Antler River/Pipestone Creek BasinOverview

Sask Water
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INTRODUCTION

PHYSICAL SETTING - This report examines a study area located in the extreme southeastern portion of Saskatchewan, and which is sometimes referred to as the Lower Souris Basin or the Lower Souris River Group. The area is bounded to the east by the province of Manitoba and to the south by the state of North Dakota. It is comprised of two small drainage basins: Antler River and Pipestone Creek. The Antler River and Pipestone Creek are the primary streams in the area, flowing in a general south-easterly direction. Both streams are tributary to the Souris River; via Oak Lake and Plum Creek in Manitoba. In addition, a number of lesser streams rise in Saskatchewan and are ultimately tributary to the Souris River in Manitoba. These are the Lightning, Stony, Jackson, Graham, Gopher, Bosshill, Auburnton and Gainsborough creeks. The study area is approximately 8,400 square kilometres.

Stream	Gross Drainage Area (km^2)	Effective Drainage Area (km^2)
Jackson Creek	172.7	63.2
Gopher Creek	165	83.7
Bosshill Creek	84.4	60.1
Gainsborough Creek	1,063	519
Pipestone Creek	3,851	1,370
Antler River	3,069	1,331

Note: The drainage areas of Lightning, Stony, Graham and Auburnton creeks are included with the drainage areas of the larger streams to which they are tributary.

Table 1 Streams Tributary to the Antler River

All of the study area falls within the Saskatchewan Plains physiographic region. The topography of the study area can be described as gently rolling, with a change to a more hilly and hummocky terrain in the upland regions. In some parts of the study area, the Saskatchewan Plains Region can be further subdivided into the Moose Mountain Uplands and the Souris Plain.

The Moose Mountain Uplands are a type of topographic feature which typically does not represent an abrupt change to the landscape; rather, the higher ground often seems to emerge from the plains in an almost imperceptible manner. At an elevation of 808m, Moose Mountain is the highest point of this physiographic subdivision.

The Souris Plain is primarily a till plain. The lowest elevation in the study area is around 488 m, located in the southeast corner near the Manitoba and North Dakota boundaries.

The study area has a sub-humid climate, characterized by significant variations in both seasonal and annual temperatures and precipitation. The mean annual precipitation for the study area as a whole varies from about 460 mm to 490 mm; some 130 mm occurs as snowfall. The wettest months are June and July (Figure 1).

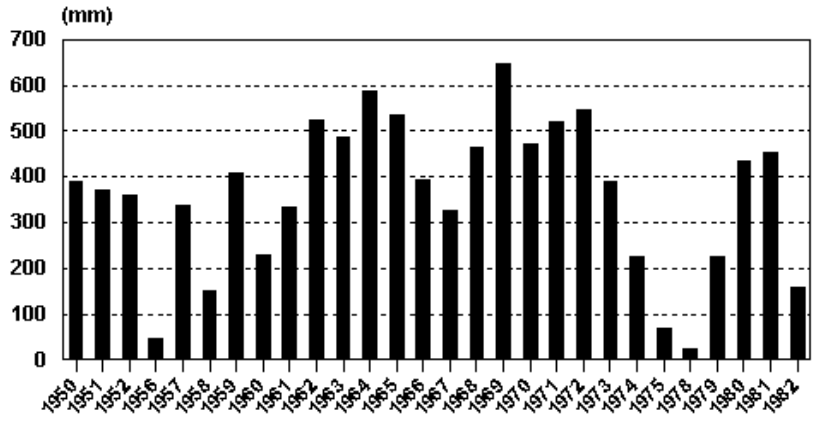

Figure 1 **Annual Precipitation at Redvers**

The temperature variation experienced in the study area is illustrated by the values recorded in centrally located Redvers. Temperatures here have ranged from extremes of -18^0 C to nearly 26^0 C. The mean annual temperature for the study area overall is 2.0^0 C.

Nearly all of the soil found in the study area is classed as Chernozemic, or dark coloured grassland soils. The Moose Mountain upland area contains Podzolic, or light coloured forest soils. The Chernozemic soils can be further differentiated into the Black and Black Calcareous sub-groups, which reflect topography, drainage and the amount of organic matter in the soil. The Podzolic soils are represented by the Gray Wooded and Dark Gray Wooded sub-types, which reflect the heavily forested nature of the uplands.

All of the study area, with the exception of the Moose Mountain Upland, originally supported grassland vegetation and localized aspen groves. This type of plant cover coincides with the black soils which predominate in the area. Although cultivation has resulted in the loss of a significant amount of the study area's natural plant cover, some areas have remained undeveloped. Remaining natural Grassland and Forest vegetation regions are found in the study area.

A small tract of aspen forest is associated with the Moose Mountain Upland area. Other wooded zones, characterised as aspen groves, tend to

be located in valleys and depressions where greater amounts of moisture may be found.

Plants common to the grassland areas are short and medium-tall grasses. While vegetation in the forested area is primarily aspen, there is some minor mixture of balsam popular, white birch, tall shrubs such as chokecherry and saskatoon, and a variety of herbs and grasses.

WILDLIFE AND FISHERY RESOURCE - Nine species of reptiles and amphibians are established in the study area. Suitable habitat is provided for nearly 50 species of mammals, including such important big game animals as white-tailed and mule deer, while the moose, elk and cougar are less common residents. In fact cougars were released by Saskatchewan Environment to increase predator numbers. The latter species are most likely to be found in the Moose Mountain Uplands.

Approximately 190 species of birds may be found throughout the region over the course of a year, of which about 150 species are reported as having a breeding range in the study area. Breeding species range from the common house sparrow to the turkey vulture. Waterfowl make up the greatest proportion of the 19 species classed as gamebirds.

The area's natural fishery is somewhat restricted, with only the major streams and deeper reservoirs offering limited habitat. Seven species of fish are found in local waters. These include the yellow perch, walleye, and northern pike, the most common gamefish species found in prairie waters.

Fish and Wildlife Branch of Saskatchewan Environment has been involved with stocking selected waters to develop and support a recreational fishery throughout the province. Waterbodies in the study area to be stocked were Moosomin Reservoir, which received walleye fry.

The Borrow Wildlife Refuge, located between Moosomin and Wawota, offers protection to wildlife and waterfowl in the study area. The Bow Valley and the Moosomin and District regional parks, together with the northern portion of Moose Mountain Provincial Park which falls in the study area, may provide some incidental environmental benefits because of the controls placed on activities such as hunting within their boundaries.

Another area inhabitant, the prairie long-tailed weasel, is considered an endangered species by the Committee on the Status of endangered Wildlife in Canada (COSEWIC), an independent body with provincial and federal government representation Included in the overall bird population are rare, threatened or endangered species identified by COSEWIC. This organization classifies such varieties of study area birds as the burrowing owl, piping plover and Baird's sparrow as endangered,

the loggerhead shrike and ferruginous hawk as threatened, and the eastern bluebird and Cooper's hawk as rare. The whooping crane and peregrine falcon are examples of endangered migratory visitors to the study area.

DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS - The total 2001 population in the study area was about 15,000. In short, many farm residents, together with people from smaller towns and villages, are relocating to ever bigger urban centres. The net result is a decline in the number of rural residents throughout the province, and an increase in the population of the cities (cited from ??, 2003)

Demographic chart from Stats Canada.

COMMUNITY	POPULATION 1996	2001
Alida	158	117
Antler	64	45
Carievale	253	254
Carnduff	1,069	1,017
Fairlight	56	45
Fleming	89	95
Glen Ewen	148	158
Gainsborough	296	286
Kennedy	231	243
Kipling	1,004	1,037
Maryfield	363	359
Moosomin	2,420	2,361
Redvers	965	917
Rocanville	875	887
Storthoaks	119	99
Wapella	387	354
Wawota	620	538
Welwyn	146	108
Windthorst	239	228
TOTAL	**9,502**	**9,502 / 9,148**

Table 2 **2001 Community Population**
Lower Souris River/Pipestone Creek Area

Agriculture represents the main economic activity in the area. Mixed farms (both crops and livestock raised) are common, and grain-only farms are encountered less frequently than in the south-central part of the province. About half of the land is used to grow grain and oil seeds, with spring and durham wheat the preferred crops. In 1991, some 415,000

hectares were seeded to these two varieties of wheat. Most of the remaining land area provides pasture for a farm cattle population that in 1991 was estimated to be almost 63,000 head.

Significant oil reserves are found in the region, particularly in the southwestern part of the study area. Exploitation of the oil resource is an important activity in the local economy, both directly through employment opportunities and indirectly by the boost provided to local service and retail businesses. Finally, Saskatchewan Energy and Mines considers the area to be a potash and salt resource area, as it is underlain by large deposits of these minerals. There is no mining currently underway, as the minerals are more easily recovered at other locations in the province.

WATER SUPPLY

SURFACE WATER RESOURCES - Pipestone Creek is the largest stream in the study area, followed by Gainsborough and Lightning creeks, and the Antler River. There are no significant natural lakes in the area; Moosomin Reservoir on Pipestone Creek represents the only major surface water resource other than the streams. The Auburnton Creek Dam, built by PFRA in 1957, is a small reservoir developed to augment local natural storage.

Most of the area's local flows originate on the slopes of the Moose Mountain uplands on the northern and western edges of the area. The Stony, Jackson, Graham, Gopher, Bosshill and Auburnton creeks, along with sloughs and poorly drained lowlands provide additional, albeit limited, water resources.

Hydrometric information is available for four study area streams, collected through a total of five hydrometric stations. The period of record for these stations varies from 17 to 33 years. These streams depend on snowmelt and early spring rains for most of their annual flow, with the result that extremes of high flows and little or even no flow, may be encountered within the space of only a few years at the same location on a particular stream.

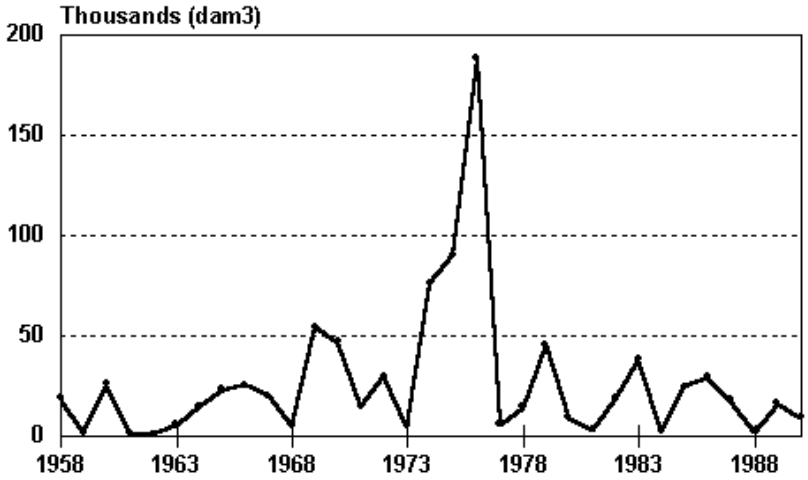

Figure 2 **Total Annual Discharge**
Pipestone Creek Near Moosomin

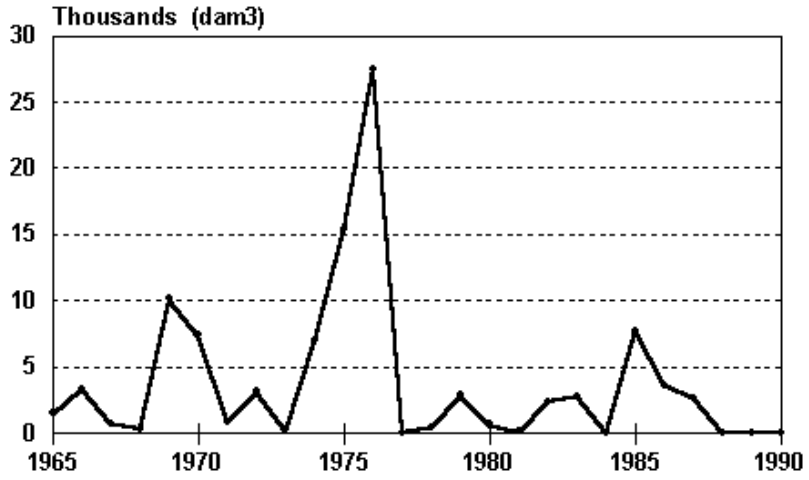

Figure 3 **Total Annual Discharge**
Antler River Near Wauchope

HYDROMETRIC STATION	DISCHARGE (dam^3)		
	Maximum	Minimum	Mean
Pipestone Creek near Moosomin	188,000	314.0	25,900
Pipestone Creek near Moosomin Lake	24,600	8.73	8,940
Gainsborough Creek near Storthoaks	59,800	0.0	8,590
Lightning Creek near Carnduff	51,000	0.0	8,270
Antler River near Wauchope	27,500	0.0	3,850

Table 3 Total Annual Discharge of Study Area Streams

Citation for this Table.

Since a number of the streams in the study area pass between provincial and international borders (e.g. the Antler River, Pipestone, Gainsborough, Gopher, Stone, Graham, Bosshill and Jackson creeks), they are managed according to specific administrative agreements. The 1969 Master Agreement on Apportionment is applied to all eastward flowing, interprovincial streams in Alberta, Saskatchewan, and Manitoba. It is administered by the Prairie Provinces Water Board, whose members represent the governments of Canada, Alberta, Saskatchewan and Manitoba.

In general terms, the agreement stipulates that each province must pass to its downstream neighbour at least 50 percent of an interprovincial stream's natural flow, which is defined as the flow which would have occurred before any water resources development had taken place. This general rule is modified in those situations where streams cross additional jurisdictions: for example, the North and South Saskatchewan rivers which originate in Alberta, combine in Saskatchewan, and enter Manitoba as the Saskatchewan River. The Master Agreement allows each jurisdiction to effectively allocate water resources for various uses, as each knows that upstream users will not take all of the water.

Number of Reservoirs, 0 to 1,000 dam^3	67
Number of Reservoirs, 1,001 to 5,000 dam^3	2
Number of Reservoirs, >5,000 dam^3	1
Total Number of Licensed Reservoirs	70
Total Capacity of Reservoirs (dam^3)	20,323.4
Total Surface Area of Reservoirs (ha)	1,316.1

Table 4 **Reservoirs**

The quality of most surface water supplies in the study area is of marginal quality for many uses, a trait shared by many small prairie streams. The cause of this relatively poor quality water is attributable to natural conditions, rather than human activity. Soils in the area tend to be rich in bacteria, nutrients and salts such as sodium chloride, calcium carbonate and magnesium sulphate.

Water quality data for three of the study area streams are available, measured at stations located in Manitoba, near the boundary with Saskatchewan. These stations are Gainsborough Creek at Highway 83, Antler River near Coulter, and Pipestone Creek near Cromer. While the data provided by these stations reflects any changes to water quality that may have occurred in Manitoba, such changes are assumed to be minimal given the nearness of the Manitoba-Saskatchewan boundary and the lack of any significant wastewater discharge in the Manitoba reach of the stream.

(This could be displayed as a pie graph) .....Conditions on many of the area's intermittent streams and sloughs are somewhat different. Salts tend to be concentrated in the soil in those locations where generally saline groundwater is drawn to the surface; these locations are frequently the same low elevations which collect surface waters. As a result, surface water quality deteriorates because of salinization. Surface water quality is also affected by concentrations of bacteria or nutrients that may be contained in the soil. These materials are dissolved by and enter surface waters when they are in contact with the soil.

In summary, water quality is often highly variable throughout any area. One stream or body of water may have a significantly different chemical makeup when compared to another, or even when upstream versus downstream locations are examined. Water quality in the same stream will also vary when high and low runoff events are compared.

GROUNDWATER RESOURCES - Groundwater supplies provide a valuable resource in the study area. In general, the groundwater is of marginal quality, being rather highly mineralized. It is, however, acceptable for domestic and municipal use without treatment. The water is not suited for irrigation.

The groundwater supply in the study area is contained in two general aquifer types: bedrock aquifers and quaternary or surficial aquifers. Bedrock aquifers tend to be of reasonably high yield, and are insulated from surface drought conditions. The water quality is typically less than that of shallower aquifers. Quaternary aquifers include buried preglacial valleys as well as the much more common intertill types. In some instances, these different types of aquifers behave as one aquifer system. This is the case with the Estevan Aquifer System which underlies much of the study area.

The Estevan Aquifer System consists of the Estevan Valley Aquifer, the Weyburn Valley Aquifer and the Ravenscrag Bedrock Aquifer, all functioning as a single, large system. The Estevan Valley Aquifer consists of four interconnected fluvial channels, incised into the bedrock of the Ravenscrag Formation. A complex aquifer, the Estevan Valley Aquifer may be as much as 80 m thick, and can be divided into an upper and lower unit.

Major buried valley aquifers such as the Estevan Valley are characterized by a long longitudinal extent and narrow width. They are recharged by vertical downward flow and by lateral flow from adjacent bedrock or Quaternary aquifers.

The only deep bedrock aquifer being used in the study area is the Blairmore Formation. This aquifer supplies very saline water for industrial purposes.

(Could this be Tabled?? A visual picture of the gound water layers.) Water quality data indicate that the water from the Estevan Valley Aquifer system is generally of the sodium-bicarbonate type, with TDS concentrations ranging from 1,500 to 3,000 mg/L. More specifically, the Ravenscrag Bedrock Aquifer water is high in bicarbonate, chloride, sodium, iron and alkalinity. Its relatively low hardness is a distinguishing characteristic. Water from the Estevan Valley Aquifer is mineralized with all the common constituents being present at moderately high levels, especially sodium bicarbonate and iron. It is hard and moderately alkaline. Weyburn Valley Aquifer water is hard, high in alkalinity, sulphate, chloride, sodium and iron.

Intertill aquifers and surface deposits are found throughout much of the study area. Typically contained in glacial till overlying bedrock, or within discontinuous sand and gravel lenses within the glacial till, they are encountered at assorted depths and vary widely in extent. Often providing water of high quality, these aquifers form an important, if limited, water

supply source for both municipal and domestic users. TDS values commonly range from 300 to 1,200 mg/L.

Much of the groundwater supply information that is available stems from pump tests undertaken during specific well development. These wells typically provide municipal or domestic water supplies for area individuals or communities. The data acquired from the testing programs completed for these wells is site- and purpose- specific; it cannot be relied upon to provide a measure of sustainable, aquifer-wide water yields. Quantifying the groundwater supply is virtually impossible. Development of the known aquifers is limited, and therefore exact information on recharge rates, sustainable yield and areal extent is frequently unavailable. Other aquifers may yet await discovery.

STUDY AREA WATER SUPPLY SUMMARY - As discussed in the previous sections, determining a reasonable total water supply value for the study area is virtually impossible. The groundwater supplies are, in many respects, largely unknown; the contribution of the many low-yielding streams and small closed drainage basins to the overall surface water supply present similar uncertainties. Perhaps the best way of summarizing the study area's water supply is to reflect the mean of the measured annual flows available on area streams. When considered in this way, the available hydrometric data indicates the study area has a supply of about 56,000 dam^3 of water in an average year.

WATER USE

Water use falls into two categories: instream or non-consumptive water use and offstream, or consumptive water use (PIE GRAPH THIS)How about citation?? Offstream water uses withdraw water from its source, and generally return some of it after use. In many instances the quality of the return flows has declined. Major offstream uses in this area are found in the municipal, domestic, and agricultural sectors. Instream water uses include those of fish and wildlife, and recreation. In these cases, water is used in the river or lake and not consumed; water quality is typically not affected.

MUNICIPAL AND DOMESTIC WATER USE - There are 17 communities in the study area that have water systems, servicing populations that range in size from 70 to nearly 2,500 persons.

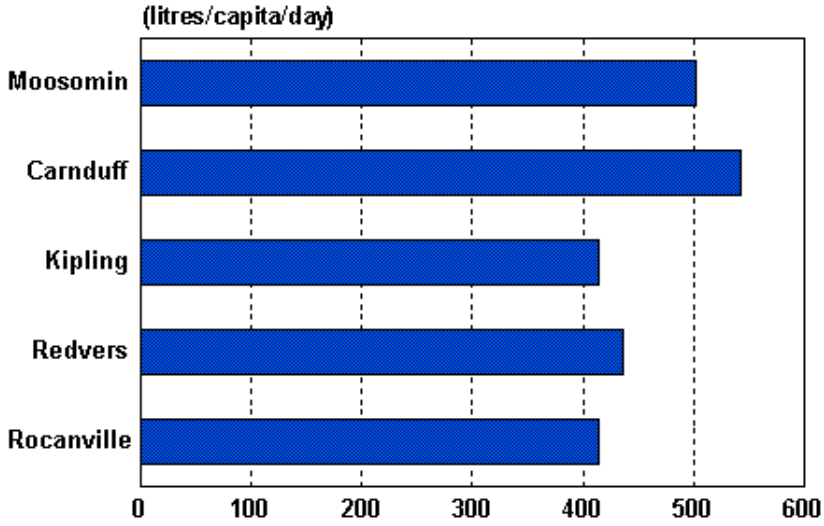

Figure 4 **1992 Municipal Water Use**

Total municipal water consumption in the study area decreased from 1,396 dam^3 in 1985 to 1,353 dam^3 in 1992. This differs from the usual pattern of municipal water use, in which the majority of communities in the province have registered increases in their water consumption over time. This trend of increasing water consumption has also been noted throughout the country as a whole.

During this same period, there were 600 fewer people served by municipal water systems in the study area, a decline of about six percent. Per capita consumption has, however, remained more in line with trends seen elsewhere in the province and across the country, registering a 7.5 percent increase. Water consumption increased from 320 litres per capita per day (Lcpd) in 1985 to 346 Lcpd in 1992, or 1,162 dam^3 in total per year. This increase likely reflects an expanded use of appliances such as dishwashers and garburetors. Drought years will also result in increased water demands for lawn and garden irrigation. Finally, it must be noted that per capita water use varies substantially among the different communities in the area, and is generally a direct response to the quality and quantity of the available water supply.

Domestic water use includes those households that employ private water supplies, farmsteads, and the households located in smaller communities not served by a municipal water system. There are nearly 7,300 people that fall into this group within the study area. Per capita domestic water use is usually assumed to be on the order of 250 litres per day. Domestic water use is therefore estimated to be 662 dam^3 annually.

INDUSTRIAL WATER USE - The industrial water use sector refers to those facilities which require significant quantities of water (in excess of 4.0

dam^3 per year), supplied by a non-municipal source. There are 14 licensed ground and surface industrial water users in the study area, collectively allocated 2,011 dam^3 of the study area's water supplies each year. This amount is composed of 1,839 dam^3 of groundwater, and 172 dam^3 of surface water.

The largest industrial water users are petroleum producers, who inject saline water from deep bedrock aquifers (such as the Blairmore Formation) into the oil-bearing formation to aid in the recovery process. Oil companies account for 10 of the 12 industrial groundwater users (or 1,790 dam^3 annually) in the area. The other industrial users consist of a feedlot drawing groundwater (49.2 dam^3) and the Canadian National and Canadian Pacific railways (172 dam^3), which are authorized to maintain small reservoirs of surface water that originally supplied water to steam locomotives.

AGRICULTURAL WATER USE - This sector is primarily made up of irrigation projects, and to a much lesser extent, stockwatering requirements. There are a total of 35 irrigation projects authorized by Sask Water in the area, with an annual combined ground and surface water allocation of 1,771 dam^3.

These irrigation projects are comparatively small in scale, with an average annual allocation of about 51 dam^3. Losses on the projects, primarily the result of evaporation, account for an additional 533 dam^3 annually.

Estimated water use for stockwatering purposes is summarized in the following table. As indicated, this water use accounts for an estimated annual consumption of 1,860 dam^3. When combined with the water allocated to irrigation and related evaporative losses, the total study area agricultural water use amounts to 4,411 dam^3 each year.

TYPE OF GROUNDWATER PROJECT	NUMBER	ALLOCATION (dam^3)
Municipal	63	1,319.6
Industrial	12	1,839.2
Irrigation	3	160
TOTAL	**78**	**3318.8**

Table 5 Summary of Licensed Groundwater Projects

ENVIRONMENTAL WATER USE - Environmental water use projects generally refer to development schemes that are intended to create and/or preserve wildlife habitat. Organizations such as Ducks Unlimited Canada

are frequent proponents; a similar function is often indirectly served by regional, provincial, or national parks. Within the study area, there are 18 environmental water use projects, accounting for a diversion of 1,581 dam^3 of water each year. All of this water is ultimately lost due to evaporation. All permits in this category have been issued to Ducks Unlimited.

There are two regional parks, a provincial historic park, and one wildlife refuge located in the study area. These sites, particularly those located adjacent to waterbodies, provide some incidental protection to wildlife through the controls placed on activities such as hunting within their boundaries.

ANIMAL TYPE	NUMBER (1991)	WATER USE (Lcpd)	ANNUAL USE (dam^3)
Dairy cattle	2,581	160	151
Beef cattle	60,373	70	1,544
Pigs	20,860	20	153
Sheep	3,067	11	12
TOTAL	**86,881**		**1,860**

Table 6 **Livestock Water Use**

MULTI-PURPOSE WATER USE - There are four multiple purpose projects in the study area. As the name suggests, this category includes projects which provide water for more than one purpose; for example, backflood irrigated hay also provides waterfowl habitat. A total of 5,530 dam^3 of water annually is diverted to these projects.

INSTREAM AND RECREATIONAL WATER USE - Included in this section are non-consumptive, water-related activities found within the region, such as wildlife habitat, recreation sites and fishery requirements.

As previously discussed, recreational sites in the study area are limited. However, both the Bow Valley and the Moosomin and District Regional parks are located adjacent to local waterbodies. These parks provide a variety of facilities and leisure opportunities.

There is significant migratory, shoreland and colonial waterbird habitat in the study area, rated important by federal authorities at the local and regional levels for specific species. The Pipestone Plain and the

Gainsborough Creek Plain are breeding locations for the burrowing owl, loggerhead shrike and great blue heron. These areas, together with the Souris River Plain, are also of importance to breeding ducks and staging geese.

REGIONAL WATER USE SUMMARY - Based on the information provided in the preceding sections of this report, the total water use within the study area each year is estimated to be about 16,000 dam^3. Of this amount, "Other" water uses account for more than half of all water licensed, followed by the Multipurpose (about 30 percent) and Industrial (about 13 percent) categories. Licensed use in the remaining water use classifications decreases from these levels.

PURPOSE	NUMBER	ALLOCATION (dam^3)	LOSSES (dam^3)	TOTAL DIVERSION (dam^3)
Domestic	67	1,632	553	2,185
Municipal	8	643	516	1,159
Industrial	2	172	49	221
Agriculture	32	1,611	533	2,144
Other	18	0	1,581	1,581
Multipurpose Uses	4	4,750	780	5,530
TOTAL	**131**	**8,808**	**4,012**	**12,820**

Notes:
1. The "Agriculture" category primarily refers to irrigation projects.
2. The "Other" category primarily refers to Ducks Unlimited Canada projects.
3. The water volumes classified as "losses" are primarily due to evaporation.

Table 7 **Summary Of Licensed Surface Water Projects**

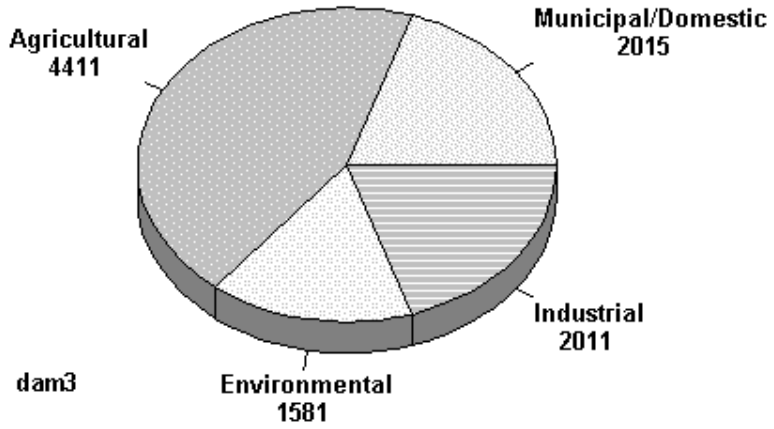

Figure 5 **1992 Water Use**

STUDY AREA WATER SUPPLY - WATER USE RELATIONSHIP

Both the annual water supply and water use patterns in a region can vary widely. This can result in water supply shortages existing one year while similar problems are not encountered the next. It is virtually impossible to develop an accurate water supply/use relationship in the study area, primarily due to the great number of unknown factors (groundwater supplies, unmeasured surface sources, etc.). Nonetheless, the exercise is worth attempting because it will illustrate in a general way any water supply problem encountered in the study area.

The following table compares the water supply for 1990 and the mean water supply for the study area calculated from available hydrometric data, then compares it to the water use estimated in earlier sections of this report. The information presented is subject to a number of conditions, and is offered for illustrative purposes only.

	WATER SUPPLY*	WATER USE**
1990 Annual Value	13,200	16,000
Mean Annual Value	55,600	16,000

* does not include groundwater supplies or small surface supplies - see text for details

** estimated

Table 8 **Study Area Water Supply and Use (dam^3)**

This table indicates that the estimated water use exceeded the available supply by nearly 20 percent in 1990. This may be contrasted with an average year, in which there is about 70 percent more water available than is required by existing uses. Runoff in 1990 was only about 24 percent of

the long-term average value. This comparison, however, requires careful interpretation. The water supply total does not include groundwater supplies nor small surface water sources such as dugouts, sloughs and intermittent streams and lakes. These sources likely supply a significant part of the domestic and livestock water demand. The table does, however, serve to demonstrate the relatively large surplus of water that typically exists in the study area.

The long term water supply picture of the study area does, however, suggest that it contains serious constraints, and could affect future developments. The period of record for which hydrometric data are available indicate that there are years when little or no runoff occurred some streams. In these situations, water supply problems become extremely critical, particularly for those users who depend exclusively on surface water supplies.

Experience in this and other watersheds shows there is a general trend to increasing water use over time. As demand for water in the study area inexorably increases, so will the pressure on water supplies which are, in some instances, only marginally sufficient for current requirements. The localized supply shortages of today can be anticipated to become an ever greater problem in the future.

WATER MANAGEMENT ISSUES

INCREASED IRRIGATION WATER SUPPLIES - A number of small dams are proposed, and some have been constructed as area farmers develop irrigation water supplies. Interest in increasing the irrigated land area, as well as calls to improve irrigation water supplies for existing irrigation areas, have been registered in several of the local watersheds. Almost inevitably, the development of new consumptive uses for water is paralleled by a rising potential for conflict among competing users.

WATER SHORTAGES - The Pipestone Creek area of Manitoba is a chronically water-short area. Conflicts over the timing of water releases from Moosomin Reservoir and the best uses for the available water have occurred. Considerable interest in both Manitoba and Saskatchewan has been expressed by local residents towards the possibility of raising the full supply level of Moosomin Reservoir to make additional water available.

FLOOD POTENTIAL OF ANTLER RIVER - Concerns over the flood potential of the Antler River near Carnduff are regularly raised.

INTERJURISDICTIONAL CONSIDERATIONS- The area's geography means that there is considerable potential for both international and interprovincial conflicts over water use and apportionment to be raised, particularly during drought years.

DAM SAFETY CONSIDERATIONS - There have been concerns raised over the safety of the Auburnton Creek Dam (allotted an annual diversion of 311 dam^3 for evaporation losses).