State of the Environment

in Lacombe County

2013

The State of the Environment in Lacombe County

Lacombe County would like to acknowledge the contributions of the following people in preparing this report on the state of the environment in Lacombe County.

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EXECUTIVE SUMMARY

A State of the Environment Report is an important tool for Lacombe County. It provides a snapshot of the current condition of the environment and the pressures that impact it. This document examines the state of the environment in Lacombe County through a scientific and socio-economic planning structure. The scientific approach focuses on analysing available data to identify and assess changes in the environment over time. The planning approach uses social norms to compare and rank alternative choices, to balance environmental, economic and social objectives, and to initiate management options.

The report outlines community perception, scientific data, current environmental legislation and environmental extension programs. It is a compilation of information gathered from various sources and provides us with a baseline. It does not include management recommendations or future planning considerations. This document is a snapshot in time; it represents only the data that is available at the time of writing.

Lacombe County is located in Central Alberta, straddling six towns and villages and bordering five counties. The County is mostly rural, with a strong industry component along the Queen Elizabeth II Highway and Highway 597. The County has approximately 10,000 residents and covers 712,960 acres or 2,885 km2. It is situated in both the Boreal Forest and Parkland *Natural Regions* of Alberta. It boasts a wide diversity of ecosystems, including numerous water bodies, and is home to the popular summer destinations of Gull, Buffalo and Sylvan Lakes. J.J. Collette Natural Area, which boasts a number of rare and special plants and animals, is also found within the County boundaries.

Due to the geographic location and abundance of fertile farmland, the County faces some unique challenges. A very high percentage, 84%, of land is used for either agriculture or development, leaving only 16% of the lands in a natural ecological state. There is also a very large component of linear disturbance in the County, with up to 9.3% of the land within the County used by pipelines, transmission lines, roads etc.

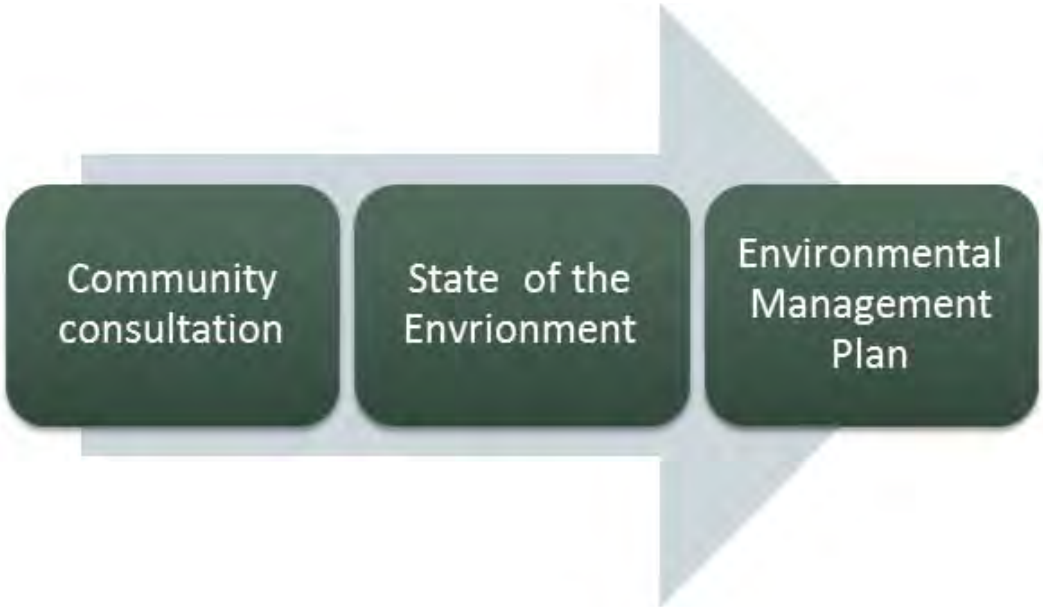
Nine environmental indicators were chosen to measure and report on the state of the environment. These indicators are based on various sources such as the Alberta Environment and Sustainable Resource Development Water Quality Guidelines, Alberta Agriculture, and previously published State of the Watershed reports in the province.

The indicators are grouped in four categories: land use, water quality, bio-indicators and human impacts. Where relevant, a three point scale of good, fair and poor was used to rank the indicators. Of the nine indicators, one indicator was measured 'good', two indicators were measured 'fair' and three were measured as 'poor'. The remaining three indicators were not ranked, due either to insufficient data or the lack of a scale that was appropriate for the County. The following table summarizes the rankings. For indicators that lack a scale, the measurement in future reports will be based on the percentage of change that occurs between the years of reporting.

Land Use	Water Quality	Bio-indicator	Human Impact
Agriculture and Livestock Operations (Fair)	Nutrients - Lakes *(Good)* and Rivers (Poor)	Habitat cover and health (*)	Waste generation and disposal**
	Bacteria - Lakes (*) and Rivers *(Poor)*	Wildlife biodiversity (*)	
	Parasites - Lakes (*) and Rivers *(Poor)*	Wetland Condition and Riparian Health - Lakes (*Fair)*	
	Pesticides - Lakes (*) and Rivers *(Poor)*	Wetland Condition and Riparian Health - Lakes (*Fair)*	
	* Insufficient Data to Rate	* Insufficient Data to Rate	** No appropriate scale for the County

This report card provides us with a baseline. This information, along with views collected from the community in an extensive consultation process conducted in 2012, will help to determine priorities and make decisions. Lacombe County is developing an Environmental Management Plan, which is scheduled to be completed and released in 2014. This document will be distributed for public comment before it is adopted by Council.

This is the first State of the Environment report to be written for Lacombe County. We will update this document on a regular schedule to accurately reflect changes in the environment in Lacombe County.



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1 INTRODUCTION

A state of the environment report is an important tool for Lacombe County to help determine the effect of management actions on environmental conditions in the local area. It provides a snapshot of

- The current state or condition of the environment (a baseline); and
- Pressures impacting the current condition of the environment.

This report examines the state of the environment in Lacombe County through a scientific and socio-economic planning structure.

The scientific approach analyses available data to identify and assess changes in the environment over time. The planning approach uses social norms as rules to compare and rank alternative choices, to balance environmental, economic and social objectives.

This report is a compilation of information gathered from various sources. It outlines community perception, scientific data, current environmental legislation and environmental extension programs. It does not include management recommendations or future planning considerations.

The report is divided into sub-sections of community perception and environmental indicators based on scientific data and published findings. It is a balance of the social and scientific information pertinent to our community.

2 CURRENT STATE OF THE ENVIRONMENT IN LACOMBE COUNTY

The information in this section provides a report card of environmental conditions. It will help to determine the current state of the environment in Lacombe County, which can then be used as a baseline to monitor our progress.
The information available is summarized into four major categories:

- water quality;
- water quantity;
- land use; and
- bio-indicators.

These categories are then broken down into nine indicators that provide more detailed information.

The categories and indicators are based on the guidelines recommended by the Alberta Environment and Sustainable Resource Development (AESRD) Handbook for State of the Watershed Reporting (2008). The specific indicators and subsequent rating systems are from various sources such as the Alberta Environment and Sustainable Resource Development Water Quality Guidelines, Alberta Agriculture and previously published State of the Watershed reports in the province. It is important to note that all of the rating systems and indicators are taken from external sources; Lacombe County has not developed any of the rating systems.
Environmental indicators such as nutrient levels in waterways and the number and condition of wetlands are important management tools used in environmental reporting. These indicators are used to summarise and communicate information about the condition of key aspects of our environment. As we continue to report on these indicators, they will demonstrate trends and will show us where and how we have improved our environment, and where we may need to consider making changes.

This report is the first of many stages to come for the County. It is the starting block from which we begin our journey to identify what is ultimately our vision for the environment in Lacombe County. The report will be published on a five year cycle with smaller editions on an annual basis. It will provide the basis for development of the Environmental Management Plan.

As you read through the document there may be words or phrases that you are unfamiliar with. There is a glossary in section 9. Any word contained in the glossary will be in *italics and green in colour.*

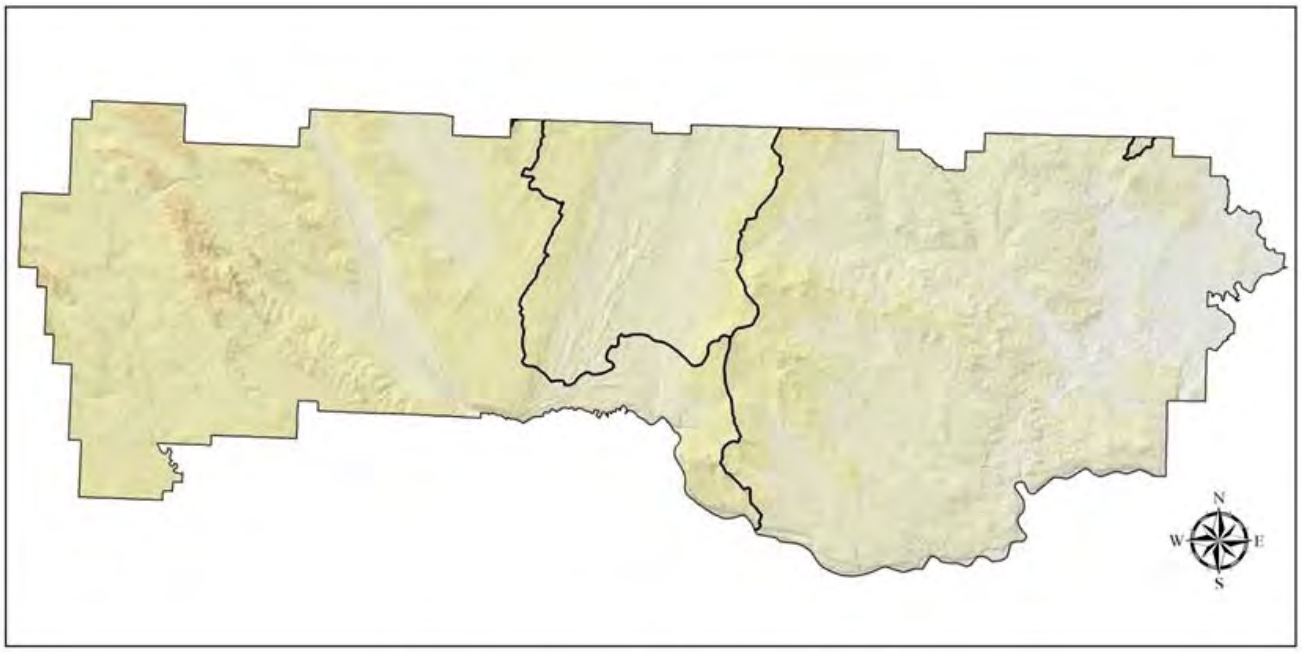
This report is the first stage in our jorney to identify our vision for the environment in Lacombe County.

2.1 AN OVERVIEW OF LACOMBE COUNTY

The County is mostly rural, with a strong industry component along the Queen Elizabeth II Highway and Highway 597. The County has approximately 10,000 residents and covers 712,960 acres or 1,782 km2. It boasts a wide diversity of ecosystems, including numerous water bodies, and is home to the popular summer destinations of Gull, Buffalo and Sylvan Lakes. J .J. Collette Natural Area, which boasts a number of rare and special plants and animals, is also found within the County boundaries.

The County is situated in the both the Boreal Forest and Parkland *Natural Regions* in Alberta. The soil found in the county is composed mainly of black and dark grey chernozemic and *grey luvisolic soils*, making it ideal for agriculture. Soils are well and moderately drained, and the topography is undulating and rolling. In isolated pockets along the Red Deer River banks, the land becomes inclined and steep. Regionally, the topographic surface varies between 740 and 1,100 metres above mean sea level (AMSL). The lowest elevations occur mainly in the eastern part of the County, as shown in Figure 1.

FIGURE 1
LACOMBE



TERRAIN RELIEF OF LACOMBE COUNTY

Watersheds

Name (WSC Region Code)

- ☐ Medicine (05CC)
- ☐ Threehills (05CD)
- ☐ Bigstone (05FA)

BATTLE RIVER WATERSHED ALLIANCE

0 2.5 5 10 15 20 Kilometers

Government of Alberta

2.2 NATURAL REGIONS AND SUB-REGIONS

Lacombe County lies within both the Boreal Forest and Parkland *Natural Regions* in Alberta. Natural region and natural sub-region classifications have existed for at least four decades. They are used to provide provincial and local ecological context to create a common basis for communication and understanding. Each region is classified based on climate, vegetation, soil, wildlife and land use attributes.

The Parkland *Natural Region* is described as an area with remnant patches of aspen and willow shrublands mixed with native grasslands underlain by black soils, and surrounded by productive agricultural lands and urban landscapes. This *Natural Region* is the most densely populated region in Alberta and has been extensively cultivated since the late 1800's. It also contains about 100 (or 20%) of Alberta's rare vascular plants species.

The Parkland *Natural Region* has three natural sub-regions. The most extensive one within Lacombe County is the Central Parkland natural sub-region. This sub-region is characterised by undulating till plains and hummocky uplands. The most notable features are the *avifauna* found here. The numerous and productive wetlands of this sub-region have been called the "duck factory" of North America. This area has been intensively cultivated for over a century, with only a few remaining contiguous areas of native parkland vegetation occurring on sites that are unsuitable for agriculture because of topography or soil constraints.

The soils are dominated by *black chernozemic soils*, which reflect the long term occurrence of productive grasslands that developed under relatively long, warm growing seasons and created deep black surface layers of humus. There is also a strong presence of *solonetzic soils*, which develop from weakly saline and sodic parent materials.

Approximately 10% of the area is covered in wetlands and 2% is covered by major watercourses such as the Red Deer River. Of the remaining area, up to 80% is covered by cropland, with only ~5% of the sub-region remaining in native vegetation.

This region is home to a number of wide-ranging species that are typically found within the Boreal Forest natural sub-region. These include the red-tailed hawk, least flycatcher, great-horned owl, white-tailed deer, snowshoe hare and American porcupine.

The aquatic and wetland habitats also help support a wide diversity of wildlife populations throughout the region, including diving ducks, grebes, terns, and amphibians such as the boreal chorus frog and wood frog. The plains garter snake is also a common resident in this area. The Central Parkland is also home to the prairie vole, which is only found in this region.

The Boreal Forest *Natural Region* occupies most of northern Alberta, but reaches as far south as Calgary. Due to the large expanse of the region, the landforms and vegetation types vary tremendously. There is a large diversity of forest types, including deciduous, coniferous and mixedwood forests.

This region has nine sub-regions, the southern-most sub-region being Dry Mixedwood, which exists within the boundaries of Lacombe County. The Dry Mixedwood Natural Sub-region is the warmest in the boreal *Natural Regions*. It has warmer summers and milder winters than any of the other eight sub-regions. It is also the second largest natural sub-region in Alberta.

This sub-region is characterized by aspen forests and cultivated landscapes, with fens commonly occurring in low-lying areas. There are saskatoon and buckbrush shrublands growing in the lower slopes of ravines or gullies and on moist and rich sites. There may also be balsam poplar, aspen and white spruce growing in pure or mixed stands. Soils in the area are dominated by moderately fine textured, moderately calcareous *glacial till* with a significant component (10%) of *glaciofluvial* sand, organic deposits and minor inclusions of *glaciolacustrine* materials. Major watercourses cover about 3% of the sub-region. As with the Central Parkland Sub-region, wetlands cover close to 10% of the area. Additionally, 5% of the area is covered by wet mineral soils and shallow peats.

Tables 1 and 2 and Figure 2 show the *Natural Regions* and sub-regions of the area.

TABLE 1 NATURAL REGIONS AND SUB REGIONS (ha) COVERAGE

Subwatershed	Bigstone	Medicine	Threehills
Natural Region			
Boreal – Dry Mixed Wood	62.6	89,523.6	0.0
Parkland – Central Parkland	37,494.5	48,088.0	133,655.5
Total	37,551.1	137,611.6	133,655.5

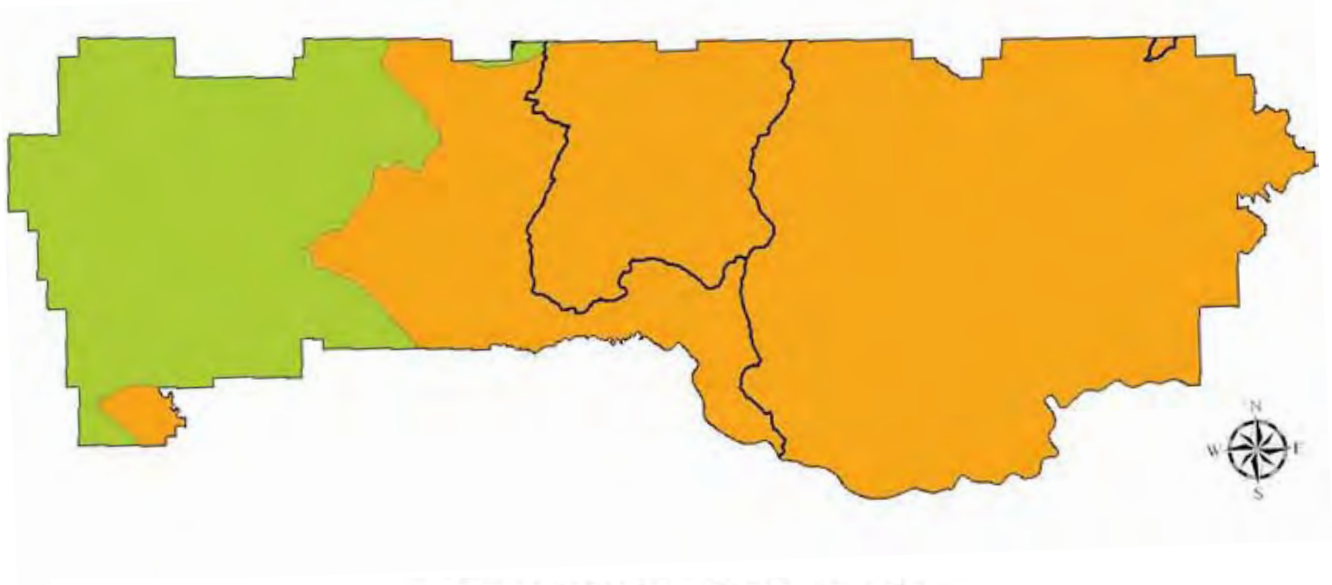
*data provided by (Battle River Watershed Alliance)

TABLE 2 NATURAL REGIONS AND SUB REGIONS AS % OF TOTAL AREA 2012

Subwatershed	Bigstone	Medicine	Threehills
Natural Region			
Boreal – Dry Mixed Wood	0.2%	65.1%	0%
Parkland – Central Parkland	99.8%	34.9%	100%
Total	100%	100%	100%

*data provided by (Battle River Watershed Alliance)

FIGURE 2
ECO-REGIONS IN LACOMBE COUNTY 2012



ECOREGIONS OF LACOMBE COUNTY

Dry Mixedwood
Central Parkland

0 2.5 5 10 15 20
Kilometres

Government of Alberta

BATTLE RIVER WATERSHED ALLIANCE

2.3 WATERSHEDS

Watersheds are defined as areas of land that catch rain or snow and drain it to a common place, like a wetland, lake, stream or river. A watershed works like a sink with a drain; the slopes of the land drain moisture into a common 'drain' or system. Watersheds may have farms, industry, natural areas, residential homes or recreational areas in them. Therefore, the quality of the watershed is dependent on all parties that live within its boundaries. The Province of Alberta created Watershed Planning and Advisory Councils (WPACs) under the *Water for Life Strategy.* These WPACs are multi-stakeholder, non-profit organizations that assess the conditions of their watershed and develop plans and activities to address watershed issues. They represent the stakeholder interests within each watershed area. Within Lacombe County there are two major WPACs including the Red Deer River WPAC and the Battle River WPAC. Figure 3 depicts the major watersheds in Alberta. Local environmental NGOs (non-governmental organizations) also exist in the community. These include the Medicine River Watershed Society, the Lacombe Lake Stewardship Society, Sylvan Lake Watershed Stewardship Society, Gull Lake Water Quality Management Society and the Friends of Chain Lakes Stewardship Society.

2.3.1 SUB-WATERSHEDS

Watersheds are divided into sub-watersheds. These are smaller basins or catchment areas that collectively make up the larger watershed areas. Large watersheds are divided into sub-watersheds, each represented by a WPAC for management purposes, making it easier to delineate boundaries and effectively manage smaller geographic areas.

The County includes portions of the North and South Saskatchewan watersheds; the South Saskatchewan watershed is divided into the Red Deer River and Battle River watersheds (Figure 3), which are then broken down even further into three minor sub-watersheds: Medicine, Threehills, and Bigstone. Figure 4 delineates the three sub-watershed areas in Lacombe County. These sub-watersheds are used as a reference point for data throughout the report.

FIGURE 3
MINOR WATERSHEDS IN ALBERTA 2012

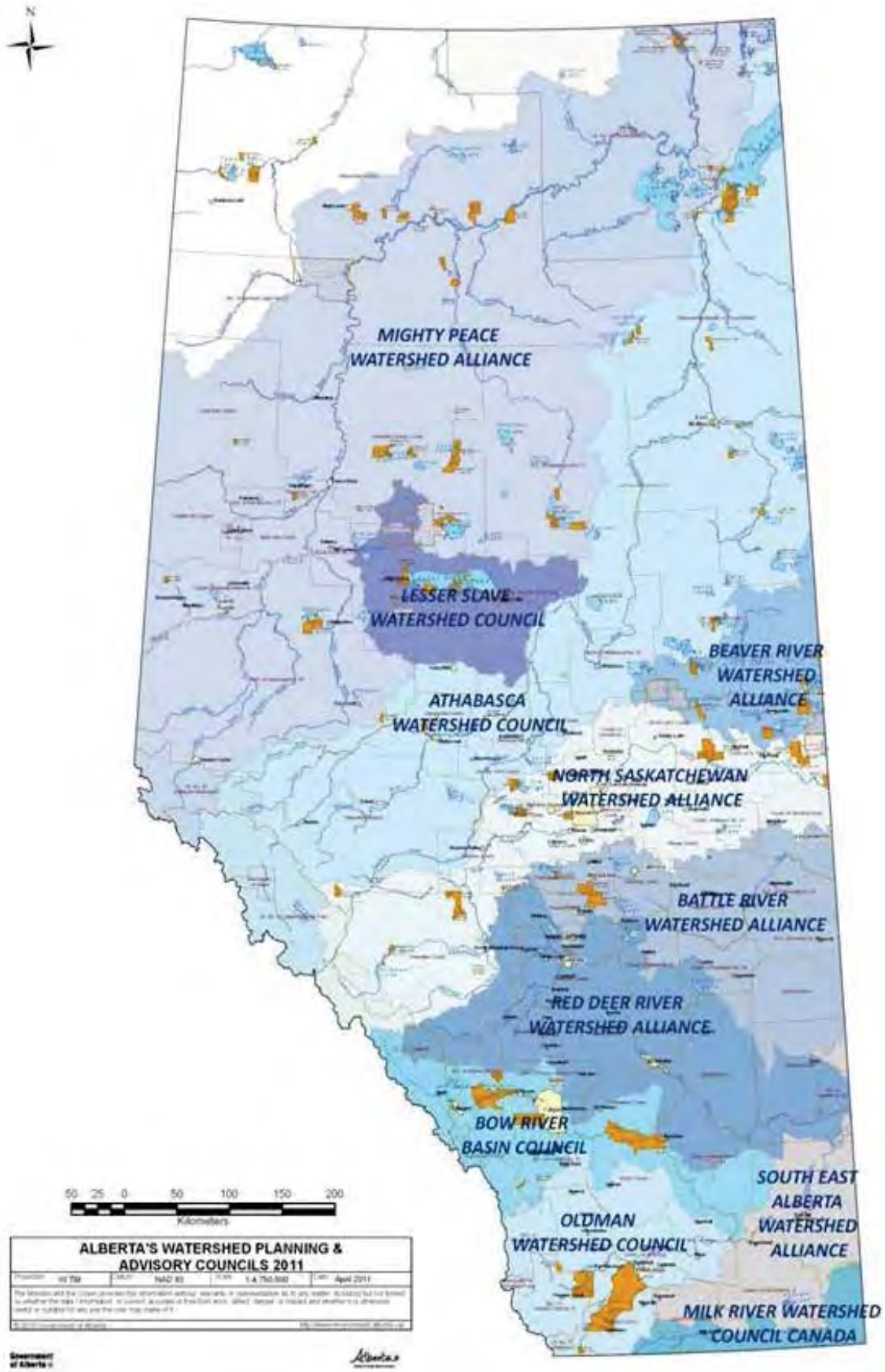
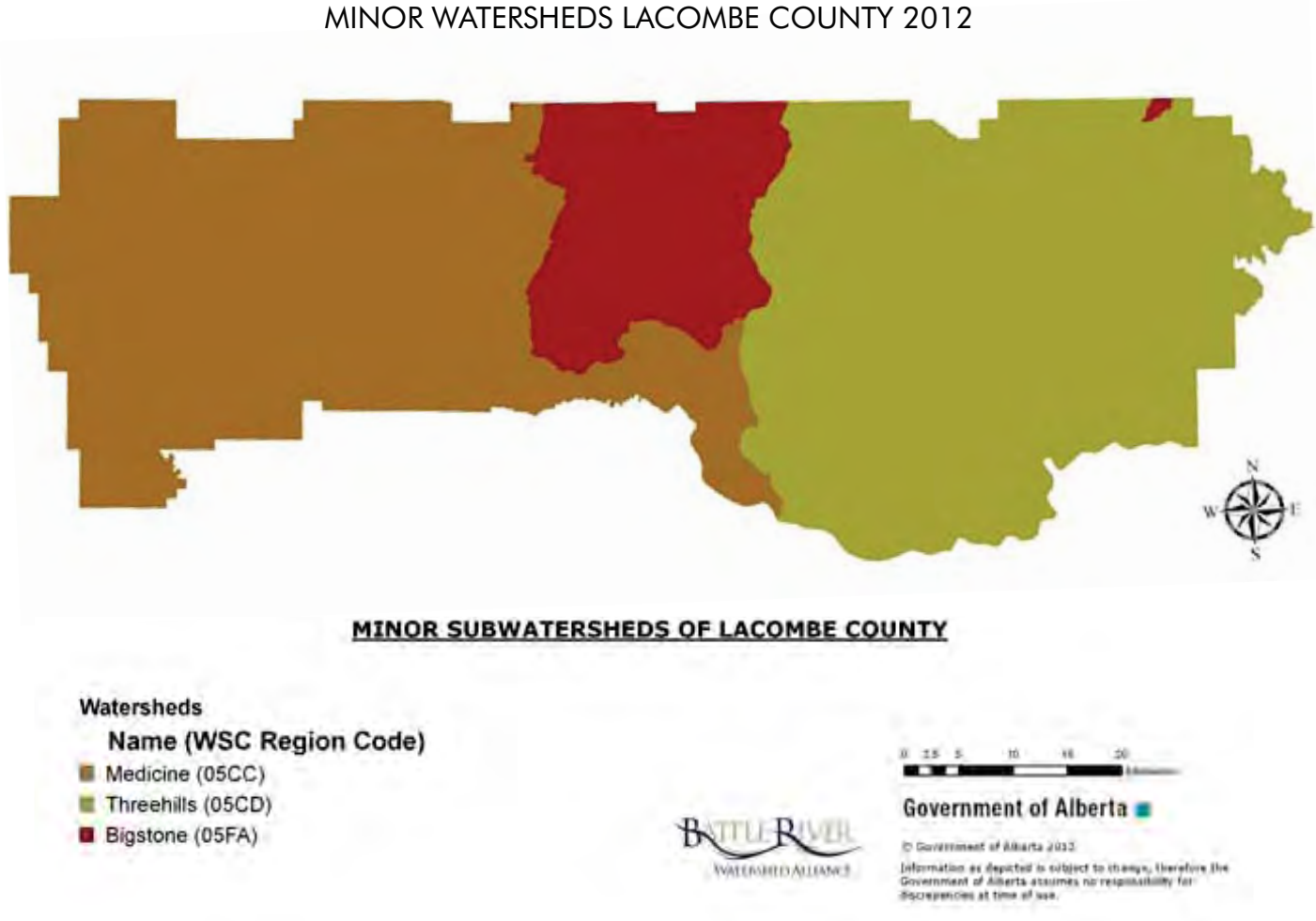
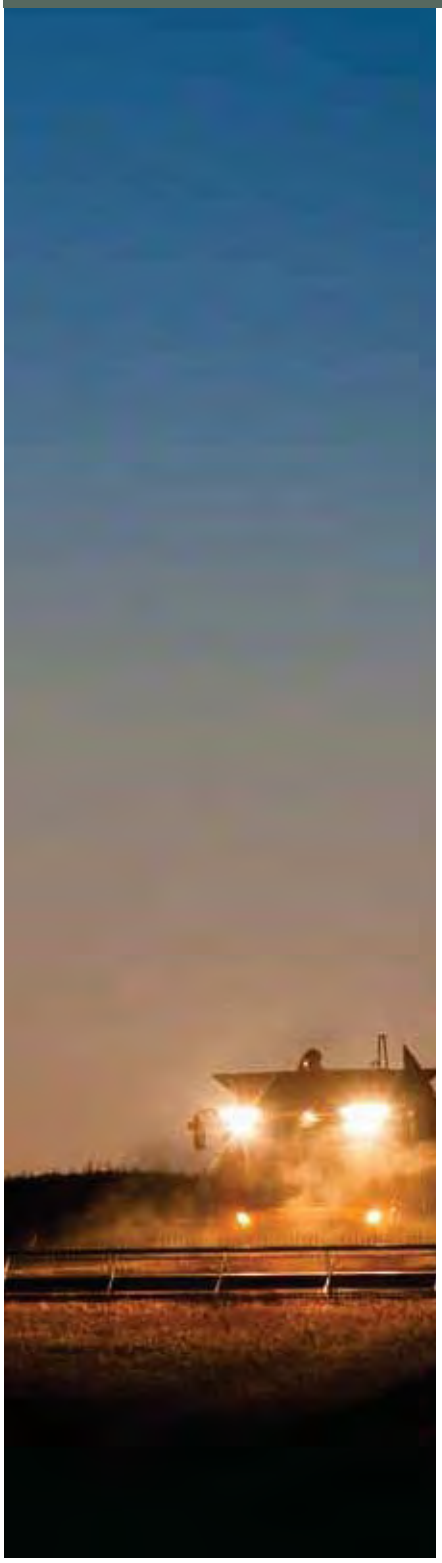


FIGURE 4
MINOR WATERSHEDS LACOMBE COUNTY 2012





2.4 SETTING THE SCENE - LAND USE IN LACOMBE COUNTY

Lacombe County is a rural county with the largest land use being agricultural, comprising up to 82% of the County's area. The remaining 18% is divided amongst urban development and ecological lands. The County is faced with balancing the needs of our residents with the needs of our environment. This is coupled with the pressures of an agriculture landscape in which farming takes precedence. The population of Lacombe County has remained relatively stable, with a slight decrease over the last six years according to Statistics Canada. The population is currently at 10,312 with a -0.8% change from 2006 when there were 10,394 residents. On a national level there was a 5.9% growth in the overall population during this time. The current population density is 3.7 persons per km2, compared to the provincial average of 5.7 persons per km^2.

2.4.1 URBAN, RURAL AND RECREATIONAL DEVELOPMENTS

Although the County has experienced a slight decrease in the population, there remains a strong demand for development within its boundaries. The developments that currently exist within the County are found in Figure 6, and separated into the following categories:

- Industrial and Commercial;
- Residential – Non - Farm;
- Residential – Non - Intensive Farm; and
- Residential – Intensive Farm.

Figures 6 and 7 show a more detailed analysis of each major category. The projected growth for 2012 is detailed in Table 5 and Figure 9. This information indicates not only the current situation, but the ongoing demand. There are a number of policies and studies required by the County before development is able to proceed. Some of the current planning tools used are detailed in Table 3. Additional tools and guidelines for environmental considerations are currently being developed by the County in order to streamline development applications and make the process more transparent for all involved.

Sustainable and planned development is important for a strong economy and a growing County. It is equally as important to take onto consideration the effects development may have on the environment.

TABLE 3
CURRENT LACOMBE COUNTY ENVIRONMENTAL PLANNINGTOOLS 2012

Planning Tool	What is it and what its purpose?
Environmental Setback	An environmental setback from a watercourse or water body identifies a minimum distance between water bodies and development of any kind. Setbacks create a buffer between where we want to live and work and areas we need to conserve or protect. Placing permanent structures in riparian areas or removing native plants can compromise riparian function; cause drainage problems, erosion and sedimentation; decrease bank stability; and increase pollution. The size of the setback depends on many factors including topography, slope, soil type and water table height.In Lacombe County there is a minimum setback of 30m from any water body.
Environmental Reserves	Environmental reserves are generally those lands that are considered un-developable. Examples are a swamp, gully, ravine, coulee or natural drainage course, flood prone areas, steep slopes or land immediately adjacent to lakes, rivers, streams or other bodies of water. The *Municipal Government Act* authorizes municipalities to require environmental reserves for buffers and to create development setback regulations. In Lacombe County these setbacks are not less than 30 metres (98 feet) in width from the high water mark of water bodies and/or top bank of watercourses to the lot line.
Studies	Studies such as bio-physical assessments, wetland inventories and mapping, and flora and fauna monitoring may need to be completed before development is approved. These studies allow planners to determine the extent of impact a development may have on a parcel of land. Special conditions may be placed on the developers and will be aligned with Alberta Environment and Sustainable Development conditions and suggestions.

TABLE 4
URBAN AND RURAL DEVELOPMENTS AS A PERCENT OF TOTAL AREA WITHIN LACOMBE COUNTY PER SUBWATERSHED 2012

	Bigstone	Medicine	Threehills
Landcover Type			
Agriculture**	45.0%	41.0%	44.0%
Annual crops	37.7%	36.0%	37.8%
Perennial Crops and Pasture	2.7%	2.4%	0.3%
Urban Development	4%	1.2%	1%
Ecological Lands (sub-total)	10.6%	19.3%	16.8%
Total Area	100%	100%	100%

*DATA PROVIDED BY (BATTLE RIVER WATERSHED ALLIANCE)
** THE GENERAL CATEGORY OF "AGRICULTURE" includes both perennial and annual crops but is used in this context when it isn't possible to determine whether the specific type of agricultural land is annual or perennial cropland from the available remote satellite imagery. Agricultural land that can be identified to be perennial or annual is categorized separately.

FIGURE 5
AVERAGE URBAN AND RURAL DEVELOPMENTS AS A PERCENT OF TOTAL AREA WITHIN LACOMBE COUNTY 2012

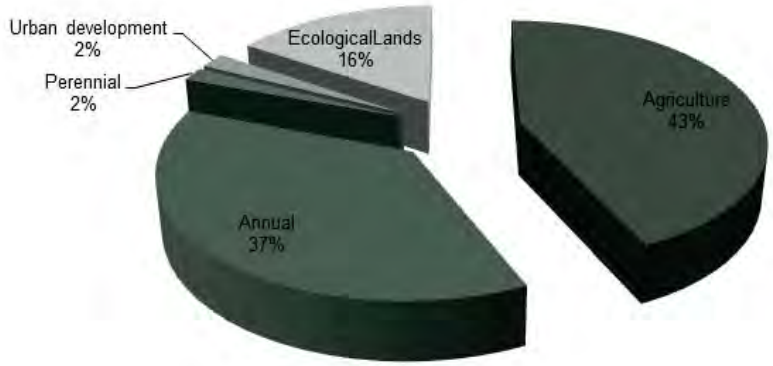


FIGURE 6
CURRENT PROPERTY TYPES IN LACOMBE COUNTY - # OF EACH PROPERTY TYPE 2012

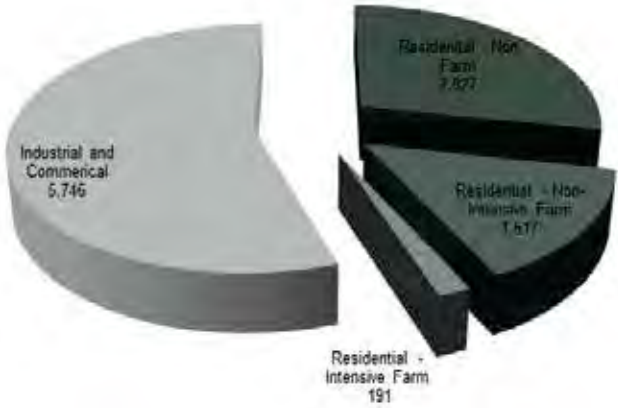


FIGURE 7
CURRENT INDUSTRIAL AND COMMERCIAL PROPERTY TYPES IN LACOMBE COUNTY - # OF EACH PROPERTY TYPE IN 2012

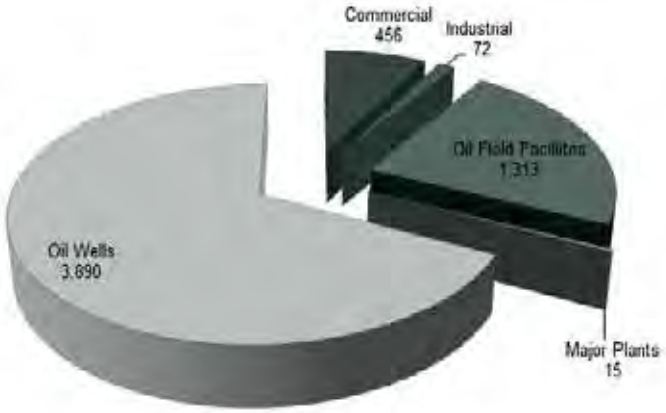


FIGURE 8
RESIDENTIAL AND INTENSIVE FARM TYPES –# OF EACH PROPERTY TYPE IN 2012

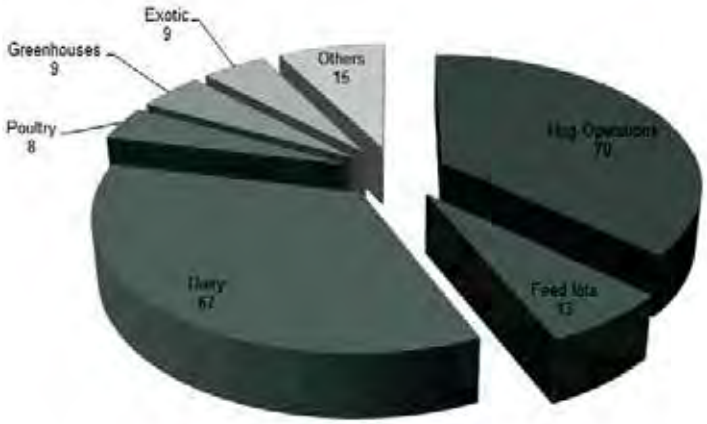


FIGURE 9
FUTURE DEVELOPMENTS APPROVED IN 2012 - # OF EACH PROPERTY TYPE

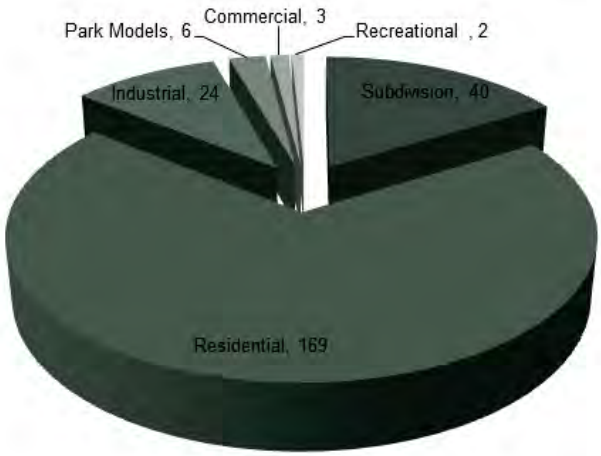


TABLE 5
FUTURE DEVELOPMENTS APPROVED IN LACOMBE COUNTY AS OF DECEMBER 2012

Description	Approved	Not approved to date
Subdivisions	40	2
Residential	169	14
Industrial	24	3
Park Models*	6	0
Commercial	3	0
Recreational	2	0
Total	244	19

*Park model - a large holiday trailer

TABLE 6
SUBDIVISIONS APPROVED IN 2012

Description	Approved
Fragmented parcel	6
1st parcel out residential	17
Agricultural	7
Fire hall	1
Industrial	1
Boundary adjustment	3
Recreational	1
Residential	1
Commercial	1
Public Use	2

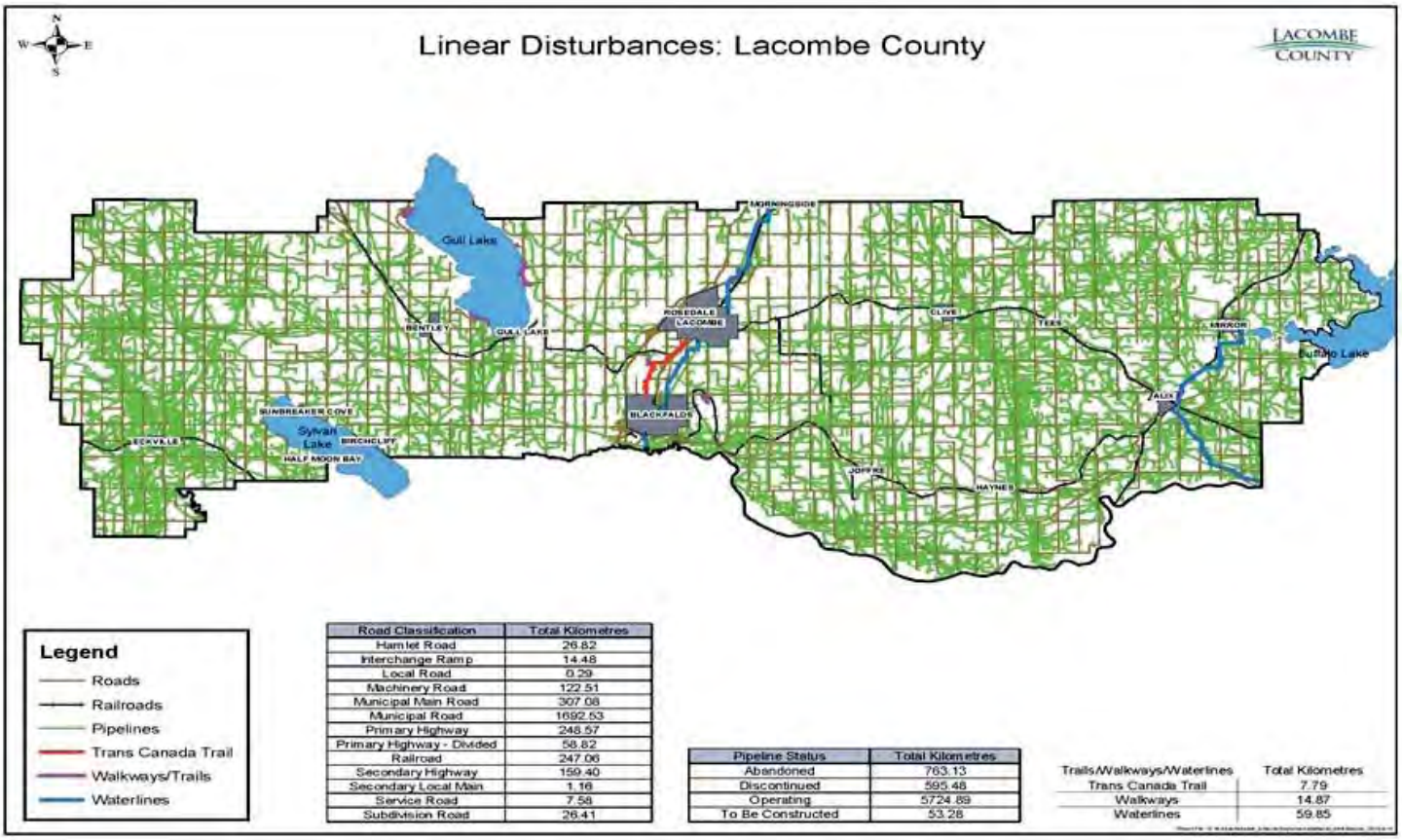
TABLE 7
AREA STRUCTURE PLANS APPROVED IN LACOMBE COUNTY 2007-2012

Year	Approved	Location
2007	1	Hamlet of Mirror
2008	2	Lacombe/Blackfalds Rural Fringe
		Milton/Morningside Area
2010	3	Sylvan Lake
		Highway 2A Urban Corridor
		Highway 11 West
2012	1	Highway 2 West

2.4.2 LINEAR DISTURBANCE

Linear developments include seismic lines, pipelines, roads, railways, and utility right of ways. In Lacombe County, as shown in Table 8 and Figure 14, 9.3% of the land in Lacombe County is covered by linear development. The largest amount of disturbance is found in the Medicine River sub-watershed area. This area has the highest percentage of each disturbance category. In total, 10.7% of the land in the Medicine River sub-watershed is covered by linear disturbances.

TABLE 14
LINEAR DISTURBANCE IN LACOMBE COUNTY 2012



Road Classification	Total Kilometres
Hamlet Road	26.82
Interchange Ramp	14.48
Local Road	0.29
Machinery Road	122.51
Municipal Main Road	307.08
Municipal Road	1692.53
Primary Highway	248.57
Primary Highway - Divided	58.82
Railroad	247.06
Secondary Highway	159.40
Secondary Local Main	1.16
Service Road	7.58
Subdivision Road	26.41

Pipeline Status	Total Kilometres
Abandoned	763.13
Discontinued	595.48
Operating	5724.89
To Be Constructed	53.28

Trails/Walkways/Waterlines	Total Kilometres
Trans Canada Trail	7.79
Walkways	14.87
Waterlines	59.85

The expansion of urban areas, rural subdivisions and recreational areas into surrounding landscapes may result in negative impacts on habitat, such as loss of wetlands, degradation of riparian areas and disruption of habitat corridors. Additionally, there may be an increase in surface water runoff and increased erosion resulting in soil and nutrient loss and sedimentation loading.

The Energy Resources Conservation Board (ERCB) is the approval body for the development, transportation, and monitoring of the province's energy resources. More information about this board can be found in section 7.2.7.

TABLE 8
TOTAL LINEAR DEVELOPMENTS (KM) IN LACOMBE COUNTY
PER MINOR SUBWATERSHED 2012

	Bigstone	Medicine	Threehills	Total
Total Linear Developments	1,284	7,898.3	6,139.3	15,321.6
Total Area Covered (km^2)*	19.72	147.42	88.96	256.1
Percent of Area Covered	5.30%	10.70%	6.70%	9.30%

Right-of-ways for linear developments followed NSWA (2005 definitions)
**Data provided by (Battle River Watershed Alliance)

TABLE 9
OIL AND GAS PIPELINES IN LACOMBE COUNTY PER MINOR SUB WATERSHED 2012

	Bigstone				Medicine				Threehills			
	A	D	O	TBC	A	D	O	TBC	A	D	O	TBC
Crude Oil	0	0	0	0	68.1	21.6	226.8	0	13.4	26.1	45.3	0.5
Fresh Water	0	0	0	0	62.1	25.6	25.7	0	27.5	0	32.4	0
Fuel Gas	0	0	0	0	0	7.6	10.6	0	6.7	5.5	26	0
HVP Products	0	0	6.5	0	1.3	0	75	0	7.5	26.7	129	0
LVP Products	0.8	0	21.7	0	19	16.8	14.4	0	0.7	0	0	0
Miscellaneous Gases	0	0	0	0	0	0	7	0	0	1	63.4	0
Miscellaneous Liquids	0	0	6	0	2.3	0	22.3	0	0	0	59.2	17.4
Natural Gas	20	6.6	298.2	3.7	62.3	60.6	1,416	18.9	73.8	70.9	2,146	23.6
Oil Well Effluent	1.6	0.6	4	1.8	177.9	120.6	426.2	3	97.6	124.6	350.8	0
Salt Water	0	0	0	0	43.6	23	90.9	0	22.2	10.3	88.4	0
Sour Natural Gas	0	0	0	0	1.7	5.6	53.9	0	16	17.7	109.3	0
Total	**22.4**	**7.3**	**336.3**	**5.5**	**438.2**	**281.5**	**2,369**	**21.9**	**265.5**	**282.7**	**3,051**	**41.5**

*data provided by (Battle River Watershed Alliance)

KEY: Abandoned-A
Discontinued-D
Operating-O
To be Constructed-TBC

TABLE 10
POWER LINES (KM) IN LACOMBE COUNTY PER MINOR SUB WATERSHED 2012

	Bigstone	Medicine	Threehills
Trans Line	50.1	2,107.4	27.7

*data provided by (Battle River Watershed Alliance)

TABLE 11
RAILWAY LINES (KM) IN LACOMBE COUNTY PER MINOR SUB WATERSHED 2012

	Bigstone	Medicine	Three hills
Abandoned			
Former			
Spur	1.86	0.26	0
SGL Track	51.43	71.78	0.1
Total	**53.29**	**72.04**	**0.1**

*data provided by (Battle River Watershed Alliance)

TABLE 12
ROADS (KM) IN LACOMBE COUNTY PER MINOR SUB WATERSHED 2012

	Bigstone	Medicine	Threehills
Interchange – Ramp	6.5	3.3	0
Road – Gravel – 1L	184.7	626.5	566.8
Road – Gravel – 2L	42.7	43.2	93.1
Road – Paved – DIV	53.1	5.7	0
Road – Paved – UNDIV – 1L	2.4	8.7	7.5
Road – Paved – UNDIV – 2L	204.9	323.1	343.6
Road – Unimproved	180.7	969.4	763.7
Truck – Trail	28.6	86.8	131.7
Total	**703.6**	**2066.7**	**1906.5**

*data provided by (Battle River Watershed Alliance)

3 MEASURING ENVIRONMENTAL CONDITION

3.1 ENVIRONMENTAL INDICATORS

Healthy ecosystems consist of numerous components and perform many functions. Interactions between components may be very complex in nature, so much so that measuring any in isolation would lead to a misunderstanding of the ecosystem and the way it functions. In order to make well informed management decisions, we require easily measurable attributes that reflect the conditions and dynamics of the broader environment. By measuring the attributes, we will be able to determine if conditions are improving, degrading or are becoming stable. With this information we will be able to create management policies and plans that help us to reach our vision for a healthy environment in Lacombe County.

The measurement tools used are called indicators. These are measures of environmental quality that are used to assess the status and trends of the physical condition of a region. They provide a method for tracking impacts on the environment. Indicators may include physical, biological, chemical and socio-economic attributes. Each of these indicators may be detailed or general in nature, meaning they may measure a single metric such as water temperature, or an index such as nutrient levels in water. Although each indicator is significant, we need to measure the effect of all the indicators together to see the whole picture.

The indicators used in this report were gathered from various sources. Using a common set of indicators will help us compare the Lacombe County SOE to similar reports written by WPACs and Provincial organizations.

3.2 WHAT INDICATORS SHOULD BE USED?

A literature review and peer consultation helped us decide which environmental indicators were to be used. These were then compared to the information gained through community consultation. Our goal is to ensure that this report reflects the local realities and needs of our community. There are two types of indicators in this report. There are condition indicators and risk indicators. Condition indicators measure the standard and condition of a particular subject; for example water quality, nutrient levels or bio-diversity.These measures are compared against scientific standards such as the water quality standards for the Province. Risk indicators measure potential threats to watershed health, such as manure production, development or oil and gas activity. A brief description of the criteria for indicators is given below. Additional information can be found in each section of the report.

AGRICULTURE AND LIVESTOCK OPERATIONS – MANURE PRODUCTION

The 2001 Census of Agriculture collected information about the numbers of all livestock raised in the province. Statistics Canada calculated the amount of manure produced by the total number of livestock. A formula that weighted the different livestock based on animal size and average manure output was used. The numbers of each type of livestock reported in the Census, multiplied by its manure factor, were totalled to give the total manure produced in tonnes. The values for each were ranked between 0.0 and 1.0. The ranking of 1.0 signifies the highest production and thus the highest risk indicator (Alberta Agriculture Food and Rural Development, 2004).

ALL WATER QUALITY PARAMETERS

Ratings of water quality use the Surface Water Quality guidelines (ASWQ), which were developed by Alberta Environment in 1999. The guidelines are used in combination with water quality monitoring data for each specific site. A basic rule of thumb is, if the data does not exceed the guidelines, problems are unlikely, but if they are exceeded further testing may need to occur. Ratings range from excellent (Guidelines almost always met; "best" quality) to poor (Guidelines almost always exceeded by large amounts; quality is impaired and well below desirable levels; "worst" quality).

WETLAND CONDITION AND RIPARIAN HEALTH PARAMETERS

A rating of Healthy is 80-100%, little to no impairment to any riparian functions; Healthy but with Problems is 60-79%, some impairment to riparian functions due to management or natural causes; and Unhealthy is less than 60%, with severe impairment to riparian functions due to management or natural causes.

HUMAN IMPACTS – WASTE GENERATION AND DISPOSAL

The purpose of this indicator is to judge the impact of waste generation and disposal on the environment within Lacombe County. Due to the lack of an appropriate scale adapted to the County, this indicator will be a baseline. It will be monitored and measured in the years to follow to see if there any changes in the amount of waste generated and disposed of, and if these changes are negative or positive.

It is important to remember that most data gathered in the report comes from a Provincial or Federal level and as such is not detailed to the County level.

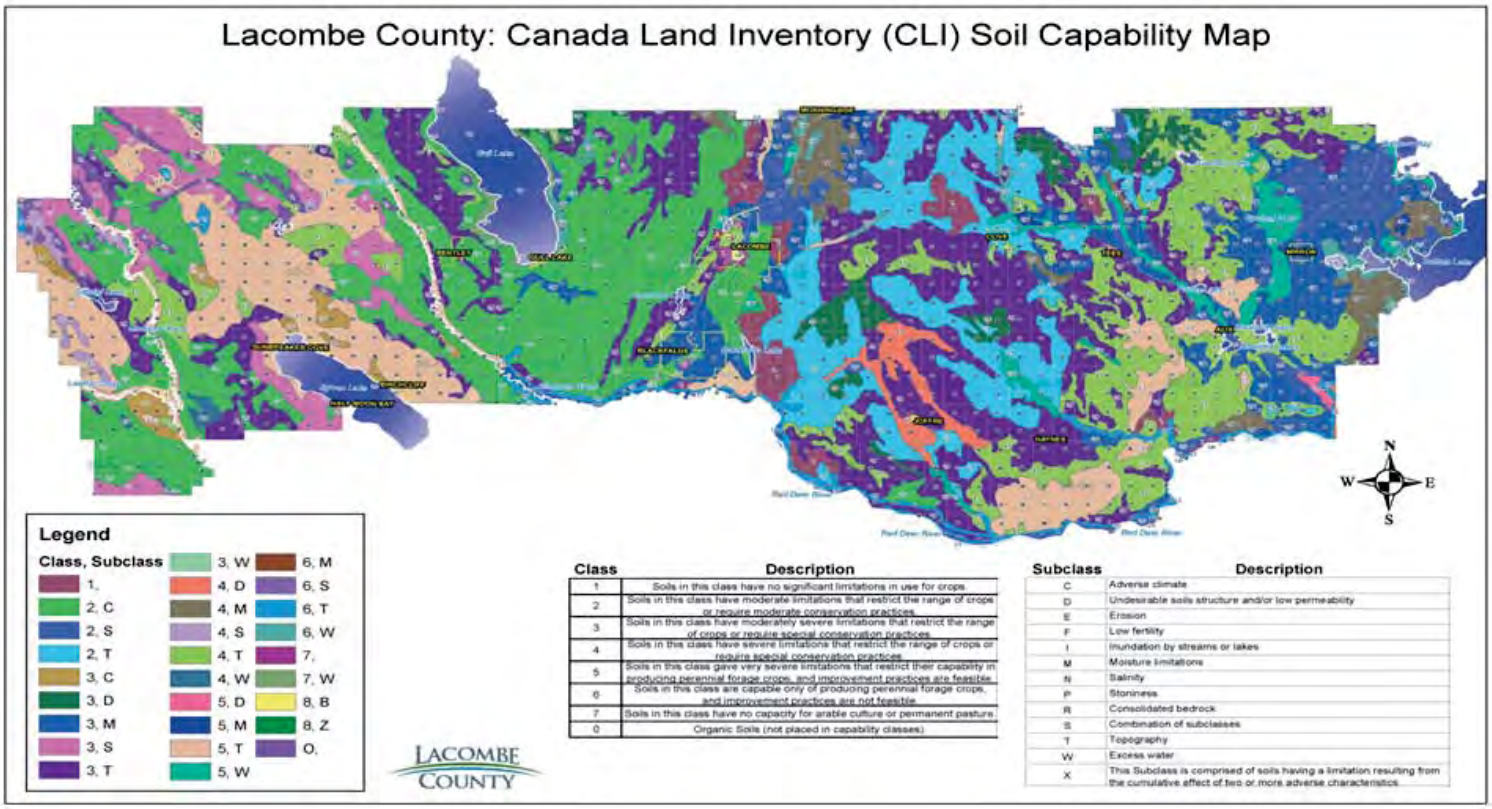
3.3 LAND USE

Changes in land use patterns reflect major development trends such as grasslands converted to agriculture. These changes and the subsequent changes in management practices impact a number of ecological values including water quality and quantity, habitat distribution, or habitat effectiveness within the boundaries of Lacombe County. The indicator chosen to demonstrate the effects of land use practices on the environment in Lacombe County is "Agriculture and Livestock Operations."

This land use indicator also reflects socio-economic growth in the region. Because human activities in the region may have negative environmental impacts, we need to find a balance between socio-economic growth and the sustainable management of natural ecosystems to ensure their long-term health and enjoyment by future generations.

Land Use	**Water Quality**	**Bio-indicator**	**Human Impacts**
			
Agriculture and Livestock Operations	Nutrients	Wildlife Biodiversity	Waster Generation and Disposal
	Bacteria	Habitat Cover and Health	
	Parasites	Wetlands Conditions and Riparian Health	
	Pesticides		

FIGURE 10 LACOMBE COUNTY: CANADA LAND INVENTORY (CLI)
SOIL CAPABILITY MAP 1963-1995



Data sets used for this indicator include the potential risk of wind erosion to agricultural lands, cultivation intensity index and the manure production index. The three data sets are discussed below and are shown in Figures 11, 12 and 13.

3.3.1 AGRICULTURE AND LIVESTOCK OPERTIONS MANURE PRODUCTION (POOR)

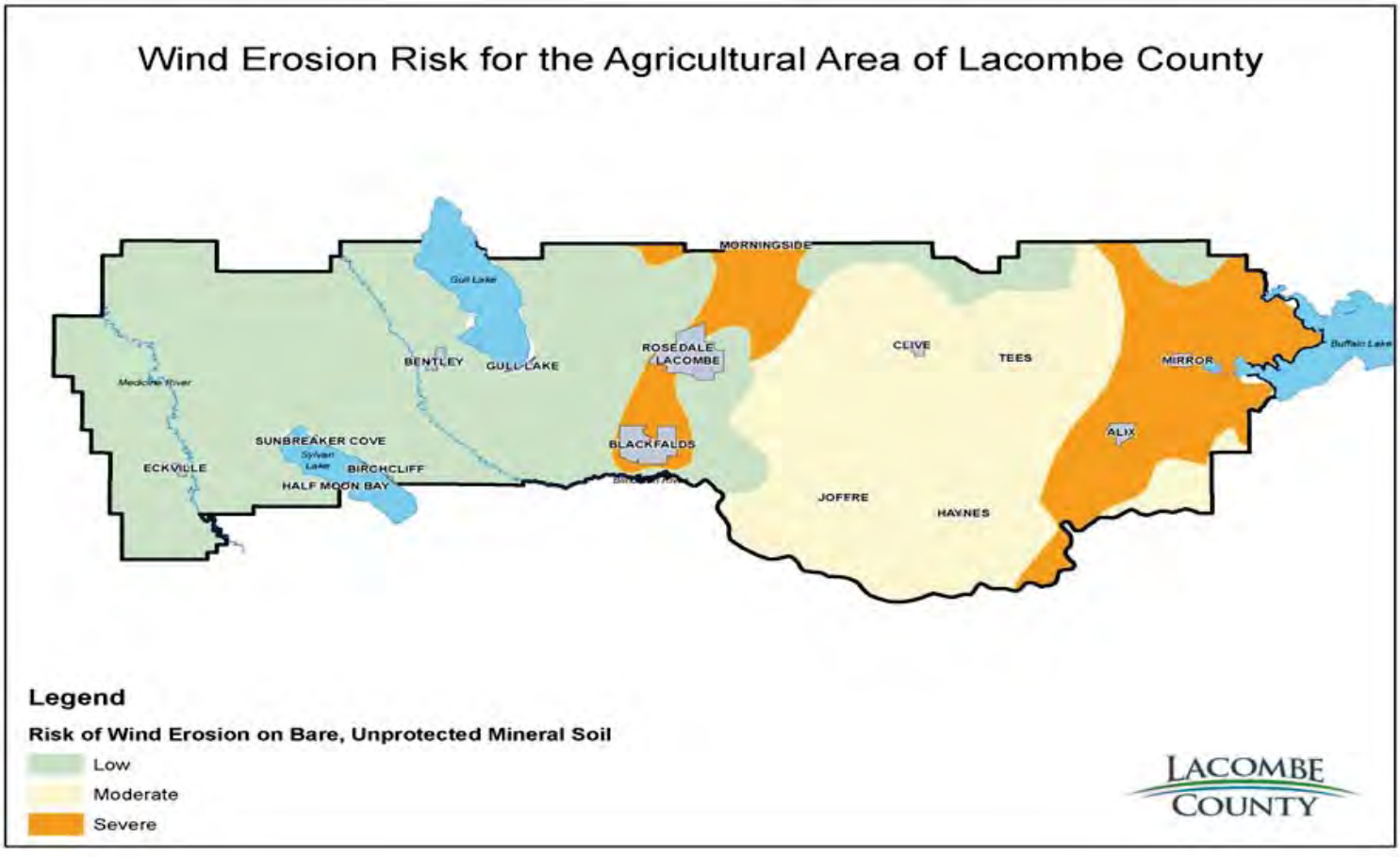
Lacombe County is fortunate to have soils that are relatively high in natural fertility and have good moisture-holding capacity. This makes the area highly productive for crops. The landscape is level-to-rolling, consisting mainly of *hummocky* (hilly) *morainal* (glacial) deposits and gently undulating *fluvial* and *lacustrine* deposits. The high soil fertility is reflected in the data gathered by the Canadian Land Inventory, which classifies soil types. These soil types provide us with information on what types of landcover could potentially grow in certain areas. The inventory is broken into eight classes, each one described in detail in Figure 10. The overall size of Lacombe County is 712,960 acres or 2,885 km^2. Of this, 468,564 acres or 68% of area within Lacombe County is arable, fertile farmland. 166,810 acres or 23% of the land is pasture land, and 15,836 acres or 2% of the land under this classification is considered wasteland such as wetlands.

Overall, this means that up to 91% of the land within Lacombe County could potentially be used as farmland for either cultivation or pasture land. This has environmental ramifications for the area. Central Alberta is one of the country's leading agricultural regions, and as such the soils may be degraded through compaction, acidification, and erosion. It is also important to note that agrochemicals may reduce the quality of waters linked to agricultural systems.

By ensuring the use of best management practices, we can minimize risk and reach a balance between agriculture and protecting the environment.

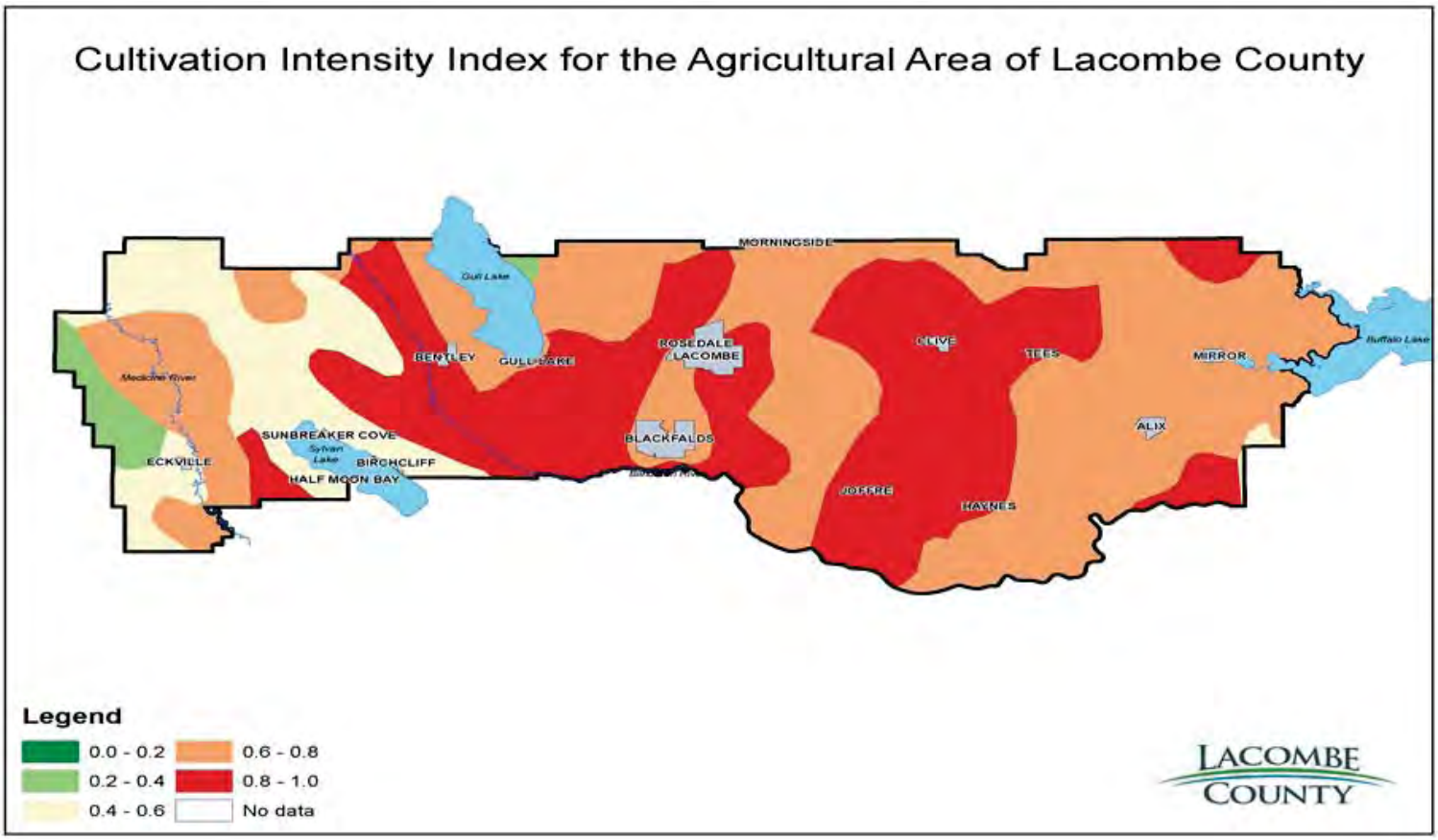
Within the Province, and more specifically Lacombe County, there are areas that have greater potential for wind erosion based on soil and land characteristics, and climatic conditions. Soil degradation by wind is a concern because it reduces soil quality by removing soil nutrients, smaller particles and organic matter. Wind erosion can reduce air quality during extreme events and may also reduce water quality if eroded particles drift into streams or lakes. Figure 11, shows the areas of Lacombe County that may be at risk of wind erosion (Alberta Agriculture Food and Rural Development, 2004). By understanding the risk, beneficial management practices that reduce the effects can be directed to these areas. For example, practices that maintain a vegetative cover (i.e. perennial forages or crop residues), reduce cultivated fallow, use field shelterbelts and avoid over grazing could be promoted in high-risk areas.

FIGURE 11
WIND EROSION RISK OF THE AGRICULTURAL AREAS OF LACOMBE COUNTY IN 2004



Cultivation is the agricultural activity with the most impact on soil quality in Alberta. The extent of this impact is represented quantitatively through the cultivation intensity measurement. This measurement is the frequency of cultivation associated with the following management practices: no till, conservation till, conventional tillage and summerfallow. It is an estimate of the degree to which cultivation contributes to wind and water erosion. The classes on Figure 12 are ranked between 0 (lowest) and 1 (highest). Generally, more cultivation means a greater risk of wind and water erosion. However, the physical characteristics of the soil and landscape also have an influence on the sensitivity of the soils to cultivation. In areas of high risk, best management practices such as reduced tillage or direct seeding can be encouraged.

FIGURE 12
CULTIVATION INTENSITY OF THE AGRICULTURAL AREAS OF LACOMBE COUNTY IN 2004

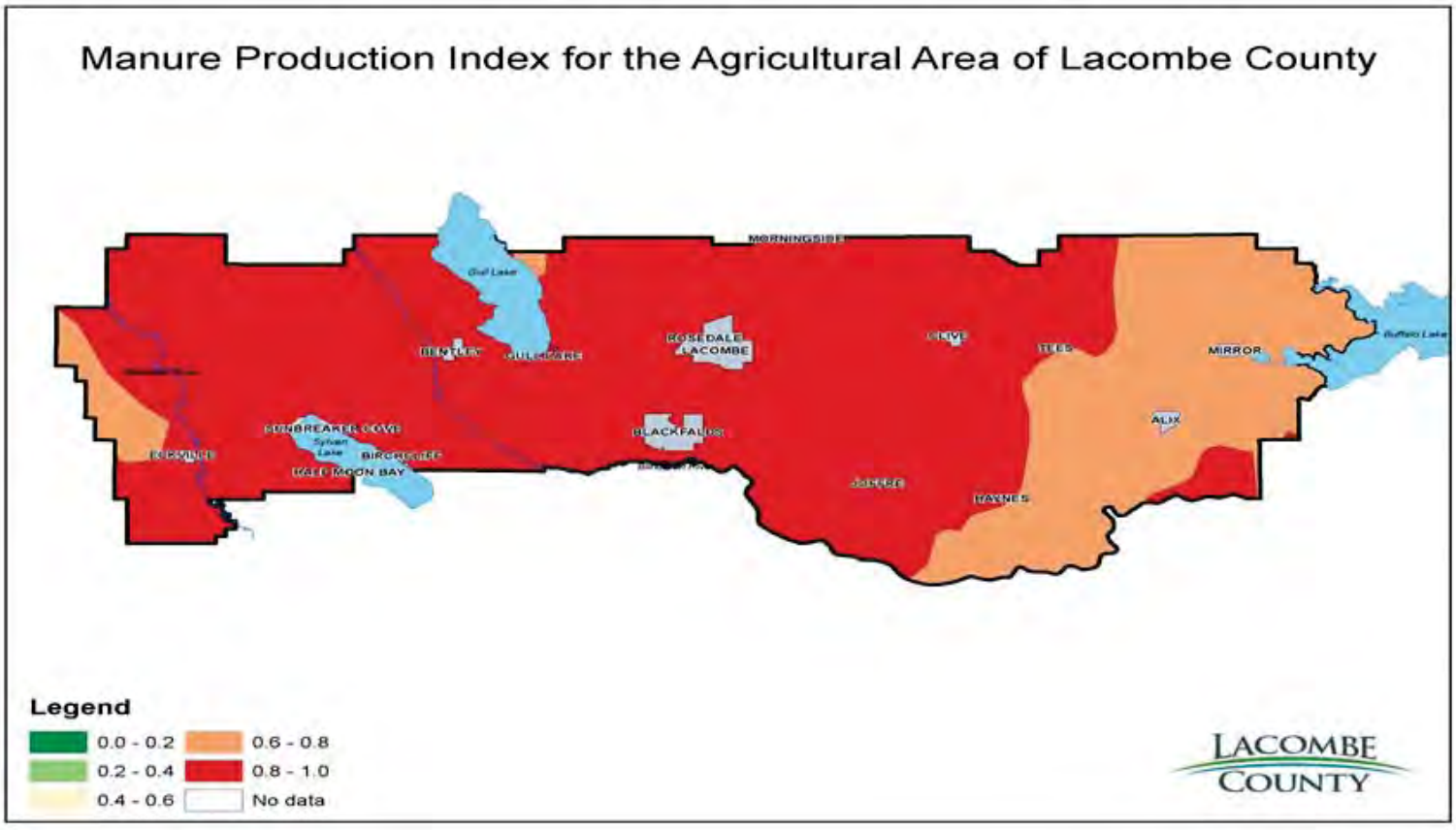


Cultivation intensity is ranked between 0 (lowest) and 1 (highest) as shown in Figure 12. This provides us with some indication of where cultivation was occurring in Lacombe County in 2004.

The manure production index calculated by the Alberta Land Resource Atlas of Alberta (Alberta Agriculture Food and Rural Development, 2004) gives the relative amount of manure production in the agricultural areas of Alberta. It is an estimate of the degree to which livestock production may contribute to nutrient loading, pathogens or odour. This information can be used to help assess the risk of agricultural impacts on surface water. By ensuring the use of best management practices, we can minimize this risk and reach a balance between agriculture and protecting the environment. This information is an estimate of manure production per animal and was conducted on a province-wide scale, although only Lacombe County data is shown in Figure 13.

Lacombe County recognises that management practices have and do continuously change over time. This report uses the data available at the time of writing. It will be updated on a 5 year cycle to reflect the impacts of changes in management practices.

FIGURE 13
MANURE PRODUCTION INDEX FOR AGRICULTURAL AREAS IN LACOMBE COUNTY IN 2004



Manure production classes are ranked between 0 (lowest) and 1 (highest) as shown in Figure 13. This provides us with some indication of where the province's livestock were most concentrated in 2004.

3.4 WATER QUALITY *"GOOD TO POOR"*

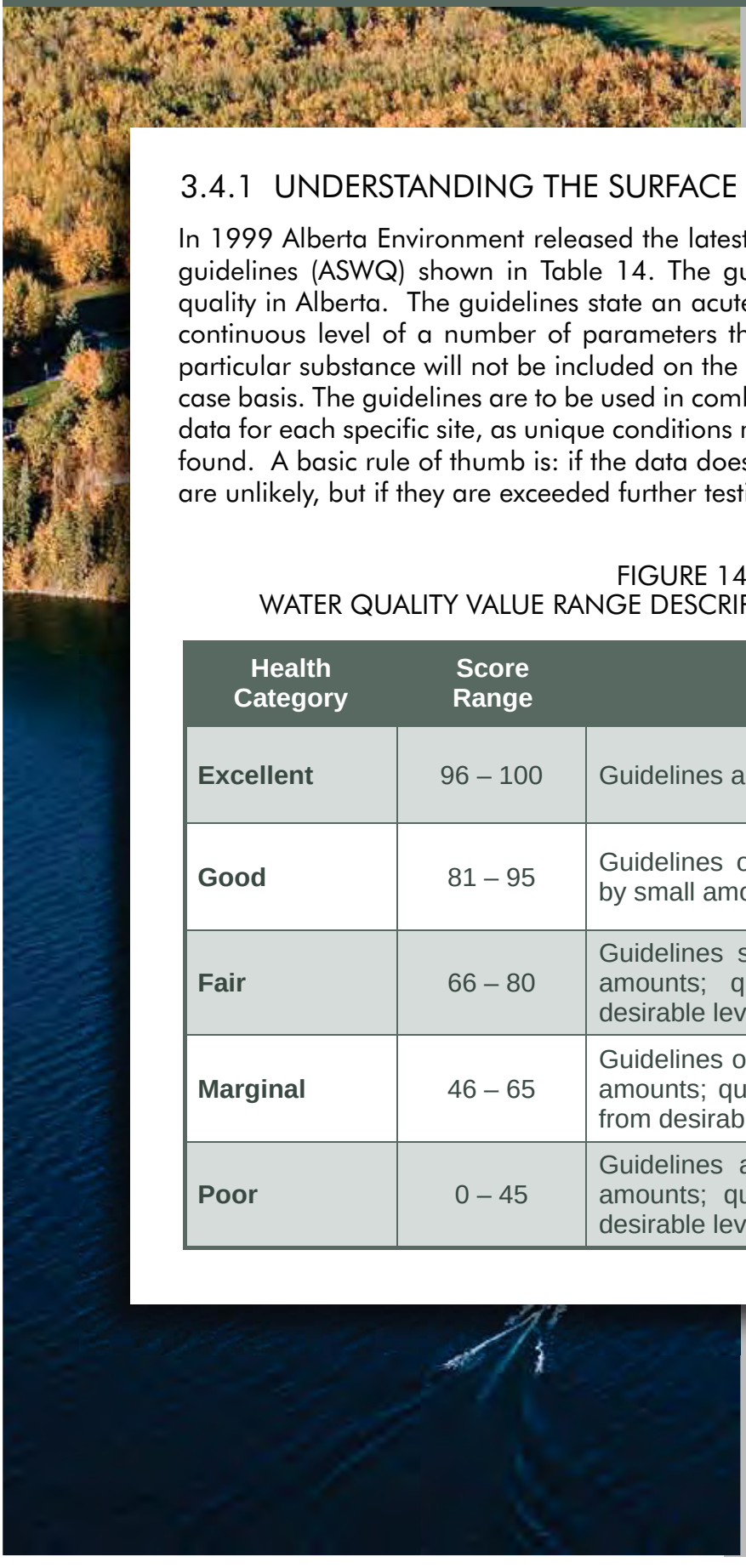
Approximately 5% of the area within Lacombe County is covered by water. Gull Lake covers 19,916 acres, Sylvan Lake covers 10,576 acres and Buffalo Lake covers 23,104 acres, of which the south and west banks are within the County. Other large water bodies within Lacombe County include Lacombe Lake, Gabriel Lake, Horse Shoe Ponds, Blackfalds Lake, Gadsby Lake, Haunted Lakes, Parlby Lake, parts of Chain Lakes, part of Alix Lake, Medicine River, Blindman River and Red Deer River. In section 3.4.2 there is a brief description of some of the major water bodies found within Lacombe County.

Where we have data on the water bodies in Lacombe County, we have provided details on the water conditions.

Water quality is measured through a variety of methods. The method chosen depends on the type of water body being examined. There are two major types of water bodies; *lentic* (lake) and *lotic* (river). Although the types of tests or measurements vary depending on the testing of a Lotic or Lentic system, the sources of nutrients, bacteria and general water chemistry generally are the same. Substances may be transported by rain, snow, and groundwater or inflow streams. The concentration of these substances may vary depending on the amount of precipitation in a particular year, the types of adjoining land uses, or the use of a waterway for recreational purposes. A few of the standard tests are explained in detail where data has been available. This is not an exhaustive list and there are still gaps in the available data.

A major report written by Alberta Environment compiles the data available for major water bodies in Alberta. This report mentions a few water bodies that occur within or are in close proximity to the County's boundaries. These water bodies in general are affected by agriculture, which is prominent throughout the County, and to a lesser extent by some point source discharges. In general, nutrients are of particular concern, as they are in most agricultural regions. There is particular mention in the report that the majority of nutrient and sediment loading within the Red Deer River sub-watershed originates from the Little Red Deer, Medicine and Blindman rivers. The effects of these rivers on the watershed as a whole may be moderate since the size of the watershed is larger but when you look on a much smaller scale they may be more significant for the County since the geographic size is much smaller.

In accordance with the Alberta Government "Handbook for: State of the Watershed Reporting, water quality is based on a five point scale. This is explained in more detail below in Table 14. The scale runs from excellent to poor.



3.4.1 UNDERSTANDING THE SURFACE WATER GUIDELINES

In 1999 Alberta Environment released the latest edition of the Surface Water Quality guidelines (ASWQ) shown in Table 14. The guidelines help monitor surface water quality in Alberta. The guidelines state an acute or maximum level and a chronic or continuous level of a number of parameters that are to be monitored. At times a particular substance will not be included on the list, but this is dealt with on a case by case basis. The guidelines are to be used in combination with water quality monitoring data for each specific site, as unique conditions may occur that alter the levels that are found. A basic rule of thumb is: if the data does not exceed the guidelines, problems are unlikely, but if they are exceeded further testing may need to occur.

FIGURE 14
WATER QUALITY VALUE RANGE DESCRIPTION (WATER FOR LIFE, 2008)

Health Category	Score Range	Description
Excellent	96 – 100	Guidelines almost always met; "best" quality
Good	81 – 95	Guidelines occasionally exceeded, but usually by small amounts; threat to quality is minimal
Fair	66 – 80	Guidelines sometimes exceeded by moderate amounts; quality occasionally departs from desirable levels
Marginal	46 – 65	Guidelines often exceeded, sometimes by large amounts; quality is threatened, often departing from desirable levels
Poor	0 – 45	Guidelines almost always exceeded by large amounts; quality is impaired and well below desirable levels; "worst" quality

3.4.2 SIGNIFICANT WATER BODIES WITHIN LACOMBE COUNTY

BUFFALO LAKE (FAIR)

Buffalo Lake is a large shallow lake. It is naturally divided into four areas. The surface area of the lake is 23,104 acres. Main Bay, at the east end, is the largest and deepest (maximum depth of 6.5 m) and supports most of the recreational activity on the lake. Secondary Bay, to the west of Main Bay, is smaller and so shallow (maximum depth of 2.5 m) that it was possible to drive wagons across it when water levels were extremely low in the 1930s. The Narrows is the channel west of Secondary Bay and is a popular fishing area. Parlby Bay is the small bay west of the Narrows. Because it is very shallow (maximum depth of 1.1 m) and densely filled with aquatic plants, it provides excellent waterfowl habitat (Atlas of Alberta Lakes).

GULL LAKE (GOOD)

Gull Lake is a relatively large shallow lake in central Alberta. The surface area is 19,916 acres. It is centrally located between Edmonton and Calgary and lies within both Ponoka County and Lacombe County. Several area streams, including Birch Bay Creek and Wilson Creek, flow into Gull Lake. The lake has had a long history of concern regarding the low water levels and the desire for recreation. Since 1977, water has been pumped from the Blindman River into Gull Lake to ensure the water levels are maintained (Atlas of Alberta Lakes).

SYLVAN LAKE (GOOD)

Sylvan Lake is a popular recreation destination in central Alberta. It is located halfway between Edmonton and Calgary, which has resulted in increasing development pressure. Currently there are five summer villages around the lake. The Town of Sylvan Lake is situated on the southeast end. In addition, several camp facilities are located along the lakeshore and new subdivisions are also appearing along the lake's edge and elsewhere in the watershed. The lake covers 10,576 acres and is currently in good ecological condition.

LACOMBE LAKE (FAIR)

Lacombe Lake is a narrow and relatively shallow lake with a maximum depth of 2.9m. The main sources of water to the lake are from precipitation and runoff from the watershed. Land use surrounding the lake is predominately agricultural, with a slight mix of urban residential and wooded vegetation. There are also designated recreational areas and walking trails within close proximity of the lake's edge.

CHAIN LAKES (POOR)

Chain Lakes is a string of long narrow lakes located on the northern boundary of Lacombe County, with most of its area within Ponoka County. It has a surface area of 403 acres. The lakes have steep banks with reasonable tree cover. Beyond the Lacombe County boundaries to the north, the habitat that surrounds the lakes has up to 450 acres of wetlands cover. It is broken by only a single road, providing valuable habitat for many birds, amphibians, and potentially moose (Ponoka County, 2012).

WOLF CREEK (NO DATA)

At this time there is no ecological data available for Wolf Creek. If information is made available it will be included in future versions of the SOE report.

RED DEER RIVER (POOR)

Red Deer River originates on the eastern slopes of the Rockies just inside Banff National Park and flows east through the mountains and foothills region. It meanders its way through residential communities, First Nations traditional lands, agricultural areas, open prairie and historical sites before it meets the South Saskatchewan River just inside the Saskatchewan border (Aquality Environmental Consulting , 2009). The ratings for the Red Deer River are provided by the Red Deer River Watershed Alliance (RDRWA) and as such are not detailed in this report (Aquality Environmental Consulting , 2009). Further details about the water quality in the Red Deer River can be found on the RDRWA webpage http://www.rdrwa.ca/.

BLINDMAN RIVER (POOR)

The Blindman River is a medium sized river located in central Alberta. It originates south of Winfield, Alberta and flows southeast before joining the Red Deer River near Blackfalds. It passes through the Town of Rimbey, flows past Gull Lake and drains into the Red Deer River. The river is currently used as a water source for Gull Lake when water levels are low in the lake. The ratings for the Blindman River are provided by the Red Deer River Watershed Alliance (RDRWA) and as such are not detailed in this report (Aquality Environmental Consulting, 2009). Further details about the water quality in the Blindman River can be found on the RDRWA webpage http://www.rdrwa.ca/.

MEDICINE RIVER (POOR)

Medicine River begins at the outlet of Medicine Lake, north of Rocky Mountain House. At its origin it travels through a large section of cattle grazing and recreational lands before it reaches the town of Eckville. The river is medium in size and has a number of smaller tributaries. It joins the Red Deer River north of The Town of Innisfail, downstream of the Dickson Dam at the Medicine Flats.

PARLBY CREEK (NO DATA AVAILABLE)

Parlby Creek is best known for the role it plays in the Parlby Creek – Buffalo Lake Water Management Project. In 1985, the Alberta Government began the design and construction of this water management project. The goals of the project were agricultural flood control, fish and wildlife habitat enhancement, municipal water supplies and the stabilization of water levels in Buffalo Lake. Parlby Creek acts as the water conveyance system to divert water from the Red Deer River into Buffalo Lake. In essence, the entire system is a pipeline and conduit system that conveys the pumped water to a series of small lakes and ultimately to Alix Lake. From here, water is transported through a 20 kilometer long channel, Parlby Creek, through several control structures to Buffalo Lake. At the end of the system a control structure is placed on the Buffalo Lake outlet, which when over-topped, allows water to enter Tail Creek and flow back to the Red Deer River (Buffalo Lake Management Team). When this system was built, a number of opportunities arose to enhance the existing habitat of the area. Ducks Unlimited began managing the water level on a naturally occurring wetland approximately 400 acres in size and AESRD became able to back flood Spotted Lakes during the spring and enhanced the fisheries. The back flooding provided benefits to agriculture and the environment. Fish passage was improved and naturally existing spawning areas were once again accessible.

HAYNES CREEK (POOR)

Haynes Creek is a small tributary of the Red Deer River located east of Haynes. The area is home to a large number of mixed agricultural operations, including intensively farmed cropland and livestock operations. In 1995-1996 a study was done on this creek to determine if runoff from cultivated fields and cattle wintering grounds has a direct influence on surface water quality. The research was conducted as part of the Canada-Alberta Environmentally Sustainable Agriculture (CAESA) Agreement, which monitored surface water quality in agricultural areas across the Province. The Haynes Creek watershed was selected for this site-specific study because it was considered representative of an area with very intense agricultural activity in a landscape sensitive to water erosion. A brief synopsis of the findings is included in Section 3.4.6.

WHELP CREEK (POOR)

Alberta Agriculture and Rural Development and partners implemented a six year scientific evaluation of Beneficial Management Practices (BMPs) in two watersheds: Whelp Creek near Lacombe in central Alberta, and Indianfarm Creek near Pincher Creek in southern Alberta. The sites were chosen for their diversity of farming operations, landscape, climate, and location. More importantly, the producers in these areas have shown an interest in enhancing environmental sustainability, and have been supportive of various stewardship initiatives. The project was designed to assess the effectiveness of best nutrient management practices, to help reduce the impacts of poor nutrient management on water quality. Final results of the study have not yet been released, but a brief synopsis of the nutrient findings between the years 2008-2010 is included in Section 3.4.3.

3.4.3 NUTRIENTS

Nutrients include various forms of phosphorus and nitrogen. Nutrients are essential to the healthy function of an aquatic ecosystem; algae and aquatic plants require nutrients such as nitrogen and phosphorus for growth. Phosphorus stimulates the growth of algae in water bodies and is commonly considered the limiting nutrient to growth in a lake. This means that although phosphorous is required for some plant growth such as algae, there can also be too much of a good thing. Excessive amounts of phosphorous may result in nuisance blooms of algae, growth of aquatic *macrophytes* (so called "lake weeds") and may have toxic effects on aquatic organisms. Once in a lake, nutrients can remain available for algae and plant growth for many years. Phosphorous makes up a large portion of fertilizer content and is prevalent in feces and it is often the primary "polluting" nutrient. To a large degree, concentrations of phosphorus are naturally elevated in many Alberta lakes. This is due to the nutrient-rich surrounding soils and underlying glacial deposits, both of which are yielded from weathered sedimentary bedrock. However, phosphorus can also increase as a result of urbanization, industry and agricultural practices. Nitrogen is usually in greater supply naturally in lakes and is therefore not considered a limiting nutrient in most cases. However, it is also a component of fertilizers and feces. Changes in its concentration in a water body may indicate contamination from these sources. In addition, nitrogen compounds (especially ammonia) are typically more toxic relative to other nutrients such as phosphorus. Some Alberta lakes have small populations of algae and large aquatic plants, while others have large populations. Water quality is impaired by increased biological growth in many lakes as this limits their suitability for fish, recreation and drinking water sources. Biological growth in a lake is measured by 'trophic status,' which is the degree of biological production within a lake - a key component of water quality.

Trophic status is usually based on the total mass of algae in a lake, which is represented by the concentration of photosynthetic pigment (chlorophyll-a) in water samples. Lakes with low levels of biological production are often clean and clear, supporting small fish populations. As biological productivity increases, there is an increase in algae growth creating murky water. The density of large aquatic plants also increases with increased productivity. Decomposition of algae and plants can use up oxygen and stress the resident fish. In lakes where biological productivity is extremely high, water quality can be impaired to the point where some recreational activities - including swimming and water-skiing - may not be advisable. Additionally, treating drinking water from these lakes is difficult and costly. This information is important to understand before examining the water quality data found in the County. The water quality data is presented in two forms, *lotic* (river) and *lentic* (lake). This is because different parameters are measured for rivers and lakes.

Overall, it should be noted that there is limited data in regards to water quality for water bodies within the boundaries of Lacombe County. This data is not a full representation of the current status of the County, but it does provide us with a starting point to assess the condition of the County's water bodies.

3.4.3.1 RIVERS

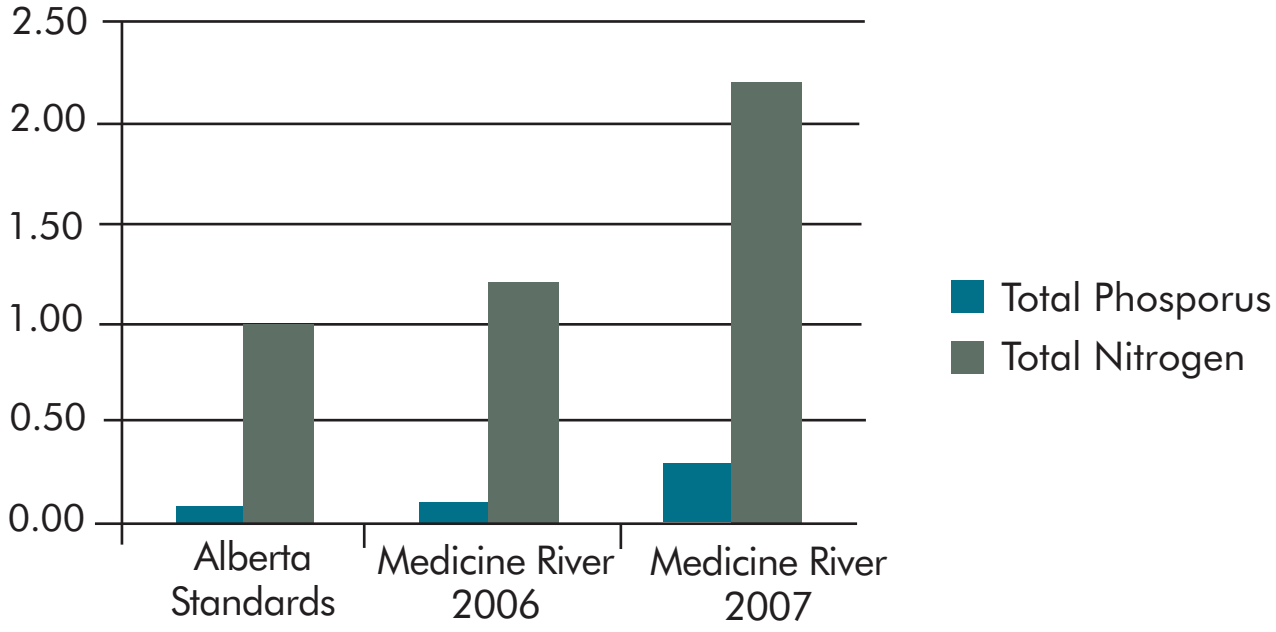
In this section, data is available for Medicine River, Haynes Creek and Whelp Creek. There is no data presently available for Parlby Creek.

MEDICINE RIVER (POOR)

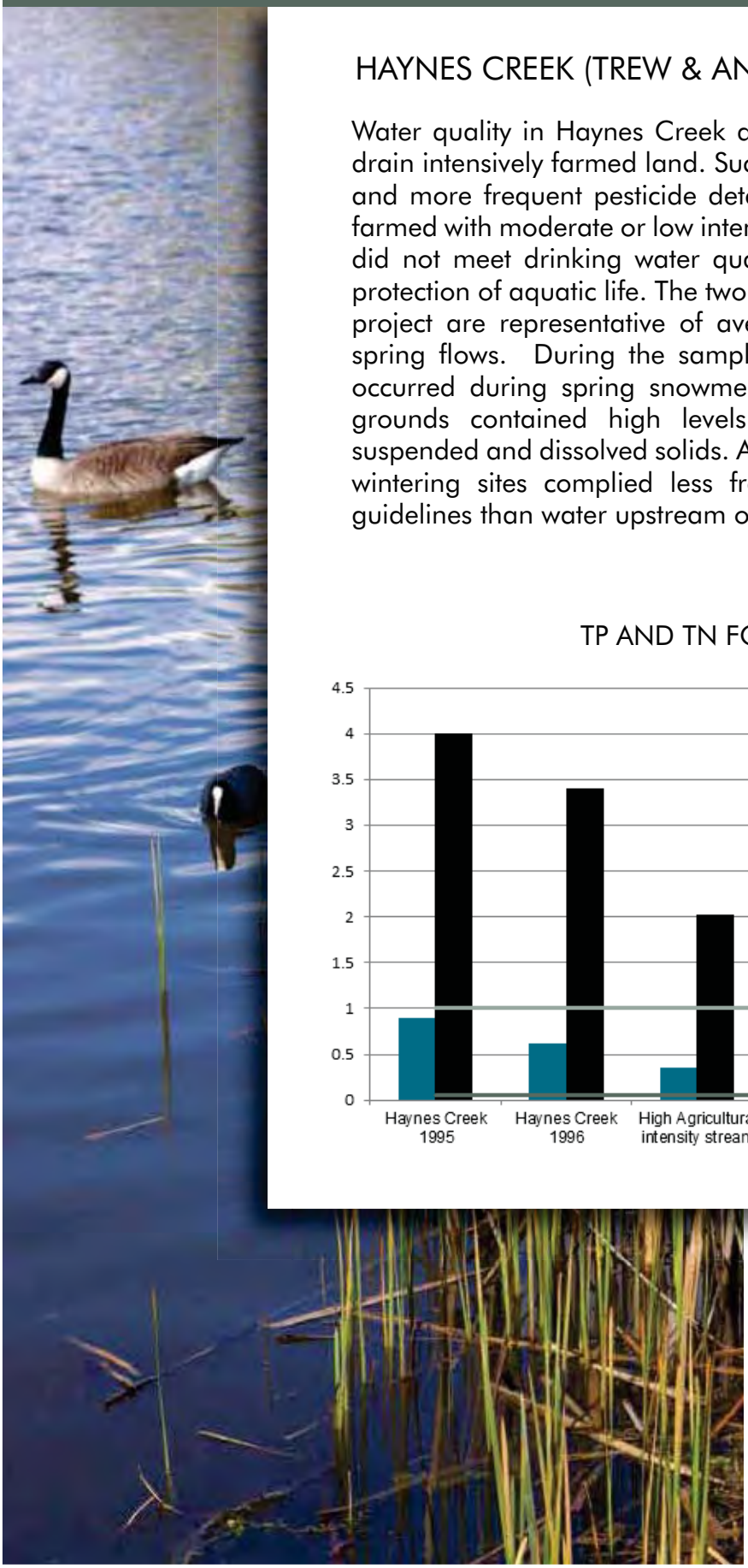
The water quality data for the County is somewhat limited. In 2006 and 2007, as part of a collaborative program, the Medicine River Watershed Society and Alberta Environment collected water samples at four locations in the river between spring and fall. In both years the total phosphorus (TP) and total nitrogen (TN) exceeded the ASWQ guidelines on numerous occasions. TP concentrations ranged from 0.054 – 0.123 mg/L in 2006 and from 0.075 -0.35 mg/L in 2007. TN concentrations ranged from about 0.73 – 1.21mg/L in 2006 and from 0.68 -2.2mg/L in 2007.

Increased precipitation in 2007 may have contributed to greater transport of nutrients and sediments from uplands into the Medicine River, thereby causing the overall water quality to drop in 2007. Figure 15 shows the highest values of TP and TN in the Medicine River in comparison to ASWQ guidelines. From this data alone the water quality would be rated poor.

FIGURE 15
WATER QUALITY IN MEDICINE RIVER 2006/2007



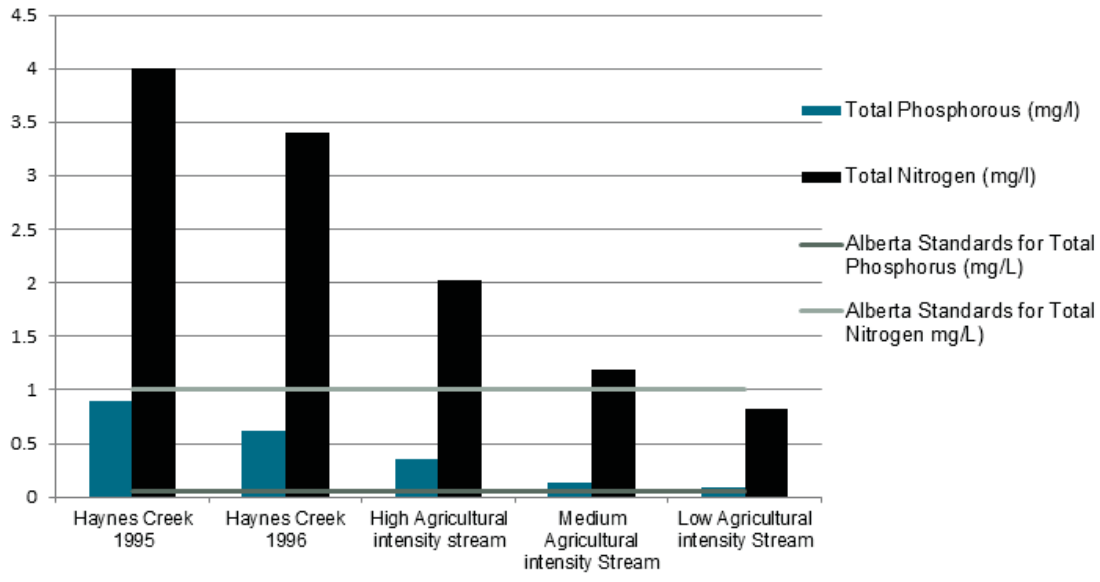
Concentration of Nutrients in Water Mg/Litre



HAYNES CREEK (TREW & ANDERSON, 1998) (POOR)

Water quality in Haynes Creek appears to be typical of streams that drain intensively farmed land. Such streams have higher nutrient levels and more frequent pesticide detections than streams that drain land farmed with moderate or low intensity. The water in Haynes Creek often did not meet drinking water quality guidelines or guidelines for the protection of aquatic life. The two years of data from the Haynes Creek project are representative of average (1995) and very high (1996) spring flows. During the sampling period, runoff in the watershed occurred during spring snowmelt only. Runoff from cattle wintering grounds contained high levels of nutrients, fecal bacteria, and suspended and dissolved solids. As a result, water downstream of cattle wintering sites complied less frequently with surface water quality guidelines than water upstream of the wintering sites.

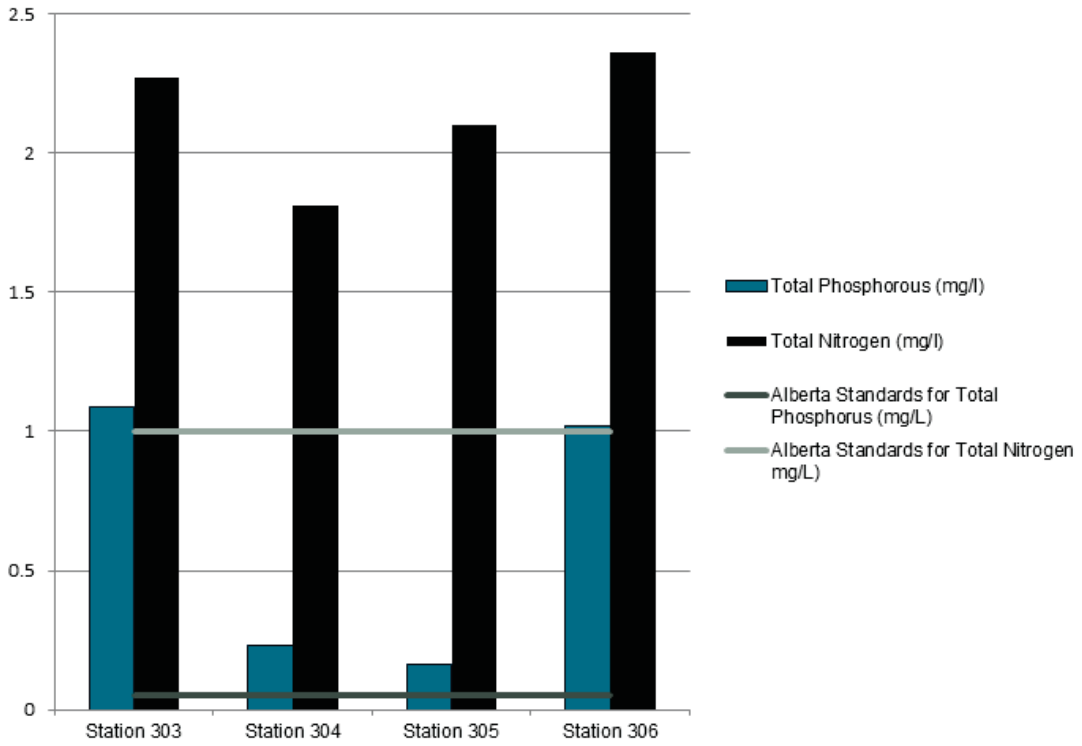
FIGURE 16
TP AND TN FOR HAYNES CREEK 1998



WHELP CREEK (POOR)

The Whelp Creek watershed is classified as a highly intensive agricultural watershed. Major land use in the watershed includes 61% annual crops and 25% perennial crops, as well as raising livestock consisting of approximately 2,160 cows (87% dairy) and 480 calves. In 2008 to 2010, water quality monitoring data for nutrient levels showed the water quality to be in poor condition. It did not comply with drinking water quality guidelines or with guidelines for the protection of aquatic life. 2010 data is shown in Figure17.

FIGURE 17
TOTAL PHOSPHORUS AND TOTAL NITROGEN IN WHELP CREEK 2010



3.4.3.2. LAKES

In this section data is available for all significant lakes listed in section 3.4.2.

CHAIN LAKES (POOR)

One study was completed in 2011 by the Alberta Lake Management Society (ALMS) on Upper Chain Lake (Alberta Lake Management Society, 2011). This report measured a suite of water chemistry parameters including phosphorous, nitrogen and chlorophyll-a, which are all indicators of *eutrophication* or excess nutrients that can lead to algae blooms. The average TP (total phosphorous) measured at Upper Chain Lake during 2011 was 344.5 µg/L. This is very high, and falls into the *hyper-eutrophic*, or extremely nutrient rich, classification. Throughout the summer, TP ranged from a minimum of 263 µg/L on June 16th to 425 µg/L on September 15th. Runoff from the watershed acts as a large source of phosphorous, and 2011 showed particularly high amounts of runoff. Similar to TP, total Kjeldahl nitrogen (TKN) was also very high and fell into the *hyper-eutrophic* classification with an average value of 2090 µg/L. The water clarity and amount of dissolved oxygen were also reported in the 2011 study. Both indicators were deemed poor in the report.

LACOMBE LAKE (FAIR)

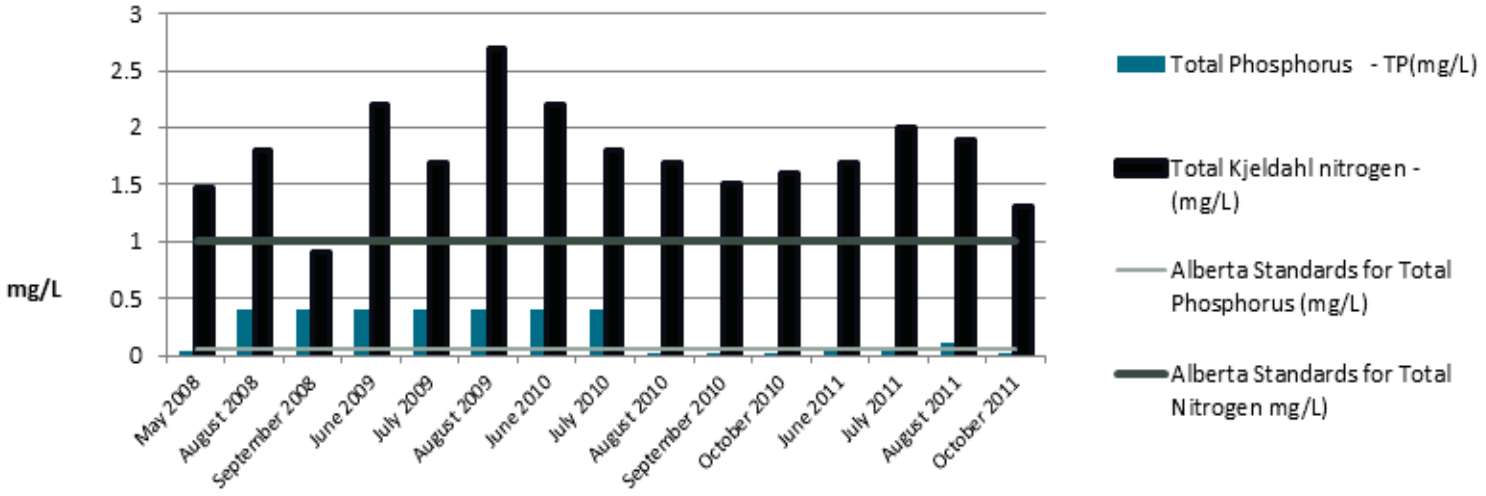
In the 1960's, the Prairie Farm Rehabilitation Association (PFRA) constructed a weir system on Whelp Creek to control and direct stream flow. Periodically, water would be diverted from Whelp creek to Lacombe Lake during periods of high flow to prevent flooding of the landscape. In recent years there has been some concern regarding the water quality of the lake, as the lake has shown signs of excessive *macrophyte growth*. It was suggested that water from Whelp Creek may be contributing bacteria and excess nutrients, and thus negatively impacting Lacombe Lake. In 2008, Lacombe County responded to community concerns by temporarily suspending the diversion of water and undertaking water quality monitoring of the lake over the subsequent four years, from 2008-2012. An analysis of this water quality data was completed in late 2012 by Golder Associates. They found the following results:

- TKN, or total Kjeldahl nitrogen, exceeded the water quality guidelines, but was shown to have an overall decreasing trend over the five year monitoring program. It does suggest that, prior to the diversion, Whelp Creek may have been a significant source of nitrogen to Lacombe Lake.

- Total coliform or fecal coliform bacteria showed no indication of an increasing or decreasing trend over the last five years, suggesting the main contributing source of bacteria is independent of Whelp Creek. Periodic elevations of the coliform counts are likely associated with major rainfall events, which effectively wash bacteria from the watershed into nearby waterways.

- Total phosphorous concentrations exceeded the newly revised guideline four times in the last two years, but showed only minor year to year variation since 2010. The peak TP concentrations seen are likely attributed to runoff from agricultural land in the watershed. A decision is yet to be made on how to move forward with this information. An update will be included in the next SOE report.

FIGURE 18
TOTAL PHOSPHORUS AND TOTAL NITROGEN IN LACOMBE LAKE 2008-2011



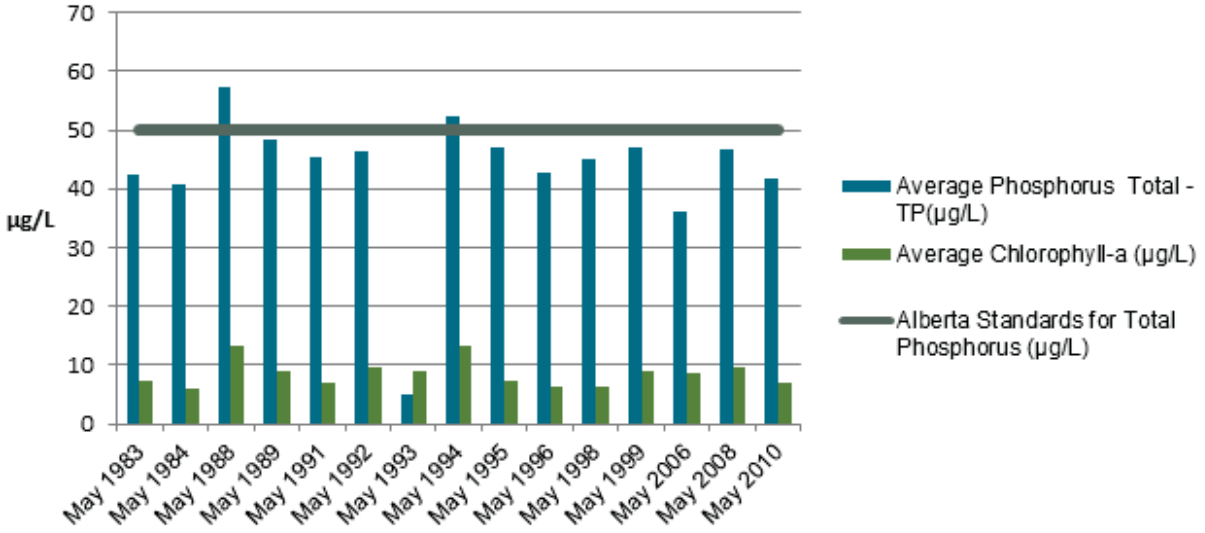
GULL LAKE (GOOD)

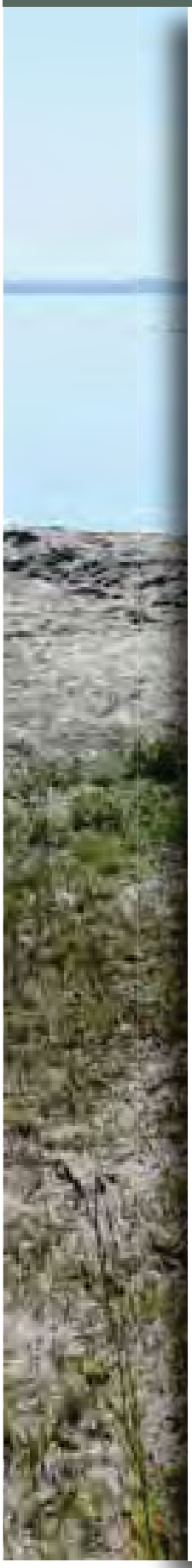
Gull Lake is classified as a Eutrophic lake. Eutrophic lakes tend to experience high densities of large aquatic plants (macrophytes) and algae, and support productive fisheries. Surface accumulations or blooms of algae may occur during the warmest months, which can significantly reduce water transparency to the point of discouraging recreational activities such as swimming or waterskiing. Eutrophic lakes have phosphorus levels between 35-100 μg/L (see Figure 19 for more information).

Data has been collected on Gull Lake for 15 years by Alberta Environment. Figure 19 displays the findings. This data shows that the level of phosphorous has been very similar over time, with spikes over the guidelines in only two years, 1988 and 1994. Changes in the level of phosphorous in a lake may be generated by a result of urbanization, industry and agricultural practices. However, Gull Lake is also naturally high in nutrients.

Currently, Lacombe County manages the diversion of water from the Blindman River into Gull Lake in order to maintain water levels. Water coming from the Blindman River is not monitored before it is diverted to Gull Lake.

FIGURE 19
AVERAGE ANNUAL PHOSPHOROUS AND CHLOROPHYLL PRODUCTIVITY IN GULL LAKE LAKE IN 1983- 2011

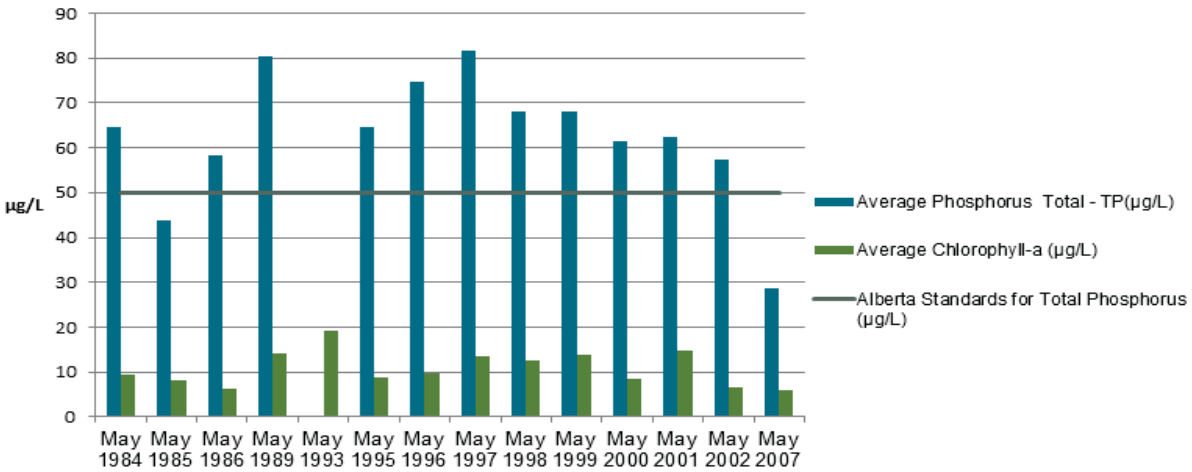




BUFFALO LAKE (FAIR)

Buffalo Lake is classified as a Mesotrophic Lake, defined as a lake that contains moderate levels of phosphorus, which acts to support greater biological production. Buffalo Lake is moderately saline with relatively clear water. Algae blooms may occur but are generally confined to late summer, and often affect only the western half of the lake (Alberta Sustainable Resource Development, 2010). Water quality data has been gathered on Buffalo Lake for the past 14 years. The data shows that the levels of phosphorous have been in fluctuation for some time and have often exceeded the ASWQ guidelines by quite large amounts at times. These peaks in phosphorous levels may be related to natural fluctuations, urbanization, industry and agricultural practices, or from the addition of water that is pumped into the lake from the Parlby Creek to maintain the water level. There are variations in the water quality in different parts of Buffalo Lake. This is due to the influences of the source water. Water quality found in Parlby Bay is strongly influenced by the inflowing water from Parlby Creek, while Main Bay reflects the groundwater water quality more closely. Water in Secondary Bay is also similar to groundwater, but it is mixed with Parlby Creek inflow. (Alberta Sustainable Resource Development, 2010). Extensive research and planning has taken place on Buffalo Lake. In 2004 the Buffalo Lake Integrated Shoreland Management Plan (BLISMP) was initiated. One of the goals within the BLISMP was to maintain and enhance Buffalo Lake's water quality. Recommendations included ongoing monitoring and reporting, as well as preventing detrimental activities on the lakeshore to ensure water quality was not reduced. Work is currently being done with the Buffalo Lake Management Team to ensure initiatives of the BLISMP are being met and integrated into planning documents such as the Buffalo Lake Intermunicipal Development Plan or IDP.

FIGURE 20
AVERAGE ANNUAL PHOSPHORUS AND CHLOROPHYLL PRODUCTIVITY IN BUFFALO LAKE IN 1984-2011



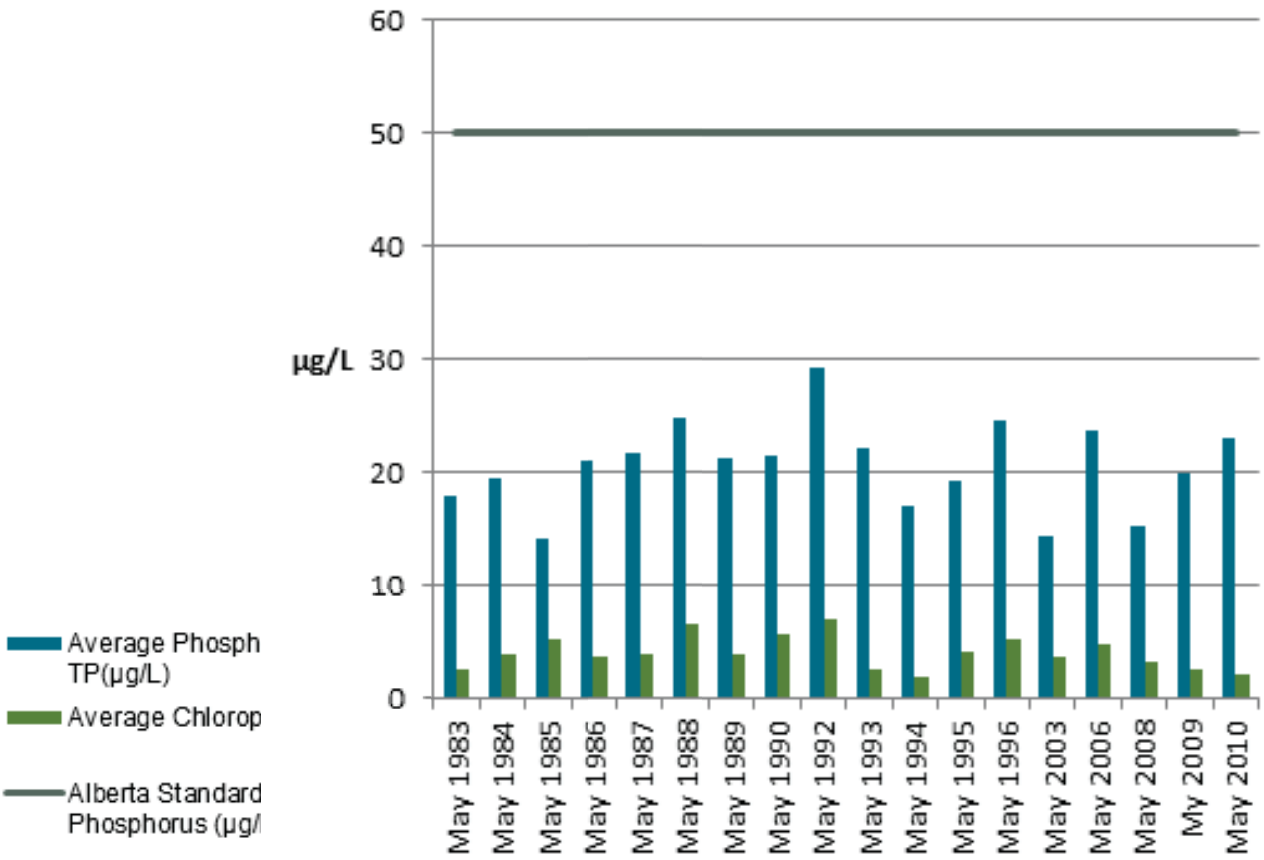
SYLVAN LAKE (EXCELLENT)

Sylvan Lake is classified as a mesotrophic lake, defined as a lake that contains moderate levels of phosphorus, which acts to support greater biological production. Water clarity is moderate, which may lead to an increased probability of oxygen depletion in the deepest areas.

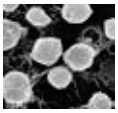
Water quality data has been collected for 18 years at Sylvan Lake, providing the County and the Province with strong historical data. Refer to Figure 21. The data shows that phosphorous is well below the ASWQ guidelines and is relatively stable. This is due mostly to the natural state of the lake being mesotrophic.

Levels of chlorophyll-a have remained relatively low compared to other Alberta lakes, but occasional blooms have been reported as far back as the 1970's. Historical data collected from the lake in the 1970s indicates that the concentration of chlorophyll-a has not varied much since that time (Axys Environmental Consulting , 2005).

FIGURE 21
AVERAGE ANNUAL PHOSPHOROUS AND CHLOROPHYLL PRODUCTIVITY
IN SYLVAN LAKE 1983-2011



Fecal coliforms



E Coli

3.4.4 BACTERIA

In this section there is data for Medicine River, and Whelp Creek. There is no data presently available for Haynes Creek, Parlby Creek or any of the significant lakes listed in section 3.4.2. Coliforms are a broad class of bacteria found in soil, vegetation sediment and human and animal wastes. Coliforms, which include *Escherichia Coli* or *E. Coli*, are a sub-set of these bacteria that occur naturally in warm blooded animals. *E. Coli* is one of three bacteria commonly used to measure direct contamination of water by human or other mammal wastes. If it is present, the water may have been contaminated with feces originating from agricultural and municipal runoff, wildlife, faulty septic systems or septic fields. Ingestion or exposure to fecal bacteria can have negative health impacts.

MEDICINE RIVER (POOR)

In 2006 and 2007, fecal coliforms and *E. Coli* concentrations both exceeded the CCME Agriculture/Irrigation and Recreation guidelines. Rates were particularly high in July and early August 2006, and May to mid-July 2007 (Aquality Environmental Consulting, 2009). The sources of the bacteria may have been large storms in the spring and summer months which carried sediment and bacteria from uplands into the river.

WHELP CREEK (POOR)

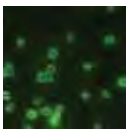
Typical of the Whelp Creek sub-watershed, and other agricultural watersheds, concentrations of bacteria were high during the summer months of June and July 2010. Concentrations reached the highest value measured in Whelp Creek watershed in the summer of 2010. The peaks in these levels may be related to wildlife activity or manure application. (Olson, B. and Kalischuk, A., 2011)

To provide some context the USEPA guidelines are 0 oocytes/100 L for *Cryptosporidium* and 0 cysts/100 L for *Giardia* in drinking water. Concentrations of both parasites in the Medicine River consistently exceed the USEPA guidelines, however we should not apply drinking water guidelines to raw water guidelines (Table 15).

3.4.5 PARASITES

In this section there is data only for Medicine River. There is no data presently available for Haynes Creek, Whelp Creek, Parlby Creek or any of the significant lakes listed in section 3.4.2. Waters may become polluted with several different disease-causing organisms commonly called parasites. *Enteric parasites* live in the intestines of warm blooded animals and can carry or cause a number of infectious diseases. *Cryptosporidium* and *Giardia* species are two such parasites. They have been found lakes, rivers, reservoirs and groundwater. Their concentration is related to the level of fecal pollution or human use of the water. (Hansen & Ongerth, 1991). They come from the feces of rodents, birds, cows, pigs, and humans. Ingestion of these parasites causes gastrointestinal conditions known as cryptosporidiosis and giardiasis, "beaver fever." Very limited data specific to Lacombe County is available, although some testing has been done along the Medicine River, according to the *Red Deer River State* of the *Watershed* report (Aquality Environmental Consulting , 2009). Although guidelines in Canada have been established for *Giardia* and *Cryptosporidium*, because current detection methods are not very reliable, the guideline does not give a maximum acceptable concentration (MAC) value for these parasites in drinking water.

Cryptosporidium



Giardia

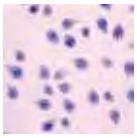


TABLE 15
LEVEL OF BACTERIA IN MEDICINE RIVER

Year	Cryptosporidium (oocysts/100L)	Giardia (cysts/100L)
2002	766	1,493
2001	<20	200
1999	915	795

(Aquality Environmental Consulting , 2009)

3.4.6 PESTICIDES

In this section there is data for Medicine River and Haynes Creek. There is no data presently available for Whelp Creek, Parlby Creek or any of the significant lakes listed in section 3.4.2. Pesticides are among the most widely used chemicals in the world; they are also among the most dangerous to human health (Hallenbeck & Cunningham-Burns, 1985). Three factors (soil adsorption, water solubility and persistence) are used to rate pesticides. This is because of the potential for pesticides to leach or move with surface runoff after application. Water solubility is measured in parts per million (ppm) and measures how easily a pesticide may be washed off the crop, leach into the soil or move with surface runoff.

Persistence is measured in terms of the half-life, or the time in days required for a pesticide to degrade in soil to one-half its original amount. For example, if a pesticide has a half-life of 15 days, 50 percent of the pesticide applied will still be present 15 days after application, and half of that amount (25 % of the original) will be present after 30 days. In general, the longer the half-life, the greater the potential for pesticide movement.

MEDICINE RIVER

According to the *Red Deer River State of the Watershed* report (Aquality Environmental Consulting, 2009), the Medicine River was tested between August 1974 - December 2006. Fourteen different pesticides were detected. None of the levels exceeded the CCME PAL guidelines for the seven pesticides that had guidelines. There were no guidelines for the remaining 7 pesticides.

TABLE 16
PESTICIDE CONCENTRATION IN MEDICINE RIVER 1974-2006
(ALL MEASUREMENTS ARE IN UG/L)

Pesticide	Mean Range	Maximum	CCME PAL	Sample Size
2, 4- D	0.014-0.016	0.081	4	41
Bromoxynil	10.001-0.005	0.012	5	41
Clopyralid	1.005-0.022	0.062	---	41
Dicamba	0.001-0.006	0.014	10	17
Diuron	0.007-0.202	0.293	---	41
Ethalfluralin	0.001-0.005	0.021	---	41
Imazamethabenz-methyl	0.012-0.058	0.286	---	41
MCPA	0.019-0.021	0.133	2.6	41
MCPP	0.001-0.005	0.012	---	41
Picloram	0.007-0.011	0.093	29	41
Triallate	0.0003-0.005	0.01	0.24	41
Triclopyr	0.024-0.030	0.311	---	17
Trifluralin	0.00002-.005	<0.005	---	41

HAYNES CREEK (TREW & ANDERSON, 1998)

Local producers reported applying 13 different pesticides to the cultivated field sites within the selected study area. Water samples were analysed for these and for other pesticides in common use across the Province. Pesticide residues were detected in 15 of the 22 samples taken in the two year testing period. Residues of seven herbicides which had been applied the previous spring were detected in field runoff samples. This confirms that pesticides can persist from the spring of one year to the spring of the following year. Five pesticides for which there was no local record of application in that area were also detected. This suggests that long-range atmospheric transport and deposition are possible pathways for water contamination. Water samples from the control site, four sites on Haynes Creek and one site on the Red Deer River, were also analysed for pesticides. Of the 67 samples tested, 73% had at least one pesticide detected. The recorded detections were from the Haynes Creek samples. There were no detections from the control site and only a few from the river. Eight of the 13 compounds for which the water was tested were detected. Residues of imazamethabenz were found in 61% of the samples. This compound, which is highly mobile in water, was detected more often and at higher concentrations in 1996 than in 1995, possibly as a result of the higher runoff in that year. None of the samples exceeded existing Canadian drinking water guidelines for pesticide contamination. Only a single detection of trifluralin exceeded guidelines for the protection of aquatic life. However, there is no guideline for imazamethabenz or for six of the eight pesticides that were detected. Consequently, the economic, environmental and health significance of these detections cannot be fully assessed.

TABLE 17
PESTICIDE CONCENTRATION IN HAYNES CREEK 1995 -1996
(ALL MEASUREMENTS ARE IN UG/L)

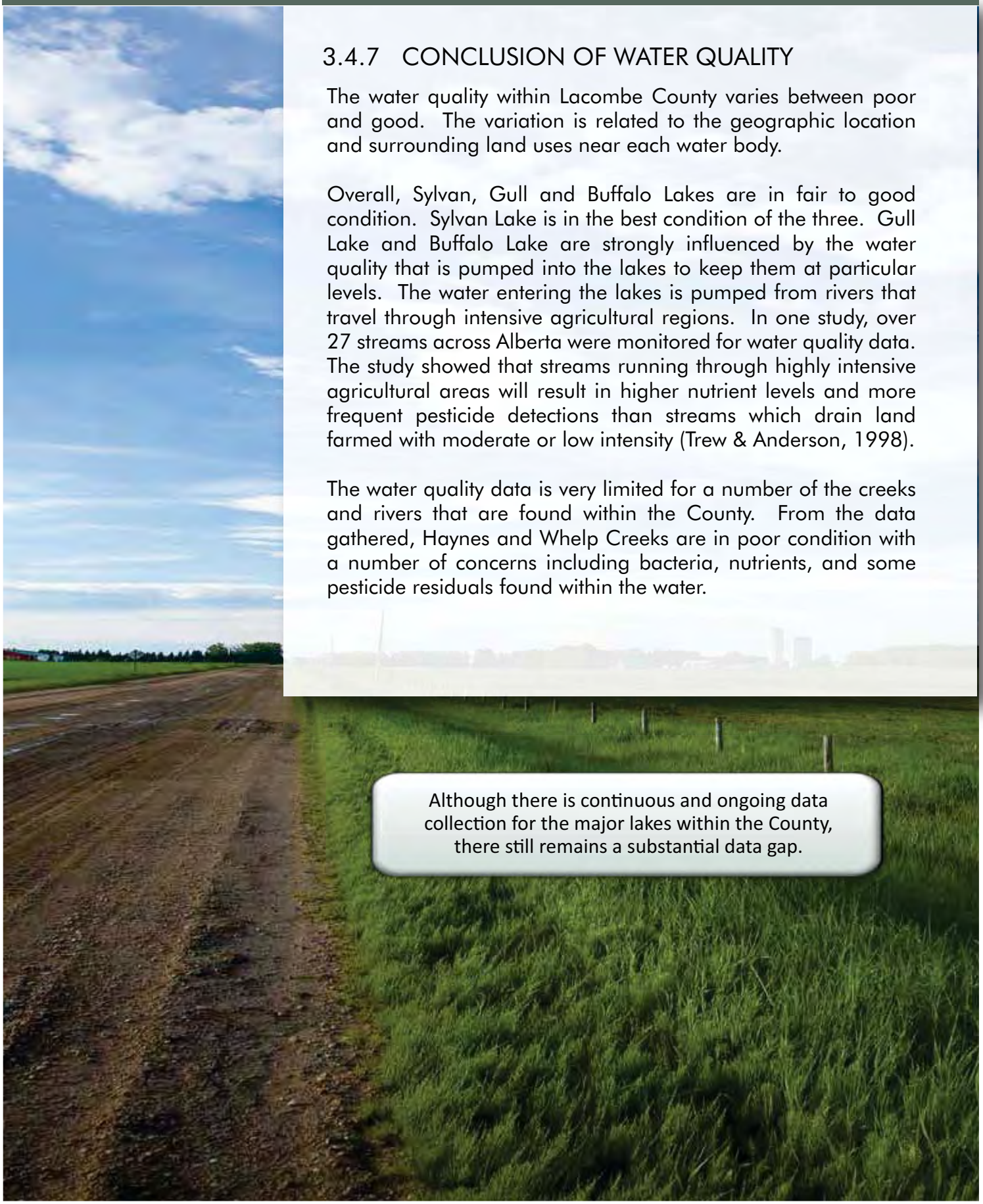
Pesticide	Maximum Concentration	% Non-compliance	# of Detections	Sample Size
2, 4- D	0.24	0	12	67
Bromoxynil	0.71	66%	3	67
Imazamethabenz-methyl	1.3	No guideline	41	67
MCPA	0.25	100%	7	67
Picloram	0.17	0	2	67
Triallate	1.1	38%	14	67
Picloram	0.17	0%	2	67
Trifluralin	0.31	50%	11	67
Fenoxaprop	0.021	No guideline	1	67

3.4.7 CONCLUSION OF WATER QUALITY

The water quality within Lacombe County varies between poor and good. The variation is related to the geographic location and surrounding land uses near each water body.

Overall, Sylvan, Gull and Buffalo Lakes are in fair to good condition. Sylvan Lake is in the best condition of the three. Gull Lake and Buffalo Lake are strongly influenced by the water quality that is pumped into the lakes to keep them at particular levels. The water entering the lakes is pumped from rivers that travel through intensive agricultural regions. In one study, over 27 streams across Alberta were monitored for water quality data. The study showed that streams running through highly intensive agricultural areas will result in higher nutrient levels and more frequent pesticide detections than streams which drain land farmed with moderate or low intensity (Trew & Anderson, 1998).

The water quality data is very limited for a number of the creeks and rivers that are found within the County. From the data gathered, Haynes and Whelp Creeks are in poor condition with a number of concerns including bacteria, nutrients, and some pesticide residuals found within the water.



Although there is continuous and ongoing data collection for the major lakes within the County, there still remains a substantial data gap.

3.5 WATER QUANTITY

Water quantity is a very important factor in our community, as water is used for many purposes. Water is used for human consumption, ecosystem health and economic activities such as industrial uses, power generation, and agriculture. The most prominent stresses on water quantity relate to the decrease in the amount of natural flow due to human use and development. The amount of water in a watershed area is affected by a number of factors including precipitation, soil infiltration rate, groundwater discharge, evapotranspiration, aquatic fragmentation, water regulation, water withdrawals, and water inputs from human sources such as irrigation, wastewater, and directed storm water runoff. The net available ground and surface water in a watershed can be estimated by subtracting the sum of water allocations and downstream obligations from the estimated natural runoff volume. Other stressors to water supply include variability in short-term and long-term weather patterns, and increasing use and diversion in upstream jurisdictions. By examining these indicators,a summary of water quantity will be established for the County.

In order to enable us to measure the amount of water within Lacombe County, we are examining three key indicators; some that are indications of water quantity and some that place stresses on the amount of water consumed.

3.5.1 VOLUME

In a river or stream, water volume is the amount of water flowing past one point over a given time. In the case of lakes or other standing water bodies, water volume is the total amount of water present in a water body at a given time. This amount varies seasonally or annually with shifts in weather patterns (Aquality Environmental Consulting , 2009). Changes in allocation rates, increases in developments and new recreational pressures all affect the amount of water allocated to human consumption. Maintaining the overall water volume reflective of natural fluctuations in stream flows is important for conserving the biodiversity and health of ecosystems such as wetlands and riparian areas. Changes in flow regimes affect the aquatic ecology of these ecosystems and may result in alterations in aquatic habitat, aquatic communities, riparian zones, floodplains, wetlands, the stability of river channels, and water levels. As discussed in section 3.4.1, both Gull Lake and Buffalo Lake are 'managed lakes,' which means their water levels are controlled by provincial government policies that guide these systems. In Gull Lake, water is pumped in from the Blindman River to ensure water levels are maintained. In Buffalo Lake, water is pumped in from the Red Deer River. Lakes are managed to provide numerous benefits to local residents, adjacent landowners and lake users as well as to maintain the ecology of the lake. Water from the Red Deer River is diverted to Buffalo Lake to restore historical water levels which are beneficial to shoreland and fish habitat and to support various recreational activities. Water diversions occur annually between May 1st and October 31st. Operations continue until the water level in Buffalo Lake reaches a Full Supply Level (FSL) or a shoreland contour elevation of 780.85 meters. At times the water diversion may also occur when the lake is at its FSL in order to meet the needs for community water supply, back flooding or fish and wildlife benefits along the Parlby Creek component of the water diversion system (Alberta Sustainable Resource Development, 2010).

3.5.2 ALLOCATIONS

The withdrawal, diversion and use of water in Alberta are regulated under the *Water Act*. Under this *Act*, anyone who wants to divert or use water (other than for basic household or domestic use) must obtain a licensed allocation or approval to divert the water. Alberta Environment requires each applicant to explain the intended use and the rationale for the amount of water that would be diverted on an annual basis. However, an allocation is generally based on the maximum amount of water that an applicant expects will be required over the licensing period, meaning that the amount that is actually diverted and consumed in any particular year may be less than the full allocation. For example, in agricultural and irrigation practices, demand for water is typically lower during wetter years. This is because there is much more natural rainfall and surface runoff, so higher diversions are not required. As well, municipalities may apply for enough water to reasonably meet their growing population needs into the future, even though it may not yet be required. Within Lacombe County there are approximately 60 million square meters (m^2) of surface water and 6 million square meters (m^2) of ground water diverted annually (as explained previously, this may not be the amount actually consumed and some water may be put back into the system). The two most prominent uses of surface water are for water management (46% of total surface water diversions) and for industrial use (29% of total surface water diversions). The two most prominent uses of ground water are municipal (38% of total groundwater diversions) and agriculture (33% of total groundwater diversions) as shown in Table 19 and Figure 23.

TABLE 18
SURFACE WATER LICENSES M^3 IN LACOMBE COUNTY PER MINOR SUBWATERSHED 2012

	Bigstone		Medicine		Three Hills		Lacombe County Total		
Purpose	#	Maximum Annual Diversion	#	Maximum Annual Diversion	#	Maximum Annual Diversion	#	Maximum Annual Diversion	%
Water Management	2	117,180	2	5,292,510	1	22,572,720	5	27,982,410	46.67%
Industrial			6	4,644,420	7	12,946,610	13	17,591,030	29.34%
Commercial	2	153,010	10	2,939,385	11	3,935,022	23	7,027,417	11.72%
Dewatering					2	4,341,850	2	4,341,850	7.24%
Irrigation	4	113,310	9	420,620	6	379,300	19	913,230	1.52%
Municipal	1	740,090			1	107,310	2	847,400	1.41%
Agriculture	7	25,870	30	158,390	27	355,743	64	540,003	0.90%
Habitat Enhancement	1	85,110	1	214,630	4	93,230	6	392,970	0.66%
Recreation	1	24,000			1	253,090	2	277,090	0.46%
Wildlife Management			2	22,200	1	17,270	3	392,970	0.07%
Disturbance							0		0%
Other							0		0%
Total	18	1,258,570	60	13,692,155	61	45,002,145	139	59,952,870	100%

*DATA PROVIDED BY (BATTLE RIVER WATERSHED ALLIANCE)

TABLE 19
GROUND WATER LICENSES M^3 IN LACOMBE COUNTY PER MINOR SUBWATERSHED 2012

	Bigstone		Medicine		Three Hills		Lacombe County Total		
Purpose	#	Maximum Annual Diversion	#	Maximum Annual Diversion	#	Maximum Annual Diversion	#	Maximum Annual Diversion	%
Municipal	10	1,695,665	34	696,549	17	155,568	61	2,547,782	38.15%
Agriculture	84	459,184	209	1,056,213	165	701,264	458	2,216,661	33.19%
Commercial	11	216,813	29	332,507	17	1,055,191	57	1,604,511	24.02%
Industrial			6	187,155	1	480	7	187,635	2.81%
Recreation	2	10,230	6	49,722	5	1,704	13	61,656	0.92%
Wildlife Management			3	4,217	2	51,810	5	56,027	0.84%
Other			5	3,903	1	865	6	4,768	0.07%
Total	107	2,381,892	292	2,330,266	208	1,966,882	607	6,679,040	100%

*DATA PROVIDED BY (BATTLE RIVER WATERSHED ALLIANCE)

FIGURE 21
SURFACE WATER LICENCES
IN LACOMBE COUNTY 2012

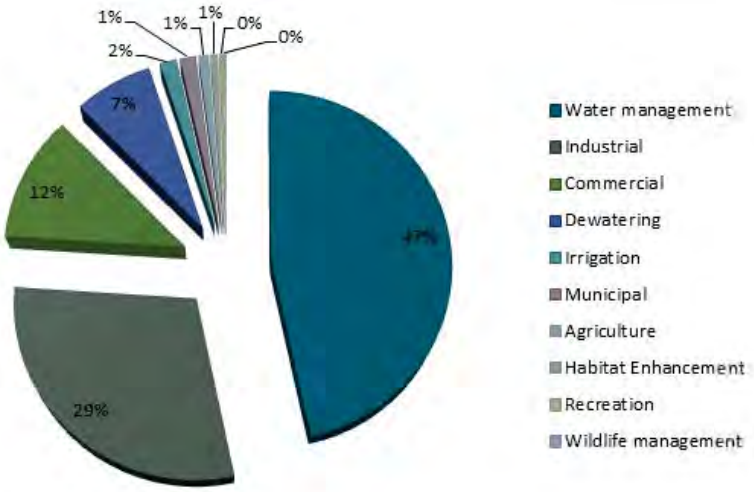


FIGURE 22
GROUNDWATER LICENCES
IN LACOMBE COUNTY 2012

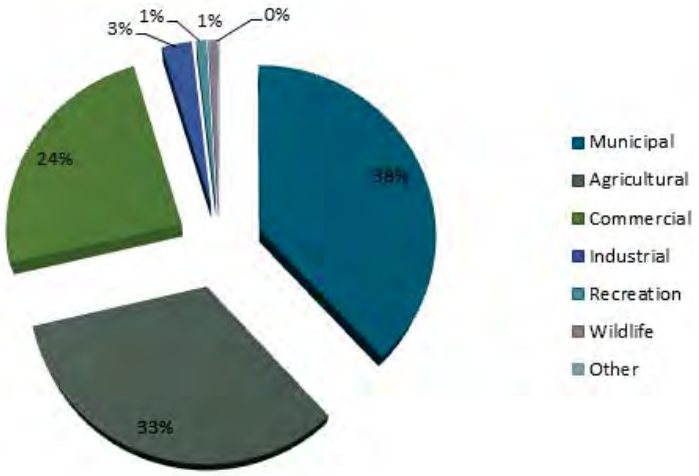


FIGURE 24
SURFACE WATER REGISTRATIONS IN LACOMBE COUNTY 2012

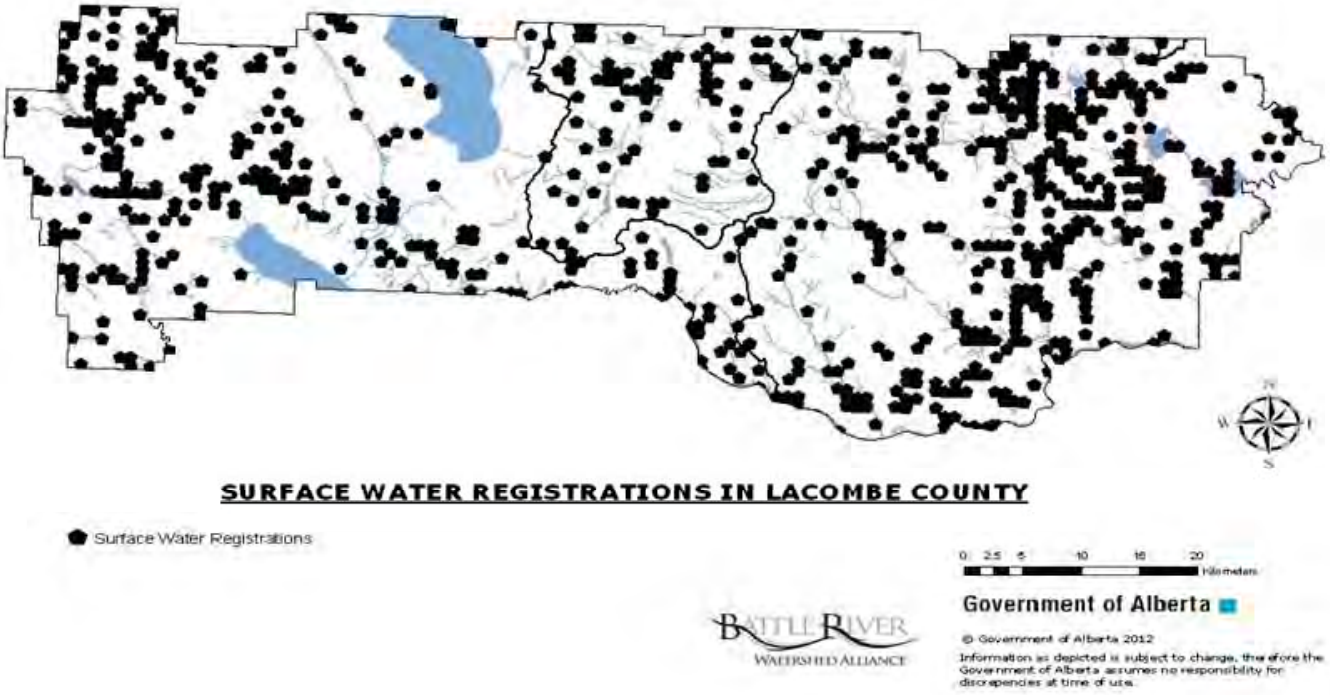


FIGURE 25
SURFACE WATER LICENSES IN LACOMBE COUNTY 2012

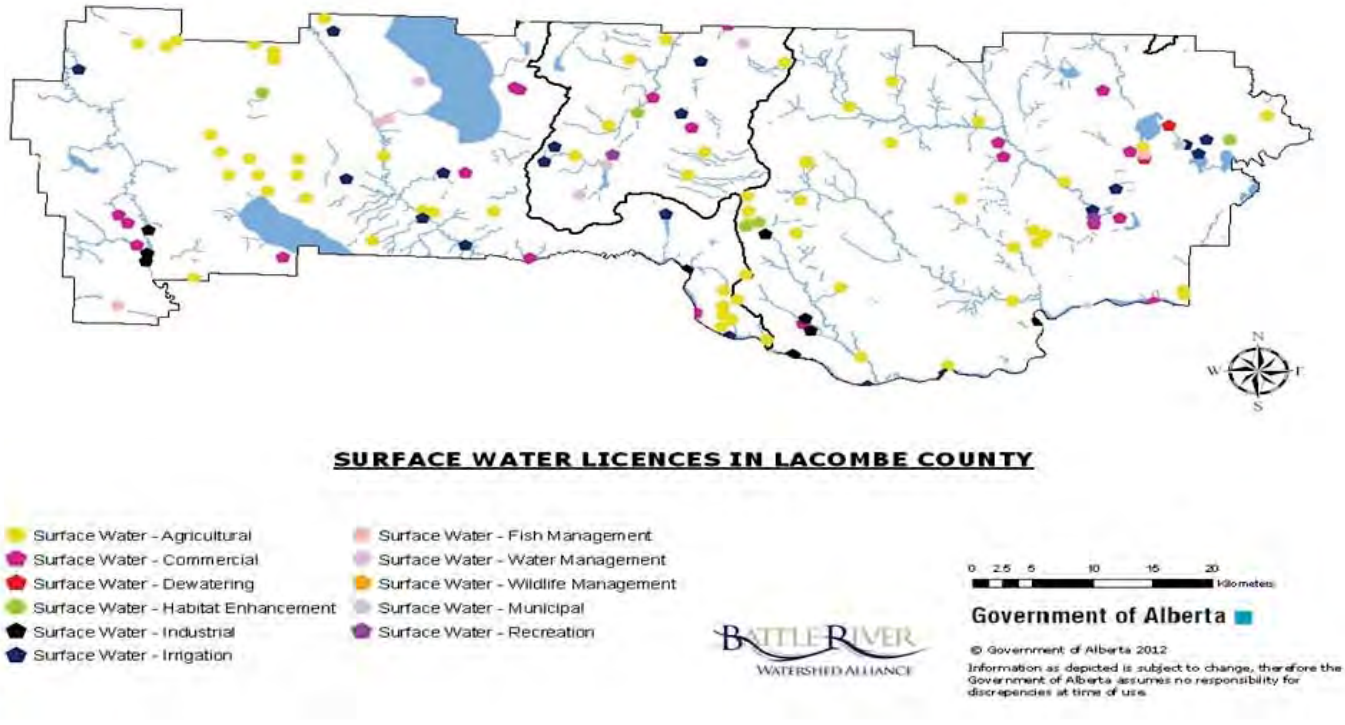
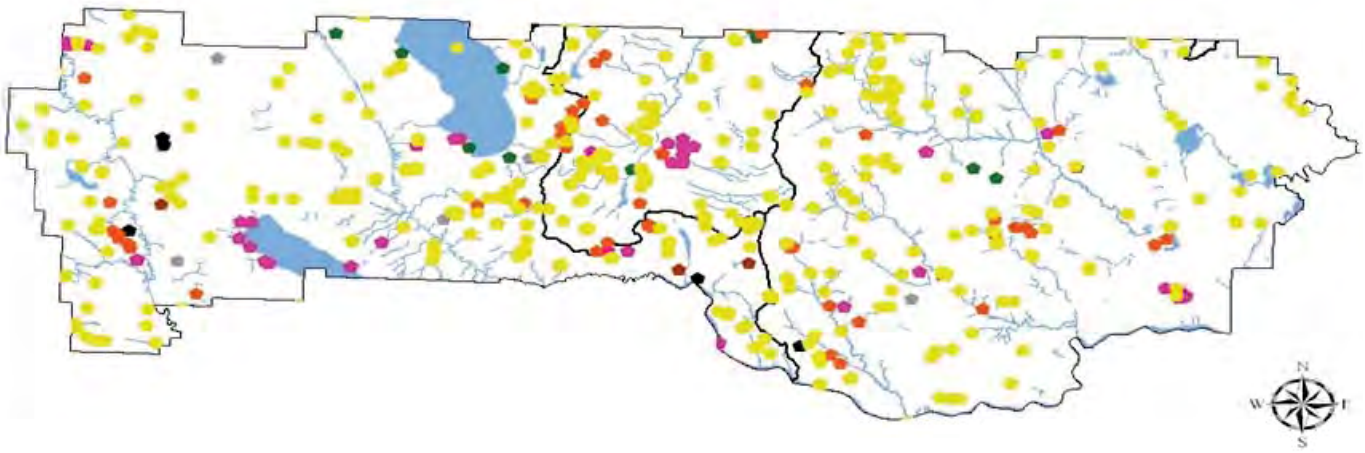


FIGURE 26
GROUNDWATER LICENSES IN LACOMBE COUNTY 2012



GROUNDWATER LICENCES IN LACOMBE COUNTY

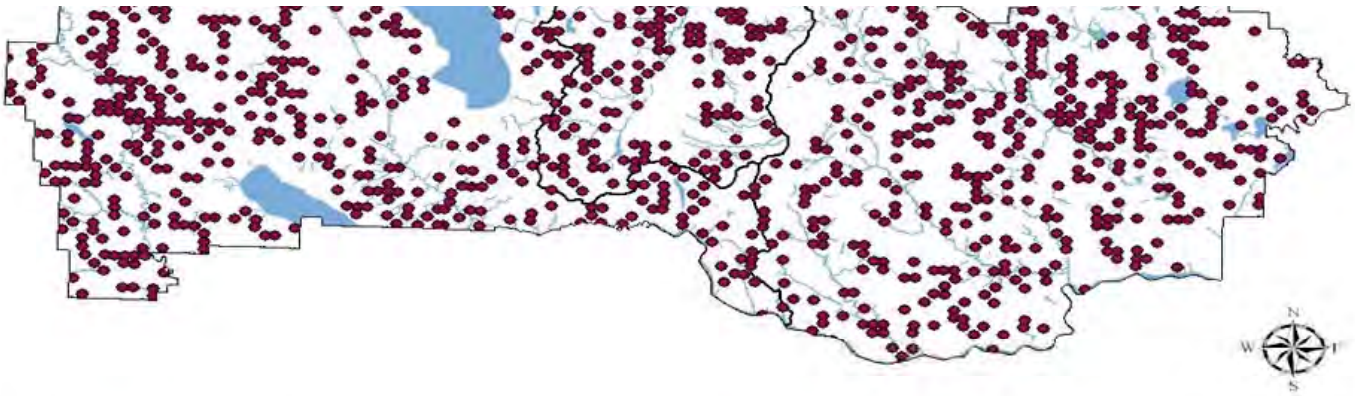
- Groundwater - Agricultural
- Groundwater - Commercial
- Groundwater - Fish Management
- Groundwater - Industrial
- Groundwater - Municipal
- Groundwater - Recreation
- Groundwater - Other

0 2.5 5 10 15 20 Kilometers

BATTLE RIVER WATERSHED ALLIANCE

Government of Alberta

FIGURE 27
GROUNDWATER REGISTRATIONS IN LACOMBE COUNTY 2012



GROUNDWATER REGISTRATIONS IN LACOMBE COUNTY

- Groundwater Registrations

0 2.5 5 10 15 20 Kilometers

BATTLE RIVER WATERSHED ALLIANCE

Government of Alberta

3.5.3 GROUNDWATER

Groundwater is present in almost every part of the province, but aquifer depths, yields and potability vary widely. Because of the importance of water to humans and to the environment, Alberta Environment and its partners are active in monitoring and analyzing the past and present status of water supplies. Understanding the distribution and variability of water is critical for planning, managing and allocating water for human use while maintaining a healthy ecosystem (ESRD(c)). An area where groundwater gets recharged or discharged to the surface indicates that the groundwater table is close to the surface and the soils are generally more permeable. These areas have a greater risk of having a negative impact from development, agriculture and/or industrial activities. Knowing where groundwater recharges or discharges occur will help to identify areas requiring special protection or limitations of land use. (Aquality Environmental Consulting , 2009). There are currently records for 7,388 water wells in the groundwater database for the County. Of the 7,388 water wells, 6,505 are for domestic/stock purposes. The remaining 883 water wells were created for a variety of uses, including industrial, municipal, observation, injection, irrigation, investigation and dewatering. This information was based on a rural population of 10,081 in 1999. At that time, there were 2.6 domestic/stock water wells per family of four. It is unknown how many of these water wells may still be active. The domestic or stock water wells vary in depth from 0.30 metres to 241 metres below ground level (HCL, 2001). Unfortunately an exact and direct measurement of groundwater recharge or discharge is not possible from the data that is available for the County, although an estimate has been made. Based on the findings of a study conducted by Hydrogeological Consultants Ltd, there is significantly more groundwater flowing through the aquifers than the total of the licensed and unlicensed diversions from the individual aquifers, except in the case of the Upper Horseshoe Canyon Aquifer. The estimated flow through the Lower Sand and Gravel Aquifer and the total estimated groundwater use from the Lower Sand and Gravel Aquifer are similar in magnitude. The calculations of flow are very approximate and are intended as a guide for future investigations (HCL, 2001). Freshwater springs are points in the landscape where an aquifer surface meets the ground surface. In other words, freshwater springs are areas of groundwater discharge. There are 46 freshwater springs in the County; the majority (33) are found in the Medicine River sub-watershed.

FIGURE 28
GROUNDWATER VULNERABILITY IN LACOMBE COUNTY 2012

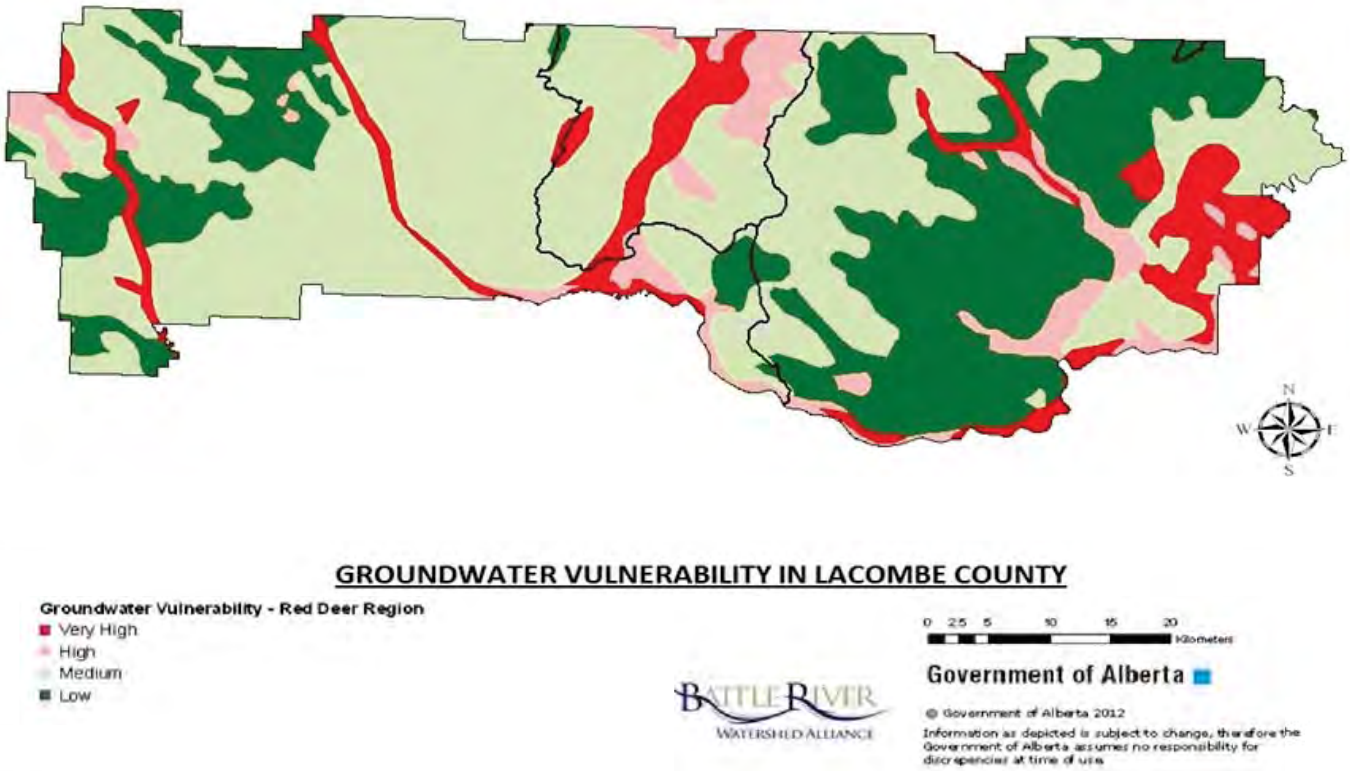
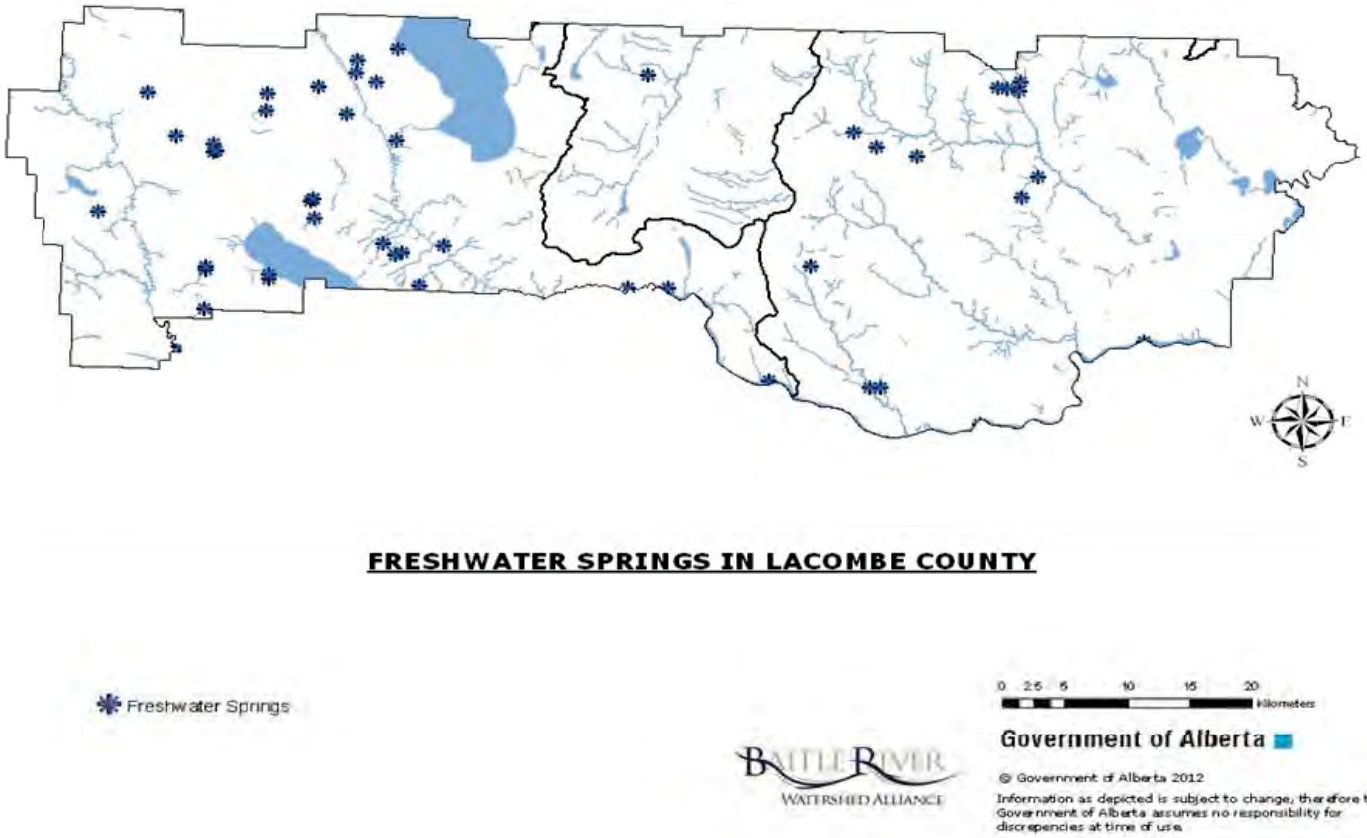


FIGURE 29
FRESHWATER SPRINGS IN LACOMBE COUNTY 2012



3.6 BIO-INDICATORS

3.6.1. LANDCOVER - PERCENTAGE AND TYPE OF LANDCOVER INCLUDING TREES, SHRUBS, GRASSLAND, CULTIVATED AND BARE SOIL

Lacombe County recognizes and supports the predominant land use of the area, which is agricultural, and as such our goal as a County will be to see small improvements in the amount of land dedicated to habitat over time where appropriate and available. Landcover is commonly used as a bio-indicator, but due to the abundance of fertile farmland, the scale that is commonly used is not appropriate for Lacombe County. Therefore, landcover will be used as background information only.

By identifying the physical attributes such as landcover of trees and shrubs, we may determine the types of wildlife that exist within the area. This cover provides shelter and food to many animals that rely on them for habitat. An alteration of the landcover will result in a direct alteration of the plants and animals that exist here. Landcover alterations can provide very positive outcomes such as food and fibre production for humans; we therefore need to be aware of what percentage of cover is cultivated for agriculture and what has been left for nature. Data for this section is available, but has been collected on a high level and may lack accuracy at the more local level. The majority of information is on the Alberta Provincial level. A full assessment of landcover specific to Lacombe County is required to provide more accurate information at that level. Alberta Environment and Sustainable Resource Development is currently collating data on vegetation types and land use practices in Alberta. To date there are two inventories: the Alberta Vegetation Index (AVI) and the Grasslands Inventory Index (GVI). The AVI is a photo-based digital inventory developed to identify the type, extent and conditions of vegetation, where vegetation exists and what changes are occurring with the vegetation. It looks at lands that are managed by the Crown, a Forest Management Agreement (FMA), Metis Settlements, First Nation or a Federal Park. The GVI is a biophysical and land-use inventory, rather than just a vegetation inventory. The area that Lacombe County exists within is not currently covered by either inventory program. Additionally, both inventories are completed on a large provincial scale and may lose detailed resolution on a County scale.

One area of concern within the Province and Lacombe County is native grasslands. On a regional scale it is estimated that fescue grasslands now cover less than 5% of the area in which they were once found, yet there has been no comprehensive inventory performed of remnant fescue grasslands. Of particular concern are the plains rough fescue (*Festuca hallii*) grasslands, found primarily in Alberta and Saskatchewan. These were once the predominant grasslands of the Northern Fescue Grassland Natural Sub-region, and were interspersed with aspen stands in the Central Parkland Natural Sub-region. Land clearing and cultivation have reduced the cover of native vegetation communities, including native grasslands. To help preserve the biodiversity of species and ecosystems, we need to keep representatives of native vegetation communities. Very few remnant plains rough fescue communities currently exist. This can be attributed to clearing for crops or tame forages, or to over-grazing, causing a shift from fescue-dominated grasslands to western porcupine grass (*Stipa curtiseta*) or needle and thread (*S. comata*) dominated grasslands, or from native grassland communities toward non-native types (Holcroft Weerstra, 2003).

A very substantial portion (84%) of Lacombe County is developed. This number represents a strong agricultural community with up to 82% of the County currently in agricultural production. The remaining 2% of the 84% is covered by development. Ecological lands within the County make up 16% of the landcover, and include water bodies (4.5%), deciduous forests (6%), and wetlands, shrub lands and grasslands (all approximately 2% each). This is shown in Figure 30, 31 and Table 20.

FIGURE 30
LAND COVER AS PERCENT OF TOTAL AREA WITHIN LACOMBE COUNTY 2012

FIGURE 31
LAND COVER TYPES IN LACOMBE COUNTY 2012

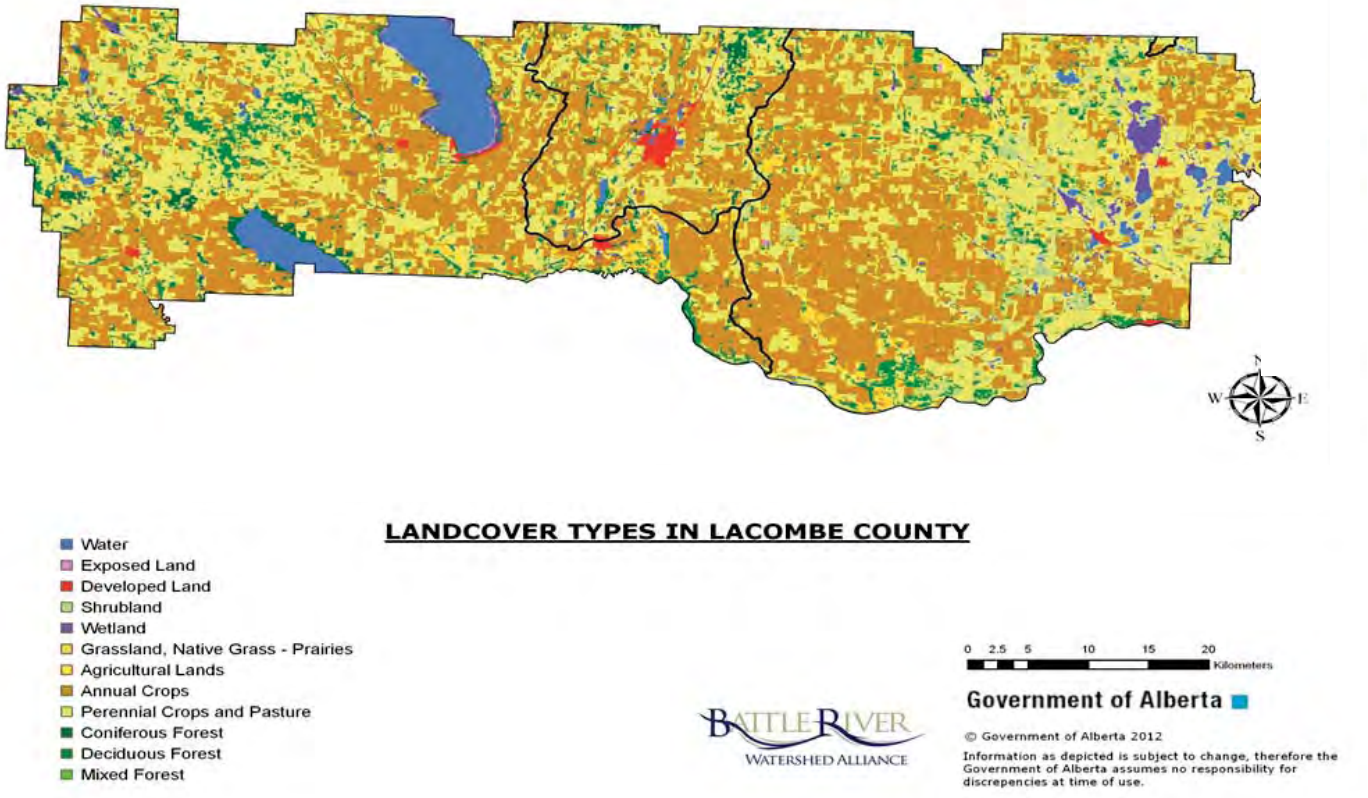


TABLE 20
LANDCOVER AS A PERCENT OF TOTAL AREA WITHIN LACOMBE COUNTY
PER SUBWATERSHED 2012

Landcover Type	Bigstone	Medicine	Threehills
Water	1.30%	8.10%	1.80%
Exposed Land	0.10%	0.20%	0.10%
Developed	4.00%	1.20%	1.00%
Shrubland	1.30%	0.90%	4.60%
Wetland	1.30%	1.60%	2.50%
Grassland, Native Grass- Prairies	0.80%	1.30%	2.80%
Agriculture	45.00%	41.00%	44.00%
Annual Crops	37.70%	36.00%	37.80%
Perennial Crops and Pasture	2.70%	2.40%	0.30%
Deciduous Forest	5.60%	7.20%	4.90%
Mixed Forest	0.10%	0.10%	0.00%
Ecological Lands(sub-total)	10.60%	19.30%	16.80%
Built-up/Urban Lands (sub-total)	89.40%	80.70%	83.20%
Total Area	100%	100%	100%

*DATA PROVIDED BY (BATTLE RIVER WATERSHED ALLIANCE)

The County manages public landcover through a number of processes. These include limiting development in areas that are environmentally sensitive, dedicating portions of new developments to municipal reserves that serve as both a resource for the community and for nature, and ensuring setbacks from water. As shown in Table 21 Lacombe County currently manages 20 environmental Reserves, which cover 134.55 acres, and an additional 47 municipal reserves consisting of 54.18 acres. This is .003% of the total land within Lacombe County.

TABLE 21
RESERVE LANDS IN LACOMBE COUNTY 2012

Type	# of Properties	Total Acres	% of Landcover
ER	20	134.55	0.02%
MR	47	54.18	0.01%

3.6.2 WILDLIFE BIODIVERSITY

Wildlife biodiversity provides us with many important benefits, including soil protection, pest control and the supply of clean water. It also provides us with aesthetically pleasing vistas, recreational opportunities and enjoyment. This biodiversity may be threatened by the encroachment of development, an increase in agriculture, and a decrease in habitat. As mentioned previously, Lacombe County is found within two *Natural Regions*, the Boreal Forest *Natural Region* and Parkland *Natural Region* in Alberta. Some important facts about these regions are:

- Approximately 100, or 20%, of Alberta's rare vascular plants species are found within the Parkland Natural sub-region ;
- Historically the Central Parkland Natural Sub-region (part of the Parkland Region) was characterised by numerous and productive wetlands and is regarded as the "duck factory" of North America;
- The Central Parkland area has been intensively cultivated for over a century, with only a few remaining contiguous areas of native parkland vegetation occurring on sites that are unsuitable for agriculture because of topography or soil constraints;
- Approximately 10% of the area is covered in wetlands and 2% is covered by major watercourses such as the Red Deer River. Of the remaining area up to 80% is covered by cropland, with only ~5% of the sub-region remaining in native vegetation.

We need inventories to determine the biodiversity within the County. These inventories will help determine diversity and will also indicate changes in environmental conditions such as habitat fragmentation, loss of nesting and breeding sites and changes in water quality and quantity. At this time there have been only limited studies done on the fauna within Lacombe County and we are therefore unable to draw firm conclusions. This indicator does not currently have enough data to be used in the assessment, but in future will be an important indicator of overall health.

3.6.3 HABITAT COVER AND HEALTH

There are a number of indicators that could be used to test the overall habitat cover and health of Lacombe County. Based on previously published reports, we have divided this indicator into 4 separate measurements.

- Environmentally significant area
- Presence of weeds
- Presence or absence of habitat corridors
- Species at risk

3.6.3.1 ENVIRONMENTALLY SIGNIFICANT AREAS

Environmentally Significant Areas (ESAs) are important, useful and often sensitive features of the landscape. They provide long-term benefits to our society by maintaining ecological processes and by providing useful products. The purposes of ESAs are varied, but a few include the protection of rare or endangered species and their habitat, provision of travel corridors and resting places for migratory species, and conservation of soil and protection from erosion (Sweet Grass Consultants, 1998). Studies have been completed on a Provincial level that identify the ESAs for Alberta. One study, completed in 1998 by Sweet Grass Consulting, examined the Counties of Lacombe and Stettler.

The study focused on providing an inventory of environmentally significant areas of regional, provincial, national or international importance, as well as evaluating the relative sensitivity of the sites. This information was used to develop strategies for these areas. The report identified 14 regionally significant sites and 1 provincially significant site. Most of the sites had a strong focus on wetlands and birds. Table 23 provides information that was extrapolated from the Sweet Grass Report. (Sweet Grass Consultants, 1998). There are some limiting factors to consider with regard to this study. It identifies only areas which are 160 acres or larger, it focuses on 'rare or significant` features and it is over 14 years old.

J.J. COLLETT NATURAL AREA

The J.J. Collett Natural Area, located at 26-41-26-W4M, is valued for its diversity of habitat types, diverse fauna, and its accessibility to local residents and proximity to Ponoka, Lacombe, and Red Deer (Leszczynski, 1987).

Due to the ease of access by the public, this natural area has had a number of uses throughout its history. It has been used as a research site, for natural history walks, and for activities such as orienteering exercises, camping by boy scouts, and hunting (Leszczynski, 1987). Before 1974, the area was privately owned and the site of a logging and mill operation and pasture grazing. In 1974, 240 ha (600 acres) were purchased by the Alberta Department of Environment in trust, so that the area would be used for environmental education (Natural Areas Program, 1980). In 1982, an additional 16.2 ha (40 acres) were obtained and placed under protective notation (PNT 820462). The J. J. Collett Foundation was incorporated in 1985 in order to manage the site.

One of the outstanding features of the Natural Area is its distinctive ecological areas. They include stabilized sand dunes covered by shrubby grasslands, white spruce forests or balsam poplar mixedwood, open grassy meadows and willow and sedge wetlands (NAP 1980). The known fauna in the area includes several uncommon or sensitive species, such as boreal chorus frog (*Pseudacris maculata*), wood frog (*Rana sylvatica*), western toad (*Bufo boreas, sensitive)*, and pileated woodpecker (*Dryocopus pileatus,* sensitive) (Leszczynski, 1987), (Timone, K. and Robinson, A., 2009).

In 2009, Lacombe County planned to reconstruct and widen a one-mile long section of Range Road 26-1 on the east border of the J.J. Collett Natural Area in Section 26, Township 41, Range 26, W4. Due to the diverse habitat and fauna found in the area, when work was to be carried out by Lacombe County that had the potential to negatively affect the Natural Area, studies were undertaken to assess the impact. The County commissioned a survey of the rare plants and vegetation of the eastern margin of the Natural Area. Field work was conducted within both acquisition and work areas, totaling an estimated 4.7 ha (about 10 acres, the affected area). The report describes, maps, and discusses the rare element occurrences. The results and discussion include a summary of the ecological importance of the element occurrences and suggestions to mitigate the damage resulting from road construction.

BUFFALO LAKE

Riparian habitat suitable for fish and colonial water birds is of great importance to the Buffalo Lake area. The Buffalo Lake Integrated Shoreland Management Plan (BLISMP) includes goals to protect and enhance the habitat available to both of these species.

The first Buffalo Lake *Intermunicipal Development plan (IDP)* was written in 1997, in response to concerns regarding the environmental capability of Buffalo Lake to support more intensive residential development in the area. In 2008, after the completion of BLISMP, the 1997 Buffalo Lake IDP needed to be updated to integrate new ideas and data. Recommendations from the BLISMP were taken into consideration. The updated plan emphasizes the importance of riparian areas and shoreline habitat. Efforts are being made to create a more coordinated approach to policy direction, and developments are being restricted to areas outside of the designated Shoreland Management areas (Lacombe County, 2008).

Buffalo Lake is a regionally important sport fishery location for Northern Pike. The high alkalinity of the main basin of the lake prevents Pike and White Sucker (an important food item for Pike) from spawning in the main basin. Spawning occurs within the area influenced by fresher inflows and in Spotted Lake. Buffalo Lake contains Burbot and several species of small non-sport fish that rely on shoreline habitat areas. To help manage the fisheries of Buffalo Lake and return the native fish populations back to their former productive capacity, a number of actions were suggested. No new disturbances were allowed within the Northern Pike habitat, and both public access and off-highway vehicle access were restricted. Another recommendation was to monitor fish populations on a five year basis (Alberta Sustainable Resource Development, 2010).



In 2007, the Fish and Wildlife Division of AESRD, with support from local partners, conducted a comprehensive survey of bird species around Buffalo Lake. The goal was to prioritize the lake's shoreland, based on the number and types of bird species observed, and the areas identified as having high conservation importance for birds. A total of 125 species of birds were identified around the lake during the survey and an additional 20 species of birds were encountered during other activities on the lake. 30 species were classified as being "Sensitive" status in Alberta; no species of high risk status were present in 2007. Areas were identified as having a high priority for the conservation of birds. These areas characteristically had extensive emergent vegetation and were relatively undisturbed by human activity. It was recommended that land-use planning at Buffalo Lake includes some protective measures for these areas of significant bird habitat (Alberta Sustainable Resource Development, 2010).

NOBLET AREA

Although this parcel is not classed as an environmentally significant area, it is a natural area worth noting. Lacombe County owns a small parcel of land, approximately 80 acres, on NW 23-41-24 W4M. Until 1996 this parcel was leased to various residents for farming purposes. In 1996 the Council decided that the parcel was to become a natural area that would no longer be leased. The parcel of land has forested and grassland areas as well as a small creek passing through it, creating potentially viable and healthy habitat. It is also in close proximity to Chain lakes.

BRAITHWAITE CONSERVATION EASEMENT AREA

The Braithwaite *conservation easement area* located at NW 27-40-27 is approximately 85.34 acres in size. It was deemed a *conservation easement area* at the request of Mr. Charles Braithwaite in his estate in 1990. The area has been left in its natural state of tree cover with walk in access only. The Red Deer River Naturalist Society serves as volunteer stewards of the area. This parcel of land provides habitat to the area.

DUCKS UNLIMITED CANADA

Ducks Unlimited Canada (DUC) is a registered charity that partners with government, industry, non-profit organizations and landowners to conserve wetlands that are critical to waterfowl, wildlife and the environment. The charity was formed in 1938 and has to date completed 9,112 habitat projects and conserved 6.3 million acres of wetlands and associated habitat. They also conducted scientific research through their Institute for Wetland and Waterfowl Research (IWWR) and deliver education programs to students and teachers through interpretive centers across Canada. DUC has a presence in Lacombe County, as shown in Table 22. These projects provide valuable waterfowl habitat to the area.

TABLE 22
DUC PROJECTS SITES IN LACOMBE COUNTY 2012

D C Pro ect Name	Legal Land l	Pro ect Type
Big Pond	SW 34-41-22 W4	Purchase
Thompson	E 1/2 34-41-22 W4	Purchase
Willy	SE 31-40-21 W4	Purchase
Cummings Bros.	NW 29, SE 31 Pt SW 32-40-22 W4	Purchase
Barritt	SE 11-40-22 W4	Purchase
Parlby Cree	Pt. W 1/2 10-40-23 W4	Purchase
Hawthorne	NW 24-38-24 W4	Purchase
Country Cocoon	NW 1 N 1/2 2-40-22 W4	Conservation Easement
ingsland	SW 4-40-22 W4	Conservation Easement
Abel	N 1/2 2- 41-27 W4	Wetland Restoration
Rainy Cree	NE 4-41-2 W5	Wetland
Wildrose	NE 11-41-1 W5	Wetland
Blac more	NE 4-40-27 W4	Wetland
Ideal	SW 1-41-27 W4	Wetland
Collett	NE 26-41-26 W4	Wetland
Claerhout	SE 36-40-22	Wetland

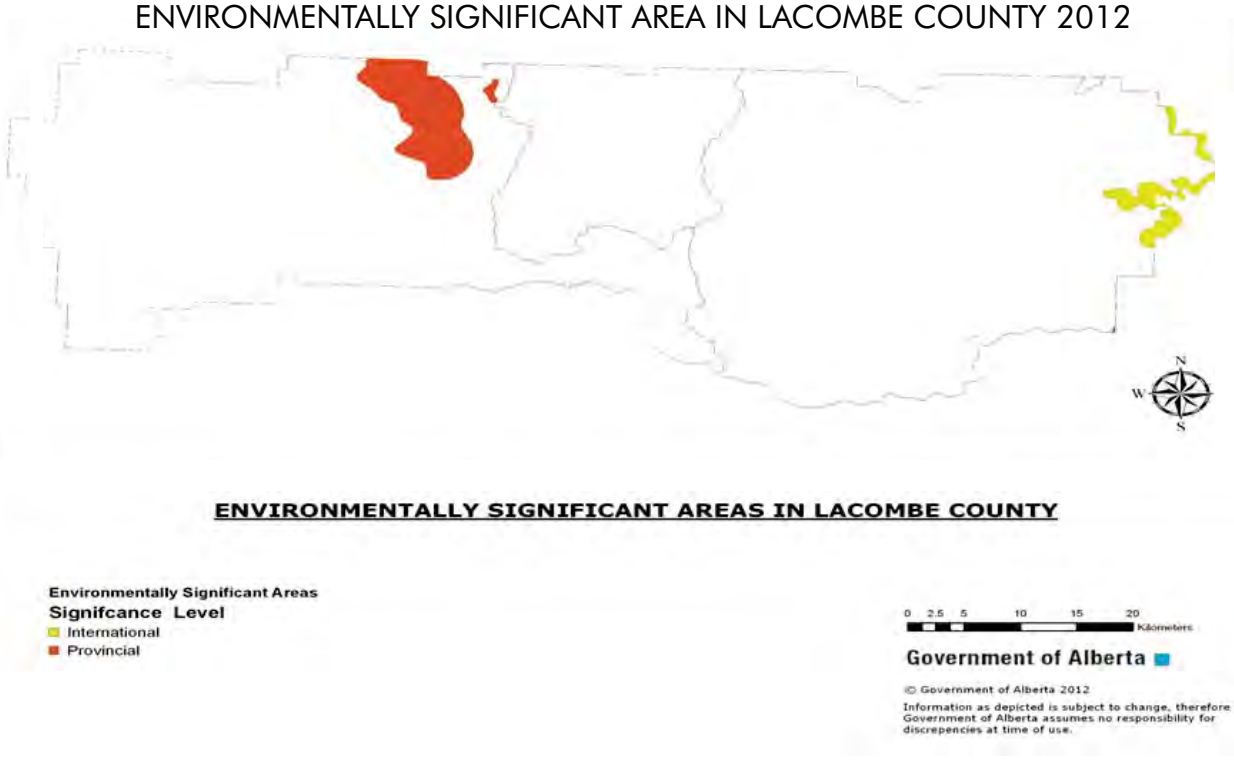
*WETLAND — land owner conservation agreement and licensed water control structure.
LLD is the location of the control structure; wetland project may also be part of other lands.

TABLE 23
ENVIRONMENTALLY SENSITIVE AREAS-REGIONALLY AND PROVINCIALLY SIGNIFICANT SITES

Site Name	Major Features	
Regional Significant		
Alix Wetlands	• Productive marsh • Diversity of marsh birds	• Boreal wetland • Uncommon birds
Blindman River	• Key deer habitat	
Gabriel La e Wetlands	• Productive marsh • Extensive boreal wetlands	• Diversity of breeding birds
Gabriel and Tait La es	• Productive marsh	• Key waterfowl habitat
Gull La e	• Productive marsh • Key waterfowl habitat	• Diversity of marsh birds • Key fish habitat
Lacombe - Blac falds Wetlands	• Diversity of productive wetlands • Diversity of marsh birds	• Important waterfowl habitat

Site Name		Major Features
Lower Parlby Cree	• Extensive sedge marsh willow • Key Deer habitat	• Great Blue Heron colony • Uncommon birds
Medicine Lodge Hills	• Diversity of habitats • Key Deer habitat	• Rare and uncommon birds and plants
Morningside	• Aspen Parkland on sand dunes • Diversity of habitats	• Uncommon plants and birds
Red Deer Canyon	• Deep, picturesque canyon • Diversity of habitats • Diversity of breeding birds • Springs and perched wetlands	• Key deer habitat • Significant bedroc exposure • Nesting birds of pray
Spruceville Wetlands	• Numerous rare and uncommon birds	• Uncommon bird • Boreal wetlands
Sylvan La e	• Productive moose and deer habitat • Key fish habitat • Diversity of breeding birds	• Rare and uncommon birds and plants • Boreal wetland
Tees Springs	• Calcalerous springs and Marl deposits	• Uncommon plants
Upper Parlby Creek	• Extensive boreal wetlands • Uncommon birds and plants	• Diversity of breeding birds • ey deer habitat
Site Name		**Major Features**
Provincially Significant Buffalo La e	• Extensive, productive marsh • Diversity of breeding birds • Endangered, rare and uncommon birds	• ey deer habitat • ey waterfowl and shorebird habitat

FIGURE 32
ENVIRONMENTALLY SIGNIFICANT AREA IN LACOMBE COUNTY 2012



3.6.2.2 PRESENCE OR ABSENCE OF HABITAT CORRIDORS

Small remnant grasslands that connect larger areas of native landscapes represent corridors in a "conservation net." As fragmentation of natural vegetation increases, these corridors become critical dispersion routes for plant and small wildlife species. Establishing conservation nets is one solution for landscape diversity protection in regions heavily influenced by agriculture or urbanization, such as the Central Parkland Natural Sub-region (Forman, 1995). At the present time there is no data that maps out habitat corridors within Lacombe County.

3.6.2.3 PRESENCE OF WEEDS

In the *Weed Control Act,* the Prohibited Noxious category currently contains 46 species of weeds and the Noxious Weed category contains 29 species of weeds.
For the past ten years Lacombe County's weed control efforts have focused on enforcing and controlling four species of weeds:

- Scentless Chamomile
- Yellow Toadflax
- Common Tansy
- Canada Thistle

For the most part, diligent weed inspection and landowner cooperation contained the spread of these species. Today's environment has changed from that of a decade ago. The moisture regime for the past three years has contributed to the propagation of weeds. Increased land development has created an environment where prohibited noxious and noxious weeds are very hard to control due to lack of vegetative competition and topography. The second threat to Lacombe County is the continued spread eastward of tall buttercup and caraway from the foothills eastern slope area.Tall buttercup and caraway are two species first identified a decade ago in the eastern slopes boreal forest region located directly west of Lacombe County. Both species have invaded both native and improved range lands. Control is very difficult due to the wet, rough terrain where the weeds prefer to grow. Each year, Lacombe County hires two seasonal weed inspectors employed from May to August. The weed inspectors' duties are to look for and deal with prohibited noxious and noxious weeds found on municipal, crown and private land. Inspection reports are entered in a weed mapper program designed and developed by Lacombe County. The weed database allows the inspectors to acquire landowner contact information as well as update the status of the weed case information. The weed mapper is a valuable tool and allows continuity from year to year in monitoring individual weed cases and the status of weeds within the County. Currently the County manages 21 parcels of land encompassing 2,120 acres of land, on which we control weeds. The parcels consist of:

- County Reserve lands
- Gravel Pits
- Gravel Stockpile Sites
- Lacombe Regional Solid Waste Authority - Waste Transfer Sites

SCENTLESS CHAMOMILE

YELLOW TOADFLAX

COMMON TANSY

CANADA THISTLE

TABLE 24
WEED CASES IN 2011

eed Species	# of eed Cases	Problem Areas
Scentless Chamomile	9	Near the City of Lacombe and Wolf Cree
ellow Toadflax		Near the City of Lacombe near highway 11 Near offre and moving northeast through the Tees area and secondary highway 821
Common Tansy	3	Central area of the County and isolated patches east and west of Lacombe
Canada Thistle		Throughout the County boundaries, mostly in rangeland and pasture land
Leafy Spurge	4	Eastern portion of the County north and south of Mirror
Tall Buttercup	21	Ma ority on west side of the County but moving to the east.
Wild Caraway		West of Highway 2 in pasture and rangelands, however a significant population is found in the offre area.

3.6.3.4 SPECIES AT RISK

By identifying species at risk and their habitat requirements, the County will be better able to balance the management of the area's ecology with the needs of our community. The *Species at Risk Act* (SARA) was introduced June 2003. It is a legal document that is used to prevent wildlife species in Canada from disappearing; to provide for the recovery of wildlife species that no longer exist in the wild in Canada, that are endangered, or that are threatened as a result of human activity; and to manage species of special concern to prevent them from becoming endangered or threatened. The Act outlines a number of measures applicable across Canada. Some of these measures establish how governments, organizations, and individuals in Canada work together, while others implement a species assessment process to ensure the protection and recovery of species. Some measures provide for sanctions for offences under SARA. The Fish and Wildlife Department within Alberta Environment and Sustainable Resource Development has collected data on various bird and animal sightings over a number of years. These sightings are used to help identify and track species locations. Management decisions can be made on the basis of this data. Within Lacombe County the following species of interest have been identified:

- American White Pelican
- Bader
- Bald Eagle
- Bank Swallow
- Barred Owl
- Black Tern
- Black-Crowned night Heron
- Franklin's Gull
- Osprey
- Peregrine Falcon (threatened)
- Pied-Billed Grebe
- Plains Garter Snake
- Prairie Falcon
- Red-Sided Garter Snake
- Sprague's Pipit (threatened)
- Western Grebe
- White-Winged Scoter
- Yellow Rail (special concern)
- Great Blue Heron
- Northern Leopard Frog (endangered)
- California Gull
- Canadian Toad
- Cliff Swallow
- Eared Grebe
- Forester's Tern

One major study has been done on Species at Risk within Lacombe County. This study was done on Buffalo Lake in 2007 and is titled "Bird Populations on the Shoreline of Buffalo Lake: Identification of Priority Areas for Conservation". Buffalo Lake has been frequently noted for its importance to wildlife, especially birds. This recognition stems mainly from its value as a waterfowl production staging area, and because of the presence of several large colonies of colonial birds. In 2007, a study by Alberta Fish and Wildlife Division looked at the importance of shoreline areas of Buffalo Lake to avian species. The work was done to provide guidance on the important areas of conservation that should be incorporated into land-use decisions. In total the study identified a total of 145 species of birds, of which at least 30 were classed as "sensitive" in Alberta. (Prescott, D.R.C. and S.D. Stevens, 2007). Based on the findings, areas were mapped to show sensitive habitat, and recommendations were set forward on how to ensure a balance between current usage, future development and ecological needs. Some of the recommendations included zoning areas of development based on sensitivity of shorelines, establishing speed limits and restricted areas for boaters and all-terrain vehicles, and increased awareness among lake users and residents.

3.6.4 WETLANDS AND CONDITION INCLUDING RIPARIAN HEALTH

Wetlands are important for biodiversity: they provide habitat and food for a disproportionately high number of species. Prairie wetlands, in particular, serve as vital habitats for migratory bird populations, species that are economically and culturally important for many Canadians. Wetlands serve many functions in the natural landscape, including water storage, flood attenuation, wildlife habitat, groundwater recharge and general water quality improvements. The loss of wetlands to development and/or agriculture can have a negative effect on surface and groundwater quality and quantity. (Aquality Environmental Consulting, 2009).

Research done by the University of Saskatchewan has demonstrated that farms that implement agricultural best practices have supported larger and more diverse bird communities than farms that do not. Examples of best practices include reduction or elimination of pesticides, minimizing the frequency of tillage, and restoring degraded sites. These agricultural practices offer promise for striking a balance between maintaining agricultural productivity and protecting local wildlife (Environment Canada). The Prairie Habitat Joint Venture (PHJV) is a partnership between federal and provincial governments, organizations, and conservation groups in Manitoba, Saskatchewan and Alberta. This joint venture assessed the loss of wetlands in the Parkland and Boreal *Natural Regions* from 1985 -2001 (Prairie Habitat Joint Venture, 2008).

Studies have shown that modifying traditional farming practices and land-use may offer relatively practical and inexpensive solutions.

Based on studies conducted by Watmough and Schmooll, 2007, the PHJV noted that there is ongoing wetland loss due to drainage and infilling, which is believed to be reducing the carrying capacity of the Canadian prairie/parkland to attract and hold breeding pairs of waterfowl. The ultimate influence of habitat change on waterfowl depends on the coincidental occurrence of wetland and upland habitat change. In their studies they explain that the native grasslands have declined by about 10% within the PHJV from 1985-2001. Native prairie is a unique and valuable habitat component that, once lost to cultivation, is virtually impossible to restore (Prairie Habitat Joint Venture, 2008). They also found that in Alberta, the Central Parkland Sub-Region has lost 7% of its total wetland area and 8% of the total number of wetlands due to human disturbance between 1985 and 2001. Comparatively, there have been losses of 3% in total wetland area and 1% in total number of wetlands in the Dry Mixedwood Subregions. Caution must be taken with this data as it is a generalization and not specific to Lacombe County. (Aquality Environmental Consulting, 2009).

As already mentioned, there is a lack of research specific to Lacombe County, but there is general information gathered on a province wide scale. The research data provided by Battle River Watershed Alliance (BRWA) and the Government of Alberta indicates there is 5,819.76 hectares or 1.96% of Lacombe County covered in wetlands at the present time. The diversity of wetland classes as described by Stewart and Kantrud (1971) is unknown at this time.

Based on the information provided by PHJV and the BRWA about the condition of wetlands in Lacombe County, the rating is considered to be "poor" due to high loss. Loss of wetlands may be caused from agricultural practices, development and linear developments such as roads, railways, pipelines and power lines.

Riparian areas are simply the portions of the landscape strongly influenced by water. They feature water-loving vegetation along rivers, streams, lakes, springs, ponds and seeps. When riparian areas are healthy and functioning properly, they are one of the most ecologically diverse ecosystems in the world.

Healthy riparian areas sustain fish and wildlife populations, provide good water quality and supply, provide forage for livestock and support people on the landscape. They trap sediments, which help in turn to stabilize and build banks. They help to recharge groundwater supplies and provide protection from flooding. Threatening all of these benefits are the ongoing pressures that riparian areas are facing.

Because of extensive and ever growing land use demands, riparian areas are among the most valuable, productive and vulnerable areas of the agricultural sector. Information about the health of riparian areas in the county is limited. The available information is provided in the following section.

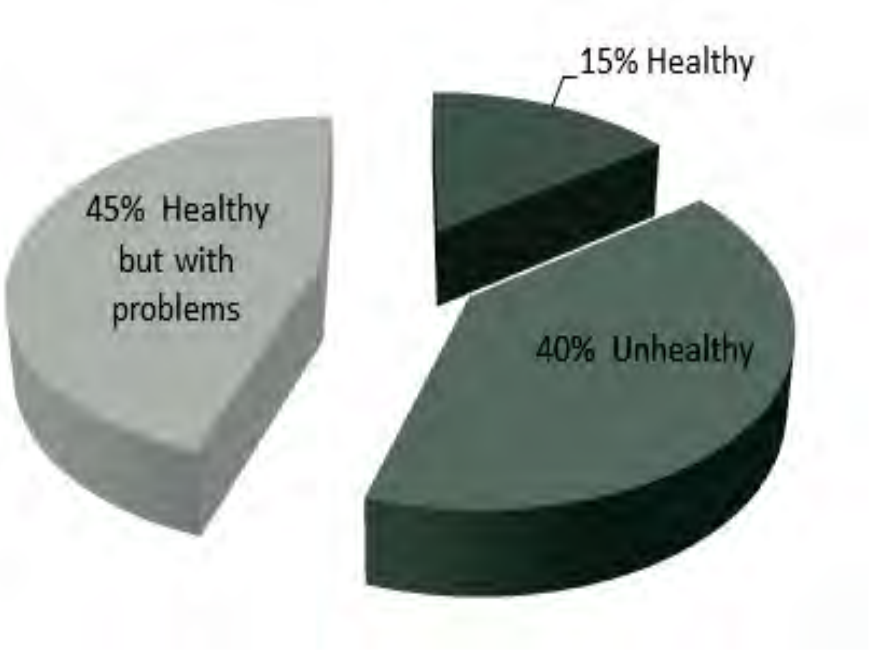
MEDICINE RIVER

Only one small study along a section of the Medicine River has been done. This study was conducted by Cows and Fish in 2004.The study is a baseline of information which can be used to help establish a management plan to ensure long-term sustainability of a healthy landscape. The baseline data is used to establish a point of comparison for future changes to the landscape, to determine if the health of riparian areas is being maintained, improved or is declining. Data from the Medicine River Riparian Health Inventory:

20 polygons or areas were assessed and the results found that:

- 15% (3/20) are healthy,
- 45% (9/20) are healthy but with problems,
- 40% (8/20) are unhealthy.

FIGURE 33
CONDITION OF RIPARIAN HEALTH - MEDICINE RIVER PROJECT AREA



Healthy Category Score Ranges Description

Healthy	80-100% - little to no impairment to any riparian functions
Healthy but with problems	60-79% - some impairment to riparian functions due to management or natural causes
Unhealthy	Less than 60% - severe impairment to riparian functions due to management or natural causes

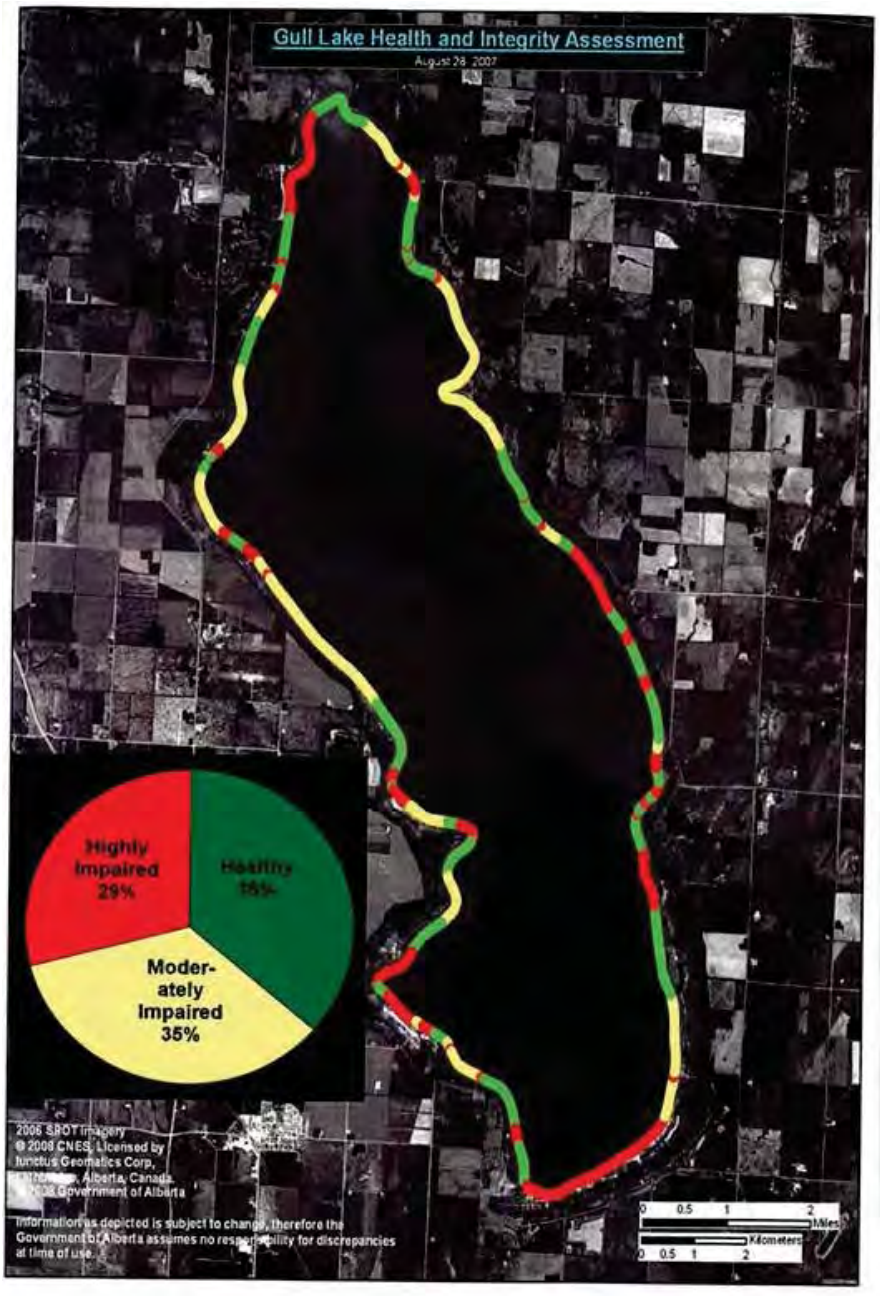
*This information is very limited as the research was conducted in 2004, and no additional research in the area or the rest of the County has been conducted.

GULL LAKE

On August 28, 2007 videos of the shoreline of both Gull and Sylvan Lake were taken from a helicopter using a digital video camera that recorded both the location and time of the footage. This information was used to produce a map showing the flight line of the helicopter. (Refer to Figure 34.) The data taken from the flyover was used to help examine and asses the riparian health around the lakes. The data taken from the flyover was used to help examine and asses the riparian health around the lakes. Assessment criteria included examining the proportion of area covered by natural vegetation, presence of cattails and bulrush, abundance of trees and shrubs, the amount of human-caused disturbance or vegetation removal and the amount of human caused physical alternation.

FIGURE 34
MAP OF GULL LAKE 2007

This assessment was then used to score the shoreline on a scale of healthy, moderately impaired or highly impaired. The 2007 assessment found that 36% of Gull Lake was in a healthy state, 29% was in a highly impaired state and 35% was moderately impaired. Refer to Figure 34. The most common causes of lower scores in moderately and highly impaired areas were encroachment of adjacent subdivision developments (i.e. removing vegetation, and establishing private beaches, boat lifts and marinas), ATV trails and livestock grazing (Alberta Sustainable Resource Development, 2008). Gull Lake is managed by multiple government bodies including counties, summer villages and the Province of Alberta. As such, impacts along the lake shore and within the lake proper are at times outside of the jurisdiction of Lacombe County.



SYLVAN LAKE

The 2007 assessment found that 51% of the riparian area around Sylvan Lake was in a healthy state, while 42% was highly impaired and the remaining 7% was moderately impaired. This is shown in Figure 35. The most common causes of lower scores in moderately and highly impaired areas were encroachment of adjacent subdivision developments (i.e. removing vegetation, and establishing private beaches, boat lifts and marinas), ATV trails and livestock grazing. (Alberta Sustainable Resource Development , 2008)

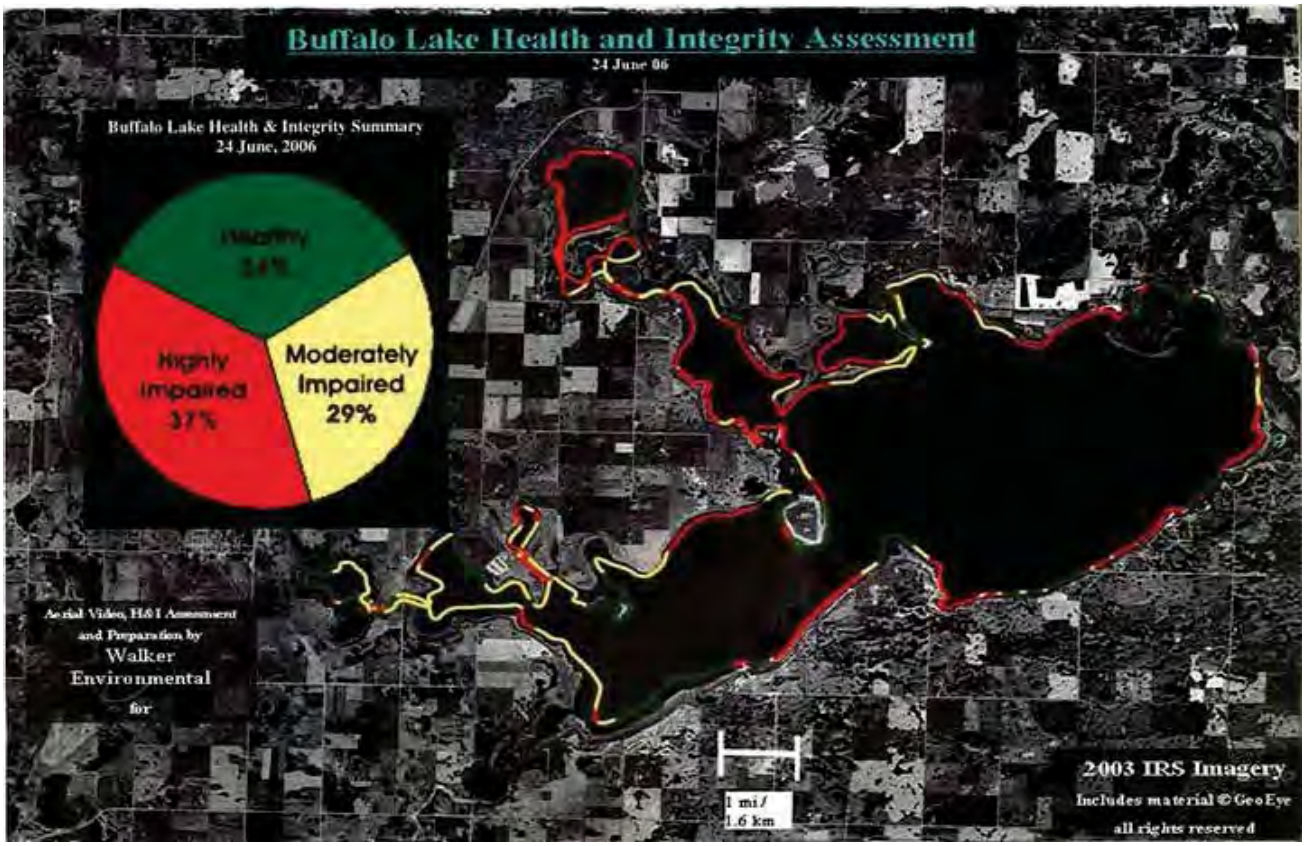
Sylvan Lake is managed by multiple government bodies including counties, summer villages and the province of Alberta. As such, impacts along the lake shore and within the lake proper are at times outside of the jurisdiction of Lacombe County.

FIGURE 35
SYLVAN LAKE RIPARIAN HEALTH AND INTEGRITY ASSESSMENT 2007

BUFFALO LAKE

A similar shoreline assessment was conducted on Buffalo Lake. This assessment was completed in 2006 and found that 34% of the riparian area was in a healthy state, 37% was highly impaired and 29% was moderately impaired. The most common cause of impairment of the shoreline was encroachment by adjacent development (i.e. removing vegetation, establishing private beaches, shoreland beautification, construction of boat houses and marinas) and livestock grazing. A prior shoreline assessment was done in 2005 that examined the uses of the shoreline. It was found that 59% of the shoreline was used by livestock, 29% was in its natural state and 7% had been developed for beaches. There was also evidence that 43% of the shoreline was used by all-terrain vehicles. Buffalo Lake is managed by multiple government bodies including counties, summer villages and the province of Alberta. As such, impacts along the lake shore and within the lake proper are at times outside of the jurisdiction of Lacombe County.

FIGURE 36
BUFFALO LAKE RIPARIAN HEALTH AND INTEGRITY ASSESSMENT 2006



Since the shoreline assessments were completed in 2006-07, Lacombe County has seen changes in agricultural practices that may yield improvements in riparian health. Such practices include alternative watering of cattle, such as encouraging cattle to drink from troughs or pumps that are away from the water's edge. Programs and funding opportunities such as the Environmental Farm Plan provided agricultural producers access to funds through grants to purchase the necessary equipment. Future funding of this program has not yet been decided.

3.6.5 MANAGEMENT TOOLS

MUNICIPAL PLANNING TOOLS

The area bordering Buffalo Lake lies within the jurisdiction of five municipalities. The Buffalo Lake Intermunicipal Development Plan was written in 1997 in response to concerns regarding the environmental capability of Buffalo Lake to support more intensive residential development. The intent of the plan was to ensure responsible future management of Buffalo Lake and the surrounding shoreline area by coordinating "land uses, future growth patterns, and municipal infrastructure" and providing a "framework for subsequent subdivision and development" (Buffalo Lake Intermunicipal Development Plan, 2010). This plan was in place for 13 years before it was updated in 2010. The updated version of the plan took into consideration the 2004 Buffalo Lake Integrated Shoreland Management Plan (BLISMP), which identifies how provincial government agencies will manage the lake's littoral zone and the right-of-way surrounding the lake (Alberta Sustainable Resource Development, 2010). Overall the new IDP has increased the plan area boundaries and the IDP's influence over municipal decision making. Surrounding municipalities will use the plan to ensure planning decisions and responsibilities are made in alignment with each other and for the benefit of the lake.

RESTRICTED DEVELOPMENT AREAS AND PROTECTED NOTATION

Alberta Environment and Sustainable Resource Development has placed covenants on the lake shore in certain locations, which are called Restricted Development Areas (RDA). The specified areas identify key lakeshore habitat and protect features such as spawning sites for fish species (e.g. pike, perch and whitefish). These fish spawn in shallow lakeshore regions, including shallow bays, floodplains and marshy areas. These areas may also be used by other species such as shorebirds. These areas have specific habitat sensitivities and are susceptible to damage by livestock, destructive recreational usage and development. In some lakes, such as Sylvan Lake, the specified RDA Areas represent the last remaining stands of emergent aquatic vegetation remaining on the lake, and therefore are critical in maintaining the lake's ecological function. After they are identified, these areas have specific resource management objectives placed on them and they are placed under protective notation (PNT). New projects that are proposed for these areas are evaluated against the management objectives that are already set. (AESRD (b), 2012)

WHITE FISH

PIKE

PERCH

3.7 HUMAN IMPACTS

3.7.1 WASTE GENERATION AND DISPOSAL

Lacombe County is a member of the Lacombe Regional Solid Waste Authority. The Authority was established in 1987 and consists of the following member municipalities:

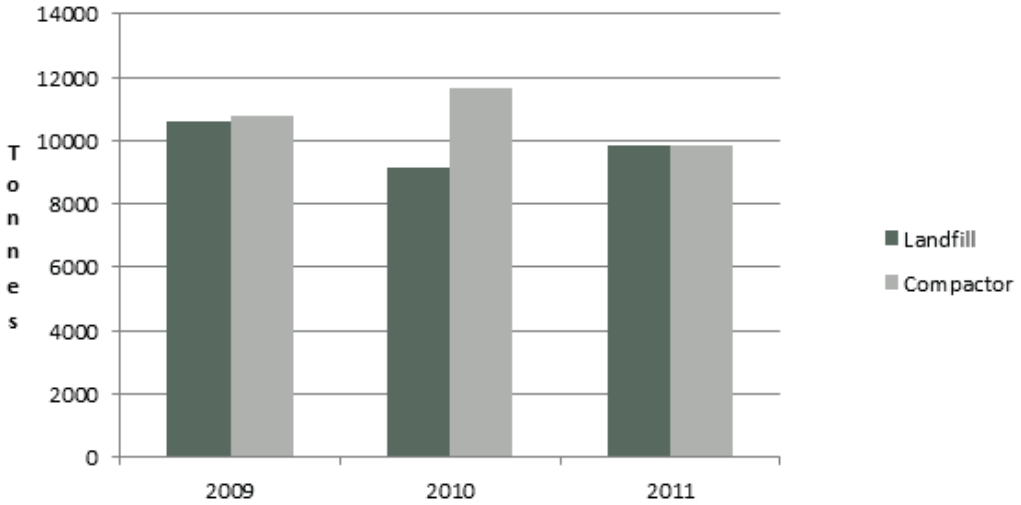
- Lacombe County
- Alix
- Lacombe
- Eckville
- Clive
- Bentley

Lacombe County's Operations Department manages the day-to-day operations for the Authority, including site and equipment maintenance, administration of the budget, equipment purchasing and sales, and staffing. Information on the overall amount of waste generated by all municipalities within the Authority has been collected and is shown in Figure 37 and Table 25 below. Waste that is quantified under the "compactor" disposal column is household waste. This waste is compacted into containers and transferred from the Prentiss landfill site to the Dried Meat Lake waste facility. The waste column labelled "landfill" is for dry rubble materials disposed at the Prentiss Landfill facility. This graph illustrates the overall waste generation for the Lacombe Regional Solid Waste Authority area, and shows that the amount of waste transferred to West Dried Meat Lake landfill on average is greater than what is placed in the Prentiss landfill.

TABLE 25
TABLE 25 WASTE GENERATED BY LRSWA 2009-2011 IN TONNES

Disposal	2009	2010	2011
Landfill	10,622	9162	9839
Compactor	10788	11660	9856

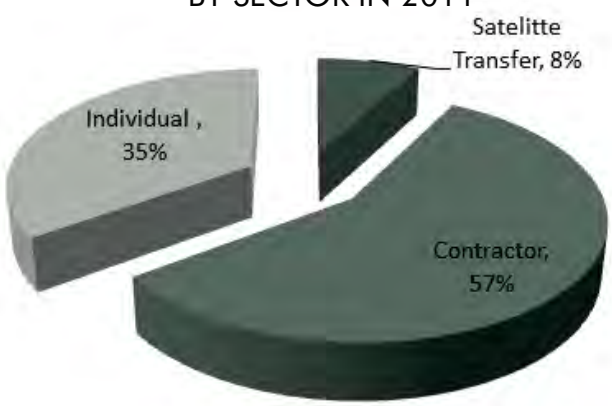
FIGURE 37
WASTE GENERATED BY LRSWA 2009-2011 IN TONNES



In 2010 and 2011 the LRSWA began tracking the amount of waste that was disposed of by sector. This breakdown of information provides us a snapshot of which sectors of our community are using the Prentiss landfill. It also provides the LRSWA with information on how to manage waste disposal and who to target regarding education about waste management.

FIGURE 38
PERCENTAGE OF WASTE GENERATED BY SECTOR IN 2010

FIGURE 39
PERCENTAGE OF WASTE GENERATED BY SECTOR IN 2011



LRSWA tracks the amount of recyclable materials disposed of at each of the recycling depot locations. Figure 40 and Table 26 display the recycling rates for 2009 through 2011. From the data gathered we do not see any obvious trend of either an increase or decrease in recycling rates for the LRSWA over the years of 2009-2011.

FIGURE 40
RECYCLING RATES 2009-2011

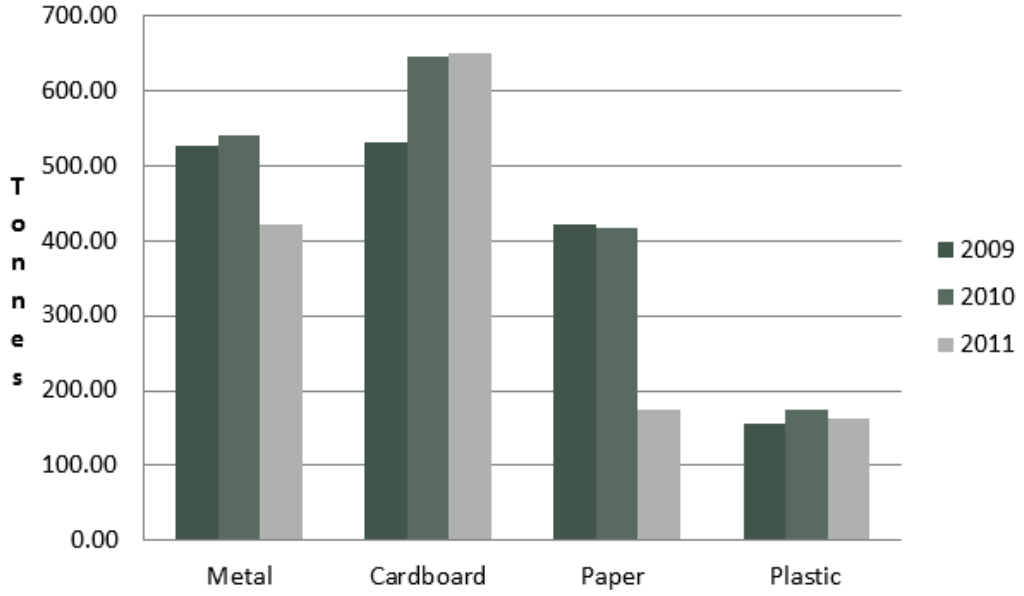


TABLE 26
RECYCLING RATES 2009-2011 (TONNES)

Recyclable item	2009	2010	2011
Metal	526.94	539.74	421.88
Cardboard	532.09	646.13	649.90
Paper	422.00	417.84	175.40
Plastic	155.39	175.40	162.68

Two studies have been completed regarding waste generation and disposal in Lacombe County. The first was a waste audit conducted by Gartner Lee in August 2008 that examined the residential waste stream for all LRSWA areas as well as an additional eight sites. Table 27 includes only that information relevant to the LRSWA partners. Samples of garbage were chosen at random and truckloads of waste were audited during a four day study. The audit was used to examine what was being disposed of in the general landfill. Any items that were recyclable were considered "contaminates" within the waste stream. To determine what contaminates were in the waste stream the waste was first sorted into primary categories, and then further separated to secondary categories. Each category of waste was weighed and the data was recorded. Table 27 provides the estimated composition of residential waste from the LRSWA, the Gartner Lee study also examined eight other sites but that data was not included in this SOE as it is not relevant to Lacombe County. The main categories that were shown to be "contaminates" or recyclable materials that were disposed of in the garbage included organic waste (29.3%), paper (28.1%) and plastic (11.2%). It is important to remember that there are facilities to recycle organic waste, paper and plastic within Lacombe County. When comparing the results found in the study by municipality or authority, the LRSWA has the highest contamination rate by at least 10%.

In 2012 Lacombe County, in partnership with members of the LRSWA, undertook a survey of the residents within the LRSWA areas. 161 participants answered the survey, which gathered information about satisfaction ratings, accessibility, barriers to recycling and education. The results showed a high rate of people recycling, with an average of 83% reporting they undertook this activity weekly. Participants were also asked about what stops them from recycling and composting. The answers included that there was a lack of diversification in recycling options i.e. glass, tin, plastics; and a lack of facilities at transfer sites, making it cumbersome to recycle. There was also a small lack of understanding regarding composting household waste and a possible lack of facilities to undertake this properly.

TABLE 27
RESULTS FROM WASTE AUDIT –
GARTNER LEE 2008

Material Categories	Total eights	Percentage
Organic waste	342.80	28.8%
Paper products	329.20	27.7%
Plastic	130.60	11%
Textiles	95.70	8%
Inert waste	67.20	5.6%
Metal	61.60	5.2%
Wood waste	29.90	2.5%
Bul y goods	27.20	2%
Fines	22.00	1.8%
Other	18.70	1.6%
Diapers	15.50	1.3%
Bio-medical waste	13.40	1%
Electronic waste	13.20	1.1%
Glass	11.80	1%
Household hazardous waste	4.20	.4%
Pet waste	3.60	.3%
Rubber	3.00	.3%
Gypsum	.070	.1%

3.7.2 HISTORICAL LANDFILLS

Within Lacombe County there are eight identified historical landfill sites. These sites are managed by Lacombe County but must adhere to Provincial legislation and policy regarding permissible uses of such areas. Each site has been identified and assessed based on public liability risk and access criteria. The use of each site will be managed on an individual basis according to community needs and applicable legislation.

3.8 CONCLUSION OF ENVIRONMENTAL INDICATORS

The choice of indicators is based strongly on recommendations from Alberta Environment, the scientific community and Lacombe County residents. The indicators have been ranked and will provide a basis to help us achieve our goals. Based on the environmental indicators discussed earlier in the paper, Table 28 outlines the ranking of each indicator. These indicators, as well as the information gathered through the community consultation, will provide us with the baseline for the designing the Environmental Management Plan.

TABLE 28
REPORT CARD FOR LACOMBE COUNTY ENVIRONMENTAL INDICATORS 2012

Theme	ndicator	Rating
Land se	Agriculture and Livestoc Operations	Fair
ater uality	Nutrients Rivers	Poor
	Nutrients - La es	Good
	Bacteria Rivers	Poor
	Bacteria La es	-----
	Parasites Rivers	Poor
	Parasites La es	-----
	Pesticides Rivers	Poor
	Pesticides La es	----
Bio-indicators	Habitat Cover and Health	----
	Wildlife biodiversity	----
	Wetland Condition and Riparian Health La es	Fair
	Wetland Condition and Riparian Health Rivers	Fair
Human mpacts	Waste generation and disposal	-----

----* no data has been found and as such no ranking has been given
----** there is no appropriate scale for the County, therefore no ranking has been given

4 COMMUNITY CONSULTATION

There is a sense of pride and concern for the environment amongst residents of the County. This sense of concern manifests as action to protect the environment for the future generations. The top four concerns are:

- water quality
- waste management
- taking responsibility and providing leadership
- providing a balance between agriculture, development and the environment

From February to April 2012, Lacombe County carried out extensive consultation in regards to environmental management. The consultation, which targeted the community and staff, has assisted in:

- gathering opinions and thoughts to provide a baseline of current perceptions
- developing a tool to engage with our stakeholders
- providing guidance for future project planning

567 participants were contacted over the three month period through the use of focus groups and a telephone survey. The information was recorded and collated in detailed reports which are available for download from the Lacombe County website. They can also be sent by post if requested.

4.1 FOCUS GROUPS

Participants in the focus groups examined seven questions. These questions will help establish a direction for the County to take when developing and implementing policies and programs.

99% of participants felt that staff and the community should be engaged with before setting new management policies and programs.

THE DISCUSSION

The first question asked was "What is your vision for the environment in Lacombe County in 20 years?"
The top three answers included:

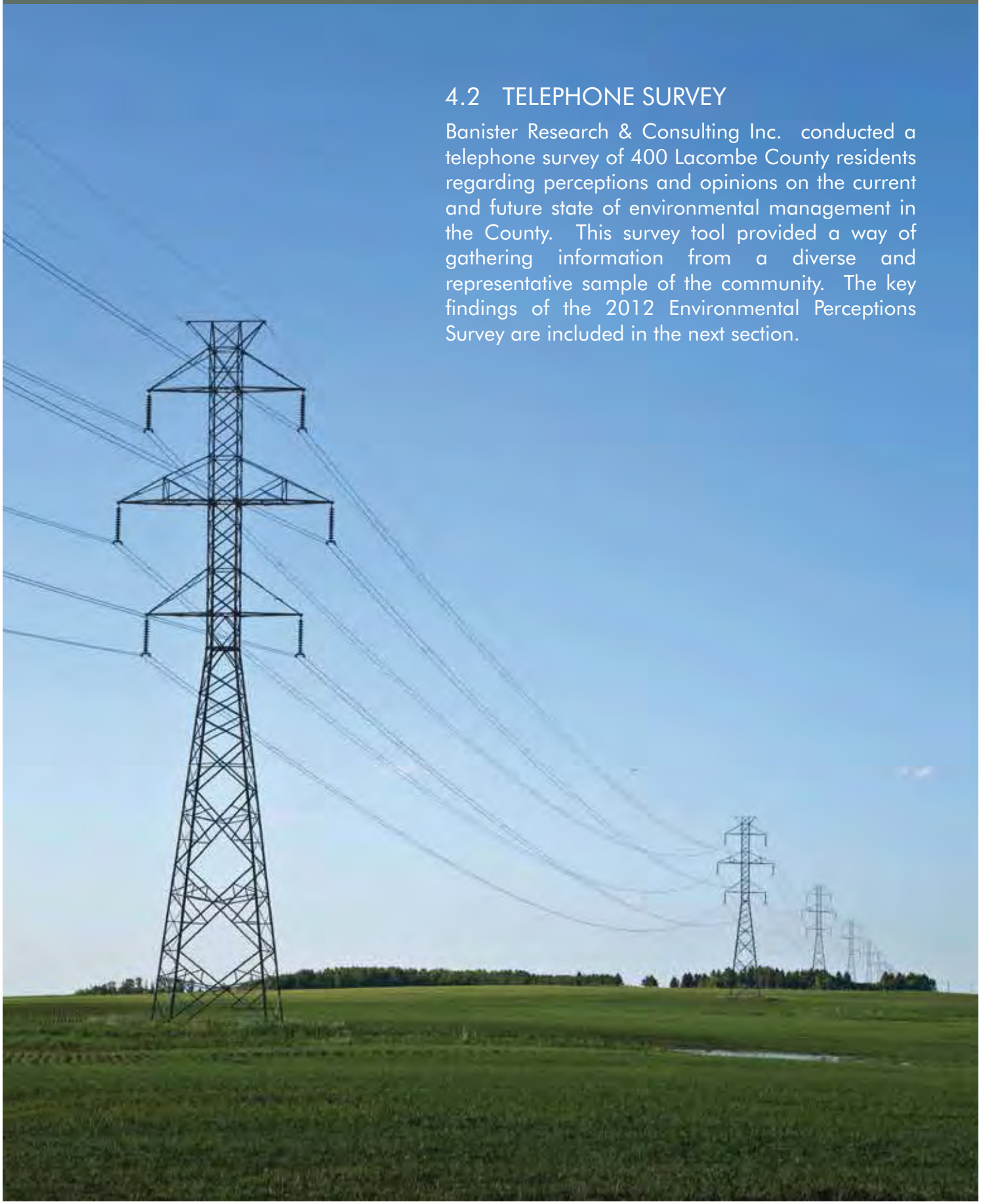
- improved habitat including water quality within the County;
- an established sense of identity that is focused on agriculture; and
- a thorough, balanced and transparent system for making decisions about development.

Once a direction was established, the participants defined in their own words what environmental management meant to them. This was crucial as it allows staff to examine preconceptions of work associated with managing the environment. The participants agreed that environmental management is defined as leadership, strategic planning, taking personal responsibility and being a steward to the land. Having established a clear vision, the participants were then asked if the County should have a role in environmental management, and if they did what would that role be. The findings show that the 87% of the participants felt the County should have a role and that it would be as a leader who takes responsibility for providing clear direction. This would be done via proper planning, education and, only when necessary, enforcement, to create a relevant, grounded and locally applicable plan.

The benefits and barriers regarding the merits of implementing environmental management in the County were then discussed. Some of the benefits identified included an increased quality of life through increased community pride, health and a secure future for generations to come. Some additional barriers included a lack of motivation or desire to change, time and cost commitments, and a lack of knowledge. A great many ideas and concerns were gathered throughout the discussion, which encompassed the current environmental issues within the County. From these, participants were asked to select their top four prioritized concerns. The findings in this report are a compilation of the staff and community findings. For details, please refer to the full report. Table 29 lists the current top four most important issues (as identified) and the corresponding vision for 2032.

TABLE 29
CURRENT ISSUES VS. VISION FOR 2032

Top our Current ssues	ision of ur Environment in 20 2
Water quality is an issue which is affected by development and agriculture	Preservation and improvement of habitat including water quality
Need to review our waste management service levels	Improve the way we currently manage our waste
Lac of leadership and responsibility when ma ing decisions	Creation of plans and policies that are strongly supported by our Council
Too pro-development, we require a more rigorous balance to protect our agricultural lands and habitat	Balanced development decisions are made that promote and encourage agriculture and protecting habitat



4.2 TELEPHONE SURVEY

Banister Research & Consulting Inc. conducted a telephone survey of 400 Lacombe County residents regarding perceptions and opinions on the current and future state of environmental management in the County. This survey tool provided a way of gathering information from a diverse and representative sample of the community. The key findings of the 2012 Environmental Perceptions Survey are included in the next section.

4.2.1 QUALITY OF LIFE

97% of respondents provided a high rating regarding the quality of life in Lacombe County. Factors contributing to this included:

- availability and maintenance of infrastructure and roads;
- the quiet, rural lifestyle or country living; and
- centralized location and proximity to other centres.

Conversely some of the issues that the County is currently facing that reduce the quality of life include:

- poor road maintenance and poor quality of roads;
- increased demand for development with an emphasis around the lakes; and
- the need to keep taxes low.

Similar responses were provided when participants were asked about what issues the County will face in 10 years.

4.2.2 ENVIRONMENTAL ISSUES FACING LACOMBE COUNTY

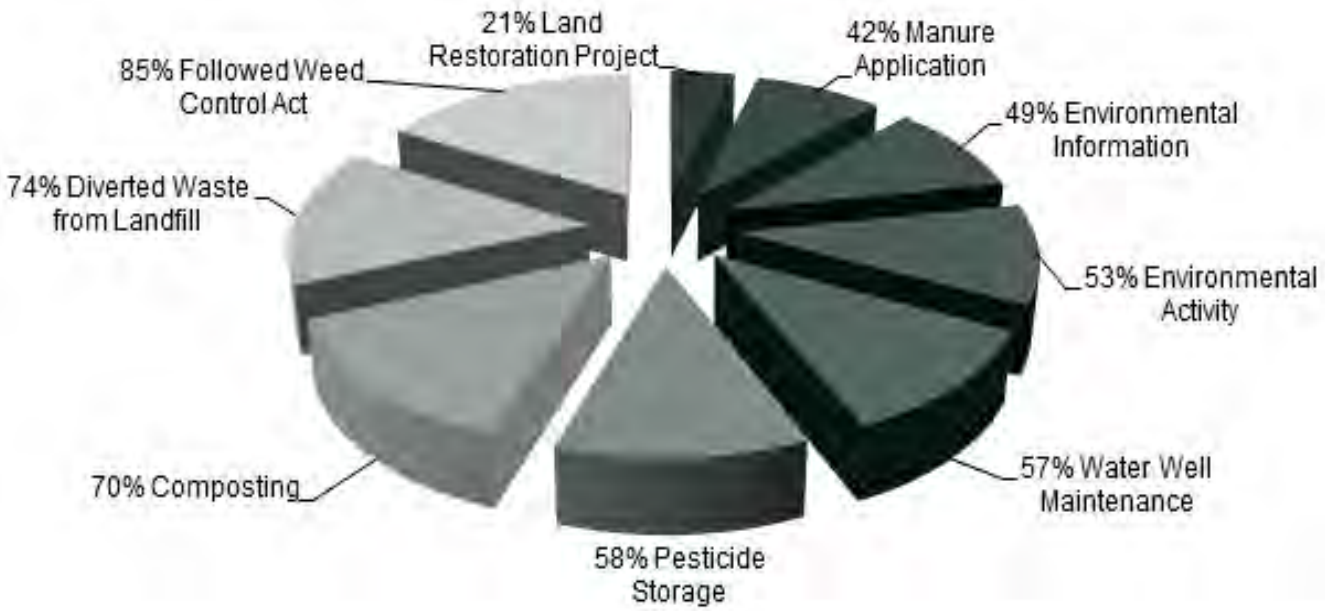
The most common environmental issues in Lacombe County are water quality, air quality, and waste generation and disposal of agricultural and household waste.

When asked to prioritize these issues almost two-thirds of respondents (62%) mentioned water quality as their greatest concern, followed by fertile and healthy soils (58%) and waste generation and disposal of agricultural and household waste (58%). When asked what level of concern respondents had about the environment, a majority (83%) of respondents were concerned to some degree (rating 3, 4 or 5 out of 5). Reasons for this concern included a general concern for the future (11%), concerned, but happy, with the current state (11%) and the pollution and damage caused by the industrial sector (10%). Of respondents who were less concerned (rating 1 or 2) about the environment, 31% stated there is nothing to worry about as everything is fine, and 17% stated that it is not a big deal and there is too much hype about the topic.

4.2.3 ENVIRONMENTAL BEHAVIOURS AND ACTIVITIES

Over half of respondents (53%) have participated in at least one environmental activity or behaviour in the past 12 months, as shown in Figure 41.

FIGURE 41
ENVIRONMENTAL BEHAVIOURS AND ACTIVITIES



The reasons given for participating in these activities included an increase in awareness and knowledge of the topic, that they have always participated, or that they are now being influenced by a spouse or family member. Two-thirds (67%) of respondents stated there were no factors that prevented them from doing more to reduce their impact on the environment, while 10% stated financial obstacles, 7% stated the availability and access to facilities and 4% each mentioned time constraints and age or health issues as barriers. Over half of respondents (54%) mentioned there was nothing more Lacombe County could do to alleviate barriers that would allow them to do more to help reduce their impact on the environment. The remaining 46% suggested ideas such as bringing facilities closer or having a recycling centre at the landfill, improving existing facilities to accept more materials, extending operation hours and improving costs, and providing recycling bins and pick-up service.

4.2.4 AWARENESS OF ENVIRONMENTAL INITIATIVES

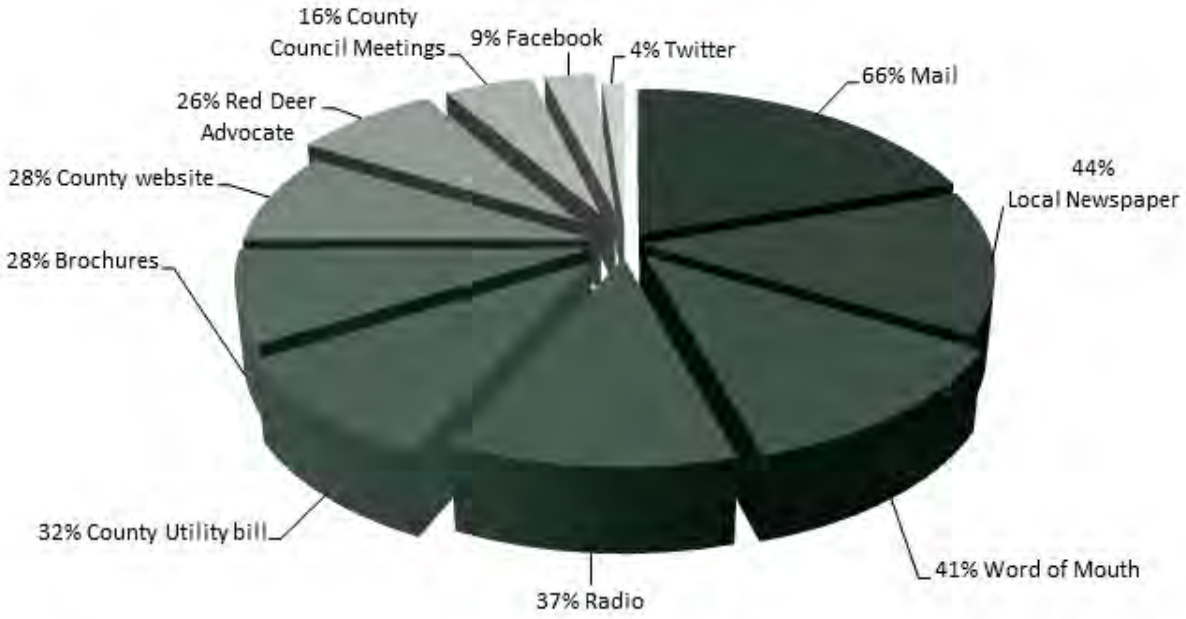
A large proportion of respondents (81%) were aware of the Alberta Weed Control Act. Almost half of respondents (45%) were aware of the Lacombe County Strategic Plan, while 41% each were aware of the Alberta Provincial Government Land-use Framework and best management practices for agriculture production in Alberta. One-third (34%) of respondents were aware of the Alberta Provincial Government Water for Life Strategy. Respondents who were aware of these environmental initiatives were asked to rate their effectiveness. Initiatives that respondents assigned a high effective rating (rating 4 or 5 out of 5) included:

- The Alberta Weed Control Act (44%)
- Best Management Practices for Agriculture Production in Alberta (42%)
- Lacombe County Strategic Plan (41%)
- The Alberta Provincial Government - Water for Life Strategy (23%)
- The Alberta Provincial Government - Land-use Framework (20%)

4.2.5 COMMUNICATIONS

Over half of the respondents rated Lacombe County as the most credible source for information regarding environmental topics. This was followed closely by family members and friends as a credible source. When asked to rate the effectiveness of a series of methods that the County could use to communicate with residents regarding environmental issues, high effective ratings (rating 4 or 5 out of 5) were provided for the following:

FIGURE 42
COMMUNICATIONS



4.2.6 FUTURE EFFORTS REGARDING ENVIRONMENTAL STEWARDSHIP

Overall, satisfaction with the County's efforts regarding environmental stewardship was high, as almost half of respondents (47%) provided a high satisfaction rating (4 or 5 out of 5), with 37% providing a neutral rating of "3" and 11% provided a dissatisfied rating (1 or 2 out of 5). The information gathered through the community and staff focus groups will be used to determine work plans, help set priorities and create change in our community.

Respondents most frequently stated that managing and protecting water sources (18%) was the single most important thing Lacombe County could do to protect the environment over the next 10 years. Other factors mentioned include protecting land from development (14%) and enforcing stricter rules and regulations (9%).

5 ENVIRONMENTAL PROGRAMING IN LACOMBE COUNTY

5.1 COUNTY PROGRAMS

The County undertakes a number of operational requirements in order to service the needs of our community. Some of these programs have an effect on the environment. As we progress with the Environmental Management Plan and our knowledge increases, we will improve our practices. Some of the current services we provide are listed below.

5.1.1 WINTER ROAD MAINTENANCE PROGRAM

Public safety is the highest priority for the County. Services such as road safety and maintenance are a top priority for the County. Effective road maintenance programs require dedication to adopting, implementing and refining best management practices. One of the most effective ways to ensure safety on the roads is through the use of a sand/salt mixture that is graded onto the roads after they have been plowed. The current mixture of sand/salt is 7% salt and 93% sand. The amount of salt added to the mix is based on road conditions. Lacombe County has an up-to-date Salt Management Policy. We are committed to measurable improvements in our salt management practices. The Transportation Association of Canada (TAC) has published a Salt Management Guide and a series of Syntheses of Best Practices.

This is to assist road authorities as they find ways to more effectively manage the salt used in winter maintenance to provide the public with the safe and efficient road systems they expect, while minimizing effects on the environment. By comparing our current practices to others' best practices and to the TAC guide, we have a benchmark against which progress can be measured and achieved.

5.1.2 DUST CONTROL PROGRAM

Dust from gravel roads may create health, safety or general nuisance concerns for residents. Therefore, the County offers a dust treatment program to mitigate the impact of dust in front of residences. Dust control is done through the application of MC 30 oil or calcium chloride. The County has been actively researching more environmentally friendly products and tried canola oil in 2011 but unfortunately it was not a suitable, effective alternative. The County is still attempting to find an effective, financially viable alternative to the products that we currently use.

5.1.3 BRUSHING PROGRAM

Lacombe County recognizes the need to remove trees and other vegetation on road allowances and adjacent properties to accommodate public safety, road maintenance and movement of vehicles and equipment. Subject to budget allocation, Lacombe County will establish and maintain a brushing program that takes into consideration the long-term transportations needs as well as smaller emergent projects that can be completed in a relatively short time period. Brushing projects are defined as areas that will normally use a crawler tractor, excavator and a full crew, have a minimum length of ½ mile and would require a minimum of one week of uninterrupted brushing to complete. Secondly, the program can include selective brushing of small areas including intersections and rail line crossings. Generally the brushing will occur in the off season for the construction crew, from December to March, depending on favorable weather. In 2012 the brushing crew removed approximately five acres of vegetation and trees from roadsides. In the future the County will be examining the possibility of offsetting clearing with re-planting of trees in appropriate locations.



5.1.4 ROAD CONSTRUCTION

The County establishes and maintains a road construction program that takes into consideration long-term transportation needs, as well as smaller emergent projects that can be completed in a relatively short time period.

5.1.5 CONSTRUCTION OF RECREATIONAL TRAILS

In 2012, Lacombe County built a recreational trail between the Town of Blackfalds and the City of Lacombe. The trail has been designed to minimize the impact on the environment. For example, boardwalks reduce the impact on environmentally sensitive water bodies. This trail has increased the recreational opportunities in the County.

5.1.6 MOWING

The mowing program runs from July to October each year. The program mows in either a shoulder cut or a ditch to ditch cut pattern. The program's aim is to create safe travel on County roads and to alleviate snow build up in the winter. The program also includes spot spraying of weeds where applicable and required.

5.2 ENVIRONMENTAL EDUCATION PROGRAMS IN LACOMBE COUNTY

5.2.1 MUNICIPAL

5.2.1.1 WEED EXTENSION WORK

Lacombe County hires two seasonal weed inspectors from May to August each year. Their duties are to inspect and deal with prohibited noxious and noxious weeds found on municipal, crown and private land. Inspection reports are entered in a Weed Mapper Program, designed and developed by Lacombe County. The weed database allows the inspectors to acquire landowner contact information as well as update the status of the weed case information. The Weed Mapper is a valuable tool and allows continuity from year to year in monitoring individual weed cases and the status of weeds within the County.

Currently the County controls weeds on 21 parcels of land for a total of 2,120 acres. The parcels consist of:

- County Reserve Lands
- Gravel Pits
- Gravel Stockpile Sites
- Lacombe Regional Solid Waste Authority - Waste Transfer Sites

5.2.1.2 ENVIRONMENTAL WORKSHOPS

The County has organised and supported a number of workshops on environmental topics. In 2011/12 these included supporting the Medicine River Watershed Tradeshow, partnering with Grey Wooded Forage Association for a local foods event, Yardscape 2012 and the Living Near Water Workshop. This set of programs will continue to grow, as the County now has a dedicated Environmental Coordinator to focus on environmental issues and initiatives.

5.2.1.3 COMMITTEES

SYLVAN LAKE MANAGEMENT COMMITTEE

The Sylvan Lake Management Committee was formed in 1986 by the Town of Sylvan Lake, Lacombe County, Red Deer County and the Summer Villages of Birchliff, Half Moon Bay, Jarvis Bay, Norglenwold and Sunbreaker Cove. The original Sylvan Lake Management Plan was written at that time, and subsequently updated in 2000. The plan was written to help promote responsible land use and development around the lake whilst allowing each member municipality to maintain autonomy over final decisions. The committee meets on a regular basis to discuss issues and concerns that affect the lake and watershed.

5.2.2 COMMUNITY GROUPS

5.2.2.1 FRIENDS OF CHAIN LAKES SOCIETY

This community group was formed in 2010 and represents the interests of residents and community members within the Chain Lakes watershed area. The group was formed after concerns were raised about environmental risk and water quality issues arising from adjacent land uses along the banks of the lakes and wetlands. The group meets on a regular basis and provides a voice to the area regarding conservation and environmental stewardship.

5.2.2.2 GULL LAKE WATER QUALITY MANAGEMENT SOCIETY

This is a non-profit society committed to helping ensure a strong and sustainable future for Gull Lake. Their mission is to contribute to the preservation of Gull Lake and Gull Lake watershed as a continuing desirable recreational area, through protecting the water quality and quantity of the lake in cooperation with residents of the watershed.

5.2.2.3 LACOMBE LAKE STEWARDSHIP SOCIETY

This society is committed to the long term health and wellbeing of Lacombe Lake. The members of the society have a long history and vested interest in ensuring a clean and healthy environment. The society in future will be working in partnership with various organizations to understand the unique ecosystem and what can be done to ensure the beauty of Lacombe Lake remains for future generations.

5.2.2.4 SYLVAN LAKE WATERSHED STEWARDSHIP SOCIETY

The Sylvan Lake Watershed Stewardship Society is a non-government, volunteer organization whose members support the protection of Sylvan Lake's many values. The society shares the goals of watershed stewardship to protect water quality, maintaining the natural beauty and rural character, and ensuring healthy habitat and access to safe and enjoyable recreation for current and future users of the area.

5.2.3 PROVINCIAL

5.2.3.1 ALBERTA ENVIRONMENT

WATER FOR LIFE – WPACS

In 2003 Alberta Environment produced the Water for Life Strategy. This strategy led to the formation of community groups called Watershed Planning and Advisory Councils (WPAC). These are independent, non-profit organizations that are designated by Alberta Environment to assess the condition of their watersheds and prepare plans to address watershed issues. They also conduct education and stewardship activities throughout their watersheds. WPACs typically include representatives of key stakeholders in the watershed, including provincial, municipal and federal governments, important industrial sectors, conservation groups, and aboriginal communities.

They engage watershed residents in their work and seek consensus on solutions to watershed issues.

There are currently three WPAC's in Lacombe County:

- Battle River Watershed Alliance
- Medicine River Watershed - This watershed is a sub-watershed of the Battle River and was formed in 2001 by local community members. The group currently has approximately 70 members.
- Red Deer Watershed Alliance

5.2.4 SUSTAINABLE RESOURCE DEVELOPMENT (SRD)

5.2.4.1 ALBERTA LAND TRUST GRANT PROGRAM

The Alberta Land Trust Grant Program ensures conservation of ecologically important areas to prevent habitat fragmentation, maintain biodiversity and preserve native landscapes. Grants are available to land trust organizations for the purchase of conservation easements and the administration and management of new conservation projects on private land. Conservation easements are legally binding voluntary agreements between a landowner and a land trust. When placed on the land title, an easement restricts future surface development but current activities, like grazing, may continue. The landowner retains title. Grants through this program will not be available to land trusts for the purchase of land. A land trust is a not-for-profit, non-government organization established to promote biodiversity conservation on private land. Any land trust currently operating in Alberta is eligible to apply, but must provide other funding and demonstrate that their project aligns with the government's overall conservation objectives. The Alberta Land Stewardship Fund was established following changes in 2010 to the *Public Lands Act*, resulting from the *Alberta Land Stewardship Act*.

5.2.4.2 BUFFALO LAKE MANAGEMENT TEAM

The Buffalo Lake Management Team was formed by the Minister of Environment in 1991 to provide advice on the construction, mitigation and operation of the Parlby Creek-Buffalo Lake Water Management Project. Since completion of construction, the committee has focused on assessment of mitigation measures, and monitoring ongoing operations and land use surrounding the Parlby Creek-Buffalo Lake system. The management team is made up of representatives of the surrounding communities, surrounding counties and Alberta Environment.

5.2.4.3 PARKLAND AIRSHED MANAGEMENT ZONE

This multi-stakeholder, non-profit society was established in 1997 to identify air quality concerns within the zone and implement management strategies to address those concerns. By following the Clean Air Strategic Alliance model of consensus decision-making, the Parkland Airshed Management Zone provides a forum for concerned stakeholders to meet, discuss and resolve their concerns in a productive and collaborative manner.

5.2.5 AGRICULTURE AND RURAL DEVELOPMENT ALBERTA

5.2.5.1 GROWING FORWARD PROGRAM

ENVIRONMENTAL FARM PLAN OR EFP

This process helps to identify and address environmental risks and opportunities for individual farming operations. It is a voluntary program that is targeted and specific to each individual farmer. Priorities and timelines are established by the farmers themselves. The program pairs environmental stewardship with agricultural production and promotes marketing environmental credentials as a key driver for participation in the program.

As part of this program, four main sub-projects are targeted with some limited funding opportunities. These are listed below:

- Manure Management Program

Producers are asked to develop a work plan that focuses on the environmental impacts associated with manure storage and handling on their operation. They receive grant funding for projects identified in their work plan that will improve the use of their manure resource and minimize its impact on the environment.

- Grazing and Winter Feeding Management (GWFM)

This is an opportunity for producers to develop a work plan that maximizes use of their grassland resources and plans for operational improvements that will reduce their environmental impact.

- Integrated Crop Management (ICM)

Producers are asked to develop a work plan that maximizes use of their crop inputs and plans for operational improvements that will reduce their environmental impact.

- On-Farm Energy Management Program

This program is designed to help improve energy efficiency in Alberta agricultural operations, resulting in cost savings, energy conservation, and reduced greenhouse gas emissions. The program helps Alberta producers reduce energy input per unit of production, by improving access to energy-efficient technologies, and helping to implement long-term energy management strategies. The program runs from 2009 to 2013.

This is a Provincial Government program. More information can be found at http://www.albertaefp.com/.

5.2.5.2 AGRICULTURAL CARBON OFFSETS PROGRAM

The Carbon offset program, which started in 2007, is in the early stages of implementation in Alberta. There are still many questions to be answered regarding the understanding and expectations of the program and how producers will benefit. The main driver behind this legislation is to offset the carbon produced by large emitters that produce more than 100,000 tonnes of carbon dioxide or equivalent CO2 emissions annually.

The program, in brief, is a trade-off program that allows a facility that cannot meet its own targets for greenhouse gas emissions to purchase an "offset" from another unregulated source to make up the shortfall. It is a market driven program, meaning that it is not a government supported program. Producers become involved is by earning carbon offset credits and then selling these to large emitters.

For more information on the program please visit
www.agriculture.alberta.ca/agcarbonoffsets

6 WHAT IS HAPPENING OUTSIDE OF LACOMBE COUNTY?

6.1 FLORA AND FAUNA STUDIES

6.1.1 MUNICIPAL

RED DEER COUNTY ENVIRONMENTALLY SENSITIVE AREAS INVENTORY

In 1990 Sweetgrass Consulting Ltd prepared a report titled *Environmentally Significant Areas* of the *County of Red Deer*. This report identified 26 Environmentally Sensitive Areas (ESA) as being either regionally or provincially significant. This document presented an inventory but did not provide any policy direction. In 2003, the County initiated the Reeve's Task Force on Land Use Planning and Sustainable Agriculture as a means of responding to development pressures on agricultural land (Golder). One key component of the plan was the design and implementation of an updated ESA inventory in 2009-10. This inventory has recently been completed and will now be used to assist the County in developing polices and conservation tools that will protect ESAs.

6.1.2 PROVINCIAL

Independently from the studies noted above, in 1997 and then again in 2009, two province-wide studies were done by Sweetgrass Consulting, identifying Environmentally Sensitive Areas (ESA) throughout Alberta.

6.1.2.1 ALBERTA AGRICULTURE AND RURAL DEVELOPMENT

WORKING WELL

The Working Well program helps landowners properly care for the health and longevity of their wells. This program includes workshops, fact sheets, information sharing and an exhibit. The program focuses on helping landowners understand how groundwater works and how to properly operate and maintain their wells.

6.1.2.2 ALBERTA ENVIRONMENT AND SUSTAINABLE RESOURCE DEVELOPMENT

6.2 ENVIRONMENTAL EDUCATION PROGRAMS

6.2.1 MUNICIPAL

6.2.1.1 RED DEER COUNTY – OFF THE CREEK PROGRAM

The Off the Creek Program provides a variety of tools to assist community members to beneficially manage water bodies, riparian areas, shallow ground water and native range. The County, in partnership with the Alberta Conservation Association, provides funding grants to help farmers pay for projects such as off-stream watering systems, fencing, manure management, and septic system improvements. The program has had marked success, reaching 52 landowners, supporting 70 projects and decreasing impacts on approximately 1,000 acres of riparian vegetation.

6.2.1.2 INCENTIVE PROGRAMS

LOW FLOW TOILET

Climate Change Central partnered with a number of local municipalities to provide rebates of up to $100 to any resident who purchased a low flush/dual flush toilet. Partners included Red Deer County, City of Spruce Grove, the City of Leduc, Strathcona County, the Town of Stony Plain and Lac La Biche County.

SUBSIDIZED COMPOST BIN AND RAIN BARRELS

Red Deer County began the practice of subsidizing compost bins and rain barrels to reduce the waste to landfill and water requirements from well or mains water sources. The County purchased bins and barrels in bulk and then resold them to the public for a reduced cost. Rain barrels were purchased for $120 each and resold for $63. Compost bins were purchased for $100 and resold for $50. 200 items were sold in 2009, the first year of the program, and 100 items were sold in the second year (2010) of the program.

NO COST BARBED WIRE DISPOSAL

Red Deer County recycles barbed wire year round at one of their Waste Transfer Stations. Between May 1st and September 30th, they will accept the first 50 tonnes of barbed wire at no cost. After the first 50 tonnes, and during the remainder of the year, there is a cost for disposal.

6.2.1.3 DEMONSTRATION TOOLS

Clearwater County provides a number of pieces of equipment to the community for a nominal fee to assist in introducing technologies into the community that may reduce environmental impacts. Examples include:

- A shock chlorination preparation tank for maintaining water wells. They also assist with providing well reports (if available) and information on the mixing instructions.
- A modified section of seed drill fitted with eagle beak openers designed to demonstrate direct seeding.
- Soil sampling tools and advice
- Pesticide mixing and application coaching

6.2.1.4 ENVIRONMENTAL FAIRS AND TALKS

Clearwater County has two programs currently running. The first program has been in place for the past 12 years, and is called "Cows, Creeks and Communities." A more recent addition to the County's portfolio is the "Celebrating" event which focuses on promoting the concept of Landcare, through networking, sharing ideas and celebrating the success of various organisations in Central Alberta. This program has been running for two years.

6.2.2 PROVINCIAL

6.2.2.1 ALBERTA ENVIRONMENT AND SUSTAINABLE RESOURCE DEVELOPMENT CLEARWATER AREA – STOCKED FISHERY PROGRAM

The program is run through Alberta Environment and Sustainable Resource Development (ESRD) as a Provincial Government initiative. This program focuses on taking an aquatic habitat that, under current conditions does not support fish stocks, to a system that does. The project has increased the popularity of fishing on these water bodies on weekdays and weekends. There has been an increase in the number of trout 50 cm and larger being caught. The project gathers information by talking to anglers about the size and frequency of their harvests. Future work will continue with adjusting stocking and harvest rates to maintain healthy populations of trout, ensure the integrity of fish stocks and pond habitat, and support recreational use.

6.3 PRIVATE AND NGO

6.3.1 COWS AND FISH

This program began in 1998 from the vision of Lorne Fitch, a fisheries biologist, and Barry Adams, a range land agrologist, who wanted to see Alberta beef producers and trout fisherman work together to manage land uses and fishing habitat. The program's main goal is increasing awareness of riparian health issues among community members and municipalities. Cows and Fish helps to develop demonstration sites, conducts monitoring programs on riparian health and runs workshops on understanding the basics of riparian health assessment and management. This project has also produced a number of educational videos called "digital stories" that relay messages from local producers and community members

Their website is http://www.cowsandfish.org/index.html.

7 LEGISLATION AND REGULATORY BODIES

7.1 FEDERAL

7.1.1 CANADIAN ENVIRONMENTAL PROTECTION ACT

The *Canadian Environmental Protection Act*, 1999 aims to prevent pollution and protect the environment and human health by preventing and managing risks posed by toxic and other harmful substances. The Act also manages environmental and human health impacts through authorities related to biotechnology; marine pollution; disposal at sea; vehicle, engine and equipment emissions; fuels; hazardous wastes; and environmental emergencies.

7.1.2 CANADIAN ENVIRONMENTAL ASSESSMENT ACT (CEAA)

This Act is designed to ensure that projects that are carried out, funded, permitted or licensed by the Federal Government are properly scrutinized by authorities and demonstrate a solid commitment to sustainable development and the promotion of a healthy economy and environment. The *Act* is also intended to prevent any projects associated with the federal government from having any adverse environmental effects outside the jurisdictions in which they are undertaken.

7.1.3 CANADA WATER ACT

This Act is divided into four parts.

- Part I, Comprehensive Water Resource Management, authorizes the Minister of the Environment to establish consultative arrangements and to finalize agreements with the provinces respecting waters that are of significant national interest.
- Part II, Water Quality Management, allows the Minister to form agreements with provincial jurisdictions, designating certain areas as "water quality management areas" when the water quality therein has become a matter of urgent national concern.
- Part III, Nutrients, contains provisions concerning allowable concentrations of nutrients in water treatment processes. This part was incorporated into CEPA by proclamation in 1988. Guidelines originally issued under this part of the Act are now listed under CEPA. These include the Canadian Drinking Water Quality Guidelines and the Guidelines for Effluent and Waste Water Treatment at Federal Establishments.
- Part IV deals with administration and enforcement of the *Act*.

7.1.4 FISHERIES ACT

This Act is designed to protect fish, shellfish, crustaceans and marine animals in Canadian fishing zones, all Canadian territorial seas and all internal Canadian waters. The *Fisheries Act* contains more stringent prohibitions against pollution of Canadian waters than does the Canada Water Act. Under the *Canada Water Act*, an operator cannot allow waste, either directly or indirectly, to enter specified regions of sensitive water. Under the *Fisheries Act*, it is an offence to carry on undertakings that result in the harmful alteration, disruption or destruction of fish habitat, or to deposit or cause or permit the deposit of material or substances that are detrimental to fish in water that is frequented by fish. The owner of the pollutant and/or anyone who causes or contributes to the spill must report the spill and immediately take any action necessary to respond to and clean up the spill. Regulations have been established allowing certain specific deposits of deleterious substances for specific contaminants.

7.1.5 TRANSPORTATION OF DANGEROUS GOODS

This *Act* applies to the movement of substances or organisms that are deemed "dangerous" by the Governor in Council, wherein dangerous usually means dangerous to life, health, property or the environment. The classification includes explosives; gases in various volatile states; flammable and combustible liquids or solids; oxidizing substances; poisonous, toxic and infectious substances; corrosives; and other miscellaneous dangerous products, substances or organisms. The *Act* prohibits anyone from handling or disposing, or causing the handling or disposing, of dangerous or hazardous goods unless it is in compliance with the *Act* and its *Regulations*. Compliance involves, among other things, the holding of a valid permit, taking appropriate precautions in dealing with the dangerous entity, the conscientious reporting to authorities and diligent recording of any accidents or spills, and making remedial efforts to the extent possible in the case of an emergency.

7.1.6 SPILL REPORTING

These *Regulations* require that a person who has possession, charge or control of a substance to immediately report a spill to the Province's Emergency Program spill line. (Note: municipalities are generally notified as well). The *Regulation* divides spilled substances by means of their classification under the federal *Transportation of Dangerous Goods* Act and provides a schedule setting out certain threshold limits for different classifications. Spills equal to or greater than such limits are to be reported.

7.1.7 CONTAMINATED SITES

The *Contaminated Sites Acts* and their *Regulations* are intended to provide a system for the improved environmental quality, or remediation, of sites that are contaminated. Contaminated, in reference to a site, means degraded by the presence of a product, substance or organism that is foreign or exceeds the natural constituents of the environment at the site and has the potential to harm the natural, physical, chemical or biological quality of the environment or pose a threat to the health or safety of a person. Where restoration is impracticable, the aim is simply to mitigate the risks that the contaminated site poses to human health or the environment. The Acts and Regulations are consistent with the principles of sustainable development and encourage stewardship. The "polluter pays" principle may apply.

7.1.8 SPECIES AT RISK ACT

The purposes of the Species at Risk Act (SARA) are to prevent wildlife species in Canada from disappearing; to provide for the recovery of wildlife species that are extirpated (no longer exist in the wild in Canada), endangered, or threatened as a result of human activity; and to manage species of special concern to prevent them from becoming endangered or threatened. A series of measures applicable across Canada provides the means to accomplish these goals.

7.1.9 MIGRATORY BIRD ACT

This *Act* and its complementary *Regulations* ensure the conservation of migratory bird populations by regulating potentially harmful human activities. A permit must be issued for all activities affecting migratory birds, with some exceptions detailed in the *Regulations*. It covers topics such as the sale, shipment or taxidermy of birds. It also regulates activities at airports, for scientific research or the import or bird species not indigenous to Canada. The *Migratory Bird Sanctuary Regulations* grant sanctuary status to areas that represent habitat that is important to migratory birds. These sanctuaries help protect the birds from hunting and all other disturbances while they are in breeding and other staging areas.

7.2 PROVINCIAL

7.2.1 ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT

The purpose of this *Act* is to support and promote the protection, enhancement and wise use of the environment. It is set up as *Regulations*, codes of practice, and standards and guidelines. It focuses on a number of topics including but not limited to conservation practices, environmental assessments, waste management, groundwater, and air quality.

7.2.2 AGRICULTURAL OPERATION PRACTICES ACT (AOPA)

This *Act* sets manure management standards for all operations in Alberta that handle manure. It defines siting and construction standards for manure storage and collection facilities, addresses the application of manure to agricultural land, and ensures environmental protection through an approval process which involves directly affected neighbours and the municipalities. Nuisances such as odour, dust, noise and smoke resulting from agriculture activities are also dealt with in the Act. The Act also outlines penalties and fines that apply to contraventions of the Act.

7.2.3 SOIL CONSERVATION ACT

This *Act* imposes a duty upon every landholder to take appropriate measures to prevent soil loss or deterioration or to mitigate loss or deterioration that has occurred. Where a breach of duty occurs, the landholder may be served with a notice directing him or her to take remedial action within a specified time – usually 30 days. If the landholder fails to comply with the directions given in the notice, a person authorised by the local authority may enter the land and take remedial action at the landholder's expense. If the local authority does not take appropriate actions, then the Minister can appoint an officer with the authority to do so. The legislation also provides appeal and dispute settlement mechanisms.

7.2.4 WATER ACT

This *Act* focuses on managing and protecting Alberta's water, and on streamlining administrative processes. It covers topics such as surface and ground water quality and quantity and wetland remediation.

7.2.5 CLIMATE CHANGE AND EMISSIONS ACT

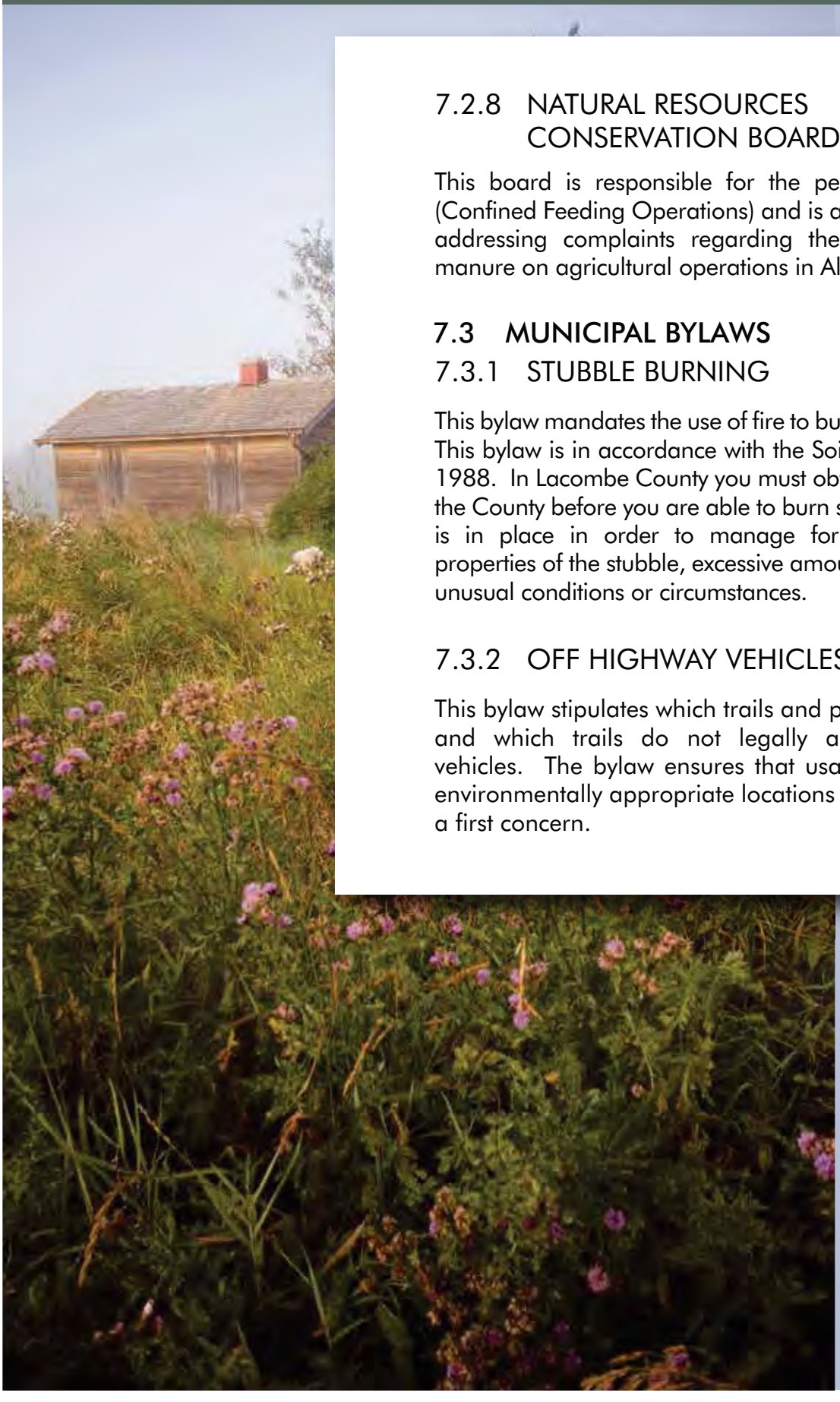
Alberta is the first jurisdiction in North America to impose comprehensive regulations requiring large facilities in various sectors to reduce their greenhouse gas emissions. It has specific regulations on emitting and reporting standards.

7.2.6 WILDERNESS AREAS, ECOLOGICAL RESERVES, NATURAL AREAS AND HERITAGE RANGELANDS ACT

This *Act* works in the public interest to ensure that certain areas of Alberta are protected and managed for the purposes of preserving their natural beauty and safeguarding them from impairment and industrial development. The *Act* is carried out for the benefit and enjoyment of present and future generations. It establishes certain areas and reserves in order to provide varying degrees of protection and to establish certain lands as heritage rangelands in order to protect their grassland ecology.

7.2.7 ENERGY RESOURCES CONSERVATION BOARD (ERCB)

This is an expert tribunal that adjudicates and regulates matters related to energy within Alberta to ensure that the development, transportation, and monitoring of the province's energy resources are in the public interest. Their responsibilities include approval of energy resources projects and facilities (e.g., coal mines, oil, oil sands, and natural gas - including wells, pipelines and production facilities). They also provide information and advice to stakeholders in Alberta.



7.2.8 NATURAL RESOURCES CONSERVATION BOARD (NRCB)

This board is responsible for the permitting of CFO's (Confined Feeding Operations) and is also responsible for addressing complaints regarding the management of manure on agricultural operations in Alberta.

7.3 MUNICIPAL BYLAWS

7.3.1 STUBBLE BURNING

This bylaw mandates the use of fire to burn stubble on land. This bylaw is in accordance with the Soil Conservation Act 1988. In Lacombe County you must obtain approval from the County before you are able to burn stubble. The bylaw is in place in order to manage for adverse physical properties of the stubble, excessive amounts of stubble and unusual conditions or circumstances.

7.3.2 OFF HIGHWAY VEHICLES

This bylaw stipulates which trails and paths legally allow, and which trails do not legally allow, off-highway vehicles. The bylaw ensures that usage takes place in environmentally appropriate locations and with safety as a first concern.

8 CONCLUSION

The State of the Environment, (SOE) report is an important management tool for Lacombe County to help us determine the effect of management actions on environmental conditions in the local area. It provides a snapshot of:

- the current state or condition of the environment (a baseline); and
- pressures impacting the current condition of the environment.

Now that we have gathered this information, it will be used to develop the first Environmental Management Plan (EMP) for the County. This document will be shaped by the data found in the SOE, the data gathered by the community, and by balancing the social and economic needs of the community with that of the environment. The EMP will provide us with a map of how to reach our vision. It will help us to create a framework, with milestones, an end goal, and a built-in monitoring system to ensure we keep track of our progress and stay focused along the way. The EMP is planned for release in the winter of 2014.

GLOSSARY

AREA STRUCTURE PLAN guides the potential future development of the lands within the plan area. An Area Structure Plan must describe the sequence of development, the proposed land uses, the density of population proposed, and the general location of major transportation routes and public utilities for the plan area.

AVIFAUNA the collective term for all the birds in a particular region.

BLACK AND GREY CHERNOZEMIC SOIL is a soil type in the Canadian system of soil classification. Chernozem soil is a black-coloured soil containing a high percentage of humus (7% to 15%), and high percentages of phosphoric acids, phosphorus and ammonia. Chernozem is very fertile and produces a high agricultural yield.

CONSERVATION EASEMENT is a legally recorded agreement by which landowners voluntarily restrict the use of their land to protect its natural and cultural heritage. A conservation easement protects important land resources and can be held by a qualified conservation organization (land trust) or local unit of government.

CRYPTOSPORIDIUM are microscopic parasites that can be found in water.

ECOLOGICAL AREA covers a relatively large area of land or water, and contains characteristic flora and fauna that are geographically distinct from other ecological areas.

ENTERIC PARASITES are parasites that populate the gastro-intestinal tract in humans and other animals.

ENVIRONMENTAL RESERVE generally are those lands that are considered un-developable, and may consist of a swamp, gully, ravine, coulee or natural drainage course, flood prone area, steep slope, or land immediately adjacent to a lake, river, stream or other body of water. Governed by *The Municipal Government Act (Alberta) Manual* current as of 5/20/2010.

EUTROPHICATION a process where water bodies receive excess nutrients that simulate excessive plant growth.

EUTROPHIC LAKES naturally contain very high concentrations of phosphorus, resulting in great concentrations of chlorophyll-a. These lakes tend to experience high densities of large aquatic plants (macrophytes) and algae, and support productive fisheries. Surface accumulations or 'blooms' of algae may occur during the warmest months, which can significantly reduce water transparency to the point of discouraging recreational activities such as swimming or waterskiing. Oxygen depletion in deep waters may occur throughout the year as a result of excessive microbial decomposition of macrophytes and algae.

FULL SUPPLY LEVEL (FSL) refers to the level of water surface (i.e. lake elevation) when water storage is at its maximum operating level and is not affected by natural flooding.

GIARDIA is a microscopic parasite that can be found in water.

GLOSSARY

GLACIOFLUVIAL DEPOSITS are the deposits of streams formed by the melting of glaciers. These deposits are sorted and stratified by the action of water from melting ice. While the melt water deposits the coarse material near the end of the glacier, the finer material is carried further away.

GLACIOLACUSTRINE are sediments deposited into lakes that have come from glaciers. These lakes include ice margin lakes, or other lake types formed from glacial erosion or deposition.

HYPEREUTROPHIC LAKES contain very high concentrations of phosphorus and chlorophyll-a. Algal blooms are common in these lakes, often lasting throughout the summer and well into autumn. Oxygen depletion can occur throughout the year and may extend to the surface, resulting in fish kills.

INTERMUNICIPAL DEVELOPMENT PLAN guides the potential future development of lands that generally fall on the boundary between adjacent municipalities that have adopted the plan. In addition to providing guidelines for future, non-contradictory growth, it also must include procedures to resolve disputes between the municipalities, a procedure for one or more of the municipalities to amend or repeal the plan, and provisions related to administration of the plan.

LAND USE BYLAW facilitates the orderly, economical, and beneficial development and use of land and buildings with the County by dividing the County into land use districts and describing the purposes for which land and buildings may be used within these districts. The Land Use Bylaw also establishes the powers of the Development Authority (in this case either the Planning and Development Department or the Municipal Planning Commission), sets out the method for making decisions on development applications, and identifies the manner in which notice of the issuance of development permits is to be given.

LENTIC is still water, a lake.

LITTORAL ZONE is the portion of a body of fresh water extending from the shoreline, lakeward to the limit of occupancy of rooted plants (i.e. often to a depth of several meters)

LOTIC is running water, a river.

LUVISOLIC SOILS is a soil type in the Canadian system of soil classification. They typically occur in forested areas and are high in clay.

MARL DEPOSIT is a calcium carbonate or lime rich mud or mudstone which contains clay or silt.

MACROPHYTE GROWTH is a plant, especially a marine plant that is large enough to be seen by the naked eye.

MESOTROPHIC LAKES contain moderate levels of phosphorus, which acts to support biological production. Greater concentrations of chlorophyll-a are therefore present, due to increased algal biomass. Water clarity in mesotrophic lakes is moderate; there is an increased probability of oxygen depletion in the deepest areas.

GLOSSARY

MUNICIPAL DEVELOPMENT PLAN provides direction on how growth and development in Lacombe County will be managed. It contains policies on land use, transportation, recreation, economic activity, the environment, and quality of life to guide this growth.

MUNICIPAL RESERVE may also be known, in part, as reserve, park reserve, park or community reserve. Municipal reserves are lands that have been given to the municipality by the developer of a subdivision as part of the subdivision approval process. Governed by The *Municipal Government Act* (Alberta).

NATURAL REGIONS are areas that are classified based on climate, vegetation, soil, wildlife and land use attributes. They are used to provide a provincial and local ecological context to create a common basis for communication and understanding.

OLIGOTROPHIC LAKES contain low levels of phosphorus, which acts to limit biological production, meaning a lower algal biomass. This causes lakes to contain low concentrations of chlorophyll-a. These lakes tend to have clear water and sufficient oxygen throughout the year to support fish and other aquatic organisms.

SOLONETZIC SOILS is a soil type in the Canadian system of soil classification. They are grassland or grassland-forest transition soils whose features reflect the influence of sodium on soil horizon formation.

VALUED ECOSYSTEM COMPONENT (VEC) Any part of the environment that is considered important by the proponent, public, scientists or government involved in the assessment process. Importance may be determined on the basis of cultural values or scientific concern.

WATER FOR LIFE STRATEGY is the Government of Alberta's strategy for water. It was introduced in 2003 and affects both water quality and quantity issues, as well as environmental concerns. It recognizes that the management and use of water involves not only economic and environmental aspects, but social ones as well.

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