately active individuals than found provincially. The Calgary Health Region led the province with the highest percentage of people classified in these categories;
- residents of the Calgary region reported lower rates of mortality due to diabetes than residents of other regions, while Chinook and Palliser reported higher than average rates;
- residents of the Calgary and Palliser regions reported lower rates of asthma-related death than the provincial average, while Chinook reported higher than average rates;
- residents of the Chinook and Palliser regions reported higher rates for motor vehicle collision mortality, relative to the provincial average, while the Calgary region had the lowest rates in the province;
- residents of all three regions were equally likely to report their mental health status as fair or poor, relative to the provincial average;
- rates of physician claims for mental health problems were above the provincial average for all three regions;
- residents of Palliser were considerably more likely to suffer from depression than any other region in the province. Average rates of depression were reported in the Calgary region and slightly below average in Chinook; and
- substance-related disorders rates were below average for the Calgary region and above average for Chinook and Palliser.

Income

According to data from the 2006 census, the median after-tax household incomes for residents in the South Saskatchewan Region were lower than the province-wide median.

The exception to this is the census division containing Calgary and the surrounding municipalities. This reflects the strong and diversified economic growth of the Calgary area, which benefits from one of Canada's largest concentrations of corporate headquarters. Most other census divisions in the region are predominantly based in agriculture, an industry which has faced some challenges in recent years.



Census Division (2005)	2005 Median Income (Household, after-tax)
CD 6 - Calgary	\$58,557
CD 2 - Lethbridge/Brooks	\$48,191
CD 1 - Medicine Hat	\$49,677
CD 5 - Drumheller/Vulcan*	\$48,185
CD 3 - Oldman/Waterton	\$42,666
CD 15 - Rocky Mountains*	\$51,362
All Alberta	\$55,199

Source: Statistics Canada, 2006 Census

*Only partially within the South Saskatchewan Region.

Education

Education levels are a determinant of health levels in Alberta communities. Higher levels of education generally translate into higher levels of knowledge and income, providing a greater sense of security and satisfaction. A key measure of education levels is the proportion of residents who do not successfully complete at least a high school certificate, as reported by the 2006 census.

With the exception of the census divisions covering the Calgary area and the Rocky Mountains, all census divisions in the South Saskatchewan Region reported higher proportions of residents who had not attained a high school certificate, diploma or degree, relative to the provincial average. This was the case for all residents aged 15 and over, and for those residents aged 25-34.

The lower rates in the Calgary area likely reflected the large number of educated workers who moved to Calgary from across Canada, or other countries, to take advantage of employment opportunities.

Highest Educational Attainment No Certificate, Diploma or Degree

Community (2005)	% of those aged 25-34	% Total aged 15 and over
CD 6 - Calgary	9.6	18.5
CD 2 - Lethbridge/Brooks	20.7	27.7
CD 1 - Medicine Hat	16.7	29.9
CD 5 - Drumheller/Vulcan*	23.9	32.8
CD 3 - Oldman/Waterton	28.3	32.8
CD 15 - Rocky Mountains*	11.5	19.2
All Alberta	13.6	23.4

Source: Statistics Canada, 2006 Census

*Only partially within the South Saskatchewan Region.

Workforce Participation

Labour force data are significant, since unemployment and under-employment can affect the income levels and health status of residents and communities.

According to the 2006 census, labour force activity in the South Saskatchewan Region was largely comparable to the provincial average.

Labour Force Activity Total Population Aged 15 and Over

Community (2005)	Unemployment Rate (%)	Participation Rate (%)
CD 6 - Calgary	4.0	75.4
CD 2 - Lethbridge/Brooks	3.7	70.9
CD 1 - Medicine Hat	4.0	71.8
CD 5 - Drumheller/Vulcan*	3.3	72.5
CD 3 - Oldman/Waterton	5.3	65.3
CD 15 - Rocky Mountains*	4.7	78.4
All Alberta	4.3	74.0

Source: Statistics Canada, 2006 Census

*Only partially within the South Saskatchewan Region.



¹² *Campus Alberta, A Policy Framework*, April 2002.

¹³ www.researchinfosource.com/media/2008-top50-sup.pdf

Higher Education

Alberta Advanced Education and Technology has worked with partners around the province to enhance the learning system and support achievement of the vision of Campus Alberta.¹² Campus Alberta is not a program or institution, but rather a concept of principles for delivering a broad range of life-long learning opportunities to Albertans. Moving beyond traditional primary education, Campus Alberta focuses on formal education facilities such as schools, colleges, universities, and apprentice programs, as well as supporting alternative learning environments such as the workplace, community organizations and home.

Within the South Saskatchewan Region there are a number of formal public and private post-secondary education institutions. They include:

- Comprehensive Academic and Research Institutes - University of Calgary and University of Lethbridge;
- Baccalaureate and Applied Studies Institutes - Mount Royal University in Calgary;
- Poly-technical Institutes - Southern Alberta Institute of Technology in Calgary;
- Comprehensive Community Institutions - Bow Valley College in Calgary, Lethbridge College and Medicine Hat College;
- Independent Academic Institutions - Alliance University College, Canadian Nazarene University College and St Mary's University College, all in Calgary; and
- Specialized Arts and Culture Institutes - Alberta College of Art and Design in Calgary.

There are eight major public post-secondary institutions in the region. The University of Calgary is the largest, with over 28,000 full- and part-time students, including 900 international students from 87 countries. The University of Calgary has 16 faculties, 53 departments, and offers over 83 undergraduate courses. Each year thousands of students graduate from bachelor, masters and doctorate programs.

The University of Calgary is a comprehensive research university and is one of Canada's top seven research universities.¹³ It belongs to 17 Centre of Excellence Networks and is home to 30 research

institutes and centres; and has set a target to be among the top five research universities in Canada by 2010. With over 1,900 full-time equivalent teaching and research faculty, as well as over 2,500 full-time equivalent support staff, it is also Calgary's fourth-largest employer.

The University of Lethbridge is grounded in liberal education and provides students with small classes and personal experiences. It has made a strong commitment to pursuing community-minded research, developing centres of excellence, and including students in research endeavours. The University of Lethbridge offers more than 150 degree and program options through six faculties and schools and offers PhD programs in six areas of study. Today, it attracts more than 8,100 students from 58 countries and has more than 25,000 alumni worldwide.

In September 2009, Mount Royal College became Mount Royal University. Established in 1910, Mount Royal serves approximately 13,000 students in over 60 certificate, diploma, university transfer, and applied degree programs. Mount Royal is recognized for its liberal arts programming and is also considered more academically oriented than other comparable colleges in Canada. Through the Mount Royal Conservatory, more than 4,000 students annually receive instruction in credit and non-credit programs in the arts. Private lessons in music, theatre and speech are also provided through the conservatory.

The Southern Alberta Institute of Technology (SAIT) is one of Alberta's two public technical institutes. It has over 23,000 full- and part-time students enrolled in upgrading, skills training, certificate, diploma, apprenticeship, and applied degree programs. SAIT also offers over 2,300 continuing education courses. SAIT supports the development of the regional and provincial workforce by providing hands-on training and partnering with businesses in the areas of program development and applied research. Since the 1990s, SAIT has launched 11 world-class Centres of Technology Development.

Bow Valley College provides over 10,000 full- and part-time students with highly focused career-oriented training. The college offers English as a second language, academic upgrading and career certificate and diploma programs in business, accounting, health care, administration, computers, and a number of community-





oriented subject areas. Bow Valley College provides short-term focused training in a supportive environment. Bow Valley College is also the co-developer and sole owner of the Test of Workplace Essential Skills (TOWES), Canada's leading workplace essential skills assessment tool. In 2004, the college was recognized for its leadership in adult education by the Calgary Chamber of Commerce with an award for medium-sized businesses.

Lethbridge College, Canada's first publicly funded community college, celebrated its 50th anniversary in 2007-08 with a name change. To reflect its growing international scope, the institution dropped "Community" from its name. More than 7,500 students access Lethbridge College each year in over 70 career programs, including agriculture, engineering and industrial training, applied management, college and university preparatory, environmental science, health and human services, and media and computing. In 2000 through 2004, the Alberta Apprenticeship and Industry Training Board recognized four Lethbridge College instructors as the best in southern Alberta.

The Medicine Hat College is a comprehensive, community-oriented college that offers a broadly based educational curriculum, including selected pre-employment trades training, apprenticeship, and upgrading programs. The college works closely with local companies to ensure training is appropriate for their requirements and provides custom-designed training programs to meet the needs of local industries. The main campus serves nearly 2,500 students each year, with another 200 attending Brooks Campus, located 100 kilometres west of Medicine Hat. Currently, more than 30 diplomas and certificates are offered along with 25 university transfer programs, and opportunities for degree completion. Medicine Hat College offers other specialized diploma programs, including addictions counsellor, technical illustrator, paramedic, and deaf and blind support specialist. New applied degrees are also offered in ecotourism and outdoor leadership and visual communications.

Alberta College of Art and Design (ACAD) is one of only four accredited public art and design colleges in Canada. It is the only post-secondary institution in the Prairie provinces devoted exclusively to advanced education, practice, and research in visual culture, design, associated fields, and emergent fields. ACAD has over 1,300 full- and part-time students enrolled in a variety of programs including bachelor programs in the areas of fine arts, design, media arts, and digital technologies. ACAD distinguishes itself from other institutions by providing a studio-based experience.

Economic Development and Prosperity

With local economies largely influenced by agriculture and oil and gas, the South Saskatchewan Region has experienced strong economic growth tempered by occasional periods of downturn. The cyclical nature of resource prices introduces volatility in the oil and gas production industries. Market barriers and trade issues have at times presented hardship for agricultural producers.

Despite these challenges, the South Saskatchewan Region has gradually diversified and realized growing value-added industry. Food processing has taken root in the southern parts of the region, and renewable energy projects - particularly wind farms - have become prevalent.

Mining and forestry round out the resource industries in the region, while a significant tourism industry has strong potential for future growth. The region's major cities are home to a range of education, business and financial services, manufacturing, information technology and other industries. Many communities in the region also benefit from a growing recreation and tourism industry.

Agriculture

The grasslands of southern Alberta have supported farming and ranching for more than a century, providing important goods such as crops and livestock.

The region's significant agriculture industry is rooted in the earliest days of settlement in Western Canada. Canadian policies encouraged rapid development of agriculture in what is now the South Saskatchewan Region. In 1881, the Dominion of Canada made provision for the first grazing leases. These were granted for up to 21 years, with the requirement that leaseholders "stock up" their livestock levels to capacity within three years.

The arrival of the Canadian Pacific Railway (CPR) two years later brought major settlement across the Prairies for the next 40 years. Large tracts of native prairie were converted to cropland. Irrigation later developed as a means to stabilize production; this also provided a base for farm diversification.





¹⁴ Alberta Prairie Conservation Action Plan 2001-2005.

¹⁵ For the Census of Agriculture, Statistics Canada defines a census farm as an agricultural operation that produces any agricultural product for sale.

¹⁶ Alberta's State of the Environment Report: Terrestrial Ecosystems.

¹⁷ Census of Agriculture for Alberta, 2006.

¹⁸ Census of Agriculture for Alberta, 2006.

Severe drought, the Great Depression, and degradation of cropland and rangeland marked the “Dirty '30s”. Many land parcels reverted to the Crown as farmers and ranchers struggled to survive during this period. With time, better range practices, the development of soil-conserving farming systems and greater mechanization led to continued growth in agriculture.

Cultivated land area increased consistently until the 1980s.¹⁴ In the last few decades, the hallmarks of the agriculture industry have been expansion of the cattle feedlot industry, major rehabilitation of irrigation infrastructure, and adoption of conservation farming practices, which have increased production and improved soil quality.

Another key trend has been the shift towards fewer, larger farms. Farm numbers have steadily declined from about 50,000 in 1936 to the current level of 11,235.¹⁵ Mechanization and the use of chemical fertilizers and pesticides have enabled larger farm size and dramatically increased crop production. Economic factors also favour large-scale operations.¹⁶

In 2006, agriculture in the South Saskatchewan Region included approximately:¹⁷

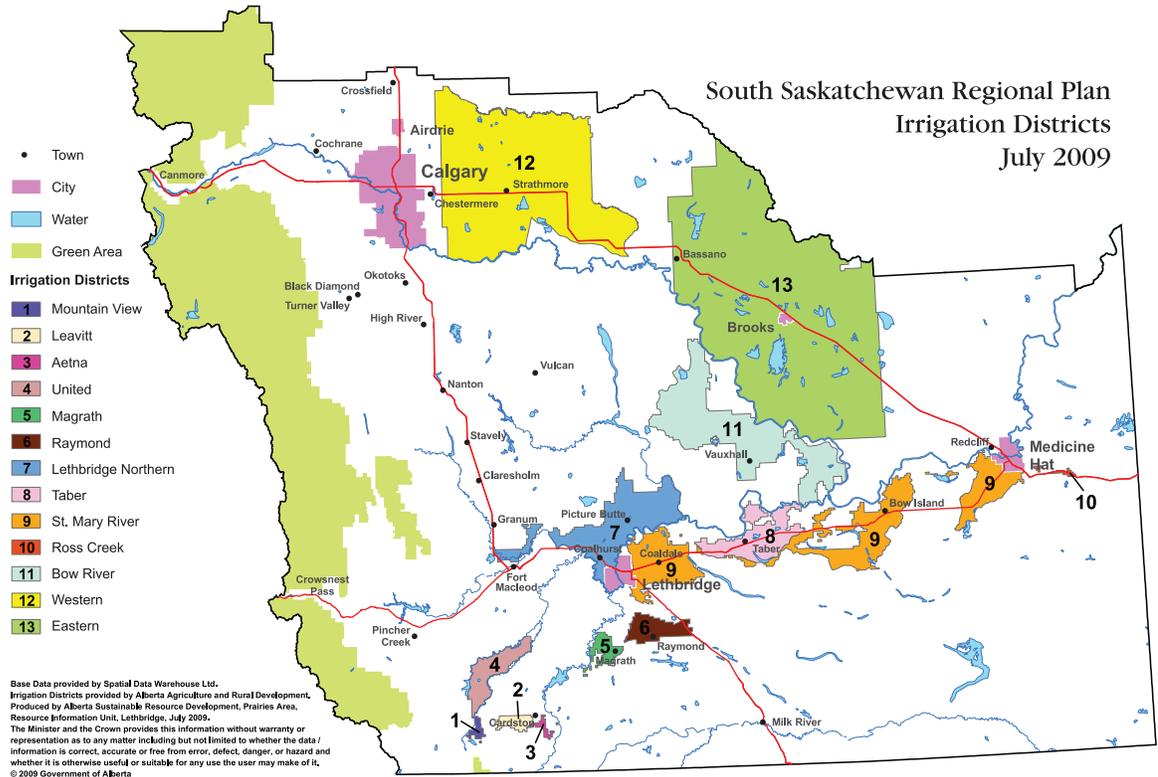
- 11,235 farms, which represents 23 per cent of the Alberta total;
- 3.6 million hectares of cultivated land (including crop and tame pasture); and
- 2.8 million hectares of natural area for grazing (including publicly and privately owned lands for grazing).

Crop Production

Today about 42 per cent of the region's land area has been cultivated (crops and tame pasture). The region includes most of Alberta's irrigation development, enabling a high level of crop diversity and significant opportunities for value-added processing.

Eighty-six per cent of the region's cultivated lands are dryland and 14 per cent are irrigated.¹⁸ About 80 per cent of the irrigated area is within Alberta's 13 irrigation districts; the balance is mostly private licences. More than 50 reservoirs and more than 7,000 kilometres of canals and pipelines currently store and distribute water to serve

these irrigated areas. In addition, almost 3,000 private irrigation projects in Alberta have authorization to use water resources from rivers, reservoirs and lakes.



The six major crop categories produced in the South Saskatchewan Region are:

- Cereal Crops - these include spring- and fall-seeded wheat, barley, oats, rye, durum, triticale and corn harvested for grain or annual forage;
- Oilseed Crops - including canola, mustard and flax;
- Pulse Crops - including dry pea, chickpea, lentil, faba bean and dry bean;
- Specialty Crops - irrigated specialty crops include sugar beet, potato, fresh pea, fresh corn, sunflower, herbs and spices, hemp, nurseries and other vegetables (safflower and canary seed are examples of dryland special crops);
- Forage Crops - these include perennial tame hay (grass, alfalfa or alfalfa-grass mixtures), forage seed and other fodder crops; and
- Tame pasture - this includes tame seeded pasture for livestock grazing.



Cultivated Land in the South Saskatchewan Region

Land Area Occupied

	Dryland		Irrigation*		Total area	
	Hectares	Acres	Hectares	Acres	Hectares	Acres
Cereals	1,546,029	3,818,669	247,400	611,100	1,793,429	4,429,769
Pulses and oilseeds	326,108	805,420	73,900	182,600	400,008	988,020
Specialty*	2,000	5,000	48,400	119,500	50,403	124,496
Forage	327,925	809,935	136,300	336,700	464,225	1,146,635
Tame pasture	459,385	1,134,731	56,700	140,000	516,085	1,274,731
Summerfallow	392,246	968,847	-	-	392,246	968,847
Total	3,053,693	7,542,602	562,700	1,389,900	3,616,393	8,932,502

Source: Statistics Canada, 2006 Census of Agriculture and Irrigation in Alberta, ARD, 2006

* Total area is from Statistics Canada, 2006 Census of Agriculture, except the Special Crop area, which is estimated from Irrigation in Alberta, ARD, 2006. Irrigated area by crop type is estimated from cropping statistical information reported by the 13 irrigation districts (Irrigation in Alberta, ARD, 2006)

Cereals occupy the largest area for crops. These are typically grown in rotation with oilseeds, pulses or special crops and in some cases with perennial forages like timothy or alfalfa hay. Irrigated tame pasture is also rotated with annual crops, whereas the majority of dryland tame pasture is long-term permanent cover for livestock grazing.

Potato is a particularly significant irrigated crop in the region, the production of which has increased during the past 15 years due to the expansion of value-added food processing plants in the South Saskatchewan Region. In 1937, growers produced about 14 tonnes per hectare of table potatoes on 2,400 hectares of irrigated land.¹⁹ Production of processing and fresh market potatoes on irrigated land in 2006 has increased to more than 17,000 hectares, with a doubling of average yields. Approximately 65 per cent of the crop goes to processing plants in the Taber, Lethbridge and Calgary areas.

¹⁹ Irrigation in Alberta, Alberta Agriculture, Food, and Rural Development, 2000.

Some of the other significant irrigated crops in the region include vegetables, timothy hay, dry beans, sugar beets and hybrid canola seed, all of which are processed for Canadian and international markets

Livestock

Livestock is a very important component of agriculture production in the South Saskatchewan Region. The main livestock types are cattle (beef and dairy), hogs, poultry (eggs and meat), sheep (wool and meat), and horses (recreation, sport, meat and pregnant urine).

Cattle numbers more than tripled between 1971 and 2006, due mainly to the growth in southern Alberta's feedlot industry. In 2006, there were approximately 2.37 million head of cattle and calves on 6,404 farms in the South Saskatchewan Region;²⁰ this represents about 37 per cent of Alberta's total cattle herd. About 659,000 head were reported as beef or dairy cows, replacement heifers and bulls, with the balance being calves or cattle fed for slaughter.

Numbers of hogs, sheep, and hens and chickens in the South Saskatchewan Region are also significant. Production of each accounts for at least one-third of the province's total numbers.²¹

²⁰ Census of Agriculture for Alberta, 2006. This includes about 25,000 dairy cows.

²¹ Census of Agriculture for Alberta 2006.

²² Number of farms reporting any livestock or livestock products for sale.

²³ Census of Agriculture for Alberta, 2006.

²⁴ Alberta Sustainable Resource Development.

Livestock Numbers in the South Saskatchewan Region

	Number of Farms ²²	Livestock Numbers	% of Alberta Herd or Flock
Cattle	6,404	2,366,862	37
Hogs	368	825,828	40
Sheep	541	77,072	34
Horses	4,369	40,197	26
Bison	104	10,400	11
Hens and chickens	865	3,873,917	33

Source: Statistics Canada, 2006 Census of Agriculture

Rangelands and Grazing

Livestock grazing, mainly that of beef cattle, is supported by significant land areas within the settled area of the South Saskatchewan Region. This includes about 2.8 million hectares of native rangeland and about 0.52 million hectares of tame pasture.²³ Native rangeland consists of about 1.9 million hectares of public lands and 0.9 million hectares of privately owned land. Additional grazing is supplied by about 0.8 million hectares of publicly owned grazing lands within the Rocky Mountains Forest Reserve.²⁴



²⁵ The “stocking rate” is the number of animals that can safely graze a defined area without degrading soil or vegetation.

²⁶ Anderson, C.G. 1941. Grazing rates report - short grass area of Alberta. Compiled with the co-operation of the Short Grass Stock Growers' Association. Department of Land and Mines, Province of Alberta; p.237.

²⁷ Alberta Sustainable Resource Development.

The use of public land for livestock grazing dates back to the province's earliest settlement. While the initial grazing lease policy provided for the orderly development of ranching, a mix of pressures – such as overly optimistic stocking rate policies, homesteading pressures and drought conditions – resulted in rangeland deterioration, particularly in the prairie grasslands. During the dust bowl years, stocking rates²⁵ were reduced on public rangelands, reflecting growing knowledge about the limited carrying capacity of prairie rangelands.²⁶

In the 1940s, a group of concerned ranchers formed the Short Grass Stock Growers Association. Their efforts led to the reform of government grazing lease policy, on which today's system is based. Following the Second World War, a period of adaptive management and range restoration began. Range management experience and practices steadily evolved and improved after this period.

Contemporary ranchers apply the principles and practices of range management to sustain range livestock production and functioning rangeland ecosystems. These include keeping appropriate stocking rates, deferring grazing during sensitive periods, distributing pressure on the landscape, and providing periods of rest after grazing.

Today, public rangelands are administered by the Government of Alberta. A system of grazing dispositions manages the use of public lands by livestock producers. The total area of public lands under grazing dispositions in the South Saskatchewan Region is 2.96 million hectares. About 73 per cent of this, or 2.16 million hectares, is in the White Area, under a combination of grazing leases, permits, licences and allotments.²⁷ Another 0.8 million hectares of public land in the Rocky Mountains Forest Reserve is designated for grazing use through allotments.

A grazing lease Code of Practice, developed collaboratively with the livestock industry, spells out the stewardship best practices and management obligations of disposition holders. In addition, the Rocky Mountain Forest Range Association applies member funds to the development of range resource inventories and management plans, to ensure ecologically sound and sustainable grazing practices in the Rocky Mountains Forest Reserve. Rangeland health assessment is used to monitor stewardship practices on public rangelands, to ensure the maintenance of health of rangeland ecosystems.

Grazing on public rangelands has significant economic importance for the province's livestock industry. Within the South Saskatchewan Region there are a total of 2,515 public grazing dispositions that annually provide about 925,000 Animal Unit Months²⁸ of grazing, supporting a farm gate value of approximately \$67 million.²⁹

As Alberta's beef industry has evolved, public grazing dispositions have become a critical feature and foundation of the beef sector's production and capital structure. Grazing-based producers have increasingly treated leaseholds as part of their asset base, leading them to make "best economic use" of the resource. Generally speaking, producers manage their disposition holdings with the same sustainable stewardship practices they employ with their privately owned grazing lands.

Agricultural disposition holders are required to provide reasonable access to the general public for recreational purposes. For example, public lands for grazing may also be used for recreational purposes. As significant population growth in the South Saskatchewan Region generates greater demand for recreational spaces, agricultural and recreational uses of public land will need to be reconciled.

Confined Feeding Operations

Confined feeding operations (CFOs)³⁰ are an important part of the agriculture industry in the South Saskatchewan Region. Beginning in the 1960s, the combination of irrigation and a relatively warmer, drier winter climate resulted in the development of a large number of CFOs. The highest density of CFOs is found in the area between Fort Macleod and Taber.

Applications for CFOs are reviewed and approved by Alberta's Natural Resources Conservation Board (NRCB), which also monitors compliance with province-wide standards.

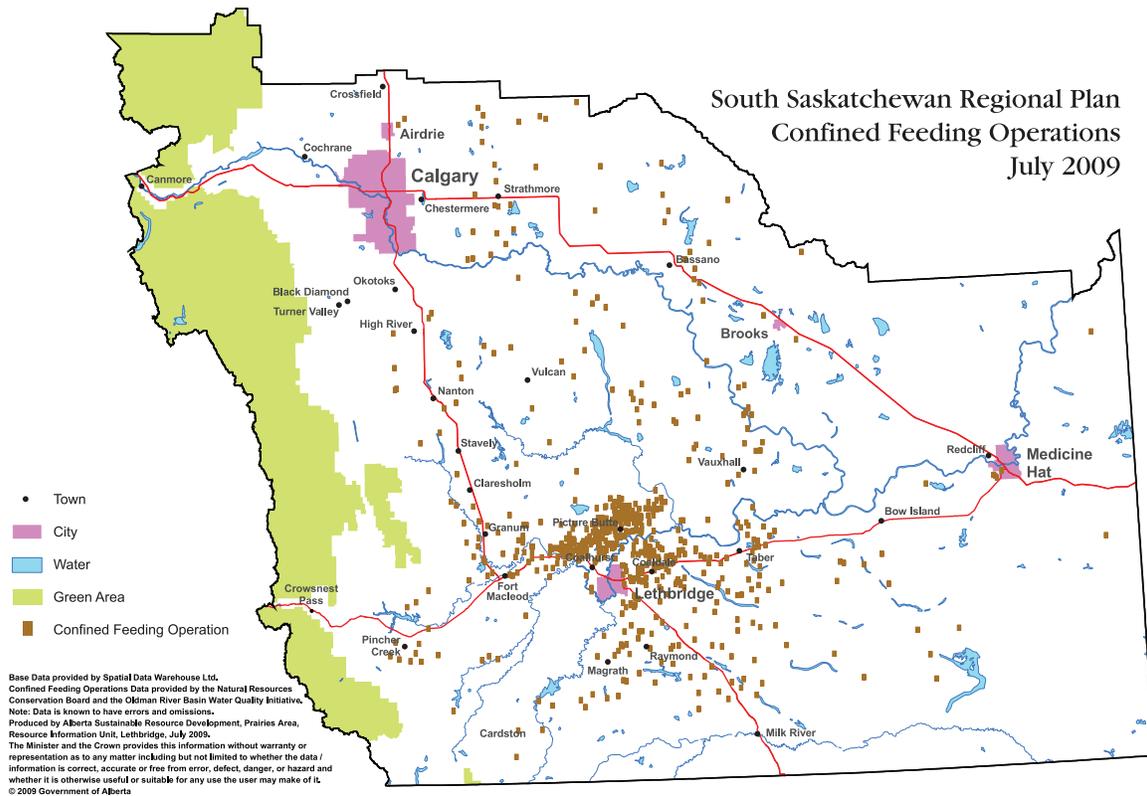
Alberta's *Agricultural Operation Practices Act*³¹ and regulations, which came into effect on January 1, 2002, launched improved standards for environmental management in Alberta's livestock industry. Requirements in the Act ensure that CFOs are environmentally sustainable and are located to reduce potential impacts on neighbours. The Act also sets out manure management requirements to ensure all livestock operations apply manure properly on arable land, by observing required set backs from common bodies of water and abiding by manure application limits.

²⁸ An Animal Unit Month is the amount of forage required by one Animal Unit for one month. This is approximately 1,000 pounds that is either dry (not nursing) or has a calf up to six months of age.

²⁹ Adapted from Ruud, L. and Wehrhahn, R., 1990. A profile of Alberta's cattle industry. Tech. Rep, Alberta Agriculture, Edmonton.

³⁰ The *Agricultural Operation Practices Act* defines a confined feeding operation as: "Fenced or enclosed land or buildings where livestock are confined for the purpose of growing, sustaining, finishing or breeding by means other than grazing, and any other building or structure directly related to that purpose, but does not include residences, livestock seasonal feeding and bedding sites, equestrian stables, auction markets, race tracks, or exhibition grounds." (Natural Resources Conservation Board, www.nrcb.gov.ab.ca/cfomain/default.aspx).

³¹ *Agricultural Operation Practices Act*, RSA 2000, c.A-7.



Economic Impact

Agriculture is one of the main economic drivers of the South Saskatchewan Region. Livestock and crop production contribute greatly to Alberta's exports and provide the foundation for a strong food-processing industry in the region. Further economic activity is generated in a wide range of agricultural support industries:

- the average farm size in the South Saskatchewan Region is 585 hectares, which is 38 per cent larger than the provincial average;³²
- agricultural production in Alberta, as measured by gross farm receipts, amounted to almost \$10 billion in 2006. Production in the South Saskatchewan Region amounted to \$4.4 billion, or 45 per cent of the provincial total;³³
- for the 11,235 farms reported in 2006 within the South Saskatchewan Region, about 58 per cent have gross farm receipts exceeding \$50,000 per year;³⁴

³² 2006 Census of Agriculture, Statistics Canada.

³³ 2006 Census of Agriculture, Statistics Canada.

³⁴ 2006 Census of Agriculture, Statistics Canada.

- irrigation makes a major economic contribution to the agricultural sector. It enables the production of a consistent supply of agricultural products for processing, generating gross revenues three to four times greater than those from dryland farming (per unit area);
- the beef feedlot sector is an important part of the South Saskatchewan Region's agriculture economy, with the majority of Alberta's cattle feedlot capacity in the region;³⁵
- the sales value of Alberta's food and beverage processing in 2006 was \$9.3 billion. The amount of processing in the South Saskatchewan Region is estimated at about \$4 billion;³⁶ and
- Alberta's exports from the agriculture and food and beverage manufacturing sectors were valued at \$8.1 billion in 2008. Wheat, canola seed, beef and live cattle were the largest exports.³⁷

Future Role

Alberta's agriculture industry is expected to remain a dominant industry in the South Saskatchewan Region, and to continue contributing to the region's innovative and prosperous economy. Despite challenges faced by the agriculture and food sector, there are numerous growth opportunities in both primary production and value-added processing.

A growing world population will generate increased demands for food, a basic need. Changing dietary requirements and preferences will continue to create niche markets and market demands for new and innovative products. Alberta's significant agricultural land-base favourably positions the province to take advantage of global opportunities. The agriculture industry remains a truly renewable industry in Alberta.

The Alberta government is also pursuing strategies that will help the industry respond to new economic opportunities. *Alberta's Livestock and Meat Strategy*³⁸ aims to assist the livestock sector in capturing local and export market opportunities created as global meat demand is forecast to double by 2050. The strategy will help the industry adjust to cost pressures and consumer demands in order to remain globally competitive.

In addition, *Alberta's Nine-Point Bioenergy Plan*³⁹ aims to stimulate bioenergy development in Alberta. The strong crop and livestock production base in the South Saskatchewan Region has the potential to provide a consistent feed stock supply to bioenergy processing facilities.

³⁵ CANFAX, Cattle on Feed – Regional Capacity (<http://www.canfax.ca>).

³⁶ Estimate provided by Statistics and Data Development Branch, Alberta Agriculture and Rural Development.

³⁷ Estimate provided by Statistics and Data Development Branch, Alberta Agriculture and Rural Development.

³⁸ Government of Alberta (2008). *Alberta's Livestock and Meat Strategy*. Edmonton: Alberta Agriculture and Rural Development.

³⁹ Government of Alberta (2008). *Alberta's Nine-Point Bioenergy Plan*. Edmonton: Alberta Energy; www.energy.alberta.ca/BioEnergy/pdfs/BioE9pointPlan.pdf.



⁴⁰ Developed in 1995, the Land Suitability Rating System (LSRS) is a comprehensive approach to integrating and modeling soil, landscape and climate factors. Universally, LSRS 1, 2 and 3 lands are considered suitable for production, and LSRS 4 lands are considered marginal for production.

Irrigation development will continue to be important for supporting the region's agriculture industry, including further diversification and value-adding. The majority of Alberta's value-added food processing, located in the region, is associated with irrigated crop production. The majority of the provincial cattle feeding capacity, also located in the region, relies heavily on forage production supported by irrigation.

However, irrigation is also the region's biggest user of water. Water supply has the potential to be the greatest limitation to future agricultural growth, as a growing regional population and economic expansion create higher demands on scarce water supplies.

Population and economic growth in the region can also be expected to place increased pressures on the agricultural land base. Loss and fragmentation of croplands due to residential development in high population areas will continue to be a concern, as this has the potential to result in the permanent loss of agriculture production potential.

It will become increasingly challenging to balance economic growth with protection of the most valuable agricultural lands.

The Land Suitability Rating System (LSRS)⁴⁰ rates the suitability of land for agricultural production, with the South Saskatchewan Region having 2.53 million hectares within the LSRS 2 and LSRS 3 categories (LSRS 1 lands are not found within Alberta). The majority of these lands are east of Calgary, extending south towards Nanton adjacent to the Queen Elizabeth II Highway - an area experiencing high levels of population growth and development. Irrigated cropland is also highly valued, due to its high production potential and the significant private and public infrastructure investment associated with these lands.

Rangelands in the region will also face pressures from population and economic growth. These lands are not only important for supporting livestock grazing; they also provide ecological services important for maintaining the health of air, water, soil and biodiversity. The intensity and extent of surface disturbances, such as linear features, may have a profound impact on the future integrity of rangelands in the region. Of particular concern are the remnant foothills fescue grasslands, 74 per cent of which are privately owned and under increasing pressure for residential and wind energy development.

Energy and Minerals

The South Saskatchewan Region possesses abundant energy resources, including oil, natural gas and coal. The region is also home to significant renewable energy production and potential. In addition, a variety of non-energy mineral resources are found in the region. These include metallic and industrial minerals, and sand and gravel.

Sixty per cent of the region is underlain by Crown minerals, with the remaining 40 per cent underlain by freehold minerals. These freehold minerals were originally granted to homesteaders, the CPR and others in the late 1800s.

Oil and Natural Gas

Conventional oil and natural gas development has been a mainstay of the region. Oil and gas activity employs a substantial number of residents in the region and provides significant economic benefits to local businesses and communities. The energy sector directly or indirectly employs nearly one in every six workers in Alberta. Many more jobs are spurred in manufacturing, retail and other sectors.

Oil and natural gas production also contributes substantial revenues to the federal and municipal governments through taxes, and to the Government of Alberta through provincial taxes, bonus payments and royalties. These revenues help fund government investments in programs, services and infrastructure for Albertans and other Canadians.

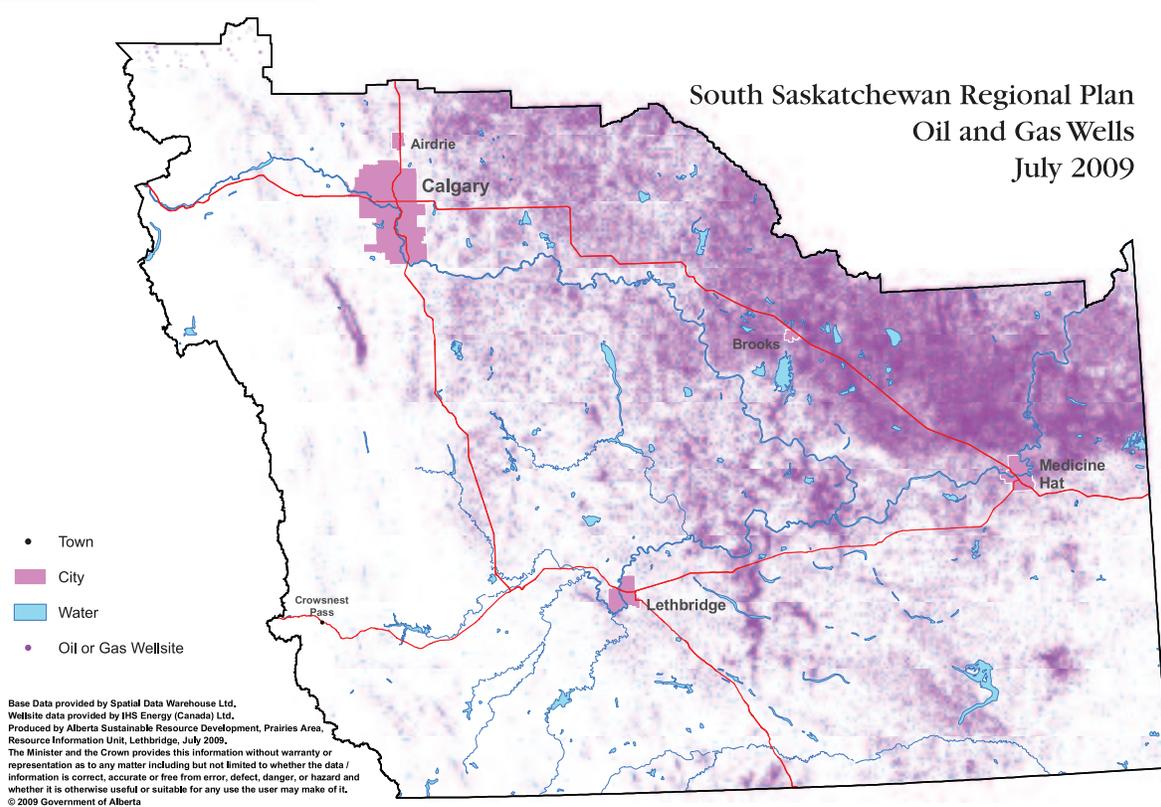




⁴¹ Alberta Energy.

⁴² Alberta Energy.

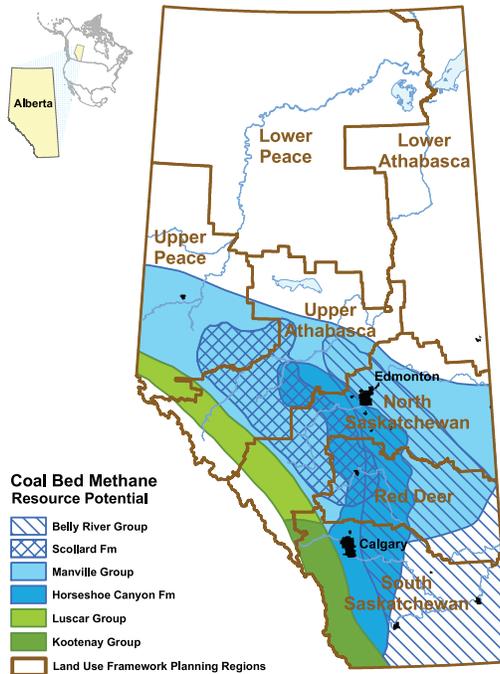
Some 93,000 oil and gas wells have been drilled in the region since the late 1800s, with roughly one-third of these located on public land. Currently, there are approximately 65,000 producing oil and gas wells in the region.⁴¹



Conventional natural gas accounts for approximately 95 per cent of all natural gas production in the South Saskatchewan Region. This has largely centred on shallow wells in the north and north-eastern parts of the region.

However, an increasing amount of natural gas production is originating from unconventional sources, such as coalbed methane (CBM). Province-wide activity in CBM has increased dramatically, from a few test wells in 2001 to more than 10,000 producing wells in 2008. There are currently about 3,400 CBM wells in the South Saskatchewan Region⁴² and significant potential for further CBM development.

The natural gas produced in the South Saskatchewan Region is typically sent to gas processing plants to remove impurities. There are approximately 130 gas plants in the region.⁴³ From these plants, natural gas enters the “Alberta Hub,” Alberta’s extensive network of 392,000 kilometres of energy-related pipelines. Approximately 75,000 kilometres of these operating pipelines⁴⁴ are located in the South Saskatchewan Region. The Alberta Hub transports approximately 15 billion cubic feet per day of natural gas to markets throughout North America.



The long history of oil and natural gas exploration and development in the South Saskatchewan Region has led to extensive land use throughout oil and natural gas production areas. This includes numerous well-sites and linear features, such as seismic lines, roads and pipeline rights-of-way.

Oil and Natural Gas Economic Impact

- About 80 per cent of Canada’s natural gas production is from Alberta. The province produces approximately 142 billion cubic metres of natural gas per year.⁴⁵
- Oil and natural gas are important contributors to provincial non-renewable resource revenues. In 2007-2008, the Alberta government received roughly \$5 billion in royalties on natural gas and by-products, and approximately \$1.6 billion in crude oil royalties.⁴⁶
- In 2007, Alberta exported approximately 33 billion cubic metres of natural gas to the rest of Canada, and approximately 70 billion cubic metres, of natural gas to the U.S.⁴⁷

Increasingly, oil and natural gas production on public lands has involved balancing exploration and production activities with other land uses, such as recreation and forestry. On private lands, meanwhile, resource producers have worked with private landowners and the Alberta government to ensure oil and gas activities on the surface of land are respectful of other uses, especially agricultural production.

⁴³ Alberta Energy.

⁴⁴ Alberta Energy.

⁴⁵ Alberta Energy. Energy Facts; available at www.energy.alberta.ca/News/984.asp.

⁴⁶ Government of Alberta (2008). *Government of Alberta Annual Report 2007-2008*, Consolidated Financial Statements. Edmonton: Alberta Finance and Enterprise.

⁴⁷ Government of Alberta. *Alberta Energy: Natural Gas - Statistics*; available at www.energy.alberta.ca/NaturalGas/727.asp.

⁴⁸ *Surface Rights Act*, RSA 2000, c. S-24.



⁴⁹ Alberta Geological Survey (2009) Open File Report 2009-11 “Simulation of Geothermal Flow in Deep Sedimentary Basins in Alberta”.

⁵⁰ Energy Resources Conservation Board (2009). ST98-2009: *Alberta’s Energy Reserves 2008 and Supply/Demand Outlook 2009-2017*.

⁵¹ Government of Alberta. *Alberta Energy: Natural Gas - Statistics*; available at www.energy.alberta.ca/NaturalGas/727.asp.

Often times, the party holding rights to produce minerals beneath the surface of the land is different from the party holding rights to the land surface. Alberta’s *Surface Rights Act*⁴⁸ sets out rules and processes aimed at reconciling these rights holders.

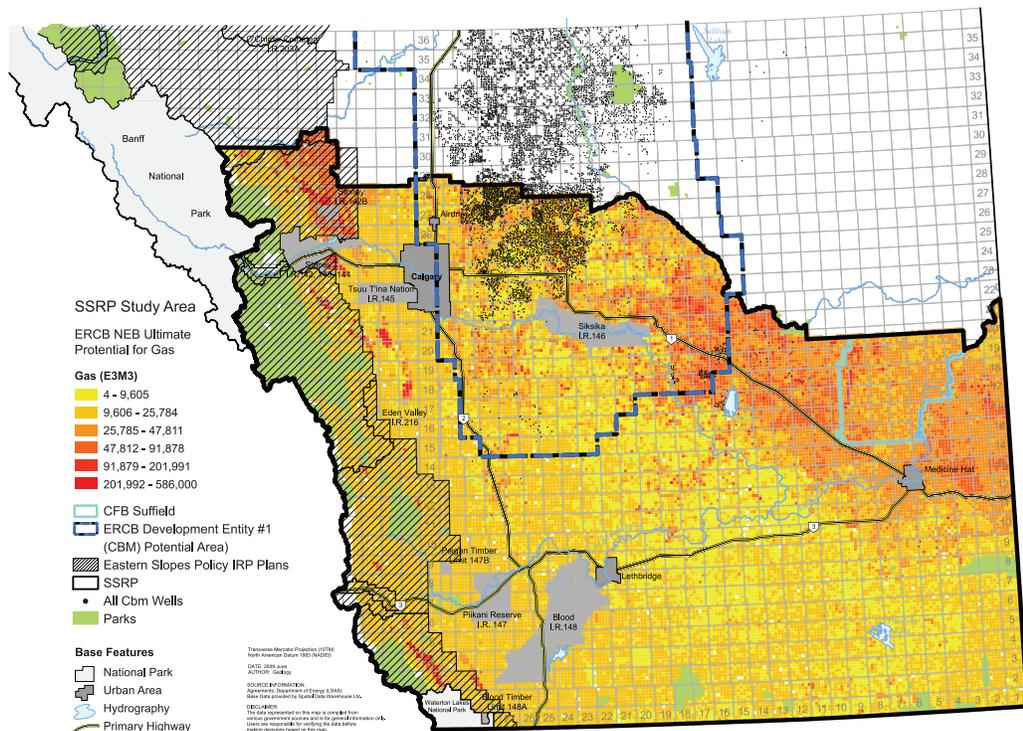
Oil and gas production is expected to remain a significant industry in the South Saskatchewan Region for the foreseeable future.

Although conventional oil production in the region peaked in 1996, and conventional natural gas production appears to have peaked in 2005, sizeable reserves of these resources remain.

At the end of 2008, Alberta’s remaining established reserves of conventional crude oil were estimated at 233 million cubic metres,⁴⁹ with ultimate potential recoverable reserves at 3,130 million cubic metres.⁵⁰ Currently, only about 27 per cent of light oil is recovered in Alberta. Very large quantities of light oil are still available to be tapped through advancements in technology and new exploration.

At the end of 2008, Alberta’s remaining established reserves of conventional natural gas stood at 1,098 billion cubic metres.⁵¹ Much of this is located in the South Saskatchewan Region.

South Saskatchewan Regional Plan Study Area - Ultimate Potential for Gas June 2009



Alberta also has significant unconventional gas resources remaining. At the end of 2008, established reserves of CBM in Alberta were estimated to be 28.3 billion cubic metres, with ultimate in-place resource estimates of up to 14 trillion cubic metres. New technologies continue to make these resources more economically viable.⁵²

Alberta's *Provincial Energy Strategy*⁵³ calls for the province to support sustained activity in the Western Canada Sedimentary Basin. Over the medium- to long-term, maximizing the recovery of remaining petroleum and natural gas reserves will involve expansion into 'frontier' areas, expansion of unconventional reserves, and the use of technology to improve oil and gas recovery in existing fields.

The *Provincial Energy Strategy* also calls for natural gas to play a key role in fostering value-added industry in the province. Natural gas can be used as feedstock for higher-value uses in petrochemicals and other higher-end products, creating greater employment and economic opportunities for Albertans.

Coal

Alberta's total coal production in 2008 was 32.5 million tonnes of marketable coal, most of which was sub-bituminous. Sub-bituminous coal is the type of coal found in the Alberta plains and is primarily used for electrical generation in the province.

The current estimate for remaining established reserves of all types of coals in Alberta is about 33.4 gigatonnes. This is equal to more than a thousand years of supply at current production levels.

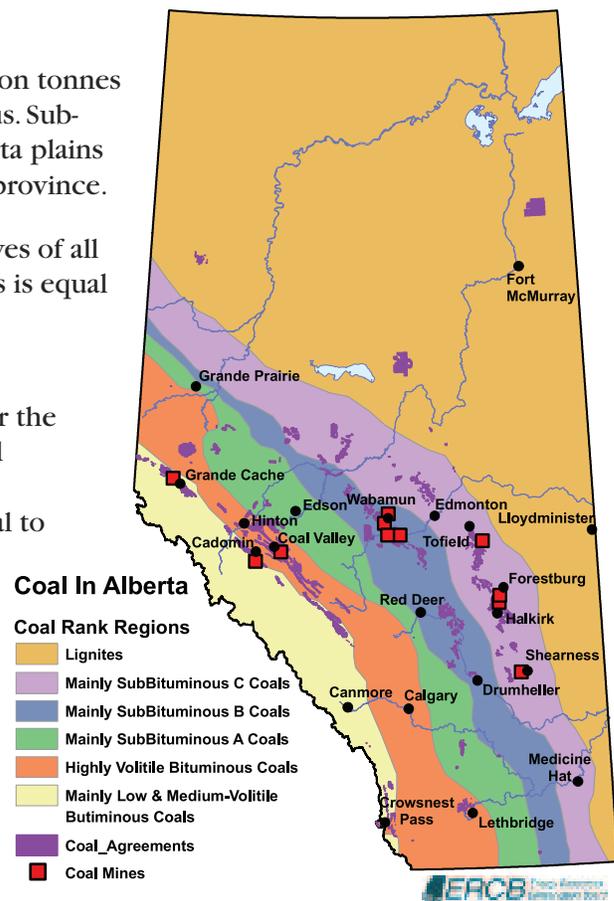
Alberta's coal production is expected to increase over the next decade to meet demands for increased electrical generating capacity and coal gasification. *Alberta's Provincial Energy Strategy*⁵⁴ envisions the use of coal to create syngas for use in heat and electricity generation, freeing up natural gas for export and value-added uses.

There is a history of coal mining in both the Bow and Crowsnest Pass corridors, as well as at Lethbridge and near Drumheller. While there are no operating mines at this time, there is a coal mine and coal-fired power plant proposed near Brooks with a substantial coal resource in this region.

⁵² Energy Resources Conservation Board (2009). ST98-2009: *Alberta's Energy Reserves 2008 and Supply/Demand Outlook 2009-2017*.

⁵³ Government of Alberta (2008), *Launching Alberta's Energy Future - Provincial Energy Strategy*. Edmonton: Alberta Energy.

⁵⁴ Government of Alberta (2008), *Launching Alberta's Energy Future - Provincial Energy Strategy*. Edmonton: Alberta Energy.





⁵⁵ Alberta Geological Survey (2009) Open File Report 2009-11 “Simulation of Geothermal Flow in Deep Sedimentary Basins in Alberta”.

⁵⁶ Alberta Utilities Commission, 2008.

⁵⁷ Canadian Wind Energy Association, www.canwea.ca/production_stats.cfm, www.canwea.ca/farms/wind-farms_e.php. The Alberta government signed contracts to purchase 90 per cent of its electricity requirements from green power starting in 2005. Enmax and TransAlta Wind (formerly Vision Quest) have constructed Canada’s largest wind farm with 114 wind turbines with a total capacity of 75.24 MW at McBride Lake. Nearby Soderglen wind farm has a total capacity of 70.5 MW. Additional Source: Alberta Energy, www.energy.alberta.ca/Electricity/pdfs/FactSheet_Wind_Power.pdf.

⁵⁸ Ibid.

⁵⁹ Government of Alberta (2008). *Alberta’s Nine-Point Bioenergy Plan*. Edmonton: Alberta Energy; www.energy.gov.ab.ca/BioEnergy/pdfs/BioE9pointPlan.pdf.

⁶⁰ Ibid.

Renewable Energy

Production of renewable energy has been growing in the South Saskatchewan Region. The region has significant potential for wind, hydroelectric power and bioenergy. There is also some potential in the region for geothermal power generation associated with deep oil and gas wells.⁵⁵

Currently, the region has 15 hydroelectric electrical generating facilities. Nine of these are located in the Bow River Basin, and six are located in the Oldman River Basin.⁵⁶

The region’s winds have contributed to growing wind power generation in the South Saskatchewan Region. There are about 21 wind-generated power projects in the region,⁵⁷ including some of Canada’s largest wind farms (near Taber and Pincher Creek), with more planned by industry over the next 10 years. By December 2008, the region’s wind generation capacity, at 525.2 Megawatts, had tripled from 2003.⁵⁸

Bioenergy production has also been growing in the region. This includes renewable energy and fuel derived from biological sources, such as agricultural products, livestock waste and forestry waste. Biogas plants are operating in Taber and High River.

Alberta is pursuing a *Nine-Point Bioenergy Plan*⁵⁹ which aims to encourage a bioenergy industry in Alberta. This is part of broader efforts under *Alberta’s Provincial Energy Strategy*⁶⁰ to increase production of renewable energy sources in the province, as a means of diversifying Alberta’s energy mix and reducing greenhouse gas emissions.

Metallic and Industrial Minerals

Industrial minerals include building stones such as limestone, sandstone, granite and shale; and minerals such as gypsum, salt and sulphur. They are used in agriculture, construction, landscaping, the natural resource sector, manufacturing and chemical processes.

Limestone is used for making cement. Small quantities of limestone are also quarried for use as building stone and in landscaping. There are lime plants in the region near Exshaw and the Crowsnest Pass. Alberta’s limestone plants produce more than two million tonnes of cement each year, and the province is the cement-manufacturing hub for the Prairie provinces.

Gypsum is used worldwide in concrete for highways, bridges, buildings and many other structures. It is also used extensively as a soil conditioner on large tracts of land in suburban areas, as well as in agricultural regions. A gypsum, zeolite and barite facility is located in Lethbridge.

Sulphur, a bright yellow powder, is used in making fertilizers and other industrial products. It is a common byproduct of sour natural gas production in Alberta, much of which occurs in parts of the South Saskatchewan Region.

Ammonite shell is quarried in the region, along the St. Mary River, and there is an ammonite processing and jewellery factory in Calgary.

Exploration work continues for gold, platinum group metals, zinc, lead and diamonds. Uranium, of uncertain economic viability for recovery, has also been found in the South Saskatchewan Region.

As resource development increases across Alberta, metallic and industrial minerals are expected to be in greater demand.

Aggregate Mining

Aggregate includes sand, (including silica sand), silt, gravel, clay (manufacturing and non-manufacturing), topsoil and marl. These products are used to make a variety of ceramic products, such as bentonite clay used by the oil and gas sector for drilling mud. Aggregate products are also used in road and building construction. Gravels such as “Alberta rainbow rock” and decorative river-washed gravel, are also used for landscaping.



The last glaciers were responsible for depositing much of Alberta’s sand and gravel, and a variety of these deposits are located in the South Saskatchewan Region. Aggregate mining takes place in the Bow Corridor, west of Calgary. There is also a brick plant located near Medicine Hat.

Demand for these products is expected to increase with population and economic growth and associated land development.



Forestry

Current Activity

Forestry also occurs in the South Saskatchewan Region. Forested lands in the Green Area of the South Saskatchewan Region make up 16 per cent of the region. Of this, only 48 per cent is actively managed for timber. The Alberta government manages the majority of this production on public lands, which includes the majority of pine and spruce-fir forests. The federal government

manages the largest proportion of white spruce in Banff National Park. Freehold landowners manage significant portions of the remaining land base, including the greatest portions of cottonwood/riparian complexes and hardwood forests.

The remainder of the region's forested lands are in the national parks; designated Prime Protection Zone under Integrated Resource Plans; or are withdrawn from the active commercial forest land base because of proximity to water bodies, steep slopes and other environmental values.

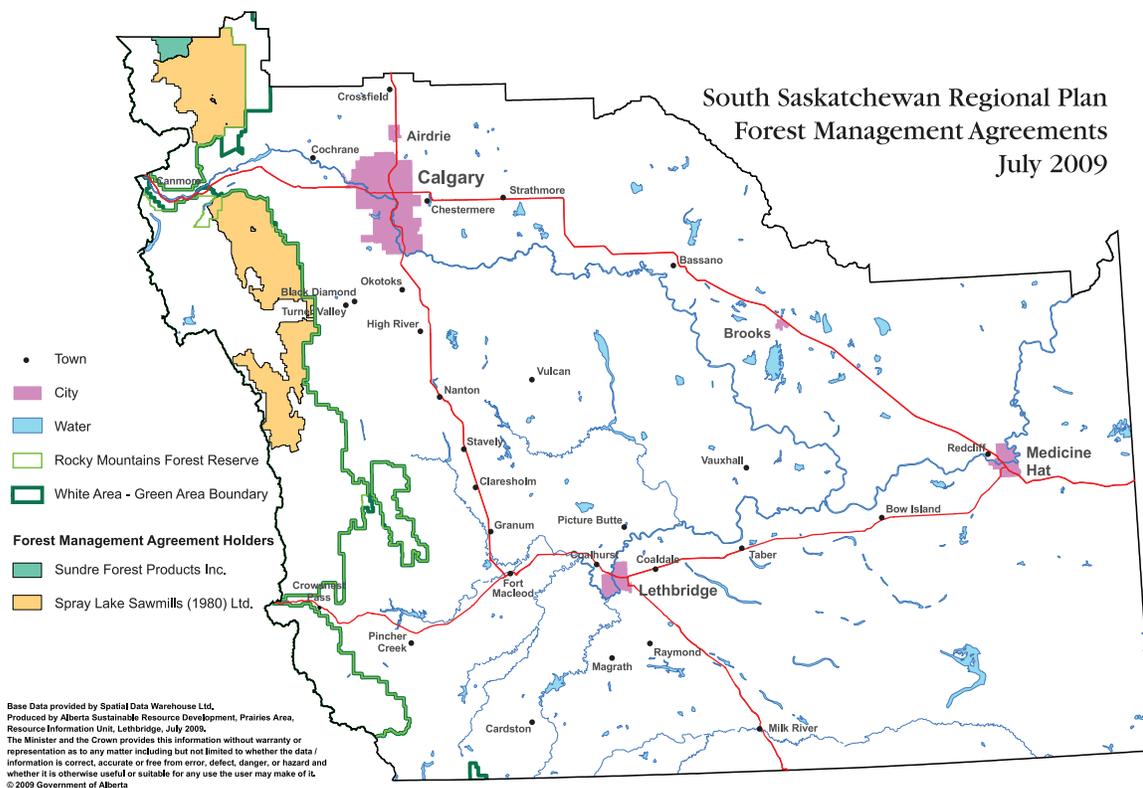
The Prime Protection Zone was established as part of the Eastern Slopes Policy (1984). This zone contains high-elevation forests and steep rocky slopes. The intent of the zone is to preserve environmentally sensitive terrain and valuable ecological and aesthetic resources. This includes the area's rugged mountain scenery; its critical wildlife ranges, especially for bighorn sheep and mountain goats; and its importance as a key source of water. This zone receives the greatest amounts of precipitation and produces most of the streamflow of the Eastern Slopes.

Alberta uses three types of tenure systems - timber permits, timber quotas and forest management agreements to ensure that Alberta's forest resources are managed in a sustainable way, while providing value for Albertans.

The most significant are Forest Management Agreements (FMA). These are agreements between the Crown and forest companies, typically 20 years in length, which give companies the right to harvest, remove and grow timber in a specified area. Under an FMA, the forest company takes on obligations for forest management planning. The company must manage forest resources within the FMA area in keeping with the principles of sustainable forest management, meaning the company must consider a range of social, economic and environmental factors (e.g., watershed, wildlife habitat).

Within the South Saskatchewan Region there are two FMAs, two community timber programs, and four coniferous timber quotas. The two FMA holders are Spray Lake Sawmills (1980) Ltd. (Spray Lake); and Sundre Forest Products (Sundre Forest).

There are also numerous smaller manufacturing facilities in the South Saskatchewan Region including sawmills, round-wood processing facilities, log home manufacturers and remanufacture plants.





Forest Management Unit Summary

	FMU	% of FMU Area	Coniferous	Deciduous	Total
South Saskatchewan	B09	84.9	146,843	45,547	192,390
	B10	100.0	144,944	-	144,944
	C04	100.0	1,536	-	1,536
	C05	100.0	174,920	-	174,920
	R10	1.8	25,846	2,885	28,731
South Saskatchewan Total			494,089	48,432	542,521

Source: Sustainable Resource Development/Forestry Division/Forest Management Branch

The details of where, when and how trees on public lands are harvested and managed are contained in Forest Management Plans approved by the Government of Alberta, with input from public and other stakeholders. Detailed Forest Management Plans are prepared by industry as a condition of an industry's FMA. The Alberta government is responsible for preparing plans for areas that are not covered by FMAs.

The Forest Management Plan is a technical document describing forest management objectives, strategies and commitments. It identifies intended methods of cutting, reforestation, and managing timber resources within the defined area of responsibility. The forest management planning time frame considered is 200 years; this generally represents two full life cycles, or "rotations", for trees in the FMA.

Forest Management Plans also require a watershed analysis to determine the impact of timber harvesting on water yields. Water from forested areas is important for the South Saskatchewan Region. If improperly managed, timber harvesting and forest roads can negatively impact watershed values. If properly managed, forestry activities can aid in managing headwaters for watershed values. Forest Management Plans in the region have involved assessments of 20 years of planned harvesting. Model results showed there would be no impact due to sustainable forestry on watershed values.

Forestry Economic Impact

- Forestry operations in the South Saskatchewan Region provide employment opportunities for local residents and are contributors to local tax bases.
- In addition to primary production, the forest industry also contributes to secondary manufacturing in Alberta, including cabinetry, engineered building components and millwork.
- In 2007, total forest product exports from Alberta in 2007 were valued at \$2.4 billion. Major markets for Alberta forest products include the United States, Japan, South Korea and China.⁶¹
- In 2007, in the area of Rocky Mountain House-Calgary-Southern Alberta, primary and secondary employment from the forest industry stood at 12,400 direct, indirect and induced jobs.
- The forestry industry in the Rocky Mountain House-Calgary-Southern Alberta area was responsible for \$124 million in corporate, personal and local taxes in 2007.

Future Role

As with other cyclical resource-based industries, the forest industry is sensitive to volatility. A number of recent trends have affected the forest industry's competitiveness.

The forest industry is competing with other sectors for labour and services such as trucking. Operators are facing higher labour and energy costs, and are limited in their ability to pass these costs on to customers. Currently, the slowdown in the American housing market has resulted in lower demand for forest products, depressing prices. Although international demand for pulp products remains strong, Alberta forest producers face rising competition from lower-cost jurisdictions.

Forest companies also face transportation-related barriers. In some cases, municipalities that are having difficulty affording road maintenance costs are placing new constraints on roads, or insisting that forest companies maintain the roads.

The Forest Industry Sustainability Committee, appointed by the Alberta government to examine challenges facing the forest industry, recommended a number of ways of enhancing its competitiveness.⁶² The Alberta government has accepted over 90 per cent of the recommendations,⁶³ including:

⁶¹ Government of Alberta (2008), *Economic Impact of the Alberta Forest Industry*. Edmonton: Alberta Sustainable Resource Development; available at <http://srd.alberta.ca/ManagingPrograms/ForestManagement/ForestBusiness/documents/EconomicImpactOfAlbertaForestIndustry-June2008.pdf>.

⁶² Forest Industry Sustainability Committee (2008), *Forest Industry Competitiveness: Recommendations for Enhancing Alberta's Business Model*. Edmonton: Alberta Sustainable Resource Development; available at <http://srd.alberta.ca/ManagingPrograms/ForestManagement/ForestBusiness/documents/FISC-ForestIndustry-EnhancingAlbertasBusinessModel-Aug2008.pdf>.

⁶³ Government of Alberta (2008), *Government of Alberta Response to FISC Recommendations on Forest Industry Competitiveness*. Edmonton: Alberta Sustainable Resource Development; available at http://alberta.ca/home/documents/FISC_document.pdf.



- making forest tenures openly transferable to reallocate wood to uses with the highest value;
- working cross-ministry to address strategic cost issues;
- making necessary resource road investments; and
- establishing a new Alberta Biomaterials Development Centre to support development of the bio-economy.

Alberta's forest industry is also positioned to benefit from new opportunities related to bioenergy. Forestry waste can be used as a sustainable feedstock supply to produce biofuels. This has the potential to generate new revenues for forestry companies, which in turn can help strengthen the industry, sustaining the economies of rural communities that are strongly tied to forestry.

Alberta is proactively building the research and commercialization infrastructure for the next generation of forest-based biomaterial products. Originating in the report, Alberta's Fibre Roadmap (2007), opportunities to gain greater value from more of the forestry fibre available, including current waste products, are being explored in public- and industry-supported collaborations. Two new facilitating organizations were launched in 2009, the Alberta Bioconversion Network and the Alberta Biomaterials Development Centre. They will be joined by an organization dedicated to product development using nanocrystalline cellulose derived from plant material.

In addition to economic pressures on the forest industry, there are other pressures and demands on the forest landscape, including the following:

Disease

Diseases such as dwarf mistletoe are prevalent in fire-origin lodgepole pine stands within the region;

Mountain Pine Beetle

Current populations are on the increase in the Bow Corridor area, Spray Valley, Upper Oldman River, and Crowsnest Pass areas. Numbers of attacked trees have increased from 11,496 in 2006 to 22,156 in 2007, and more than 35,515 in 2008. Although recent cold weather events have helped reduce populations, they have not stopped the spread of the beetle. Forests in the Eastern Slopes, about 70 per cent of which are mature and overmature lodgepole pine, are susceptible to the beetle. Mountain pine beetle can kill

80 per cent of the mature pine trees during an outbreak. This can have serious consequences for water supplies, biodiversity, recreation and the forest industry. It also raises the risk of intense wildfires. Alberta is engaging in aggressive control measures to prevent or slow the spread of the beetle along the Eastern Slopes and to protect major watersheds;

Population Growth

Significant population growth in the region, and expanding human reach in the Eastern Slopes, is leading to increased pressure on forested areas from recreational activities and residential developments. More housing developments are being built within forest environments, where wildland-urban interface fires are a threat. Wildfire ignition also parallels the human access footprint, and human-caused fires are encroaching further into the forest land base;

Access Management

Use of off-highway vehicles is steadily increasing, creating issues relating to watershed protection, vegetation and soil conservation and wildlife protection. User-conflicts are also increasing. These issues are also being created from random camping in forested areas. Garbage and waste disposal, fire risk (due to abandoned camp fires) and rowdy behaviour are less controlled in random camping than in designated camping areas;

Land Base Maintenance

Losses and fragmentation of the land base can be caused by other developments, such as oil and gas. This can also lead to water quality issues and biodiversity concerns, including the maintenance of wildlife habitat. Land management tools and approaches such as integrated land management (ILM)⁶⁴ and access management plans are helping manage human uses on the land base, ranging from recreational to industrial; and

Wildfire

The last significant wildfire events in the South Saskatchewan Region occurred in the late 1800s and early 1900s. Over time, aggressive forest fire suppression and the resulting lack of disturbance have resulted in a significant increase of fire risk. The South Saskatchewan Region has the highest wildfire threat compared to any other region. In Alberta an average of 200,000 hectares of forest are burned each year, with costs often exceeding \$250 million. In addition to these direct costs of fighting fire, wildland fires impact the forest industry; pose serious risks to watershed integrity; and threaten public health, safety, housing and other infrastructure. The leading human causes of wildfire are residents, recreation and industry. Expanding public and industrial development into forested areas raises the risk of wildfire.



⁶⁴ Integrated Land Management (ILM) is an approach to inform land management planning, decision making, actions and evaluations that applies to the life cycle of activities on the landscape. Successful examples of ILM can be found between forest and energy companies sharing access corridors.



Tourism

Tourism is one of Alberta's largest economic sectors with 80 per cent of Alberta's tourists being from Alberta. The South Saskatchewan Region is an international-calibre destination and is critical to ensuring the ongoing growth of the provincial and national tourism industries. Nearly 50 per cent of the province's direct tourism expenditures are made in the region. A significant portion of the tourism industry is dependent on the region's natural diversity and the opportunities and experiences this diversity provides. To date, many potential tourism destinations, such as Kananaskis Country, have been marketed and developed while others are relatively untapped (e.g., Badlands, Cypress Hills, Crowsnest Pass).

The tourism industry in the region has diversified local economies that are traditionally dependent on declining resource extraction-based industries, created employment opportunities, generated important revenues and showcased the natural diversity and cultural history of the region to the world. In 2007, direct tourism visitor expenditures were estimated to be \$2.2 billion, which sustained a province-wide economic impact (income) of \$2.5 billion, of which \$1.6 billion was retained in the South Saskatchewan Region. These expenditures supported 45,300 jobs province-wide and 36,404 jobs within the region. As a result of tourism expenditures, approximately \$942 million in total taxation revenues was accrued to all three levels of government. Provincially, Alberta is targeting a \$6.3 billion tourism industry by 2011-12.

Hunting activities also contribute to the rural economy in incidental purchases such as accommodation, meals and gas. The outfitting and guiding industry is a large part of this, with Alberta being a destination point for many out of country hunters. In 2008, about 112,000 people hunted in Alberta and the economic value was estimated at \$296 million plus up to \$36 million made by outfitters and conservation organizations.

Ecosystems and Environment

In addition to supporting human development and economic growth, Alberta's landscape provides important ecosystem goods and services. These are the benefits of nature's ecosystems, which have importance for our well-being. For example, riparian areas contribute to healthy water supplies, as well as offering storm and flood protection services. Nature also provides services such as pollination and photosynthesis, which are essential for supporting healthy air and the production of food.

Ecological goods and services support the growth and progress of society, but these goods and services are limited, and can be impacted by human activity on the landscape.

Over time, the South Saskatchewan Region's landscape has been transformed. A region that was once dominated by grassland is now dominated by cropland. Industrial, commercial and residential developments have all increased with a growing population.

Today the region is under increasing pressure to maintain multiple uses on the same land base, including grazing, wildlife habitat, recreational use, and industrial and commercial development. The region also has the province's scarcest water supplies but some of the highest water demands, adding to the challenge of cumulative effects management.

Natural Regions and Subregions

Natural Regions and Natural Subregions are the broadest levels of ecological classification of Alberta's complex landscape. They define areas that have similar physical qualities and attributes.

A Natural Region is defined geographically on the basis of landscape patterns, notably vegetation, soils, and physiographic features. Additionally reflected at the broad level is the combined influence of climate, topography and geology. Wildlife distribution and land-use patterns may also be helpful in delineating Natural Regions.⁶⁵ Each Natural Region is divided into Subregions, defined as an area of land within a Natural Region that is characterized by vegetation, climate, elevation and latitudinal or physiographic differences.⁶⁶

⁶⁵ Natural Regions Committee 2006. Natural Regional and Subregions of Alberta. Compiled by D.J. Downing and W.W. Pettapiece. Government of Alberta. Pub. No. T/852 (pg. 1).

⁶⁶ Natural Regions Committee 2006. Natural Regional and Subregions of Alberta. Compiled by D.J. Downing and W.W. Pettapiece. Government of Alberta. Pub. No. T/852 (pg. 1).



⁶⁷ http://tpr.alberta.ca/parks/heritageinfocentre/docs/Grassland_Natural_Region_of_Alberta_Report.pdf.

Conditions within a Natural Region or Subregion are not identical throughout. Each is home to diverse species and landscape conditions.

The South Saskatchewan Region spans four of Alberta's six Natural Regions – the Grassland, Parkland, Foothills and Rocky Mountains – and 11 of Alberta's 21 Natural Subregions. Five of Alberta's Natural Subregions are only found in the South Saskatchewan Region.

Grassland Natural Region

The largest Natural Region in the South Saskatchewan Region is the Grassland Natural Region, which covers 14.5 per cent of the province. Forty-three per cent of the South Saskatchewan Region's total land area is native grasslands.⁶⁷ Presently 1.29 per cent of this Natural Region is protected in Alberta in national and provincial parks.

This Natural Region covers most of South Saskatchewan Region, extending westward from the Alberta-Montana and Alberta-Saskatchewan borders to the Foothills and Rocky Mountain Natural Regions. It is a flat-to-gently rolling plain, with a few major hill systems. Badlands have developed where river valleys and their associated coulees and ravines have been carved deeply into bedrock, especially along the Red Deer, Oldman-South Saskatchewan and Milk rivers.

Grasslands are dominated by grasses, which include needle and thread and blue grama in the driest portions, and rough fescue and Parry oat grass in the moist foothills areas. Extensive narrow-leaf cottonwood forests, found nowhere else in Canada, occur along the Oldman, Belly, Waterton and St. Mary rivers. Upland wildlife is most diverse on the broad plateaus of the Cypress Hills and the Milk River Ridge.

The Grassland Natural Region provides many important ecosystem services, such as erosion control and sediment retention. In southern Alberta, this is important for maintaining the fertility of arable land. Grasslands also perform the service of soil formation and climate regulation.

Within the South Saskatchewan Region, four of the Grassland Natural Subregions are represented. Of the four, the Dry Mixedgrass Subregion is the largest, covering about half of the Natural Region. Most of this subregion has been altered by agricultural development over time, and is mainly used for cattle production on native pasture and crop production on irrigated land. It is the warmest and driest in Alberta, with a predominance of short and mid-height grasses.

The other three Natural Subregions are characterized by sand plains, dunes and rolling moraines, with various grasses and fescues.

Parkland Natural Region

The Parkland Natural Region forms a broad transition between the grasslands to the south and the forests to the north. It is present only in the Prairie provinces of Canada, and only about one per cent of this Natural Region is presently protected in Alberta in national and provincial parks.

Only two subregions – the Central Parkland and Foothills Parkland subregions – occur in the South Saskatchewan Region. A very small portion of the Central Parkland is located in the region; most of this land has been cultivated to grow agricultural crops.

The Foothills Parkland Subregion occupies a narrow band along the eastern edge of the foothills from Calgary south to the Porcupine Hills; and from Pincher Creek south to the U.S. border. The topography is rougher than that of the Central Parkland and elevations are higher, ranging to more than 1,300 metres above sea level.

Within this subregion there is a gradual transition from grassland with groves of aspen to closed aspen forest. This transition occurs across a very short distance (one km to five km) because of rapid changes in topography and climate. This results in small geographic areas being very diverse, with many animal species different from the Central Parkland. This subregion is found only in the South Saskatchewan Region.





⁶⁸ Natural Regions Committee 2006. Natural Regional and Subregions of Alberta. Compiled by D.J. Downing and W.W. Pettapiece. Government of Alberta. Pub. No. T/852 (pg. 67).

Foothills Natural Region

A small portion of the Foothills Natural Region lies within the South Saskatchewan Region. The tip of the Foothills Natural Region extends north from around Bow River Valley⁶⁸ along the eastern edge of the Rocky Mountains in a gradually widening belt. Two subregions are represented in the South Saskatchewan Region – the Lower Foothills and Upper Foothills.

The Lower Foothills Subregion includes rolling topography created by the deformed sandstone and shale outcrops along the edge of the Rocky Mountains. Mixed forests of white spruce, black spruce, lodgepole pine, balsam fir, aspen, white birch and balsam poplar populate the region. Many of the animals that inhabit these forests occur throughout the Boreal Forest, Foothills and Rocky Mountain Natural Regions.

The Upper Foothills Subregion occurs on strongly rolling topography along the eastern edge of the Rocky Mountains. Upland forests of this Subregion are nearly all coniferous and are dominated by white spruce, black spruce, lodgepole pine and subalpine fir. Animal species are less diverse in this Subregion than in the Lower Foothills because of a reduced diversity of plant communities. Elk, black bear and grizzly bear are characteristic mammalian species.

The forests of these subregions provide many important ecosystem services, including dampening the severity of environmental disturbances through flood prevention and storm protection. For instance, the forests of the Eastern Slopes regulate spring runoff, helping minimize flood damage.

Rocky Mountain Natural Region

The Rocky Mountain Natural Region, running along the Continental Divide, ranges from about 10 km wide in the Waterton Lakes National Park area to more than 100 km wide in the central portion of the region. It contains the most rugged topography in Alberta. Among other ecosystem services, this Natural Region provides vital water supplies for southern Alberta.

All three subregions of the Rocky Mountain are represented in the South Saskatchewan Region – Montane, Subalpine and Alpine. The Montane Subregion is characterized by a pattern of open forests and grasslands.

The Subalpine Subregion occupies a band between the Montane and Alpine subregions in the south, and between the Upper Foothills and Alpine subregions in the north. It is characterized by closed coniferous forests, and snow avalanches create a diverse mix of shrubby and herbaceous communities.

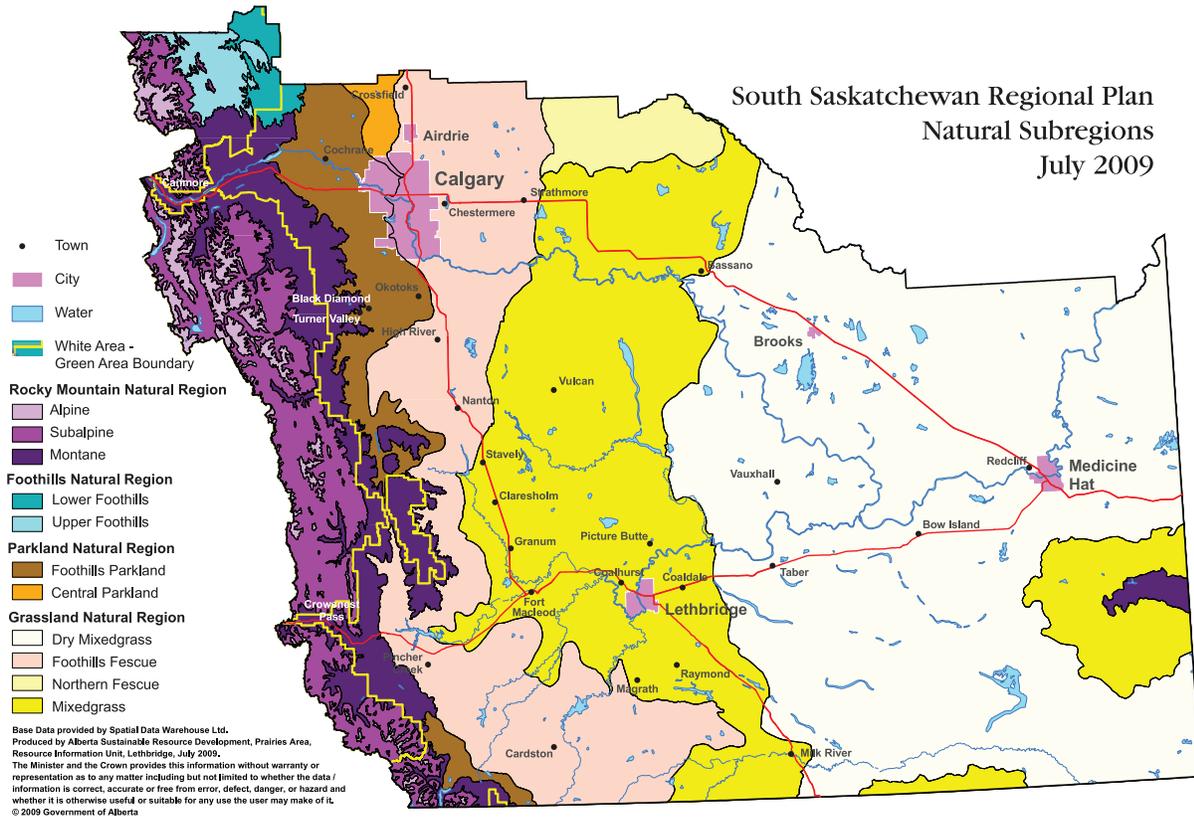
The Alpine Subregion occurs above the treeline and includes vegetated areas, bare rock, snowfields, and glaciers. Deep, late-melting snowbeds are occupied by black alpine sedge communities. Diverse, colourful herb meadows occur in moist sites below melting snow banks or along streams. Lichen communities on rocks struggle to survive at the highest elevations.

Ecosystems of the South Saskatchewan Region

Region	Subregion
Grassland Natural Region	Dry Mixedgrass Mixedgrass Northern Fescue Foothills Fescue
Foothills Natural Region	Upper Foothills Lower Foothills
Parkland Natural Region	Central Parkland Foothills Parkland
Rocky Mountain Natural Region	Montane Subalpine Alpine

Source: Natural Regions and Subregions of Alberta, 2006





Water

Water in the South Saskatchewan Region stands to be the limiting factor on future population and economic growth. Due to a combination of history, climate, geographic factors, and patterns of settlement, the region faces challenges in matching water demand with water supply.

In dry years, for short periods, peak demand for water can exceed the supply of water available for use in Alberta. In very dry years, demand for water can exceed the volume of water available in some rivers for extended periods. Water stored in reservoirs during the spring, or carried over from the previous year, can help meet the water demands of licensed allocations, the aquatic environment and the water-sharing agreement with Saskatchewan.

However, substantial population and economic growth in the South Saskatchewan Region have contributed to increased water demands. Water conservation objectives in some parts of the region's water basins are lower than the flows required to maintain healthy fish populations. As the region continues to grow, matching water demand with water supply will continue to be a key challenge.

⁶⁹ *Water Act*, RSA 2000, c.W-3.

River Basins

Under Alberta's *Water Act*,⁶⁹ the province is divided into seven major river basins. More than half of the South Saskatchewan River Basin (SSRB), and all of the Milk River Basin, fall within the region.

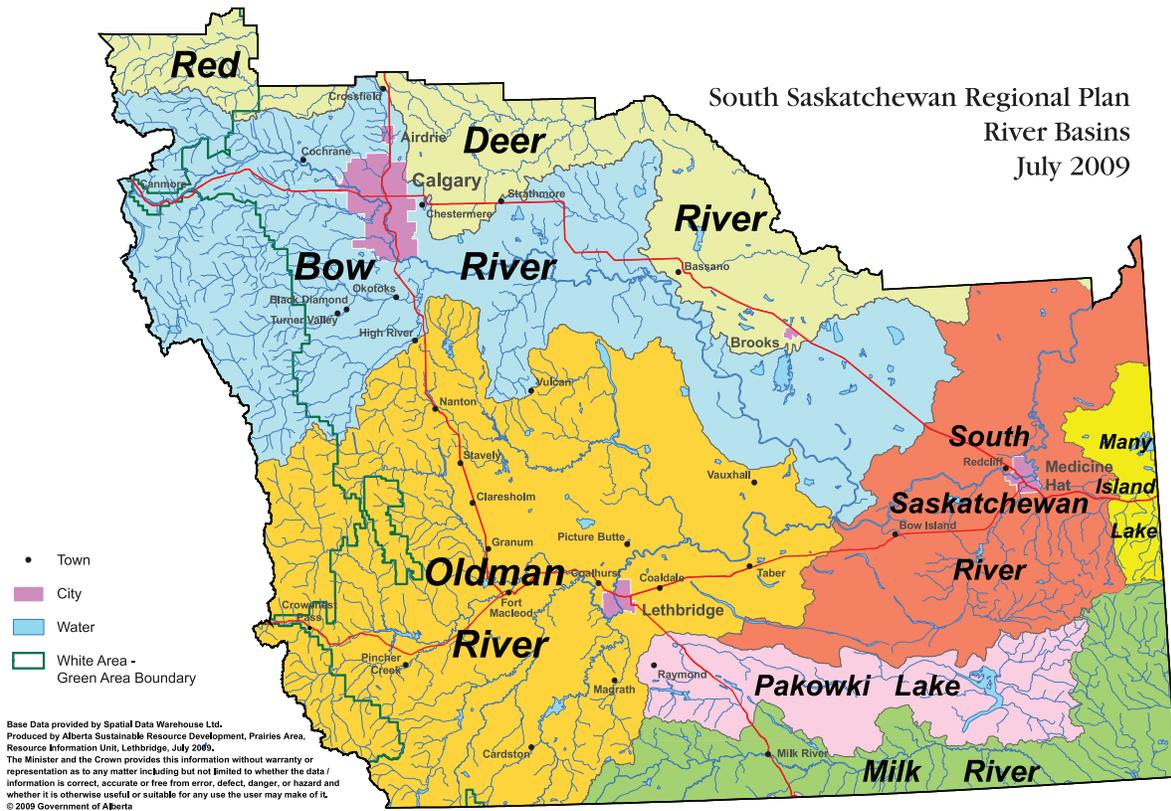
South Saskatchewan River Basin

The SSRB consists of four sub-basins. Three of these four sub-basins are entirely within the land-use region: the Bow, Oldman, and South Saskatchewan. Portions of the fourth, the Red Deer River Sub-basin, extend into the M.D. of Bighorn and the Counties of Newell and Wheatland in the northern part of the region. For the purposes of this report, the Red Deer River Sub-basin is not discussed in detail due to its limited influence in the region. All of the sub-basins begin in the Rocky Mountains, generally flowing eastward through foothills and prairie.

The combined area of the SSRB is 121,095 square kilometres. The major urban centres of Calgary, Lethbridge, Red Deer and Medicine Hat, and all of the province's 13 irrigation districts are located within the SSRB.

Milk River Basin

The Milk River is the smallest of the province's major river basins, encompassing an area of about 6,500 square kilometres. The Milk River also forms a part of the Missouri-Mississippi River Basin. The Milk River enters Alberta from Montana, flows eastward through the southern portion of the province, and then loops back into Montana. The town of Milk River is one of the few towns in the basin.



The region's water basins are characterized by a number of factors that contribute to the water supply/demand challenges faced by the region:

Runoff Patterns

Water from melting snow in the Rocky Mountains accounts for about 75 per cent of annual flow in the region's rivers. Spring snow and rain typically contribute to runoff in early spring and the month of June. After leaving the mountains and foothills, the rivers conduct water away from the mountains across the prairies. There are few tributaries that contribute water to river flows. For example, the flow of the South Saskatchewan River results from the additive flows of the Oldman and Bow rivers; there is very little inflow in its sub-basin;

Protection of Headwaters

The headwaters of watersheds in the South Saskatchewan Region enjoy protection in the mountain national parks, provincial parks and forest reserves. This is the result of forward thinking by our predecessors, who recognized the need to protect the headwaters to ensure clean, reliable water is supplied for development on the prairies. The Rocky Mountain Forest Reserve and Rocky Mountain Park were established in the early 1900s. Although the names and boundaries have changed, the primary purpose of watershed protection has been served. The policy originally created in 1977, entitled A Policy for Resource Management of the Eastern Slopes (Revised 1984)⁷⁰, has also been important to protect headwaters (for Alberta and downstream jurisdictions).



⁷⁰ Government of Alberta. 1984. A Policy for Resource Management of the Eastern Slopes, Revised 1984. ENR Number T/38. Edmonton, Alberta.

More recently, the Land-use Framework (page 45) specifically referenced that “Historically, watershed and recreation were deemed the priority uses of the Eastern Slopes. These priorities should be confirmed, and sooner rather than later.”

Healthy watersheds have direct implications on future health, quality of life, settlement patterns, recreation opportunities, agricultural irrigation, biodiversity and development opportunities that support the economy. The impacts on our water from cumulative human activities also increase. Source water protection helps to ensure reliable, quality water resources for society, ecosystems and the economy. In the South Saskatchewan Region, risks include such environmental threats as climate variability that results in droughts and floods, mountain pine beetle infestation and wildfires that disrupt runoff and infiltration patterns;

Flow Variability

There is a large degree of variability in the flows of the region’s rivers, from year to year and within each year. There are usually large flows during the spring runoff, which taper off during the summer to very low flows during the winter. Consequently, the concept of “average” flow does not reflect the challenges of water management planning of the region’s rivers;

Drought

Scientific studies indicate that severe droughts have occurred during the past 2,000 years, with an average duration of more than 10 years. At least 20 short droughts occurred during the twentieth



century, including a 10-year dry period starting in 1977. The drought of the 1930s is one of the most notable and was the most severe and prolonged drought since the beginning of western settlement. On a provincial scale the 2001-2002 drought had the driest back-to-back years in 74 years;

Floods

Floods are also characteristic of the region's rivers. Recent major floods in the region occurred in 1995, 2002 and 2005. Major floods are usually the result of heavy rainfall events (over 100 mm) which historically occur in early June when a large, moist air mass is pushed in

an easterly direction upslope against the mountains. These major events can be only marginally attenuated by water storage reservoirs. Floods can pose a major risk to life and property, but they also play a role in aquatic ecosystem function. Riparian vegetation, for example cottonwood trees, has evolved in response to flood events and is dependent on these events;

Riparian Areas

The health and function of riparian areas is an important consideration in the South Saskatchewan Region. Riparian areas are the lands adjacent to streams, rivers, lakes and wetlands, where water and land interact. The expression of healthy riparian vegetation influences a number of important ecological processes and functions. Healthy riparian areas trap and store sediments, build and maintain banks and shores, store water and energy, recharge aquifers, filter and buffer water, reduce and dissipate flood energy, maintain biodiversity, and create primary productivity. Although they make up only a small fraction of the land, they are among the most productive and valuable of all landscape types.

In the South Saskatchewan Region, riparian vegetation, and most notably the cottonwood forests alongside Southern Alberta rivers and the lush bands of vegetation around our lakes and wetlands, play an ecological role in the prairie landscape. This vegetation can be negatively affected by both land use (development and livestock grazing) and flow alteration by dams. There are reaches of the rivers and their tributaries where one or the other is clearly the cause, and others where a combination is likely the case.

The Alberta Riparian Habitat Management Society, also known as Cows and Fish, has been active in developing education and awareness programs that foster a better understanding of how improvements in grazing and other management of riparian areas can enhance landscape health and productivity for the benefit of all users. Cows and Fish provides valuable monitoring tools that establish current status and trends in riparian health. In particular, Cows and Fish assists in building community-based and producer-driven groups to address local riparian issues.

The riparian vegetation along the main rivers in the South Saskatchewan Region has been evaluated at a high level by Cows and Fish. Approximately 20 per cent of the sites evaluated were found to be in a healthy state. Additional evaluation is required along tributaries and headwater reaches. Alberta's Grassland Vegetation Inventory will help in understanding the extent of riparian vegetation in Southern Alberta and will aid in planning further health assessments.

Alberta Sustainable Resource Development's Rangeland Management Branch also has a special Riparian Management Program that provides additional manpower support for monitoring of riparian health on public rangelands, to increase the understanding of beneficial practices and to enhance overall riparian health on grazing dispositions;

Few Natural Lakes

There are few natural lakes in the region, outside of the mountains. Almost all the lakes are man-made reservoirs constructed in connection with irrigation infrastructure;

Non-Contributory Areas

There are vast areas of flat and rolling prairie where evaporation usually exceeds precipitation. Little if any water runoff is generated. These areas are considered to be "non-contributory". The largest of these are two terminal basins, which have no outlets under the present-day hydrological regime: the Pakowki Lake Basin and the Many Islands Basin;

Milk River

This river is unique in Alberta in that it has greater than natural flows during the summer. This is because it conveys water diverted from the St. Mary River in Montana through Alberta to eastern Montana. This water is not available for use in Alberta. The Milk River is also the only river in Alberta that is part of the Mississippi River Basin and, consequently, it supports some species not found elsewhere in Alberta; and



Storage Reservoirs

Storage reservoirs constructed on the Bow, Oldman and Waterton-St. Mary river systems have provided water for hydroelectricity, irrigation, recreation, and municipal and industrial uses. They also provide flow augmentation for minimal flows. There have also been off-stream storage developments, mainly to supply irrigation districts. Water captured through storage in the South Saskatchewan Region is being fully utilized.

Water Allocation

Under Alberta's *Water Act*, most use of surface water and groundwater is regulated through a system of water licences issued by Alberta Environment. Municipalities, private companies, individuals and others can apply for permission to use water for drinking, irrigation, industrial processes or other uses. The terms of the licence include many conditions of use, such as maximum volume, rate of diversion and timing.

Licence allocations only indicate maximum water volumes allowed for a specific use. Some licences were granted with room for growth, and some purposes (notably irrigation) have demands that can vary widely depending on weather conditions. Consequently, allocations do not measure the water actually used or water recycled back into the basin. Water allocations are a general measure of the degree of pressure being placed on a water basin.

The *Water Act* also provides statutory rights to water. Landowners outside urban municipalities have a right to 1,250 cubic metres per year for household purposes and 6,250 cubic metres per year for registered traditional agricultural users for raising animals or applying pesticides to crops. This can be surface water on or adjacent to the land, or groundwater. These users do not need to obtain a water licence.

Water licences are subject to a priority system based on time. The licence priority system gives licences with highest priority (i.e., those issued earliest) the right to have their requirements met before licences with lower priority.

The major users of water in the South Saskatchewan are municipalities, industry, and agriculture. The largest by far is agricultural irrigation, which accounts for 75 per cent of the volume of all water allocations in the region.

Approximately 8,000 km of canals and pipelines support irrigation of approximately 627,000 hectares of land. Major water diversions from the Oldman River Basin are for nine irrigation districts, including the St. Mary River Irrigation District, the largest in Alberta. Three large irrigation districts divert water from the Bow River. A number of off-stream storage reservoirs have been constructed within these irrigation districts to help meet the needs of agricultural producers during low river flow periods. Irrigation districts provide water to 48 communities, as well as to numerous recreation facilities and wetlands projects throughout southern Alberta.

Of the water diverted for irrigation, approximately 80 per cent is consumed and 20 per cent returned to the basin. The irrigation industry has been steadily increasing its water use efficiency for several years. Increased efficiency reduces power costs, and facilitates the expansion of irrigated areas within existing allocations.

Municipalities and other industries also divert substantial quantities of water year round, but much of this water is continuously returned to rivers after treatment. In fact, most urban areas are net contributors to river flows, as the large amount of impermeable surfaces in modern cities creates large amounts of runoff, although this runoff can result in water quality problems.

The Alberta government has been supportive of the development of regional systems for drinking and waste water. These enable municipalities to cooperate with each other to build and operate a single facility. Water diverted into regional systems is generally not returned to the source river, so it represents a net depletion of that water body.

Water Quality

Each sub-basin's water quality and aquatic health are influenced by its unique features and water uses.

Bow Sub-basin

Alberta Environment's long-term monitoring sites indicate that overall water quality is good in the Bow River and its major tributaries in terms of nutrients, metals and fecal bacteria. However, there is some decline in water quality in the Bow River downstream of Calgary, and in the Elbow River in the vicinity of Calgary. This can be attributed largely to urban runoff from storms.

Oldman Sub-basin

The water quality of the Oldman River and smaller rivers in the basin is quite good. Water withdrawals have created some concerns





for the aquatic ecosystem. However, stored water and the implementation of minimal flows in the Oldman River and its tributaries have helped to reduce the severity of negative impacts on riparian ecosystems during periods of prolonged or excessive droughts. Invasive plants, altered river flows, and poor bank stability are concerns for maintaining riparian health. Land use along smaller tributary streams tends to be agricultural, which may influence water quality.

South Saskatchewan Sub-basin

Although water quality is generally good, riparian health is affected by invasive vegetation, poor native grass cover, altered flows and agricultural practices.

Milk River Mainstem

Water quality in the Milk River mainstem is reported to be generally good, although some tributaries have lower quality water. The riparian areas of the Milk River are also healthy. The population and distribution of mature cottonwood trees has not changed appreciably for many decades. Stream bank erosion, however, is a growing concern; this is believed to be a result of artificially high flows during the summer.

Water Quality and Riparian Health – Major Sub-basins in South Saskatchewan Region

	Water Quality		Riparian Health	
Bow River Sub-basin - 10 Total Reaches	Excellent	5	Healthy	2
	Good	3	Healthy with problems	7
	Could not be rated	2	Unhealthy	1
Oldman River Sub-basin - 10 Total Reaches	Excellent	4	Healthy	2
	Good	6	Healthy with problems	7
			Unhealthy	1
South Saskatchewan River Sub-basin - 2 Total Reaches	Good	1	Healthy with problems	1
	Could not be rated*	1	Unhealthy	1

*This river reach met all objectives in 2003 measurements.

Source: Government of Alberta (2007), *Aquatic and Riparian Condition Assessment Report*.
Edmonton: Alberta Environment.

Pressures on Water

A number of factors place pressure on the quality and quantity of surface water and groundwater sources in the South Saskatchewan Region:

Population Growth

Population growth drives urban development, recreational growth, industrial growth and intensification of agricultural operations. This can lead to loss of wetlands, sediment input from roads and fragmentation of streams and blocking movement of fish. Residential development is also moving further into ecologically important areas; especially the Eastern Slopes, which is the source of fresh water for most of southern Alberta;

Municipal Use and Wastewater

Most of the surface water and groundwater withdrawn for domestic use is returned to the basin, but is not always of the same quality or returned to the same place. Wastewater effluent is higher in temperature, organic material, nutrients and bacteria than the original water withdrawn, which can negatively affect native biodiversity in the receiving water;

Loss of Wetlands and Riparian Areas

Years of development have resulted in the loss of approximately 60-70 per cent of wetlands in the settled areas of Alberta, and the alteration of riparian areas. Riparian areas and wetlands help prevent erosion and help trap sediment and nutrients; loss of these areas negatively impacts water quality. Working partnerships among land trust organizations and landowners in the irrigated areas of the region are developing new wetlands and habitat areas in support of a growing need for wildlife and secure, quality water supplies;

Agriculture

While substantial, agriculture uses of water including irrigation and livestock watering are important for the region. Irrigation infrastructure provides quality water supplies to municipalities, rural communities, industries and wetlands. The irrigated areas of the South Saskatchewan Region contain some of the most intensive agriculture operations in Canada. Increasing agricultural intensity can result in increased nutrient concentrations, soil erosion and higher sediment due to increased runoff. Greater use of stewardship best practices among agricultural producers is helping mitigate these pressures;



⁷¹ Martz, L., J. Bruneau and J.T. Rolfe, (eds.), 2007. *Climate Change and Water, SSRB Final Technical Report*. Saskatoon: University of Saskatchewan.

⁷² This figure is but one point within a wide range of variation from year to year, which has always been a characteristic of the South Saskatchewan River Basin.

⁷³ Government of Alberta (2003), *Water for Life: Alberta's Strategy for Sustainability*. Edmonton: Alberta Environment.

⁷⁴ Government of Alberta (2008), *Water for Life: A Renewal*. Edmonton: Alberta Environment.

Climate Change

A major research project concerning the possible implications of climate change for water supply and demand was recently completed for the South Saskatchewan River Basin.⁷¹ Among its conclusions is a prediction that average river flows in the basin could decrease by 8.4 per cent by 2050⁷².

Water Legislation, Plans and Agreements

Since 2003, *Water for Life: Alberta's Strategy for Sustainability*⁷³ has been the central policy for managing Alberta's water resources. In the renewed 2008 strategy, *Water for Life: A Renewal*,⁷⁴ the Government of Alberta reaffirms its commitment to the *Water for Life* approach of wisely managing Alberta's water quantity and quality for the benefit of Albertans now and in the future. It also reaffirms three goals: safe, secure drinking water supply, healthy aquatic ecosystems, and reliable quality water supplies for a sustainable economy.

The renewed strategy accelerates action to safeguard Alberta's water sources, ensuring integration of watershed planning with regional planning under the Land-use Framework. It sets clear direction for improved watershed management in Alberta, and it outlines the need to take action on a number of fronts, including:

- regional drinking water and wastewater solutions;
- aquatic ecosystem health;
- viable governance system that supports sustainable management of surface and groundwater; and
- water monitoring, evaluation and public reporting.

Water for Life includes objectives for water conservation for all water basins in Alberta. It sets a medium-term goal of improving overall efficiency and productivity of water use in Alberta by 30 per cent from 2005 levels, by 2015.

In addition to the objectives and direction in *Water for Life*, management decisions regarding the region's water basins are made in accordance with other key documents.

Among these are transboundary water sharing agreements that Alberta has in place with Saskatchewan and Montana. These agreements recognize that downstream users in other jurisdictions rely on water from rivers flowing through Alberta.

Under the *Master Agreement on Apportionment*, Alberta must allow at least 50 per cent of the natural flow of the South Saskatchewan River Basin to pass into Saskatchewan on an annual basis. The Master Agreement also provides for a minimum flow rate. Historically, on average Alberta has passed 75 per cent of the natural flow of this water basin to Saskatchewan. In 2001, the driest year on record, Alberta passed on 57 per cent of the natural flow.

Apportionment Requirements

Alberta has obligations to pass on minimum amounts and flows of water from the South Saskatchewan River Basin (which includes the Red Deer River) to Saskatchewan.⁷⁵ Meeting these obligations is likely to become increasingly challenging in the future, as water licence holders in Alberta use greater portions of their allocations and additional allocation takes place in the Red Deer River Basin. Alberta's policy is that all the sub-basins of the South Saskatchewan River Basin can be drawn upon as needed to meet apportionment requirements. Consequently, the most junior licence holders may be required at times to reduce or cease diversions in order to meet Alberta's obligations. A committee with representatives from the South Saskatchewan River Basin's four Watershed Planning and Advisory Councils has been established to advise Alberta Environment on meeting apportionment obligations with Saskatchewan; and

Alberta and Montana share the waters of the Milk River and St. Mary River under the 1921 Order of the International Joint Commission under the *Boundary Waters Treaty*. The Governments of Montana and Alberta have agreed to work together on an initiative that will improve both jurisdictions' access to the waters of these rivers, and will be jointly submitting a report to the International Joint Commission in 2010.

Another significant tool used in water management decisions is the *Approved Water Management Plan* for the South Saskatchewan River Basin.⁷⁶ The main outcome of this plan has been recognition that the limit of water resources has been reached in the Bow, Oldman and South Saskatchewan river sub-basins. A major decision resulting from the plan is the *Bow, Oldman and South Saskatchewan River Basin Water Allocation Order*.⁷⁷ Under this Order, Alberta Environment may consider applications for water allocations in these sub-basins only for a number of specific purposes, including the following:⁷⁸

Since 1989, Alberta Environment has not accepted water allocation applications for irrigation, industrial or commercial purposes in the mainstem Milk River. Applications for household and municipal



⁷⁵ The *Master Agreement on Apportionment* governs the volume, rate of flow and quality of water that must be delivered to Saskatchewan. Alberta and Montana share the waters of the Milk River and St. Mary River under the 1921 Order of the International Joint Commission under the *Boundary Waters Treaty*.

⁷⁶ Government of Alberta (2006), *Approved Water Management Plan for the South Saskatchewan River Basin*. Edmonton: Alberta Environment.

⁷⁷ *Bow, Oldman and South Saskatchewan River Basin Water Allocation Order* (AR 171/2007).

⁷⁸ The Order allows Alberta Environment to consider any applications that were already filed prior to the Order being made; and applications concerning the Little Bow Project/Highwood Diversion Plan or the Pine Coulee Water Management Project.



⁷⁹Water allocation transfers are not authorized for the Milk River Basin.

purposes are accepted and considered. In the Milk River Basin's eastern tributaries, Alberta Environment accepts and considers applications only for allocations for small stockwatering.

First Nations

Water could be used for projects on reserves and on other land owned by a First Nation;

Water Conservation Objectives

Water for the desired flow regime instream after diversions; and

Storage

If the storage is for both the protection of the aquatic environment and for improving the availability of water to existing licence holders and registrants.

Under the plan, water conservation objectives have also been established for the Bow, Oldman and South Saskatchewan rivers; these have the purpose of flow restoration.

The plan also authorizes the use of water allocation transfers, which provide a means for new and growing enterprises to secure water allocations, and for managing the risk of water shortages.⁷⁹ Transfers enable water users to secure more reliable (i.e., higher priority) water allocations from existing licence holders, through private arrangements. Alberta Environment approval is required for transfers to take place. Factors such as the possible implications for other licence holders and the aquatic environment are considered in granting approvals.

A market in water allocations has been developing since 2002, when the use of water allocation transfers was first authorized for the South Saskatchewan River Basin (SSRB) in Phase One of the Approved Water Management Plan for the SSRB. The expected long-term outcome of the market is that water allocations will move to the most economically valuable water uses. Transfers are also expected to provide a financial incentive to existing licence holders to increase their water use efficiency.

Overall, the future for water management in the South Saskatchewan Region lies in:

- using the existing pool of allocated water as efficiently and effectively as possible;
- mitigating impacts on aquatic ecosystems when possible; and

- being prepared with risk management strategies for inevitable water shortages of varying degrees of severity and duration.

Wetlands

Over a million hectares of prairie-parkland wetlands have also been drained and converted to agricultural use in the course of Alberta history. Between 1970 and 1990, approximately 2.4 wetland basins per square kilometer were lost, primarily to agricultural use. Wetland margins, which provide even richer wildlife habitat than the wetlands themselves, shrank or disappeared. This has resulted in a loss of wildlife habitat and detrimental effects on water and soil quality.

The transition from dry uplands to water provides very important gradients of habitats and thus are disproportionately important for biodiversity compared to their scarcity. Alberta is relatively short of water compared to other areas of Canada.

Alberta is a partner within the North American Waterfowl Management Plan. Through Ducks Unlimited, millions of dollars come to Alberta annually from the United States to fund the retention, recovery and creation of wetlands to benefit waterfowl and riparian dependent species and biodiversity.

Groundwater

Relative to surface water, groundwater is presently not a major source of water in the South Saskatchewan Region. However, in some local areas it is important. On the provincial level, groundwater provides drinking-water supplies for approximately 600,000 Albertans. Groundwater is also an integral part of the hydrological cycle and contributes to stream flows and lake levels.

As is the case for most of Alberta, little is known about the groundwater in the region. Although there have been past initiatives to map groundwater resources, mapping is incomplete. Alberta Environment and Alberta Geological Survey are investing \$12.5 million over the next three years to build on past mapping programs. Mapping is being targeted in high priority areas experiencing rapid growth, such as the Edmonton-Calgary Corridor; however, the aim is to map the groundwater resources of the entire province.⁸⁰

There may be growing pressure placed on groundwater resources in the Bow, Oldman and South Saskatchewan river sub-basins, since new surface water allocations are generally no longer available in these basins. Consequently, groundwater is a valuable resource that requires protection. Once aquifers become contaminated, remediation is extremely difficult and expensive.



⁸⁰ www.ag.s.gov.ab.ca/groundwater/groundwater.html.



Biodiversity

Biodiversity refers to the variability among living organisms and the landscapes they inhabit. It is the foundation of healthy ecosystems, serving important functions such as the production of oxygen, control of flooding and erosion, natural pest control, and pollination. Without biodiversity, humans could not survive. Healthy biodiversity also contributes to recreation, tourism and the aesthetic beauty of the landscape.

Alberta is home to more than 80,000 species. The vast majority are arthropods (e.g., insects, arachnids and others), fungi and algae. Less than two per cent are vertebrates such as fish and wildlife. Though all species play important roles in ecosystem function, vertebrates are also the most publicly visible and therefore typically the

species that are assessed and legally designated.

Biodiversity Trends

The South Saskatchewan Region's biodiversity has been significantly altered over time, as the related pressures of population growth and economic development have impacted the region's landscape.

Mixed grass prairie originally covered more than 8.7 million hectares in Alberta. Most of the native prairie in the South Saskatchewan Region was transformed to farmland in the first part of the 20th century. Today only about 40 per cent of the grassland area is in native cover, much of which is managed for livestock grazing. Only around 16 per cent of native fescue prairie remains.

Over a million hectares of prairie-parkland wetlands have also been drained and converted to agricultural use in the course of Alberta history. Between 1970 and 1990, approximately 2.4 wetland basins per square kilometre were lost. Wetland margins, which provide even richer wildlife habitat than the wetlands themselves, have shrunk or disappeared. This margin reduction has resulted in a loss of wildlife habitat.

In the last three decades, oil and gas development in the region has also impacted remaining prairie landscapes. The infrastructure required to develop oil and gas in the grasslands has translated into more human activity and installations. This has resulted in considerable fragmentation of the region's landscape, impacting biodiversity.

In regard to plant biodiversity, many species of vascular plants can be found in the region. Vegetation supplies important food sources for numerous wildlife species as well as food and medicines for First Nations residents. Aside from the typical tree species of the South Saskatchewan Region, there are numerous shrub species which contribute to structural diversity of the region.

The variety of plant species supports a substantial invertebrate community, which in turn fertilizes many plants and feeds birds and amphibians. Insects and other invertebrates also participate with fungi as important decomposers of the old vegetation.

Species at Risk

When a species is lost, biodiversity as a whole is affected and ecosystem function is disrupted. The federal government, under the *Species at Risk Act*,⁸¹ and the Alberta government, under the *Wildlife Act*⁸² and the Accord for the *Protection of Species at Risk*, both play roles in preventing the extirpation or extinction of species and in providing for the recovery of species that are extirpated, endangered or threatened.

A species that is **extirpated** is considered to no longer exist in the wild in Canada, but exists in the wild elsewhere. An **endangered** species is one that is facing imminent extirpation or extinction. A designation of **threatened** means that a species is likely to become endangered if nothing is done to reverse the factors leading to its decline in numbers. A species may be designated of **special concern** because of characteristics that make it particularly sensitive to human activities or natural events. It may also be considered **data deficient** if there are inadequate data to determine the species' status.

At the federal level, species are assessed by the Committee on the Status of Endangered Wildlife in Canada. At the provincial level, the Endangered Species Conservation Committee provides advice to the Minister of Sustainable Resource Development about species at risk. This includes recommendations on legal designations and the implementation of recovery programs.

⁸¹ *Species at Risk Act*, S.C. 2002, c. 29.

⁸² *Wildlife Act*, RSA 2000, c. W-10.



Alberta's approach to species at risk planning and recovery uses scientific expertise and input from land owners, land managers and users to determine the best approach for ensuring species-specific recovery plans are relevant and practical. For example, Alberta's Grizzly Bear Recovery Plan is based on research and the ideas of many stakeholders. The plan includes education initiatives, population status evaluation, ongoing research and data management to manage grizzly bear habitat and help ensure these key animals remain a part of Alberta's landscape.

Recovery plans for species at risk are designed in part to curtail activities that are detrimental to the species. As part of implementing recovery plans, certain uses of land may be limited, reduced or subject to new conditions. It is therefore in the interests of all land users to ensure their activities do not negatively impact biodiversity.

The South Saskatchewan Region has 80 per cent of the province's species at risk. Species at risk inhabit many parts of the landscape, but are particularly concentrated in the native habitats of the grassland natural region. Species at risk in the region include diverse mammals, birds, amphibians, reptiles, fish, plants and invertebrates. These include Alberta's only lizard, the short-horned lizard, found in and near the Badlands along the Milk and South Saskatchewan rivers; and the rare soapweed plant, which occurs in only two areas in Canada.

There are many reasons that such a high proportion of Alberta's species at risk occur in the region. These include habitat loss, disturbance, and fragmentation, direct mortality, environmental contaminants, and introduction of exotic and invasive species.

**List of Species at Risk that Occur in the
South Saskatchewan Region**

Species	Designation
Eastslope Sculpin	Threatened
Lake Sturgeon	Threatened
Northern Leopard Frog	Threatened
Peregrine Falcon	Threatened
Trumpeter Swan	Threatened
Small-flowered Sand Verbena	Threatened
Stonecat	Threatened
Westslope Cutthroat Trout ⁸³	Threatened
Western Silvery Minnow	Threatened
Burrowing Owl	Endangered
Ferruginous Hawk	Endangered
Mountain Plover	Endangered
Ord's Kangaroo Rat	Endangered
Piping Plover	Endangered
Greater Sage Grouse	Endangered
Short-horned Lizard	Endangered
Soapweed	Endangered
Swift Fox	Endangered
Tiny Cryptanthe	Endangered
Western Spiderwort	Endangered
Bull Trout	Special Concern
Harlequin Duck	Special Concern
Loggerhead Shrike	Special Concern
Long-billed Curlew	Special Concern
Long-toed Salamander	Special Concern
Prairie Falcon	Special Concern
Sprague's Pipit	Special Concern
Western Blue Flag	Special Concern
Western Small-footed Bat	Special Concern
Western Grebe	Special Concern
Weidemeyer's Admiral	Special Concern
Barred Owl	Special Concern
Grizzly Bear	Special Concern ⁸⁴
Prairie Rattlesnake	Data Deficient
Wolverine	Data Deficient
Great Plains Toad	Data Deficient
Brassy Minnow	Data Deficient

Source: *General Status of Alberta Wild Species*, (2005)



⁸³ The Westslope Cutthroat Trout has been approved as a threatened species, but has not been included in the provincial regulations yet.

⁸⁴ The status of grizzly bear in Alberta is currently being reassessed.



Pressures on Biodiversity

Major pressures on biodiversity include natural and human-related factors. Each can individually have a negative impact on species diversity. The cumulative effects of these factors can greatly alter ecosystem function:

Natural and Human Disturbances

Wildfires, extreme weather and outbreaks of insect pests can affect forest structure, creating variability in habitats and landscapes. Native species have evolved in ways that enable them to recover from natural disturbances. Human disturbances, however, may place species in positions where they are less likely to recover; these issues are increasing with human population growth;

Habitat Alteration

The greatest threats to species are disturbances that damage, fragment or alter their natural habitats, forcing them outside of their normal range of variability. Significant amounts of parkland, grassland and wetlands have been fragmented and converted to other uses. A high percentage of land in the region is also privately owned, making wildlife management more complex;

Hunting, Trapping and Fishing

These are historically important cultural and trade-related activities in Canada, and contribute to rural economies. Hunting is also the primary means of controlling animal populations in the White Area, where there are few natural predators. Linear features from economic development, combined with population growth, have facilitated an increase in hunting, trapping and fishing;

Water Supply Pressures

The region faces challenges in matching water demand with water supply. An increasing population and growing economic development may place higher pressures on water basins. Unless managed effectively, this has the potential to place stress on aquatic species;

Pollution

Releases of toxic substances can originate from activities by industry, agriculture, and even the general public. Pollutants that enter the air or water can be more broadly dispersed, affecting species over large geographic areas;



Non-native Species

Invasive species not native to the regional ecosystem often have few natural predators or parasites. They can become superior competitors over native species for space, food, nutrients and water. Wildlife diseases are often introduced by non-native species or by human activities that carry parasites and diseases not native to Alberta. Chronic wasting disease in ungulates is now present in the lower eastern edge of Alberta; and

Climate Change

The effects of climate change are not yet fully known, but they have the potential to affect biodiversity. Climate change may accentuate human-related disturbances.

Biodiversity Monitoring

To address the challenge of determining whether biodiversity is being sustained, a group of scientists, land-managers and government officials began developing the Alberta Biodiversity Monitoring Institute (ABMI) in 1997. Today, the ABMI is the most rigorous and broadly supported biodiversity monitoring program in the world.

Between 2003 and 2006, the ABMI conducted field testing of biodiversity monitoring protocols. Since 2007 the ABMI has been in a full operational phase of monitoring Alberta's biodiversity. The ABMI collects a wide range of data across Alberta, including information on terrestrial and aquatic habitats, physical structures and individual species. Using a rigorous and impartial scientific approach to evaluate these data, the ABMI will help inform policy makers and resource managers about the cumulative effects that various impacts are having on the province's biodiversity.





⁸⁵ Clean Air Strategic Alliance, www.casadata.org/index.asp. The Clean Air Strategic Alliance is a provincial multi-stakeholder partnership established in March 1994, with representatives selected by industry, government and non-government organizations.

Air and Emissions

Air Quality

In Alberta, air quality is monitored by a comprehensive network of stations operated by Alberta Environment, airshed organizations, Environment Canada and industry.⁸⁵

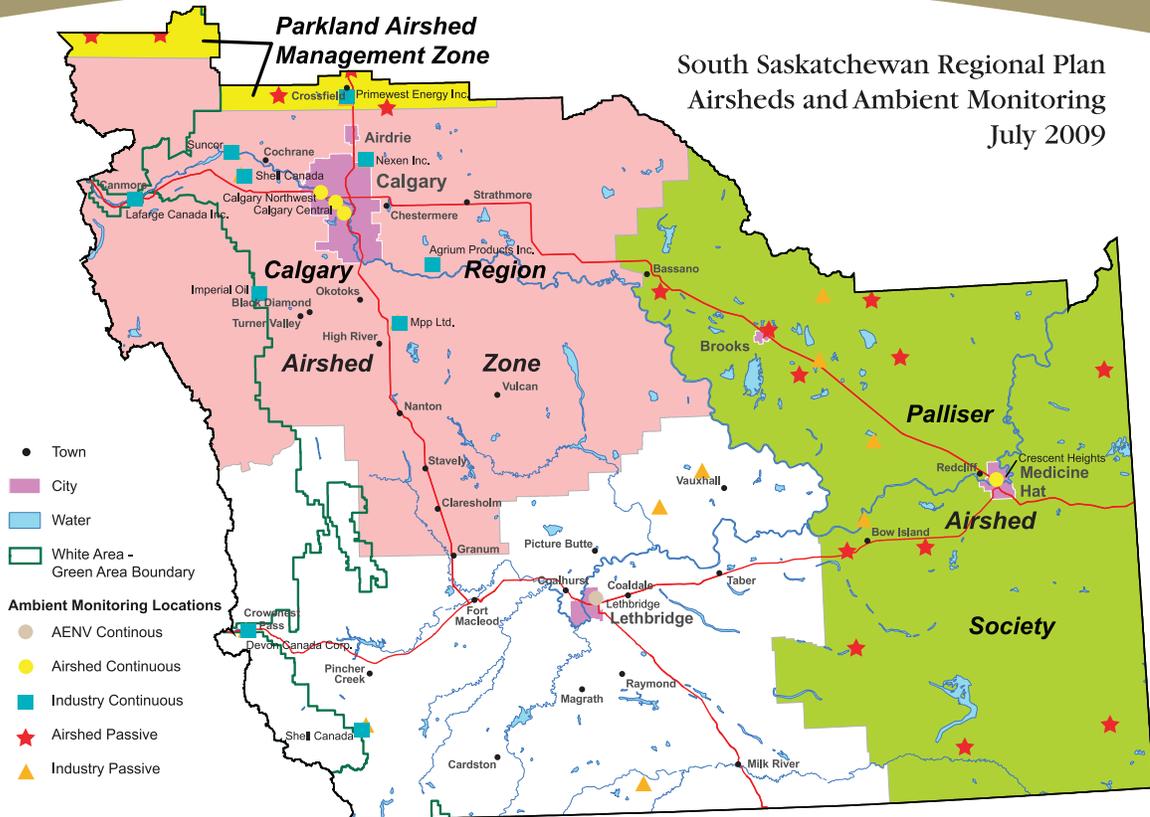
Air quality zones are geographic areas that, because of emissions, topography and meteorology, typically share similar air quality issues. In Alberta, airshed zones were formed to enable local stakeholders to design local solutions to address local air quality issues. In the South Saskatchewan Region there are three airshed zones: the Calgary Region Airshed Zone, the Palliser Airshed Society, and Parkland Airshed Management Zone. These organizations work within their designated areas to monitor, analyze, report on, and make recommendations to improve air quality.

From a human and ecological health standpoint, the primary air pollutants of concern are sulphur dioxide (SO₂), nitrogen oxides (NO_x), volatile organic compounds (VOCs), ground-level ozone, hydrogen sulphide (H₂S), fine particulate matter, metals, bioaerosols, ammonia and polycyclic aromatic hydrocarbons (PAHs).

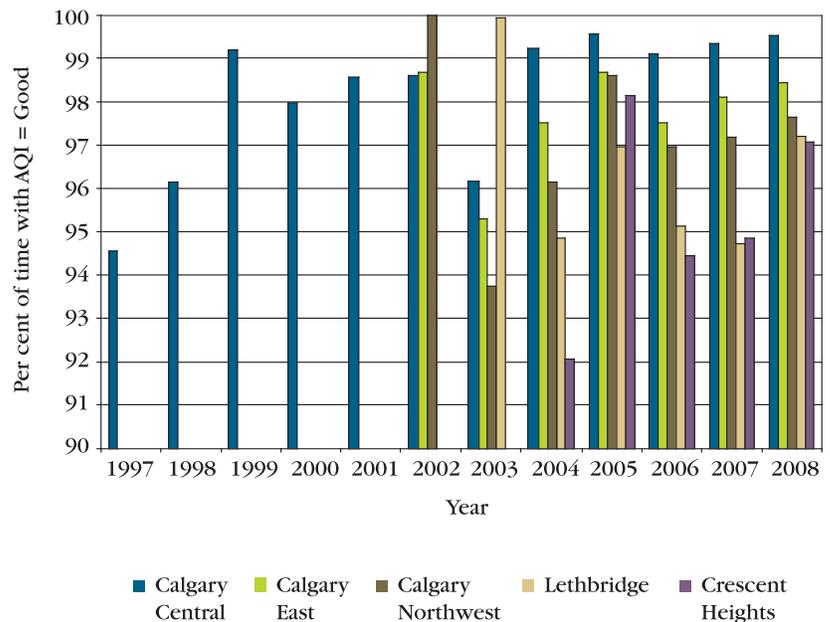
Above certain exposure thresholds, these substances can adversely affect human and ecological receptors and even disrupt ecological processes and systems. Impact pathways can be direct (e.g., inhalation) or indirect. For example, SO₂ and NO_x contribute to acid rain, which then acidifies soil and surface water; high levels of NO_x and VOCs contribute to the production of ozone, a major component of smog. Effects range considerably from nuisance odours to increased risk of cancer.

The Air Quality Index (AQI) provides a measure of outdoor air quality. The AQI is calculated from ambient measurements of carbon monoxide, fine particulate matter, nitrogen dioxide, ozone and sulphur dioxide. Under the AQI, air quality is rated as good, fair, poor or very poor.

The air quality has been classified as “good” at least 92 per cent of the time, and up to 100 per cent of the time, at all locations reporting the AQI in the South Saskatchewan Region. This statistic is based on air monitoring stations located in Calgary, Lethbridge and Medicine Hat.



Over the past two decades, better technologies in air quality control have led to improvements in ambient air quality - especially in urban centres, largely thanks to improvements in vehicle emission technologies. In fact, levels of many air pollutants have shown significant declines. For example, in downtown Calgary from the early 1980s to the year 2000, carbon monoxide concentrations have decreased by 65 per cent; lead concentrations have decreased by 98 per cent; and nitrogen dioxide levels have decreased by 38 per cent. Values of inhalable particulates - those capable of entering the human respiratory tract - have decreased by 46 per cent. Average annual concentrations of SO₂ have also been steadily decreasing.





⁸⁶ Government of Alberta (2008), *Alberta's 2008 Climate Change Strategy*. Edmonton: Alberta Environment; available at <http://environment.gov.ab.ca/info/library/7894.pdf>.

Greenhouse Gas Emissions

Currently the largest source of greenhouse gas emissions (GHG) in the province is coal-fired electrical generation facilities. The South Saskatchewan Region does not contain any of these facilities. However, the expanding population of the region has been contributing to greater demand for electricity, much of which is generated in coal-fired facilities.

Anthropogenic greenhouse gas emissions are also generated from activities such as the production, transportation and burning of fossil fuels for heat generation, all of which have increased with population.

Climate Change Strategy

Alberta has been a leader in addressing climate change. Alberta was the first province in Canada with a comprehensive climate change action plan in 2002. In 2007, Alberta became the first jurisdiction in North America to legislate GHG reductions on large industrial facilities. In the first compliance period (July 2007 to December 2007), companies made 2.6 million tonnes in actual reductions.

Alberta updated its *Climate Change Strategy* in 2008.⁸⁶ The updated strategy sets a goal of reducing Alberta's total emissions by 200 megatonnes by 2050. The plan is based on three pillars of action:

- improving energy conservation and efficiency to reduce the amount of carbon Albertans use;
- producing energy in greener ways, through technology improvements and the development of energy alternatives, including hydroelectric electricity generation and biofuels; and
- implementing carbon capture and storage (CCS) to prevent the release of greenhouse gas emissions into the atmosphere.

Of the overall 200 megatonne reduction target, it is expected that CCS will account for 139 megatonnes of reductions. Work on CCS is ongoing. The Alberta government has appointed an Alberta Carbon Capture and Storage Development Council, comprised of members from government, industry and the scientific community, to guide the implementation of CCS. The government has also committed \$2 billion of investments to encourage construction of Alberta's first large-scale CCS projects.

In addition to dramatically reducing GHG emissions to atmosphere, CCS also stands to have economic benefits in the South Saskatchewan Region. Alberta's vision of CCS includes the use of captured carbon dioxide to enhance the recovery of hydrocarbons. Closed loop applications would enable oil and gas producers in the region to extend the life and productivity of mature oil and gas fields, while simultaneously addressing climate change. Applications of CCS could also facilitate production of unconventional natural gas from coal seams, which are located throughout the region.

Land

Integrated Resource Plans

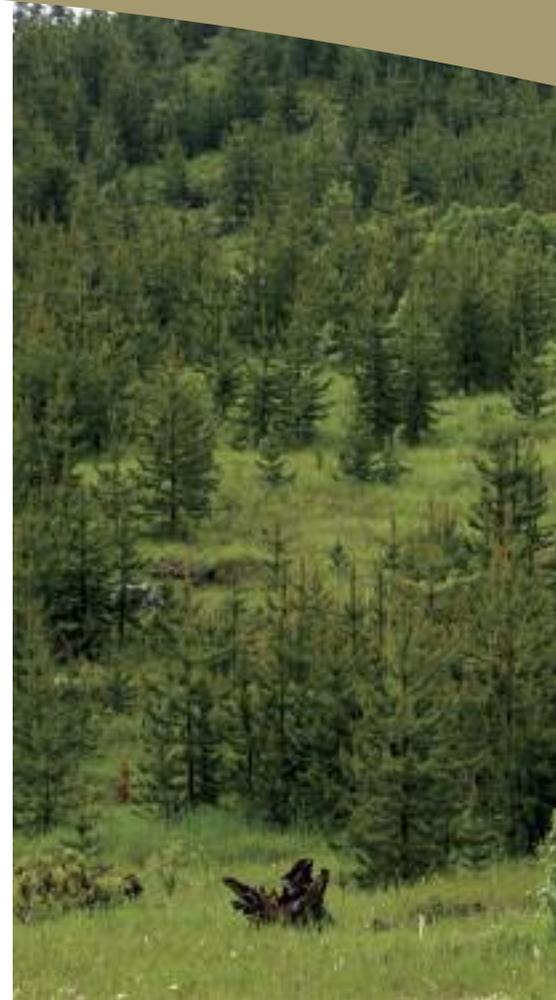
An Integrated Resource Plan (IRP) is designed to provide an integrated approach to the management of public land and resources. It identifies resource opportunities and provides guidance to resource managers, decision-makers and the general public.

Eight IRPs cover the public lands in the Southern Rockies area. The precursor to these plans was the Eastern Slopes Policy.⁸⁷ The primary objective of the Eastern Slopes Policy was to ensure that watersheds within the slopes are protected. Although these IRPs are more than 20 years old, they still serve as a foundation for making land management decisions today. Alberta government officials frequently refer to these plans to check zoning and management priorities.

Although the information is often general, it provides a context for making land management decisions. In some cases, it may be clear that an activity is not compatible with the management intent of a certain area. In other cases, the IRP may indicate that an activity may be considered if certain values are maintained and certain conditions are put in place.

Reclamation

Under Alberta's *Environmental Protection and Enhancement Act*⁸⁸ and the *Conservation and Reclamation Regulation*,⁸⁹ operators are required to conserve or reclaim specified land in accordance with standards set by the Alberta government. Alberta was the first province in Canada to legislate mandatory land reclamation.



⁸⁷ Government of Alberta (1984), *A Policy for Resource Management of the Eastern Slopes, Revised 1984*. Edmonton: Alberta Energy and Natural Resources.

⁸⁸ *Environmental Protection and Enhancement Act*, RSA 2000, c. E-12.

⁸⁹ *Conservation and Reclamation Regulation*, (AR 115/1993).



⁹⁰ Wells that were abandoned prior to June 1, 1963, on private land and August 15, 1978, on public land are exempt from the requirement to obtain a reclamation certificate.

⁹¹ Some applications may not be certifiable; over the past year approximately 93 per cent of applications were certified. Also note that there may be reclaimed sites for which a reclamation certificate application has not yet been received.

The purpose of conservation and reclamation is to return specified land to an equivalent land capability. This means returning the land to a state that is capable of supporting the same types of uses as prior to disturbance. All areas in Alberta that have been disturbed by industrial development must be reclaimed.

A key indicator measured by Alberta Environment is the reclamation of oil and natural gas wells. A number of drilled wells are dry and abandoned each year, while others are abandoned once the resources are recovered. Abandoned wells are those that have been permanently dismantled as prescribed by regulations and left in a safe and secure condition. Reclaimed wells are those that have met the reclamation standards and received a reclamation certificate, or which have been exempted from certification.⁹⁰

Alberta Environment's tracking shows that, on a province-wide basis, oil and gas well reclamation certification is progressing at a much slower rate than abandonment. Over the past 10 years, on average approximately 16,306 wells were drilled per year, 4,190 were abandoned, and 1,874 were certified reclaimed. The rate of reclamation certification has therefore been less than half the rate of abandonment. This is resulting in a build-up of uncertified wells.

There were 45,248 uncertified wells remaining at the end of 2008; approximately 25 per cent were abandoned between 1963 and 1998. As of the end of May 2009, there were 266 reclamation certificate applications for wellsites on private land awaiting processing.⁹¹

Ideally, oil and gas wells are reclaimed in a timely manner after they are abandoned. This reduces the potential for land to remain unused or unusable due to the presence of unfavourable or adverse conditions. Reclamation and abandonment rates should be similar to prevent future liabilities associated with a build-up of uncertified wells.

The Alberta government, in connection with the Alberta Energy Resources Conservation Board, is continually reviewing and adjusting land reclamation programs in order to facilitate timely reclamation. The Alberta government plans to implement new reclamation criteria. These criteria will contain greater emphasis on native grassland vegetation as an indicator of equivalent land capability and restored ecosystem function and operability.

Historic Resources

Historical Resources Act

Alberta Culture and Community Spirit administers the *Historical Resources Act*, which applies to all lands within provincial jurisdiction, both publicly and privately owned. The Act helps to protect historic resources – archeological and paleontological sites, traditional Aboriginal cultural use locations, buildings and structures and others – from adverse effects as a result of land development.

Along with the environmental impact assessment process, the Minister of Culture and Community Spirit may require that any proposed activity likely to threaten the integrity of a historic resource be preceded by a Historic Resources Impact Assessment. Once an assessment has been submitted to Culture and Community Spirit, the Minister may require avoidance or further study of the threatened historic resource. The proposed activity may proceed only after the Minister has issued clearance under the *Historical Resources Act*.

Designated Historical Resources

The highest level of protection under the *Historical Resources Act* is a Provincial Historic Resource designation.

The South Saskatchewan Region contains many sites that have been designated or are under consideration for designation. They range in age from the Early Pre-contact Sibbald Creek Site (10,000 years ago), through the Euro-Canadian contact period Fort Macleod Northwest Mounted Police post, into the early settler/industrial-era Cochrane Ranch and Brooks Aqueduct. A variety of other provincially designated sites include the Fletcher Site, Old Women's Buffalo Jump, Fort Whoop-Up, Okotoks Erratic, Morleyville Mission and Medalta Potteries Plant.

The *Historical Resources Act* also empowers municipal councils to designate and preserve resources of regional significance as Municipal Historic Resources.

Culture and Community Spirit's Municipal Heritage Partnership Program supports municipalities all over Alberta in identifying and protecting locally significant historic places.

Municipalities have designated farmsteads, community halls, churches, schools, home and commercial blocks to protect them for future generations. Places like the DU Ranchlands Cabin in Pincher Creek, a century-old ranch residence; municipal buildings like the





High River Town Office; and commercial blocks like the Dave White Block in Banff have all been recognized through Municipal Historic Resource designation.

Archeological and Paleontological Sites

Almost 15,000 archeological sites in the South Saskatchewan Region have been discovered and evaluated for their scientific value. These assessments have also resulted in the recording of numerous significant paleontological and historic period structures and sites. A significant prehistory and paleontology are reflected in Dinosaur Provincial Park and Head-Smashed-In Buffalo Jump, both UNESCO World Heritage Sites located in the South Saskatchewan Region. In addition, Writing-On-Stone Provincial Park is a candidate for World Heritage Site status.

In addition to its World Heritage Site status, Head-Smashed-In Buffalo Jump near Fort Macleod is a National Historic Site and Provincial Historic Site. The daily life and special ceremonies of the bison-hunting culture of the plains peoples of ancient times are interpreted at this site. For more than 10,000 years, the Blackfoot stampeded herds of buffalo to their deaths here. This jump is the oldest, largest and best-preserved buffalo jump site known.

A field station is operated in Dinosaur Provincial Park, one of the richest fossil sites in the world. Guided hikes or bus tours are offered.

Culture and Community Spirit closely manages certain significant historic resources such as Majorville Cairn and Medicine Wheel, Head-Smashed-In Buffalo Jump and Dinosaur World Heritage Site. To protect the integrity of these sites, Historic Resource Management Areas have been established where specific operating conditions are placed on developments so that impacts to the sites and adjacent lands are minimized.

More than 95 per cent of all known medicine wheel sites within Alberta are located in the region. Medicine wheels, which are more numerous in the province than in any other area of North America, are a class of unique stone features that have sacred or ceremonial significance to Aboriginal people.

The South Saskatchewan Region contains hundreds of fossil sites. There are few places in the world that rival the area in terms of fossil richness and diversity. From the Palaeocene mammals and fish of the Calgary area to the dinosaur eggs in Devil's Coulee to the dinosaur fossils of the Red Deer and South Saskatchewan river valleys, fossils remains from this region now grace many museums around the world and have provided a valuable window into prehistoric Alberta.

