



**LAND USE PLANNING AND WATER LICENSING / ALLOCATION
IN THE SOUTH SASKATCHEWAN RIVER SUB-BASIN**

SEAWA Watershed Report 2009-2

SEAWA Web-based State of the Watershed Report

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Summary

Land use planning in Alberta is a shared responsibility between the provincial and municipal governments. The Land Use Framework, supported by provincial legislation passed in 2009, is an attempt to better manage Alberta's resources by coordinating land use planning among involved parties, such as industry and the provincial and municipal governments.

The provincial and federal governments support the protection of several regions in the SSRSB, designed to protect the natural heritage of various sites in the region while allowing recreational and industrial land use, such as oil and gas well drilling. CFB Suffield, covering some 2,700 km², is regulated by the Federal Government, and offers one of the largest live-fire training areas in North America for military use. The Base has set aside 458 km² for a National Wildlife Area, meant to preserve the local wildlife and fragile ecosystem.

The human population of the SSRSB in 2001 was 65,451, a growth of 8.3% from 1996. The population is predominantly urban, and the urban population is growing at a faster rate than the rural population. The largest urban center is Medicine Hat, which had a population of 60,426 in 2008.

The South Saskatchewan River Sub-Basin (SSRSB) saw human settlement develop around the Canadian Pacific Railway. Early experiments into farming and ranching led to the need for irrigation in the area to support large-scale operations. Agricultural land use accounts for 80% of the Basin's total land. 25% of agricultural land is used for crops, while the majority, 63%, is used for pasture. 27% of the total water allocations in the Basin are for agricultural purposes. Livestock watering and irrigation are the major uses of agriculture water. In 2005, actual water use for irrigation (24,685 dam³) was 8.3 times the amount of water used for livestock (2,960 dam³).

Industry is concentrated near Medicine Hat and Redcliff. Seven percent (7%) of the total water allocations in the Basin were for industrial use in 2005, the majority of which, 95%, was for fertilizer plants. Thousands of oil and gas wells are operated within the SSRSB, and the majority of gas processing plants are located near Empress, Alberta. Two percent (2%) of the total allocations of water in the SSRSB were for petroleum uses.

Commercial land use in the SSRSB includes park and trail systems, golf courses, construction, and recreation. One percent (1%) of total water allocations in the region are for commercial uses. The three largest water allocations in the commercial sector - parks and recreation (44%), construction (36%), and golf courses (18%) – account for 90% of the allocations. Recreational land uses include campsites located throughout the region, and boating in the various reservoirs in the SSRSB.

Total water allocations in the SSRSB in 2005 amounted to 285,874 dam³. Existing licenses and registrations allowed a maximum of 281,971 dam³ of water to be withdrawn. Municipalities accounted for 60% of total allocations, and were licensed to use 50% of all the water that could be consumed in the SSRSB in 2005. The second most important water user was irrigation, accounting for 22% percent of allocations and 28% percent of licensed consumption.



Figure 1-1. SEAWA Watershed
(<http://www.seawa.ca/>).

The SSRSB is closed to new water licenses and allocations, but the transfer of existing licenses and allocations is allowed. The SSRB Water Management Plan, implemented in 2006 by Alberta Environment is meant to better control the use of water throughout the province. The SSRSB used much less water (66,112 dam³) than the Bow or Oldman River Basins (2,265,078 dam³ combined) in 2005. Environmental emergencies have not yet occurred in the region, but the potential for a crisis exists. Enforced regulations from Environment Canada and Alberta Environment are meant to prepare and prevent emergencies as much as possible.

Introduction

This section discusses land use planning and the licensing and allocation of water in the South Saskatchewan River Sub-Basin, shown in Figure 1. Land use planning is a blanket statement that covers all areas of human development, including municipal planning, demographics, government regulation, commercial business, industry, and agriculture. Water licenses and allocations allow a measure of control over water, an important renewable resource. These areas are examined in an effort to determine the state of the South Saskatchewan River Sub-Basin, also known as the South East Alberta Watershed.

Historic Land Use and Planning

Before the arrival of European settlers in the final decades of the 19th century, the South Saskatchewan River Sub-Basin (SSRSB) was home to Native Canadians typically belonging to the Blackfoot and Cree nations.⁴⁹ Explorations into the region by Europeans occurred as early as 1754, but early development of the region met with opposition from Natives.⁶ The arrival of the North West Mounted Police in the 1870s brought a measure of law and order to the region, and created conditions safe enough for people moving West across Canada to settle down.^{6 49}

The Canadian Pacific Railway's main line was chosen to run through Southeast Alberta for two reasons, to "lessen the economic influence of American roads"¹⁰ and to allow for faster construction of the line than if it had taken a more traditional, Northern route through the province.^{10 27} The CPR line reached the Medicine Hat river valley in 1883.¹⁰ In 1885, a narrow-gauge line was built from Dunmore to Lethbridge. Nicknamed the "Turkey Trail", it allowed coal to be transported from the Galt Mines near Lethbridge to the main CPR line in Dunmore. The CPR converted the line to a standard size in 1893 after leasing the line from the independent company that built it.^{6 8 27} Branch lines were built as required by economic conditions, leading to a few smaller length tracks

connecting the towns and villages in Southern Alberta.⁸ As of 2002, only a few lines remained in service in Southeast Alberta, including the CPR main line through Medicine Hat, the track from Medicine Hat to Crowsnest Pass, and a line between Stirling and Etzikom.¹⁰ More information on railroads in Alberta can be found at <http://railways-atlas.tapor.ualberta.ca/cocoon/atlas/>.

The Medicine Hat area is home to the largest population centres in the South Saskatchewan River Sub-Basin, the City of Medicine Hat and the Town of Redcliff. In order to get a good understanding of modern day land use planning, it is important to look at the development of these municipalities in the past.

Medicine Hat is the largest city in the South Saskatchewan River Sub-Basin but the City had a humble beginning as a small tent town in 1883. Thanks to the “Naturally graded, flat floor of the Ross Creek area,”²⁷ Medicine Hat proved useful to the railway, and with the construction of a rail bridge in 1883, the CPR main line was able to cross the South Saskatchewan River and continue across the prairie.²⁷ Due to a good supply of water and coal in the region, the CPR developed Medicine Hat as a divisional point, building shops, a roundhouse, stock and freight yards, and more bridges across the South Saskatchewan River.^{27 49} Home to the transfer station between the Turkey Trail and the CPR main line, Dunmore threatened to outgrow Medicine Hat, but the CPR decided that due to tradition, Medicine Hat was to become a divisional point, and the City of Medicine Hat soon outgrew its neighbor.^{6 27 49} As the divisional headquarters for the CPR, almost 1100 kilometers of track were built within City limits, and frequent train service drew industry to the area, including the clay manufacturing businesses.⁴⁷ Natural gas, found in abundance beneath the City, provided a huge incentive for industry, offering an inexpensive source of energy.⁴⁷ Information on the clay industry in Medicine Hat can be found at <http://www.medalta.org/index.html> under district history.

The town of Redcliff, located a few miles northwest of Medicine Hat, had its beginnings in the 1880's with the discovery of coal and natural gas. The town has an odd track record of industry, drawn to the area due to coal and gas reserves.^{27 55} Redcliff suffered a cyclone in 1915 that destroyed many businesses and homes, starting a decline in the prosperity generated by industry.^{27 55} More information on the history of Redcliff can be found at <http://www.town.redcliff.ab.ca/page2main-about.htm>.

Coal mining originated in the 1880's, with mines opening in the Medicine Hat area as well as across Alberta. Mines in the Medicine Hat and Redcliff area were typically small operations used to produce coal for the CPR or to heat homes for new settlers.⁹ The Ajax Collieries (or Ansley) mine a few miles west of Medicine Hat was the last to shut down, closing in 1967.⁷ A map of the coalmines used in the area can be found on the Atlas of Alberta Railways website, at <http://railways-atlas.tapor.ualberta.ca/cocoon/atlas/Maps-12-6-3/>. More information on the mines in the Redcliff area can be found on the Town's website, <http://www.town.redcliff.ab.ca/page2main-about.htm>, under *History*.

Ironically, in the CPR's search for water, drills struck huge stores of natural gas, leading to the discovery of a massive gas field beneath the City. This gas was supplied by the City to all residents of Medicine Hat starting in 1904, providing the City with a reliable, inexpensive form of energy.^{18 27} Natural gas helped to draw industry to both Medicine Hat and Redcliff.^{47 55}

The practices of agriculture and ranching were both commercialized from the moment settlers began to populate the area. Typically, ranchers and farmers raised some food for themselves, but sold the majority of their crops and livestock for profit.⁴⁵ Around 1870, ranching began to develop in the region, dominated by large, incorporated ventures.⁴⁵ In 1885, Sir John Lister-Kaye attempted to develop large tracts of land across Southern Alberta and Saskatchewan. With financial support from Britain, 10 large

tracts of land were obtained from the Canadian government, one of which, called the 76 Ranch, was located near Dunmore. Horses and cattle were imported from Eastern Canada, but after several years, ranchers were unable to overcome a lack of water in the area. In 1892, the farms were allowed to return to prairie grass. Investors were hit with huge losses after the Lister-Kaye experiment failed.^{6 27} The Medicine Hat Ranching Company opened up in 1886, becoming the first large ranch in the Medicine Hat area. It found a moderate amount of success compared to the 76 Ranch of Lister-Kaye.²⁷ By 1908, under pressure of land and market forces, large-scale ranching had given way to smaller, more constricted operations. Over the next several decades, ranchers fought to stabilize the livestock industry. By 1949, the American export market, consumer purchasing power, and the inclusion of feed grain in provincial land-use patterns had helped to develop the beef industry and insure its survival.²⁵ Additional [information on ranching in Southern Alberta](#) can be found on the University of Calgary Applied History Research Group website.

Despite the failure of the 76 Ranch, a plan was proposed around 1900 to develop the land near Suffield to the point where it could produce crops on a large scale. Over \$10 million in capital was spent developing the hamlet of Suffield between 1909 and 1911. Companies involved in the project began to develop an irrigation system to stimulate the land. However, a severe drought occurred in 1914, destroying that year's crop. The drought, coupled with the outbreak of World War I, led to the abandonment of the farm project and irrigation system. The land was given to local farmers and businessmen.⁶

Farming did not progress to any great extent in the area until the arrival of settlers in 1883. The practice of agriculture developed slowly at first, but accelerated between 1896 and 1914 thanks to better technology and the immigration campaign carried out by the Canadian government. The introduction of an effective irrigation system, coupled with an expanded rail network and better grain handling and marketing systems helped farming in Southern Alberta develop successfully. Despite advances in technology, farmers were hit especially hard during the depression years in the mid 1930's. Many left the land, and rural communities were gradually abandoned. World War II also affected farming in Alberta, with the end of the war bringing the trend of urbanization. Agriculture has seen a general shift to larger, but fewer, farms over the 20th century.⁵⁴ Additional information can be found at [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex2](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex2).

"The natural vegetation of the Palliser Triangle is short grass prairie and precipitation insufficient to support the type of agriculture of eastern North America."²⁶ Irrigation was first considered for use in Alberta in the late 1880's, when the semi-arid conditions of Western Canada proved too difficult to settle for many immigrants. Construction of the St. Mary Project (SMP) began in 1898, following other attempts to start a large development in irrigation. As the SMP developed and spread out from its origins near Lethbridge, the need for reservoirs became apparent. The St. Mary Dam, completed in 1951, facilitated the creation of the first reservoir of the district. Water from the SMP reached Medicine Hat via a canal constructed in 1954.^{26 51} Information on the history of irrigation in Southern Alberta can be found at <http://www.smrld.ab.ca/smrld/history.htm>.

With several towns and cities located on the banks of Alberta rivers, early settlers toyed with the idea of using riverboats as transportation between municipalities. Early businessmen in Medicine Hat attempted to develop this idea from the 1880's to 1908. A fleet of three boats was deployed on the South Saskatchewan River with the intention of shipping coal from Lethbridge to Medicine Hat. This proved unfeasible, for two reasons. The boats could only run on the river during high-water flood periods in summer, and

more coal was used to power the boats on the journey than the boats could ship between the cities. In place of the ferry system for transporting coal, the Turkey Trail, discussed previously, was built between Lethbridge and Medicine Hat. The idea of riverboats on the South Saskatchewan lingered on, despite earlier failures. Three more boats were built, which offered pleasure cruises and limited transportation of goods. By 1908, however, every boat had either been wrecked on the river or had been shipped elsewhere. The South Saskatchewan River proved unsuitable for any commercial boat transit.^{6 27}

Protected Regions Under Federal and Provincial Regulation

Alberta's parks and protected areas are governed under three pieces of legislation: the [Provincial Parks Act](#), the [Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangelands Act](#), and the [Willmore Wilderness Park Act](#).³⁹ Sites protected under legislation can range from developed recreation areas to natural, undisturbed wilderness. In the South Saskatchewan River Sub-Basin, there exists a provincial park, two natural areas, and a provincial recreation area. Information on the classification for protected sites can be found on the Government of Alberta's Tourism, Parks and Recreation site, <http://tpr.alberta.ca/parks/managing/spectrumsites.asp>.

Cypress Hills Provincial Park, located 32 kilometres South-East of Medicine Hat, covers approximately 20,000 hectares of land (roughly 50,000 acres), and is the 3rd largest provincial park in Alberta.⁴² Under the Provincial Parks Act, the park was created to protect and preserve the natural heritage of the region, and to allow the use of the land for outdoor recreation and natural heritage appreciation. Activity must be compatible with environmental conservation.³⁹ Elkwater Lake, Reesor Lake, and Spruce Coulee Reservoir all reside within the park. Information on activities in the park can be found on the Cypress Hills website, <http://www.cypresshills.com/index.php?id=1>.

Bullhead Reservoir Provincial Recreation Area is located East of the Cypress Hills Provincial Park. This provincial recreation area is small, covering only 4.4 hectares of land (11 acres).⁴³ The reservoir itself covers 57.5 hectares (142 acres).³⁵ Legislation for Provincial Recreation Areas allows the Bullshead Reservoir to support outdoor activity, and the reservoir is stocked with fish annually to support angling.^{35 39}

Two Natural Areas are located in the South Saskatchewan River Sub-Basin. The Red Rock Coulee Natural Area, located South of Medicine Hat, covers 325 hectares of land (800 acres). The Prairie Coulee Natural Area is located along the banks of the South Saskatchewan River, east of CFB Suffield, and covers 1800 hectares of land (4400 acres).⁴¹ The legislation for natural areas protects these sites from disturbance, and as such, only allows for low impact recreational use, such as hiking.³⁹ A [map of all Parks and Protected Areas in Alberta](#) is available on the Government of Alberta Tourism, Parks and Recreation website, under Land Reference Manual.

Environmentally Significant Areas (ESA's) were originally developed and used by municipalities, but were consolidated in 1997. Since then, industry, consultants, municipalities, Government Departments, and environmental non-government organizations have used ESA's extensively. ESA's are used as a source of information when making land use decisions. The Government of Alberta's Tourist, Parks and Recreation Department uses ESA's to determine priorities for conservation. There are three levels of significance to the ESA's: international, national, and provincial. ESA's are usually important, useful, and sensitive features of the landscape.⁴⁰ More information on ESA's can be found on the Alberta Tourism, Parks and Recreation site, at <http://tpr.alberta.ca/parks/heritageinfocentre/environsigareas/default.aspx>. A [map of Alberta's ESA's](#) can be found on the Tourism, Parks and Recreation website, under

Environmentally Significant Areas. There are several ESA's located in the South Saskatchewan River Sub-Basin.

Provincial Grazing Reserves (PGR's) are managed by Alberta Sustainable Resource Development (ASRD), and are primarily meant to provide summer pasture for farmers and ranchers on public land, allowing them to use their own land for crop and hay production. The land offers opportunities for recreational activities such as hiking, trail riding, and snowmobiling. Oil and gas wells are allowed on PGR's, as are pipelines. There are 32 located in Alberta. The [Seven Persons PGR](#), which covers 2,700 hectares (6,600 acres) of land, and the [Bow Island PGR](#), which covers 16,000 hectares (39,000 acres), are located within the South Saskatchewan River Sub-Basin. The reserves are typically located on poor quality soil that is unsuitable for annual cropping.³⁸ More information on the [purpose and goals of the PGR program](#) can be found on the Government of Alberta Sustainable Resource Development website, along with a [map of PGR's in Alberta](#).

The need for a Canadian/British experimental station for trials in biological and chemical defense became apparent in 1941. The Canadian Federal Government settled on using Suffield as the location of the base. Land was purchased from local owners, and the Canadian Army began operations on the base on June 11th, 1941.¹³ Information on the [history of the base](#) can be found on the Canadian Forces Base (CFB) Suffield site. CFB Suffield covers approximately 2,700 square kilometers, and is one of the largest live-fire training areas in North America.¹⁴ The Prairie Farm Rehabilitation Administration (PFRA) maintains two leases that include a large area of the Base to allow more than 5,000 cattle to graze in the area annually. The leases cover three areas of land not required by the British Army Training Unit Suffield (BATUS) for training or Defence Research and Development Canada (DRDC) for trials.¹⁵ There is an extensive network of oil and gas operations in the area, with the major oil and gas producer EnCana operating approximately 9,400 oil and gas wells.²⁰

The CFB Suffield National Wildlife Area (NWA) encompasses 458 square kilometers and borders the South Saskatchewan River on the east side of the Base. Military training is not allowed in the area, and access for other activities, such as oil and gas drilling, is controlled. The land is protected to preserve the local wildlife and fragile ecosystem.^{12 22} EnCana operates around 1,100 shallow gas wells in the NWA, and is in the process of applying to drill a further 1,275 wells within the NWA. The application is currently under a major Environmental Assessment.^{20 22} Information on the [Environmental Impact Statement](#) can be found on the EnCana website.

Defense Research and Development Canada (DRDC) Suffield performs research on chemical and biological (CB) warfare agents and military engineering. Experiments in CB agents began when the Base became operational in 1941. [Mustard gas](#) and [phosgene](#) were shipped from the United Kingdom and stored in purpose built trenches. Both chemicals were later manufactured in Canada and stored at Suffield, but in lead-lined tanks instead of dirt trenches.²⁷ The Base has been used extensively for military technology testing as well. On three occasions, 500 tons of TNT were detonated to study the effects of shock waves from explosions. These explosions carried enough force to be heard 100 miles away.⁶ Information on [DRDC Suffield's extensive CB defense program](#) can be found on the Defense Research and Development Canada website. Experiments carried out by the DRDC on CB agents have created a wealth of knowledge on the toxicology and infectivity of many chemical and biological weapons. DRDC Suffield also researches new and emerging diseases, such as malaria and SARS.⁴⁴ The risk of an outbreak of a chemical or biological warfare agent, or disease, is unknown.

Provincial Versus Municipal Regulations Governing Land Use

Land use planning in Alberta is governed by two pieces of legislation, the Public Lands Act and the Municipal Government Act. Planning is a responsibility that both the provincial government and local municipalities must address. Coordination of planning between the provincial and municipal levels is necessary to facilitate sustainable development and achieve economic stability.³⁶ Approximately 60% of land in Alberta is public land owned by the government.³⁷ More information on [public land management](#) can be found on the Government of Alberta Sustainable Resource Development website.

For administrative purposes, Alberta's land is divided into two broad land use areas, Green Area (forested portion) and White Area (settled portion). The South Saskatchewan River Sub-Basin is comprised entirely of White Area. Public land in the White Area is used as part of the agricultural landscape.³⁷ More information on [Green / White Areas](#) can be found on the Government of Alberta Sustainable Resource Development website. [Additional information on the Green and White Areas](#) can be found on the Alberta Wilderness Association website.

The [Public Lands Act](#) is the provincial government's contribution to land use planning. It allows for the administration, use, and allocation of provincially owned lands. The Minister of Sustainable Resource Development may classify lands and establish appropriate uses for them. Lands are classified in many ways, including the integrated resource management (IRM) planning process and regional integrated decisions (RID). The IRM approach to land use planning involves cooperation and communication with all parties involved with the land, such as the provincial government, municipalities, and any other stakeholder groups. IRM's depend on Integrated Resource Plans (IRP's) developed for public lands, in which resource values in a given area are assessed, and policies for efficient long-term management and use are created.³⁶

The [Municipal Government Act](#), Part 17, delegates responsibilities to municipalities to plan, regulate, subdivide, and develop land under their jurisdiction. Under this act municipalities have the authority to create planning and regulatory documents, including statutory plans, to govern how the land will be developed. Included in the documents are the planning policies and types of land uses allowed in the municipality, and land use bylaws that specify development standards and regulations.³⁶ Municipal Development Plans, Area Structure Plans, Land Use Bylaws, and Subdivision Control are all common documents under the Act. As an example of a land use bylaw, see the [Medicine Hat Land Use Bylaw](#). Note that many of these documents can be found on municipality websites. It should also be noted that the Minister of Sustainable Resource Development has the power to designate public land within a rural municipality for the purpose of exempting the land from the Municipal Government Act. Essentially, in such a case, the municipality no longer holds power over the land.³⁶ Planning and development at the municipal level do not bind the provincial government if it starts a subdivision or development on public land. Ultimately, the provincial government has control over public land use in Alberta.³⁶

The Land Use Framework

The Land Use Framework (LUF) is a new method of facilitating land use planning in the province of Alberta. The Government of Alberta stated in 2008 that it is "a comprehensive strategy to better manage public and private lands and natural resources to achieve Alberta's long-term economic, environmental and social goals. The framework provides a blueprint for land use management and decision-making that addresses Alberta's growth pressures." The Framework was developed to balance

economic, social, and environmental interests in the land. The LUF is a major effort with the goal of managing Alberta's growth and maximizing effective land use.^{31 32}

The Alberta Land Stewardship Act gives the government the necessary authority to carry through with the set up of the Land-use Framework. The Land-use Framework requires the legislation for several reasons. Regional plans developed for the Land-use Framework are legally binding under the Act. The Act requires provincial departments, regulatory agencies, municipalities, and other government authorities to align plans, decisions, and bylaws with the regional plans. The Act also includes amendments to 25 other legislative acts to support regional planning.³⁴ More information on the Alberta Land Stewardship Act can be found on the [Government of Alberta Newsroom website](#).

Seven land-use regions have been developed under the LUF, allowing for unique plans to be developed for each region's individual conditions. The South Saskatchewan River Sub-Basin is included in a larger region that encompasses the South Saskatchewan River Sub-Basin, The Old Man River Basin, and the Bow River Basin. Heading the plans for each region is a regional advisory council, consisting of representatives with a range of interests and expertise. A major focus of the LUF is to use *cumulative effects management* when dealing with the impacts of development. This is an effective means of enabling sustainable development by taking into account the combined impact of different human activities. The efficient use of land to reduce the footprint of activity, and the development of a strategy for conservation and stewardship on private and public land are also goals of the LUF. To improve land-use planning and decision-making, the framework also requires the establishment of an information and monitoring system to update the status of each region as appropriate.³¹ More information on the [Land Use Framework, and the strategies involved](#), including the [final draft of the Land Use Framework](#) (as of December 2008), can be found on the Government Of Alberta Land Use Framework website.

Demographics

According to the 2007 report on water use (Alberta Environment), the population of the South Saskatchewan River Sub-Basin (SSRSB) in 2001 was 65,451 people, with an area of 14,000 square kilometres, which translates into 4.7 people per square kilometre.⁵ Districts that are included in the Basin, either entirely or partially, are Cypress County, the counties of Forty Mile No. 8 and Warner No. 5, the municipal districts of Taber and Acadia No. 34, and Special Areas (2, 3 and 4). Major population centers include the City of Medicine Hat, the towns of Redcliff and Bow Island, the Village of Foremost, and CFB Suffield. Table 4-1 shows the populations of municipalities in the SSRSB. Table 4-2 shows the relative population growth in both the urban and rural sectors in the SSRSB.

As seen in Table 4-2, the population of the region increased by 8.3 % over five years, or 1.6 % per year. Compared with other parts of Alberta, the population in the SSRSB is growing slowly.⁵ For comparison, Alberta experienced a population growth of 10.3% from 1996 to 2001, 2.06% per year. From 2001 to 2006, Alberta's population grew in a similar manner, increasing by 10.6%.⁵³ There is not enough information to calculate the population growth of the SSRSB between 2001 and 2006. [Statistics Canada – Community Profiles](#) has in-depth information on demographics for all municipalities in the South Saskatchewan River Sub-Basin.

Table 4-1. Urban and Rural Populations in the SSRSB ^{5, 52}

Type	Municipality	2001 Population	2006 Population
Cities	Medicine Hat	51,249	56,997
Towns	Redcliff	4,372	5,096
	Bow Island	1,704	1,790
Villages	Foremost	531	524
Rural Municipalities	Cypress County	4,643	-
	County of Forty Mile No. 8	1,929	-
	M.D. of Taber	668	-
	Special Areas (2,3, and 4)	218	-
	County of Warner No. 5	117	-
	M.D. of Acadia No. 34	19	-

*Note: Information on the populations from rural municipalities that live within the SSRSB border were not available for 2006.

Table 4-2. Population Distribution and Growth in SSRSB, 2001 ⁵

	2001		1996	1996 to 2001 Population Change
	Population	Percent	Population	Percent
Urban Municipality	57,856	88.4%	53,131	8.9%
Rural Municipality	7,595	11.6%	7,312	3.9%
First Nations Settlements	0	0%	0	0%
Total	65,451	100%	60,443	8.3%

In 2008, the City of Medicine Hat conducted a census to update its demographic information. The population of the City, as of May 2008, was 60,426, an increase of 3,429 since 2006. The City has recorded a growth rate of 2.6% per annum between 2006 and 2008. ¹⁷ The City is home to the majority of people in the SSRSB. A copy of the [2008 Medicine Hat Census](#) can be found on the City's website.

Further Information on Municipalities in the SSRB

Medicine Hat is the only city in the SSRSB and had a population of 60,426 in 2008. ¹⁷ Natural gas, found in abundance in the local area, is used in the City's Power Plant to provide electricity for residents of Medicine Hat, Redcliff, Dunmore, and some surrounding rural areas. Medicine Hat's Gas Utility supplies Medicine Hat, Redcliff, and some surrounding rural areas with natural gas. ² The Water Treatment Plant, the last treatment plant on the South Saskatchewan River before the Alberta-Saskatchewan border, supplies water to residents of Medicine Hat, Seven Persons (in Cypress County), and Veinerville. It was recently expanded in 2005, and can supply 75,000 consumers. In 2014, the plant is to undergo another expansion, and water treatment in the plant is

expected to be a zero discharge operation by 2015. ⁴⁶ The sewage treatment operation managed by the City, services both Medicine Hat and Redcliff, and uses a lagoon system to treat waste. ⁴⁶ The City operates a Class 2 landfill for solid waste. Runoff water and leeching of liquids exposed to waste are major concerns when operating a landfill. The primary system for containing runoff consists of a clay layer beneath the landfill. In the event that a large amount of water flows into the landfill, due to rain or flood, any runoff from the landfill will flow into a catchment pond meant to prevent the release of contaminated water into the environment. Any waste delivered to the landfill is covered daily, if possible. Since it is only a Class 2 landfill, hazardous waste is not accepted for dumping, and must be disposed of at a Class 1 landfill elsewhere. Well water from the surrounding area is tested three times a year against Alberta Environment Guidelines. The landfill has the capacity to operate for another 20 years as of 2009. Once the landfill has reached capacity, the City may join with the Town of Redcliff and Cypress County in operating a larger landfill outside of Redcliff. ⁴⁴

A [map of Medicine Hat](#) can be found on the City's website. The map can be configured to show land use zones in the City, including residential, industrial, and recreational areas. The [Municipal Development Plan for the City of Medicine Hat](#) is available on the City's website under the planning, building, and development department. The plan is currently being reviewed and updated.

The Town of Bow Island had a population of 1,790 in 2006. ⁵³ Bow Island is located within the South Saskatchewan River Sub-Basin, but the town draws its water from the Old Man River through the St. Mary River Irrigation District infrastructure. ⁵⁷

The Town of Redcliff had a population of 5,096 in 2006. ⁵³ Redcliff has its own water treatment facility, able to pump up to 2 million gallons a day. However, the town does not process its own sewage; instead the City of Medicine Hat provides sewage treatment. ⁴ Redcliff has recently annexed land, 764 hectares (1,888 acres), from Cypress County to allow for future growth. ³³ More information on the [annexation of land from Cypress County to Redcliff](#) can be found on the Government of Alberta Municipal Affairs website.

Medicine Hat, Redcliff, and Cypress County have together developed an Intermunicipal Development Plan (IDP) to create a policy framework regarding land use and future developments within the area over the next 50 years. The IDP is a collective effort from the City, the Town, and the County to manage land use and attract economic activity by having future-oriented planning efforts. The IDP projects the population of Medicine Hat to be 127,170, Redcliff to be 14,000, and Dunmore to be 5,000 by 2057, giving the area an urban population of approximately 145,000. The plan proposes several development areas to focus on over the next several decades, including plans for residential, commercial, and industrial expansion. ⁴⁸ More [information on the IDP](#), including background info, maps of proposed development areas, and a draft of the IDP itself can be found on the City of Medicine Hat's website, under Intermunicipal Development Plan.

Table 6-1. Agriculture Land-use in the SSRSB 2001 ⁵

Land Use	Acres	Percent
Crop Land	689,256	24.6%
Summerfallow	295,344	10.6%
Tame/Seeded Pasture	143,837	5.1%
Natural Pasture	1,634,829	58.4%
Other	35,702	1.3%
Total	2,798,968	100.0%

Agriculture Including Water Allocations

In 2001, there were 1,144 farms (two percent of the Alberta total) with an average size of 2,447 acres in the South Saskatchewan River Sub-Basin. For comparison, there are 53,000 farms in Alberta with an average size of 970 acres. Farms in the South Saskatchewan River Sub-Basin cover an area of 2.8 million acres, equivalent to 11,000 square kilometres or roughly eighty percent of the basin.⁵ Table 6-1 shows the land use by various types of agriculture in the SSRSB in 2001. About twenty-five percent of agricultural land is used for crops, ten percent is summer fallowed, and sixty-three percent is pasture. Tables 6-2 and 6-3 give further information on the classification of farms and livestock populations in the SSRSB.

Table 6-2. Classification of Farms in the SSRSB and Alberta, 2001⁵

Farm Type (Gross Receipts Greater than \$2500)	SSRSB (%)	Alberta (%)	Percent of Alberta (%)
Dairy Farms	0.6	0.9	1.5
Cattle (Beef) Farms	39.8	1.9	45.4
Hog Farms	1.5	1.9	1.7
Poultry & Egg Farms	0.4	1.1	0.9
Wheat Farms	25.8	7.8	7.4
Grain & Oilseed Farms	10.7	1.3	18.4
Field Crop Farms	9.1	2.2	9.3
Fruit Farms	0.1	1.2	0.1
Miscellaneous Specialty Farms	6.8	1.4	10.9
Sum of Livestock Combination Farms	1.7	1.6	2.3
Sum of Vegetable Farms	0.5	7.4	0.1
Sum of Other Combination Farms	3.1	3.5	2.0
Total	100.0	2.2	2.1

Table 6-3. Estimated Livestock Populations in SSRSB and Alberta, 2001⁵

Livestock Species	Basin Total	Alberta	Alberta (%)
Hens and Chicken	149,803	12,175,246	1.2
Turkey	253	864,438	0.0
Cattle	168,350	6,615,201	2.5
Calves	55,817	2,169,607	2.6
Pigs	56,353	2,027,533	2.8
Sheep and Lamb	6,094	307,302	2.0
Horse and Ponies	1,920	159,962	1.2
Bison	49	79,731	0.1
Deer	0	8,331	0.0
Elk	8	31,304	0.0

Forty percent of farms in the Basin raise beef cattle and twenty-five percent are wheat farms. Cattle (beef) farms are the most common type of farm in the basin, but they comprise a smaller proportion of farms in the SSRSB than found in the provincial average. The SSRSB has a larger proportion of wheat farms and vegetable farms than the provincial average (Appendix, Table 6-2).⁵ There are roughly 224,000 cattle and calves, which account for the majority of the livestock population in the SSRSB. Other species of livestock include pigs, sheep and lamb, horses and ponies, bison and elk

(Appendix, Table 6-3).⁵ Note that the number of cattle in the basin is more than three times the human population in the region.

Water allocated to agriculture accounts for twenty-seven percent (27%) of all allocations in the South Saskatchewan River Sub-Basin. As of December 2005, 74,961

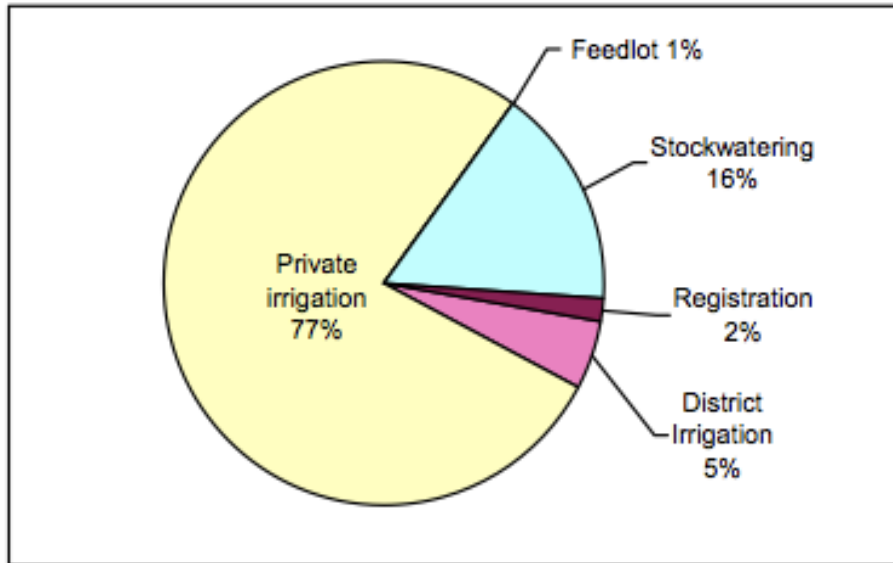


Figure 6-1. Water allocations for agricultural activities in the South Saskatchewan River Sub-Basin, December 2005.⁵

dam³ had been allocated to the agricultural sector. Private irrigation accounts for seventy-seven percent (77%) of all allocations (Figure 6-1). District irrigation accounts for five percent (5%), stock-watering accounts for sixteen percent (16%), and feedlot and registrations together account

for three percent (3%). In all, 1,619 registrations and 2,213 licenses allow for withdrawals of up to 74,008 dam³ of surface water, while 48 licenses and 8,372 registrations allow for 953 dam³ of groundwater in the agricultural sector. Surface water allocations accounted for ninety-eight percent of all water allocations for agriculture, while groundwater accounted for the remaining two percent (2%).⁵

Table 6-4. Water Use for Livestock in the South Saskatchewan River Sub-Basin (dam³)⁵

Scenario	Source	2005	2010	2015	2020	2025
Low Growth	Surface	2,780	2,849	2,922	2,995	3,071
	Groundwater	180	185	189	194	198
	Total	2,960	3,034	3,111	3,189	3,270
Medium Growth	Surface	2,780	2,950	3,132	3,324	3,528
	Groundwater	180	191	203	215	229
	Total	2960	3,141	3,335	3,539	3,757
High Growth	Surface	2,780	3,099	3,456	3,853	4,295
	Groundwater	180	200	224	249	278
	Total	2,960	3,299	3,680	4,102	4,573

*Medium growth scenario assumes growth rate in cattle population of 1.2% per year, and assumes the current mix of livestock (90% cattle) and balance of surface and groundwater use will remain unchanged between 2005 and 2025. Projections are based on 2005 water use data.

Livestock watering is one of the two major uses of water in the agricultural sector of the SSRSB. In all, 4,035 licenses and registrations allocated 13,297 dam³ for use in livestock watering in 2001. Actual water use was estimated at 1,965 dam³, about fifteen percent (15%) of what the allocations allowed for. This value does not account for the loss of water due to evaporation and seepage. In 2007 Alberta Environment produced a

more appropriate estimate of actual water use for livestock, when accounting for these factors, at roughly 2,960 dam³. Cattle account for approximately ninety percent (90%) of the livestock water demand in the SSRSB. ⁵ Under a medium growth scenario, water use for livestock operations will increase to 3,757 dam³ by the year 2025 (Table 6-4). ⁵ Note that manure from ranching operations can pose a risk to the watershed by contaminating runoff water.

Irrigation is the other major use of water in the agricultural sector. District irrigation comes from the Ross Creek Irrigation District (RCID), which is licensed to divert up to 3,701 dam³ for 1,210 acres. It is estimated that water allocations for private irrigation can support 47,663 acres. In total, water allocation can support 48,873 acres, of which ninety-eight (98%) percent is privately irrigated. ⁵ The RCID annually diverts approximately 1,500 dam³, forty percent (40%) of the licensed amount, with ninety-five percent (95%) of the irrigated acres containing forage crops (Table 6-5). ⁵ With regards to private irrigation, Alberta Agriculture Food and Rural Development (AAFRD) has indicated that most private irrigation is used to raise supplemental forages to feed livestock. ⁵

Table 6-5. District Irrigation Characteristics for the SSRSB in 2005 ⁵

District Name	Assessed acres (2005)	Licensed allocation (dam ³)	Average diversion, 1976-2005 (dam ³)	Average percent diversion of licensed allocation	Percent of License (2005)	Percent crop mix
Ross Creek	1,210	3,701	1,497	40.5%	39.7%	95% forage

The RCID district license allocates 3,700 dam³, while the 520 private irrigation licenses allocate approximately 57,963 dam³ to private irrigators. In terms of actual water use, district irrigation from the RCID diverted approximately 1,500 dam³ in 2005. Information on actual water use by private irrigators is unavailable from either Alberta Agriculture or Alberta Environment, but by assuming that private irrigators divert approximately the same proportion of the licensed volume as district irrigation (forty percent (40%) over the past 30 years), an estimate can be calculated. Using this method, private irrigation diverted approximately 23,185 dam³ of surface water in 2005 (Table 6-6). ⁵

Agricultural water use in the SSRSB is estimated to be 27,645 dam³. Actual water use for irrigation (24,685 dam³) was 8.3 times the amount of water used for livestock (2,960 dam³). Eighty-nine percent (89%) of water use in the agricultural sector was for irrigation. Surface water allocations are capped in the SSRSB, meaning that any future demand will have to be accommodated through existing allocations or by using groundwater. However, significant expansion of the agricultural sector is unlikely in the region due to biophysical and forage constraints on livestock expansion. Thus, water use by agriculture in the region is expected to remain constant. ⁵

The St. Mary River Irrigation District (SMRID) provides district irrigation for some irrigators in the region. SMRID irrigates approximately 166,000 acres in the South Saskatchewan River Sub-Basin, and operates using several reservoirs located throughout the region (Figure 6-2). ¹¹ The largest reservoirs are Grassy Lake, Yellow Lake, 40 Mile, Sauder, and Murray Lake (Appendix, Table 6-7). ¹¹ The SMRID, in total, operates 2,060km of canals and pipelines, and is Canada's largest irrigation district, providing twenty percent (20%) of Canada's irrigated area. Water used in the SMRID is

taken from the Old Man River Basin, and thus SMRID water use information was not included in the 2007 Report on Water Use prepared for Alberta Environment.⁵⁰

Table 6-6. Irrigation Allocations and Use in the SSRSB, 2005⁵

Activity	Source	Number of Licenses/ Registrations	Licensed Allocation and Use (dam ³)		
			Allocation	Water Use	Return
District Irrigation	Surface	1	3,700.5	3,453.8	246.7
	Groundwater	0	0.0	0.0	0.0
	Total	1	3,700.5	3,453.8	246.7
Private Irrigation	Surface	518	57,810.4	54,710.8	3,099.6
	Groundwater	2	153.0	153.0	0.0
	Total	520	57,963.3	54,863.7	3,099.6
Total	Surface	519	61,510.9	58,164.6	3,346.3
	Groundwater	3	153.0	153.0	0.0
	Total	521	61,663.9	58,317.6	3,346.3

*Actual water use was not reported for either district or private irrigation.

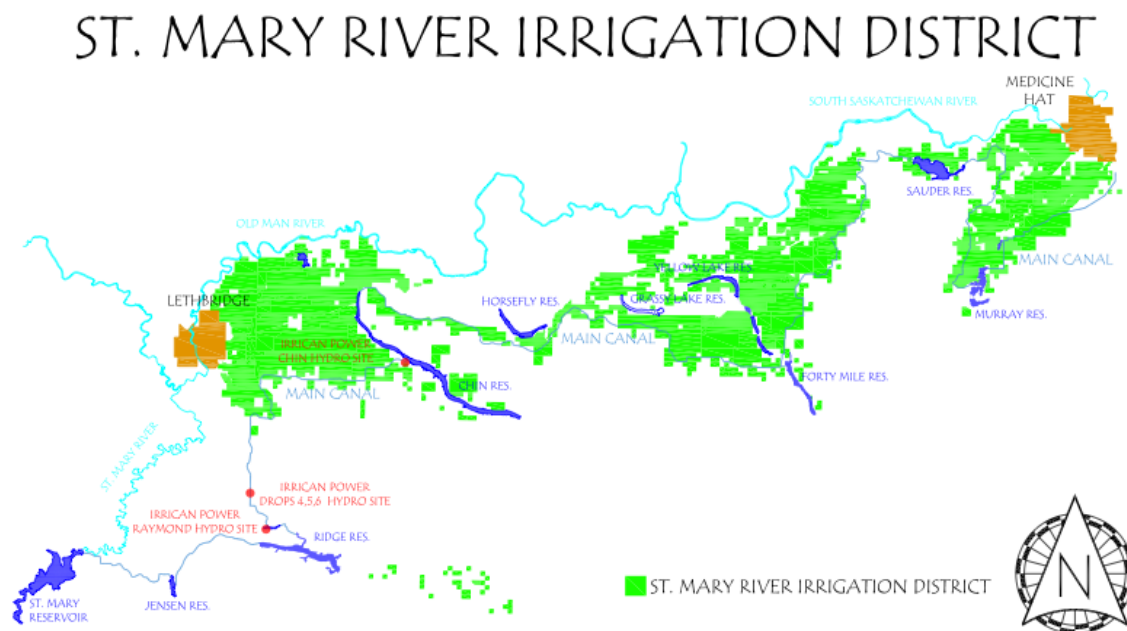


Figure 6-2. SMRID Irrigation Network⁵⁰

More information on irrigation in Alberta, including the 13 irrigation districts spread throughout Southern Alberta, is available from [Alberta Irrigation](#), the [Government of Alberta Agriculture and Rural Development](#) department, and the [Alberta WaterPortal](#) websites.

Agriculture practices can introduce chemical and biological materials into the watershed. Runoff that comes into contact with manure can find its way into rivers or wells, forming a potential health risk. Chemicals used in fertilizers along with herbicides

and pesticides may also wash into the South Saskatchewan River or other important sources of water. It is unknown what the cumulative effect of these contaminants has on the watershed. However, the Medicine Hat Water Treatment Plant has reported that the South Saskatchewan River, near Medicine Hat, does not contain dangerous amounts of chemical agents such as fertilizers or pesticides.⁴⁶ This is likely due to the dilution of any pollutants entering the river.

Table 6-7. SMRID Operated Reservoirs in the SSRSB, 2005¹¹

Reservoir	Surface Area in Square Kilometres
Grassy Lake	4.54
Yellow Lake	11.43
40 Mile	6.79
Sauder (Rattlesnake)	10.99
Murray Lake	15.43
Seven Persons	0.68
Stornham	0.12
Klaudt	0.17
West Medicine Hat Lateral 10	0.12
Bullshead	0.13

Statistics Canada regularly carries out an extensive census on agriculture in Canada. The latest census took place in 2006. The census categorizes data by municipality, and as such, does not account for the South Saskatchewan River Sub-Basin border. However, in-depth information is available from the site that provides a rough approximation of agriculture practice in the SSRSB. [The 2006 Census on Agriculture](#) can be found on Statistics Canada's website. The census provides information on land use, manure and manure application methods, forms of weed control used on summerfallow land, irrigation by type of land use, and other areas of agriculture.

Industrial Land Use and Water Allocations

Cheap and available natural gas has attracted industry to Medicine Hat. Goodyear Canada manufactures tires for markets in North America and the Pacific Rim. Criterion Catalysts and Technologies Canada Inc. provides catalysts for the petroleum industry in Canada, Japan, and the United States. Cancarb Limited produces thermal carbon black, for customers as diverse as NASA for use in the construction of the Space Shuttle. The clay industry has a history of success in the area, thanks to abundant and adaptable local sources of clay and natural gas for firing kilns. Canada Fertilizers Ltd. is another large employer in the region, and produces liquid anhydrous ammonia and granulated urea.¹ More Information on [industry in Medicine Hat](#) can be found on the AlbertaFirst website, under economic base.

Redcliff is home to some industry, including fiberglass and brick manufacture. Horticulture is a major part of the towns' economic base, with forty greenhouse operations covering 50 acres of land.³

Plant sites, the land where industrial, manufacturing, or processing facilities are located, are regulated under several government acts and agencies depending on the purpose and complexity of the operation. Any plants that use water as part of their process must ensure that the water is returned in a state that meets quality standards as runoff water from plant sites undergoing reclamation may contaminate local water

sources. More [information on the site regulations, approval process, and enforcement of regulations for plant sites](#) is available on the Government of Alberta Environment website.

In 2005, there were seven (7) active water licenses that allocated 19,803 dam³ to industry, excluding the petroleum sector. This comprised seven percent (7%) of the total allocations in the basin. The vast majority of water licenses in the industrial sector were for fertilizer plants, with ninety-five percent (95%) of the total allocations (Figure 7-1). Four surface water licenses allowing withdrawals of up to 18,869 dam³ were issued to fertilizer plants in 2005. Allocations for fertilizer plants have increased since the 1950s, with additional allocations issued in the 1970s and the 1990s. The licenses included a

return flow of 1,727 dam³, nine percent (9%) of the maximum withdrawal. There is no information on the amount of water actually used (Appendix, Table 7-1). Accounting for most of the remaining allocations, two (2) licenses for manufacturing activities were issued, allowing the withdrawal of up to 909 dam³. The licenses were originally issued in

the 1960s and have remained unchanged as of 2005. These licenses allow for a return flow of 727 dam³. There is no information on the amount of water actually used for manufacturing purposes (Table 7-1).⁵

The petroleum industry has taken advantage of oil and gas fields in the area. EnCana operates 9,400 gas wells in the Suffield area and is currently attempting to expand its operations to include an additional 1,275 wells.²⁰ There are several operating gas plants in the area, including four (4) plants close to the village of Empress, two (2) plants in the Suffield area, and a plant in Manyberries, Alberta. Wellsites are regulated under a number of provincial and federal departments. More [information on wellsites, including governing regulations, reclamation of sites, and environmental considerations](#) is available on the Government of Alberta Environment website. Transportation of oil and gas is typically done through pipelines. Information on the [regulatory process, construction, and environmental considerations when using pipelines](#) is available on the Government of Alberta Environment website. Also of importance are the well disposal sites located in the SSRB. There are three (3) known sites.¹⁶ These sites are used to pump wastewater or carbon dioxide into underground formations. The potential for disposed wastes to contaminate any present aquifers is unknown.

In 2005, there were six (6) active water licenses, allocating 6,881 dam³ to the petroleum sector, amounting to two percent (2%) of total allocations in the SSRB. The vast majority (6,879 dam³) of the allocations were for gas/petrochemical plants. Of this, four (4) surface water licenses accounted for 6,869 dam³, while one groundwater license accounted for 10 dam³. These licenses assumed that eighty-nine percent (89%) of

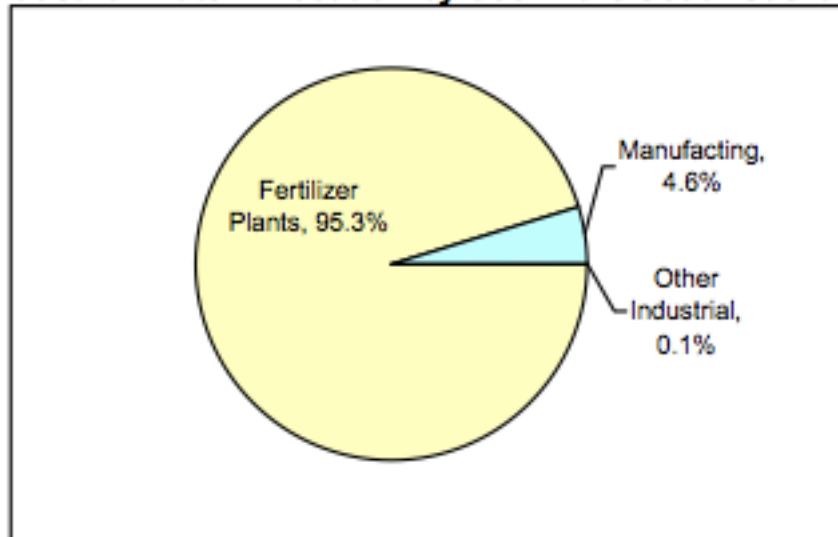


Figure 7-1. Industrial Water Allocation by Use in the SSRB, 2005⁵

surface water and one hundred percent (100%) of groundwater were to be consumed. Allocations to gas and petrochemical plants began in the 1960s, and increased until the 1980s, but have remained constant since then as of 2005. In terms of actual use, petrochemical plants used approximately 4,080 dam³ in 2005, sixty-seven percent (67%) of the total licensed use. A small amount of water, 1.2 dam³, was licensed for injection purposes, in which salt water is typically pumped into underground formations. Interestingly, data suggest that 364 dam³ of water was used for injection purposes; however, the source of this water is unclear. In total, the petroleum sector used 4,443 dam³ of water in the SSRB in 2005. It is expected that petrochemical plants will use the same amount of water in the future, while injection will require less. By 2025, water use in the petroleum sector is expected to be 4,213 dam³, down from 6,881 dam³ in 2005, under a medium decline scenario. ⁵

Table 7-1. Licensed Allocations for Industry in the SSRB in 2005 ⁵

Water Use	Source	Number of Licenses	Licensed Allocation and Use (dam ³)		
			Allocation	Water Use	Return
Fertilizer Plants	Surface	4	18,868.9	17,142.0	1,726.9
	Groundwater	0	0.0	0.0	0.0
	Subtotal	4	18,868.9	17,142.0	1,726.9
Manufacturing	Surface	0	0.0	0.0	0.0
	Groundwater	2	909.1	181.8	727.3
	Subtotal	2	909.1	181.8	727.3
Other Industrial	Surface	1	24.7	24.7	0.0
	Groundwater	0	0.0	0.0	0.0
	Subtotal	1	24.7	24.7	0.0
Total	Surface	5	18,893.6	17,166.7	1,726.9
	Groundwater	2	909.1	181.8	727.3
	Total	7	19,802.6	17,348.5	2,454.1

*Actual water use was not reported

Commercial Land Use Including Water Allocations

Commercial land uses in the SSRB include parks and trail systems, golf courses, construction, and recreation. In 2005, commercial water allocations accounted for 2,034 dam³ under 14 licenses, less than one percent (1%) of the total allocations in the SSRB. The three largest allocations in the commercial sector- parks and recreation (forty-four percent (44%)), construction (thirty-six percent (36%)), and golf courses (eighteen percent (18%)) - account for ninety percent (90%) of the total allocation (Figure 8-1, Table 8-1). There is no information on actual water use for commercial activities. ⁵

There are several golf courses located in the Medicine Hat and Redcliff area which, in 2005, required as much as 372.5 dam³ of water. ⁵ As the population of the area grows, it can be assumed that more golf courses will be built to satisfy the recreational demands of new residents. Under a medium growth scenario, water use for golf courses in the SSRB is expected to reach 1,246 dam³ by 2025, up from 373 dam³ in 2005 (Table 8-2). ⁵

Table 8-1. Licensed Water Allocations for Commercial Activities in the SSRSB, 2005 ⁵

Activity	Source	Number of Licenses	Licensed Allocation and Use (dam ³)		
			Allocation	Water Use	Return
Aggregate Washing	Surface	2	66.7	66.7	0.0
	Groundwater	0	0.0	0.0	0.0
	Subtotal	2	66.7	66.7	0.0
Construction	Surface	1	675.9	675.9	0.0
	Groundwater	0	0.0	0.0	0.0
	Subtotal	1	675.9	675.9	0.0
Golf Course	Surface	3	372.5	372.5	0.0
	Groundwater	0	0.0	0.0	0.0
	Subtotal	3	372.5	372.5	0.0
Parks and Recreation	Surface	4	800.5	273.8	526.7
	Groundwater	3	69.1	12.8	56.2
	Subtotal	7	869.6	286.7	582.9
Other	Surface	0	0.0	0.0	0.0
	Groundwater	1	49.6	49.6	0.0
	Subtotal	1	49.6	49.6	0.0
Total	Surface	10	1,915.6	1,388.9	526.7
	Groundwater	4	118.6	62.4	56.2
	Total	14	2,034.3	1,451.3	582.9

Table 8-2. Projected Water Use for Golf Courses in the SSRSB (dam³) ⁵

Scenario	Source	2005	2010	2015	2020	2025
Low Growth	Surface	373	441	486	521	543
	Groundwater	0	0	0	0	0
	Total	373	441	486	521	543
Medium Growth	Surface	373	604	832	1049	1246
	Groundwater	0	0	0	0	0
	Total	373	604	832	1049	1246
High Growth	Surface	373	985	1654	2323	2976
	Groundwater	0	0	0	0	0
	Total	373	985	1654	2323	2976

*Assumes that water demands for golf courses will increase as golf courses expand operations due to an expanding population

Many of the irrigation reservoirs found in the area are popular spots for boating enthusiasts. Forty Mile Reservoir and Sauder Reservoir, among other bodies of water in the region, are used for water sports, and have public boat launches. Several campsites have been set up near the reservoirs and lakes in the region, including sites near Sauder, 40 Mile, and Elkwater. Sandy Point Park, 27 kilometres north of Hilda, Alberta, is located on the bank of the South Saskatchewan River. ⁵⁶ Many campsites, including Sandy Point, use outhouses for human waste, and there is a potential for percolation of waste to contaminate soil. If constructed improperly, outhouses have the potential to contaminate any nearby bodies of water. Echo Dale Regional Park, the largest in Medicine Hat's park system, is situated near the South Saskatchewan River a few kilometers upstream of Medicine Hat, and contains a small man-made recreation area filled with treated water from the Medicine Hat Water Treatment Plant for swimming. ²³

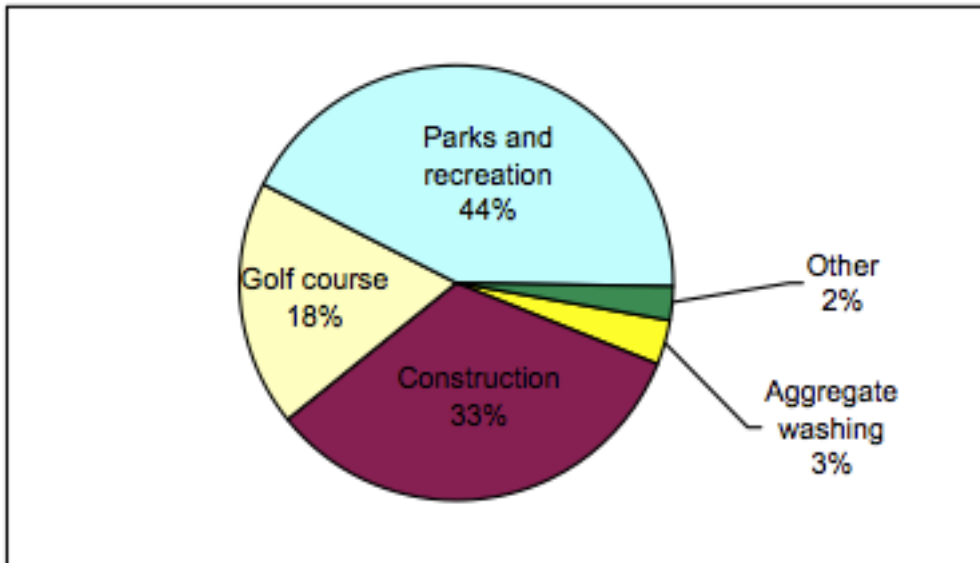


Figure 8-1. Water Allocation for Commercial Activities in the SSRSB, 2005 ⁵

Water Licences

The importance of managing water in Alberta is vital. Water supply and the demands for water change every year as a result of many factors. More information on [water in Alberta](#) can be found on the Alberta Government Environment website.

Looking at the distribution of active water licenses in the SSRSB in 2005, sixty percent (60%) of all allocations were for municipal purposes, twenty-seven percent (27%) for agriculture, seven percent (7%) for industry excluding the petroleum sector, and less than three percent (3%) of each of the other major water use sectors (Figure 9-1). ⁵ Total allocations in the SSRSB in 2005 amounted to 285,874 dam³. Existing licenses and registrations allowed a maximum of 281,971 dam³ of water to be withdrawn. These licenses assumed that 205,316 dam³ was to be used and include a return flow allowance of 76,655 dam³. While municipalities account for sixty percent (60%) of total allocations, municipal uses were licensed to use fifty percent (50%) of all the water that could be consumed in the SSRSB. The second most important water user was irrigation, accounting for twenty-two percent (22%) of allocations and twenty-eight percent (28%) of licensed consumption. In terms of actual water use, it is estimated that 66,112 dam³ were used in 2005. This is thirty-two percent (32%) of the water use allowed in existing licenses and registrations. The agriculture sector accounted for forty-one percent (41%) of total water use in the SSRSB, while industrial use accounted for twenty-seven percent (27%) (Figure 9-2, Table 9-1). ⁵

Table 9-1. Summary of Allocations and Estimated Water Use in the SSRSB, in 2005 ⁵

Sector	Licensed Allocation and Use (dam ³)				Estimated Water Use (dam ³)		
	Allocation	Water Use	Return	Percent of Total Use	Use	Percent of Licensed Use	Percent of Total Use
Municipal	169,613	101,772	67,841	50%	8,203	8%	12%
Stockwatering	13,297	13,297	0	6%	2,960	22%	4%
Irrigation	61,664	58,318	3,346	28%	24,685	42%	37%
Commercial	2,034	1,451	583	1%	1,451	100%	2%
Petroleum	6,881	6,108	772	3%	4,443	73%	7%
Industrial	19,803	17,349	2,454	8%	17,349	100%	26%
Other	8,680	7,021	1,659	3%	7,021	100%	11%
Total	281,971	205,316	76,655	100%	66,112	32%	100%

Alberta Environment no longer accepts new water license applications in the South Saskatchewan River Sub-Basin. The SSRSB is effectively closed to new allocations. However, water allocations may be obtained through water allocation transfers. In 2006, the Government of Alberta implemented a Water Management Plan for the major South Saskatchewan River Basin, including the Bow, Oldman, and South Saskatchewan sub-basins. This plan is what brought a halt to any new licenses being accepted. More information on the [SSRB Water Management Plan](#) can be found on the Government of Alberta Environment website. The plan is meant to help balance the needs of the environment and the economy through effective management of water resources. ³⁰

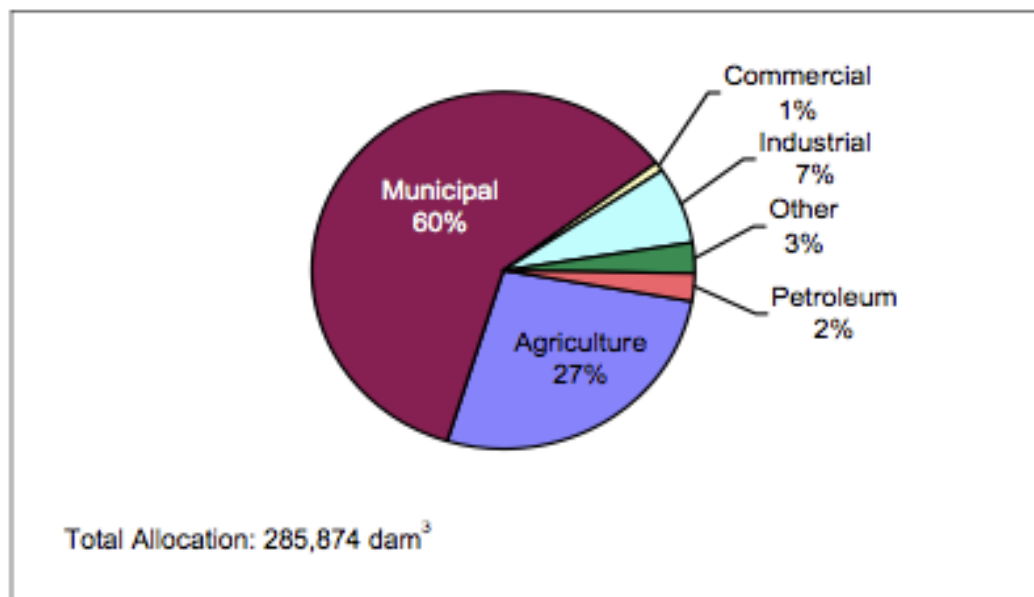


Figure 9-1. Distribution of active water allocations in the SSRSB, 2005 ⁵

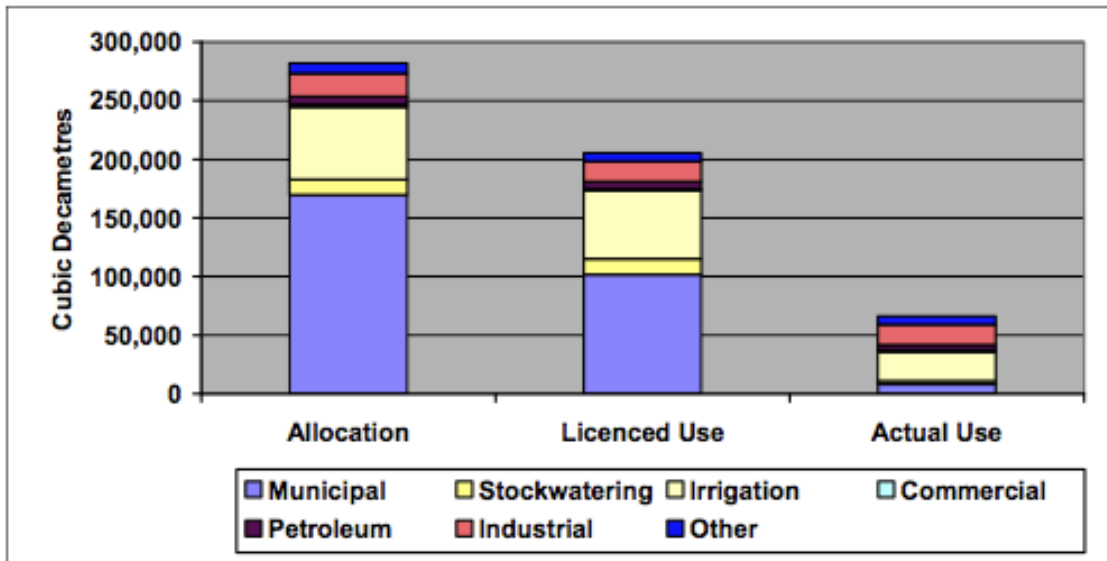


Figure 9-2. Water allocations and actual use in SSRSB, by Sector, in 2005 ⁵

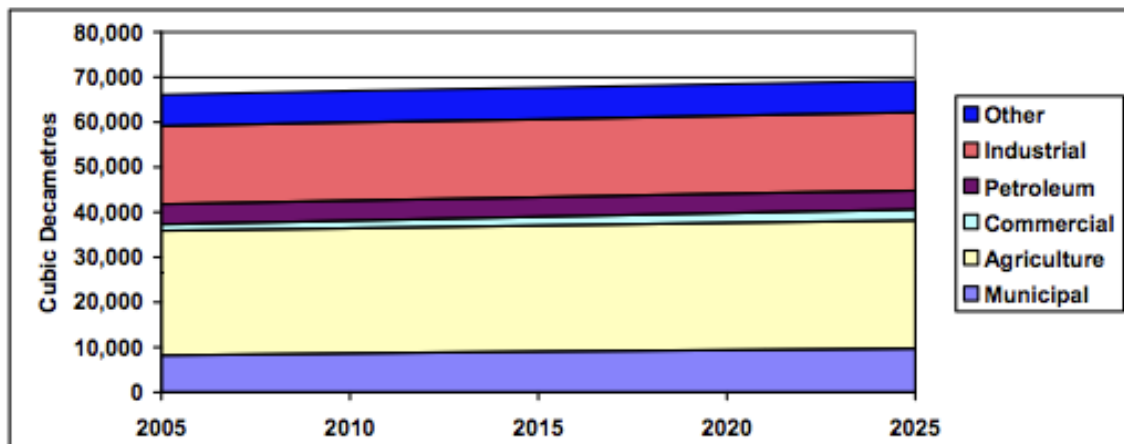


Figure 9-3. Forecast Water Use in the SSRSB, Medium Scenario ⁵

The SSRSB accounts for a relatively small amount of water use compared to other river basins in Alberta (Figure 9-7). ⁵ The Bow and Oldman river basins accounted for sixty-seven percent (67%) of the estimated water use in the province (2,265,078 dam³ combined), while the South Saskatchewan River Sub-Basin accounted for an estimated 66,112 dam³. ⁵ [Alberta WaterPortal](#) keeps data on water licenses and registrations in the South Saskatchewan River Basin. A [license viewer](#) is available on the site.

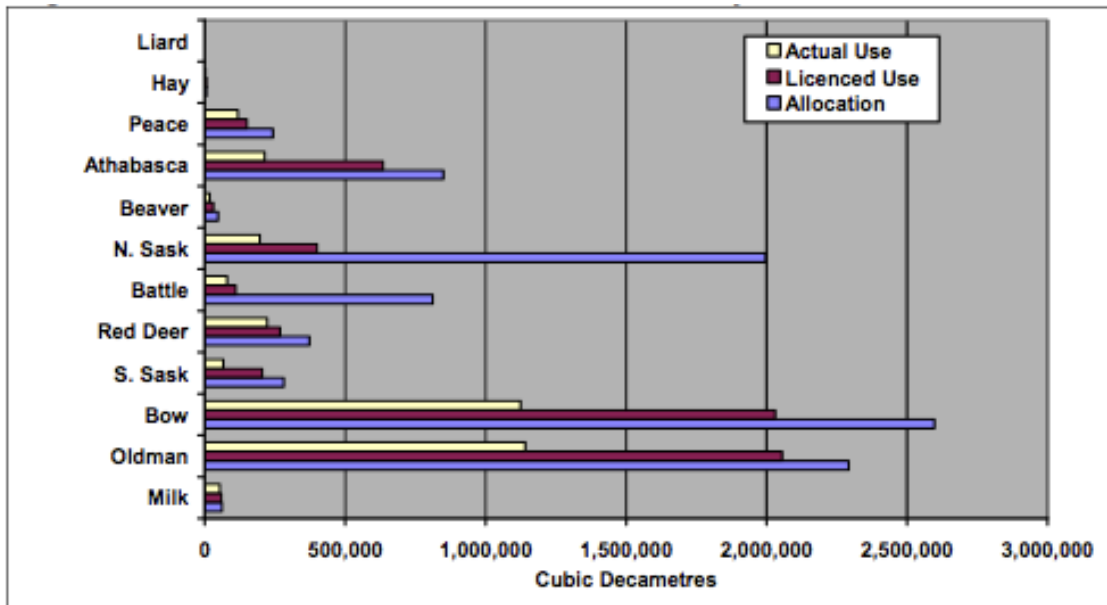


Figure 9-7. Allocations, Licensed Use, and Actual Use by River Basin, Alberta, 2005⁵

Potential Hazards Stemming from Land Use

Environment Canada enforces regulations and guidelines meant to limit the environmental risks and potential harm caused by human-induced disasters. Prevention of disaster is a priority for Environment Canada. The [Canadian Environmental Protection Act \(CEPA\)](#) lists substances that if released into the environment as a result of an environmental emergency, “(i) have or may have an immediate or long-term harmful effect on the environment or its biological diversity, (ii) constitute or may constitute a danger to the environment on which human life depends, or (iii) constitute or may constitute a danger in Canada to human life or health.” (Environment Canada, 2007) Any person who owns or manages a listed substance over a minimum quantity must provide relevant information to Environment Canada, and must develop an emergency plan to deal with the effects of an environmental emergency.²¹ Environment Canada’s Environmental Emergencies Program consists of four (4) ideals: prevention, preparedness, response, and recovery. More information on the [Environmental Emergencies Program](#) can be found on the Environment Canada website.

Environmental emergencies, such as the Lake Wabamun, Alberta oil spill on August 3rd 2005, and the [Port Moody, British Columbia ethylene glycol spill on July 19th 2007](#), have tested the policies of environment protection agencies, such as Alberta Environment and Environment Canada. In Alberta, it is the responsibility of the company or persons responsible for a spill to cleanup. Alberta Environment ensures that the cleanup is done properly and in a reasonable amount of time.²⁹

Transportation of goods in the SSRSB, by rail or road, raises concerns when looking at the environment. Paved roads can alter drainage patterns and cause erosion, and pose a threat to wildlife attempting to cross highways. Salt use on winter roads can cause elevated soil chloride levels, stunting the growth of vegetation. Herbicide used to control vegetation can potentially drift to neighboring fields or water bodies. Railroads can also pose a risk to the environment. Creosote, used to treat railroad ties, can contaminate rail beds and storage yards. Oil and fuel, spilled or leaked from trains, can contaminate sidings and maintenance yards. The use of herbicides and soil sterilants to control vegetation on rail lines can drift to affect nearby fields and water bodies. There is

a trend of using alternatives such as fire to control vegetation instead of herbicides.²⁸ Precipitation can cause any buildup of material on roads, such as windshield washer fluid, oil, and grease, to wash into storm drains. Water that enters a storm drain remains untreated, and thus any contaminants washed off the road will be transferred to the river, stream, or body of water that the drain leads to. A similar problem occurs when people wash their vehicles on their driveways. Instead of a licensed carwash, which treats any water used to wash vehicles, a driveway carwash allows grease, oil, and other contaminants to enter storm drains, eventually flowing into local streams.²⁴

Leachate from landfills, if not properly managed, can contaminate the watershed with a number of waste substances. There are no Class 1 landfills in the region, meaning no hazardous waste is accepted for disposal in the region's landfills. However, non-toxic and inert waste is accepted in SSRSB landfills.⁴⁴ Abandoned or full landfills, if not monitored after operations cease, pose a risk of contaminating nearby water sources while going unnoticed.

There is potential for rail cars or transport trucks to expose water bodies in the region directly to transported goods. Given that goods transported can include hazardous materials, an incident such as the Lake Wabamun Oil Spill in 2005 could occur in the SSRSB. Alberta Environment and Environment Canada have used incidents in the past to improve their prevention policies, and thus major environmental emergencies are becoming less frequent. There has not been a major environmental emergency in the SSRSB.

Human waste management can pose a risk to water quality. Septic tanks are often used in municipalities without access to sewage treatment plants, such as Dunmore and Veinerville in the SSRSB.⁴⁶ The tanks can potentially contaminate local soil and nearby sources of water with human waste. Septic tanks must be built and maintained properly to prevent environmental issues.

Conclusion

Land use is governed by federal, provincial, and municipal regulation. CFB Suffield is governed under federal regulations, public land is governed under provincial regulation, and municipalities govern land use on land under their jurisdiction. In the past, land use planning did not take into account the cumulative effects of different activities on the land. Growth pressures from an increasing population and the competing use of land has motivated the Government of Alberta to develop a new system of regulating land use, known as the Land Use Framework. The Land Use Framework will develop region-specific plans that take into account the cumulative effects of the land use of competing activities.

Major land uses in the South Saskatchewan River Sub-Basin include industry, commercial, agricultural, petroleum, and recreation. Runoff water is a major issue when looking at land use. Contaminants on roads within municipalities can enter storm drains with precipitation, leading directly to streams and rivers in the region. Runoff from abandoned industrial sites in the process of reclaiming an area may be a major issue.

The SSRSB is closed to new water licenses and allocations. The management and transfer of these licenses and allocations is an important issue if the resources of the region are to be used as effectively as possible. Actual water use is rarely reported, but is typically less than the licensed amounts.

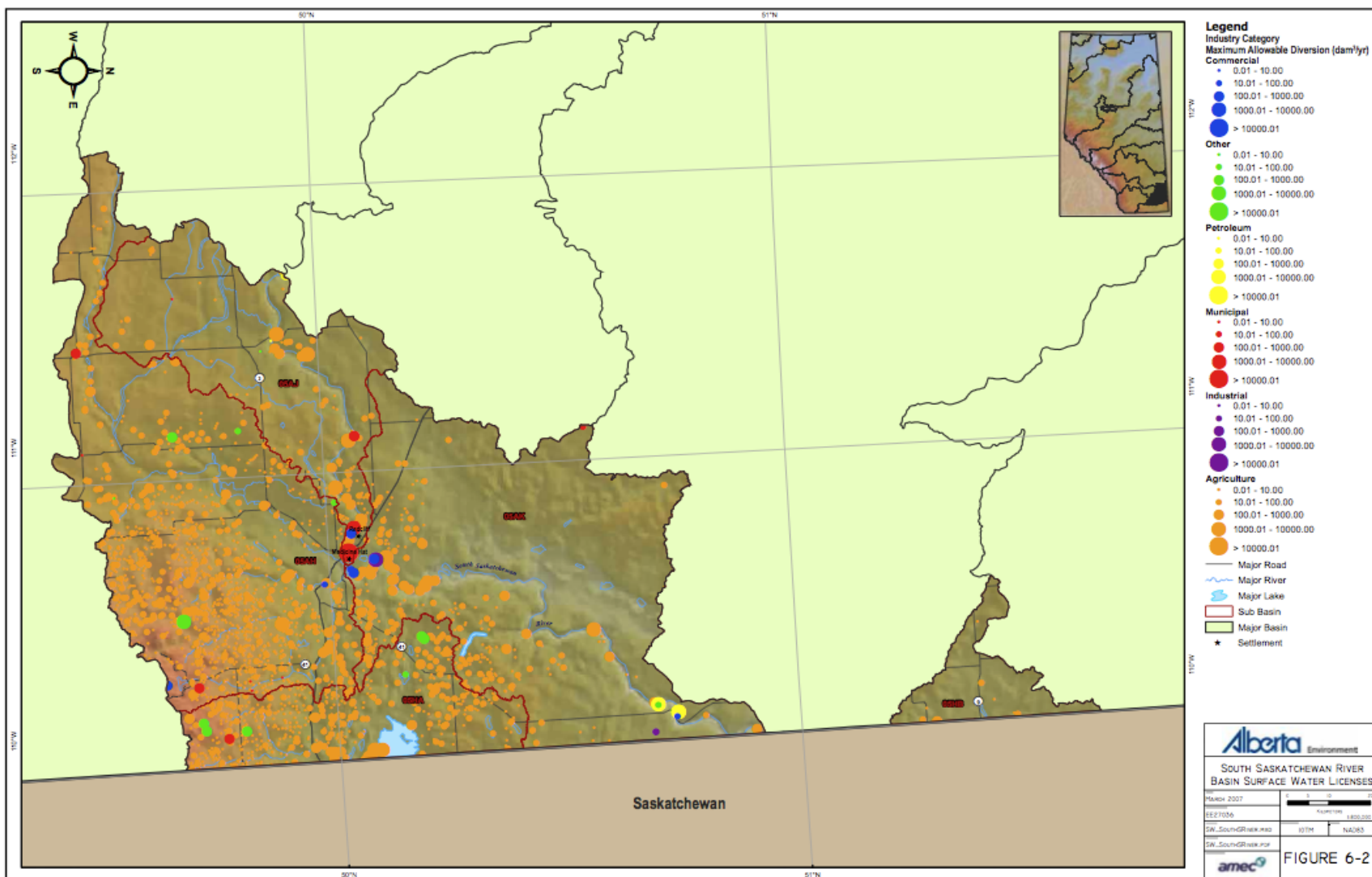


Figure 9-4. Surface Water Licenses in the SSRSB, 2005 ⁵

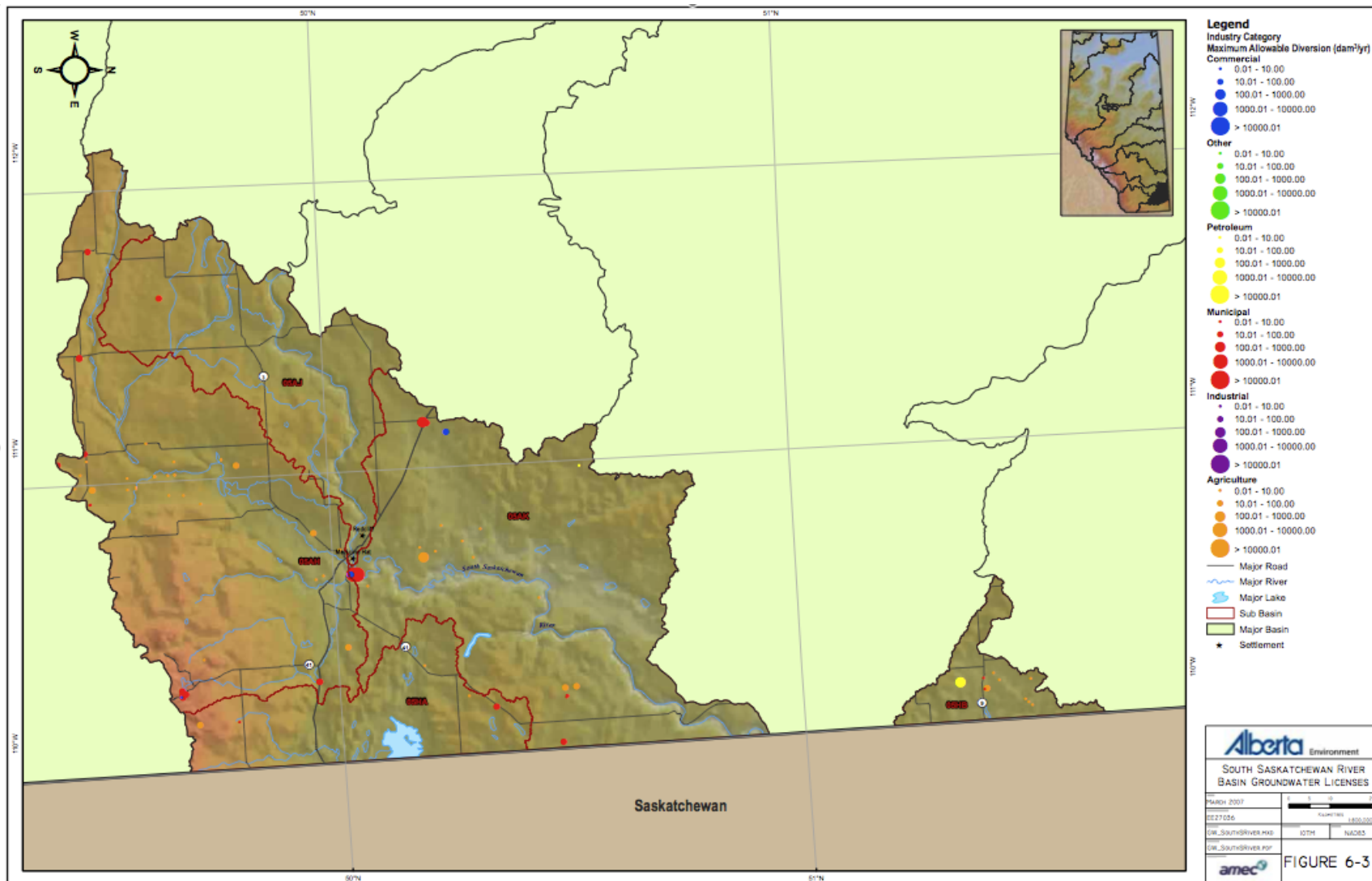


Figure 9-5. Groundwater Licenses in the SSRSB, 2005 ⁵

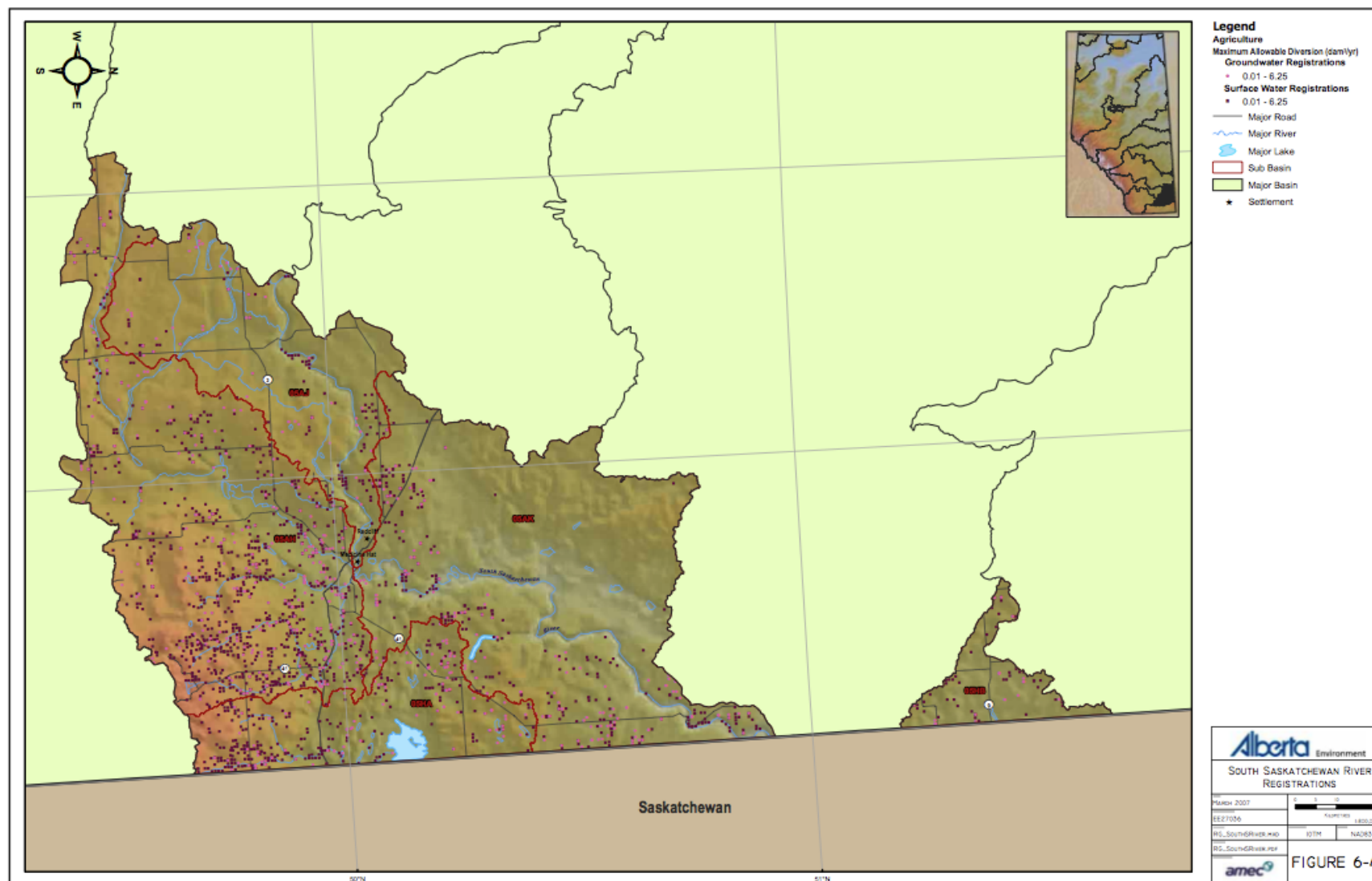


Figure 9-6. Surface and Groundwater Registrations in the SSRSB, 2005 ⁵

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GLOSSARY

Acre - unit of area, equal to approximately 40% of a hectare, or approximately 4,047 square metres (m²)

Actual water use – amount of water actually used by a licensee, often less than what a license allows for

Cubic dekameter (dam³) – unit of volume, equal to 1,000 cubic metres (m³), or 1,000,000 litres

Hectare - unit of area, equal to 10,000 square metres (m²)

Licensed water use – component of the license that is expected to be consumed or lost

South Saskatchewan River Sub-Basin (SSRSB) – component of the South Saskatchewan River Basin, starts below where the Bow and Oldman rivers join, drains the area east to Saskatchewan. The main stem of the South Saskatchewan River drains into Hudson Bay

Square kilometre (km²) - unit of area, equal to 1,000,000 square metres (m²)

Summerfallow – the practice of allowing farmland to lie idle during a growing season, rather than attempting to grow a crop

Water allocation – represents the amount of water that licensees are entitled to take from surface or groundwater sources



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The **South East Alberta Watershed Alliance (SEAWA)** was formed in 2007 and incorporated as a non-profit society in 2008. SEAWA is the designated WPAC (Watershed Policy and Advisory Council) for South East Alberta. SEAWA Members include interested individuals throughout the watershed along with our communities, ranchers, farmers, industries, companies, governments, conservation groups and educational institutions.

SEAWA Vision: *A healthy watershed that provides balance between social, environmental and economic benefits.*

SEAWA Mission: *South East Alberta Watershed Alliance brings together diverse partners to plan and facilitate the sustainable use of the South Saskatchewan River Watershed for present and future needs.*

SEAWA has over two hundred members and encourages new individual and community sector members. We are proud to include the following among our founding members:

Government Sector: Alberta Government, City of Medicine Hat, Government of Canada, Cypress County, Palliser Health Region, Town of Redcliff, Town of Bow Island, and Special Areas Board.

Land Resource - Industry and Agriculture Sectors: St Mary River Irrigation District, Murray Lake Ranching, GG Bruins Farms, Short Grass Ranches, Canadian Fertilizers Limited, Redcliff Technology Enterprise Centre, Box Springs Business Park, and Canadian Centre for Unmanned Vehicles.

Academic, Research and Non-Governmental Organizations Sectors: Medicine Hat College, Alberta Research Institute, Red Deer Watershed Alliance, and Hyperion Research.

Tourism and Conservation Sectors: Grasslands Naturalists, Canadian Badlands, and Medicine Hat Interpretive Program.

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